EUROTHERM
DRIVES

620 Vector Drive
S/W Release 2.X

User Manual

Printed in England HA389130 Issue 4

WARRANTY

Eurotherm Drives warrants the goods against defects in design, materials and workmanship for the period of 12 months from the date of delivery on the terms detailed in Eurotherm Drives Standard Conditions of Sale IA058393C.

Eurotherm Drives reserves the right to change the content and product specification without notice.

INTENDED USERS

This manual is to be made available to all persons who are required to configure, install or service the equipment described herein or any other associated operation.

Warnings and Instructions

GENERAL WARNINGS

Warning

Only qualified personnel who thoroughly understand the operation of this equipment and any associated machinery should install, start-up or attempt maintenance of this equipment. Non-compliance with this warning may result in personal injury and/or equipment damage.

Never work on any control equipment without first isolating all power supplies from the equipment.

The drive motor must be connected to an appropriate safety earth. Failure to do so presents an electrical shock hazard.

Caution

This equipment was tested before it left our factory. However, before installation and start-up, inspect all equipment for transit damage, loose parts, packing materials etc.

This product conforms to IP20 protection. Due consideration should be given to environmental conditions of installation for safe and reliable operation.

Never perform high voltage resistance checks on the wiring without first disconnecting the product from the circuit being tested.

Static Sensitive

This equipment contains electrostatic discharge (ESD) sensitive parts. Observe static control precautions when handling, installing and servicing this product.

THESE WARNINGS AND INSTRUCTIONS ARE INCLUDED TO ENABLE THE USER TO OBTAIN THE MAXIMUM EFFECTIVENESS AND TO ALERT THE USER TO SAFETY ISSUES

APPLICATION AREA: Industrial (non consumer) "Motor speed control utilising AC induction or synchronous motors"

PRODUCT MANUAL: This manual is intended to provide a description of how the product works. It is **not** intended to describe the apparatus into which the product is installed.

This manual is to be made available to all persons who are required to design an application, install, service or come into direct contact with the product.

APPLICATIONS ADVICE: Applications advice and training is available from Eurotherm Drives Ltd.

INSTALLATION: Ensure that mechanically secure fixings are used as recommended.

Ensure that cooling and air flow around the product are as recommended.

Ensure that cables and wire terminations are as recommended and clamped to required torque.

Ensure that the installation and commissioning of this product are carried out by a competent person.

Ensure that the product rating is not exceeded.

APPLICATION RISK: The integration of this product into other apparatus or system is not the responsibility of Eurotherm Drives Ltd as to its applicability, effectiveness or safety of operation or of other apparatus or systems.

Where appropriate the user should consider some aspects of the following risk assessment.

RISK ASSESSMENT: Under fault conditions or conditions not intended.

1. The motor speed may be incorrect.
2. The motor speed may be excessive.
3. The direction of rotation may be incorrect.
4. The motor may be energised (unless the installation specifically prevents unexpected or unsequenced energisation of the motor).

In all situations the user should provide sufficient guarding to prevent risk of injury and/or additional redundant monitoring and safety systems.

NOTE: During power loss the product will not operate as specified.

MAINTENANCE: Maintenance and repair should only be performed by competent persons using only the recommended spares (or return to factory for repair). Use of unapproved parts may create a hazard and risk of injury.

WHEN REPLACING A PRODUCT IT IS ESSENTIAL THAT ALL USER DEFINED PARAMETERS THAT DEFINE THE PRODUCT'S OPERATION ARE CORRECTLY INSTALLED BEFORE RETURNING TO USE. FAILURE TO DO SO MAY CREATE A HAZARD AND RISK OF INJURY.

PACKAGING: The packaging is combustible and if disposed of in this manner incorrectly may lead to the generation of toxic fumes which are lethal.

WEIGHT: Consideration should be given to the weight of the product when handling.

REPAIRS: Repair reports can only be given if sufficient and accurate defect reporting is made by the user.

Remember, the product without the required precautions can represent an electrical hazard and risk of injury, and that rotating machinery is a mechanical hazard and risk of injury.

PROTECTIVE INSULATION:

1. All exposed metal insulation is protected by basic insulation and bonding to earth i.e. Class 1.
2. NOTE: Earth bonding is the responsibility of the installer.
3. All signal terminals are protected by double insulation, i.e. Class 2 insulation. The purpose of this protection is to allow safe connection to other low voltage equipment and is not designed to allow these terminals to be connected to any unisolated potential.

How to Use this Manual

This manual provides information to support the installation and operation of the 620 Vector Drive. A description of each of the chapters is given here to assist in locating and using the information contained within the manual.

CHAPTER 1 - PRODUCT OVERVIEW

This chapter contains a brief description of the drive including a technical specification of the equipment. The purpose of this chapter is to familiarise the reader with the purpose and scope of the equipment.

CHAPTER 2 - PRE-INSTALLATION PLANNING

This chapter contains a functional description of the equipment, wiring information and a description of the signals on the input/output terminals. The purpose of this chapter is to allow the user to understand the function of the equipment and to assist in designing a particular installation configuration.

CHAPTER 3 - INSTALLATION PROCEDURE

This chapter contains information regarding the physical mounting arrangements, cable and fuse selection as well as information regarding EMC installation. The purpose of this chapter is to provide guidelines for the safe and efficient installation of the equipment. The theory of, and requirement for, dynamic braking is also explained within this chapter.

CHAPTER 4 - SETTING UP AND COMMISSIONING

A description of the user adjustments and switch settings to configure the drive for a particular application. The purpose of this chapter is to guide the user through pre- and post-power on checks and provide running performance adjustment procedures. Information is also provided on the function and set-up of operational parameters using the Man-Machine Interface (MMI).

CHAPTER 5 - FUNCTION BLOCKS

This section provides reference information for the more advanced programming capabilities of the 620 Vector series controllers.

Each section describes a particular functional area and the associated menu options which are used to alter the parameters. Where appropriate, a functional block diagram illustrates the how the function operates. Reference to the Functional Description and Microprocessor Block Diagram in Chapter 2 may be of assistance in understanding the relationship between these functional diagrams.

CHAPTER 6 - DIAGNOSTICS AND FAULT FINDING

A description of the procedures to diagnose and trace faults on the equipment. The purpose of this chapter is to guide the user through the on-board diagnosis and fault finding facilities, using the MMI diagnostic and alarm display.

CHAPTER 7 - EMC AND THE 'CE' MARK

This chapter sets out Eurotherm Drives Limited responsibilities to the recent European 'EMC, low voltage and machinery' Directives, and explains how Eurotherm are assisting their customers in achieving conformance

CHAPTER 8 - SERVICING

This chapter provides the routine maintenance and repair procedures. The purpose of this chapter is to assist returning the controller to service following a fault condition.

CHAPTER 9 - APPENDICES

Appendix A contains advanced tuning notes.

Appendix B contains MMI print-out.

Appendix C contains Tag listings.

Appendix D contains Tags by Number.

Contents

Chapter 5 FUNCTION BLOCKS

Chapter 6 DIAGNOSTICS AND FAULT FINDING

Chapter 7 THE EUROPEAN DIRECTIVES AND THE 'CE' MARK

Chapter 8 SERVICING

Chapter 9 APPENDICES

ISS.	MODIFICATION	ECN No.	DATE	DRAWN	CHK'D
1	Initial Issue of HA389130 Replaces HA388463 Additions and corrections for Release 2.1 S/W	10144	25/4/95	RM	RBR
2	Removed ducted airflow option from block 4. General spelling corrections. Up-dated block diagram. Show maximum ambient of drive in IP20 enclosure as 40°C.	M10062	11.07.95	RM	RBR
3	EMC 'CE' Conformance Changes. General revisions and corrections	10136	09.01.96	MP	DS
4	Page 1-1 Removed paragraph "Equipment Supplied".				
	Page 1-9 Added to title "For Installations ... Standards paragraph "For installations ... standards:", removed paragraph "External Surge Suppressor".	10741			
	Page 2-13 Added circle around ground symbols, to end of paragraph "Power earth." added "(ground)", replaced GND with GRD in Figure 2.10.	10728			
	Page 2-14 Same as for page 2-13.	"			
	Page 2-15 Same as for page 2-13.	"			
	Page 2-16 Same as for page 2-13.	"			
	Page 3-3 removed "Earthing" paragraph.	10731			
	Page 3-4 changed in table "Controller Type" to "Controller Rating" and the subsequent listing. Moved "Earthing" paragraph to next page.	"			
	Page 3-5 Removed paragraph "A substantial earth connection should be made to the earth terminal of the frequency inverter." Added from "ALL FREQUENCY CONVERTERS MUST BE PERMANENTLY EARTHED" and Earthing section to page 3-8.	"			
	Page 5-31 Corrected after Jumpers "DM F.1" to "DFI (ã 15V RS232)"				

FIRST USED ON	MODIFICATION RECORD 620 Vector Drive User Manual
File Name: P:\Vector\docs\manual	
EUROTHERM DRIVES	DRAWING NUMBER ZZ 389130 C
	SHT. 1 OF 2

ISS.	MODIFICATION	ECN No.	DATE	DRAWN	CHK'D
	Page 7-1 added " (as confirmed ... chapter) to 6th paragraph. Page 7-2 added boxes "EMC .... STANDARDS:" , "NO ... MODULE" & "THE E.D. ... CORRECTLY". Last box re-written. Page 7-3 replaced 22G/21/CDV with 22G/31/FDIS. Page 7-5 added "Generic Standard" column to table. added "Eurotherm Guide" heading. Page 7-7 added Manufacturers EMC Declaration.	10846 "	02.04.96	FEP	

FIRST USED ON	MODIFICATION RECORD 620 Vector Drive User Manual
File Name: P:\Vector\docs\manual	
EUROTHERM DRIVES	DRAWING NUMBER ZZ 389130 C
	SHT. 2 OF 2

Chapter 1

PRODUCT OVERVIEW

Contents Page

Chapter 1 PRODUCT OVERVIEW

INTRODUCTION

This manual provides the necessary information to plan, install and commission the 620 Vector series drives.

Division of Information

This manual comprises eight chapters, plus appendices.

- Chapter 1 summarises the 620 Vector drive's electrical and mechanical specifications.
- Chapter 2 covers the planning required prior to installing a 620 Vector drive.
- Chapter 3 describes the mechanical and electrical procedures for installing a 620 Vector drive.
- Chapter 4 shows how to commission an installation and how to adapt the 620 Vector drive to the motor/application.
- Chapter 5 describes the function blocks.
- Chapter 6 lists the diagnostic facilities built into the drive.
- Chapter 7 EMC and the 'CE' mark, explains how Eurotherm are assisting their customers in achieving European conformance.
- Chapter 8 contains routine maintenance and repair information.
- Chapter 9 Appendices.

This manual contains the information required to set up a motor drive system which automatically tunes itself to the motor and provides control of speed, ramp up and down times and similar functions. The 620 Vector series provides a further host of sophisticated programming options as standard.

GENERAL DESCRIPTION

The 620 Vector drive allows high performance speed control of AC asynchronous induction motors fitted with an encoder. It is available with a range of power ratings in two variants:

620STD STANDARD for use in systems incorporating analogue setpoints and logic control systems.

620L As above with the addition of a Link co-processor, LINK fibre optic ports for use in Eurotherm Drives LINK fibre-optic based networks and a reference encoder input for phase control applications. This drive is programmed using ConfigEd Release 4.0+ available and documented separately.

This manual only covers the 620Std and the hardware / software differences for the 620L for more information on the 620L refer to Link documentation.

PRODUCT RANGE

The 620 is available in four chassis types as follows:

CHASSIS	POWER (208 to 240 volts)	POWER (380 to 460 volts)
TYPE 4	0.75 - 4.0kW;	0.75 - 7.5kW
TYPE 5	5.5 - 7.5kW;	11.0 - 15.0kW
TYPE 6	11 - 18kW;	18.0 - 37.0kW
TYPE 7	22 - 37kW;	45.0 - 75.0kW

Table 1.1 620 Vector Drive variants

The 620 models are housed in chassis of similar appearance with a 32 character Man-Machine Interface (MMI) - an alphanumeric display utilising multi-level menus to present all parameters, diagnostics and alarms (refer to Figure 1.1). The chassis size increases with power rating. The models are further identified by the product code, refer to "**PRODUCT CODE**" in this chapter.

Equipment Supplied

The standard 620 Vector series is supplied with this manual and an external brake resistor. The standard options which are available are listed overleaf.

Optional Equipment

The following equipment options are available for the 620 Vector Drives:

1. Dynamic Braking Module (fitted internally). This is a factory fitted option and usually fitted as standard
2. NEMA 1 Top Cover.
3. Glandbox.

COMPONENT IDENTIFICATION

This manual refers to various connector terminals within the equipment which are accessible to the user for installation purposes. An exploded view of a 620 Vector Drive is shown in Figure 1.1.

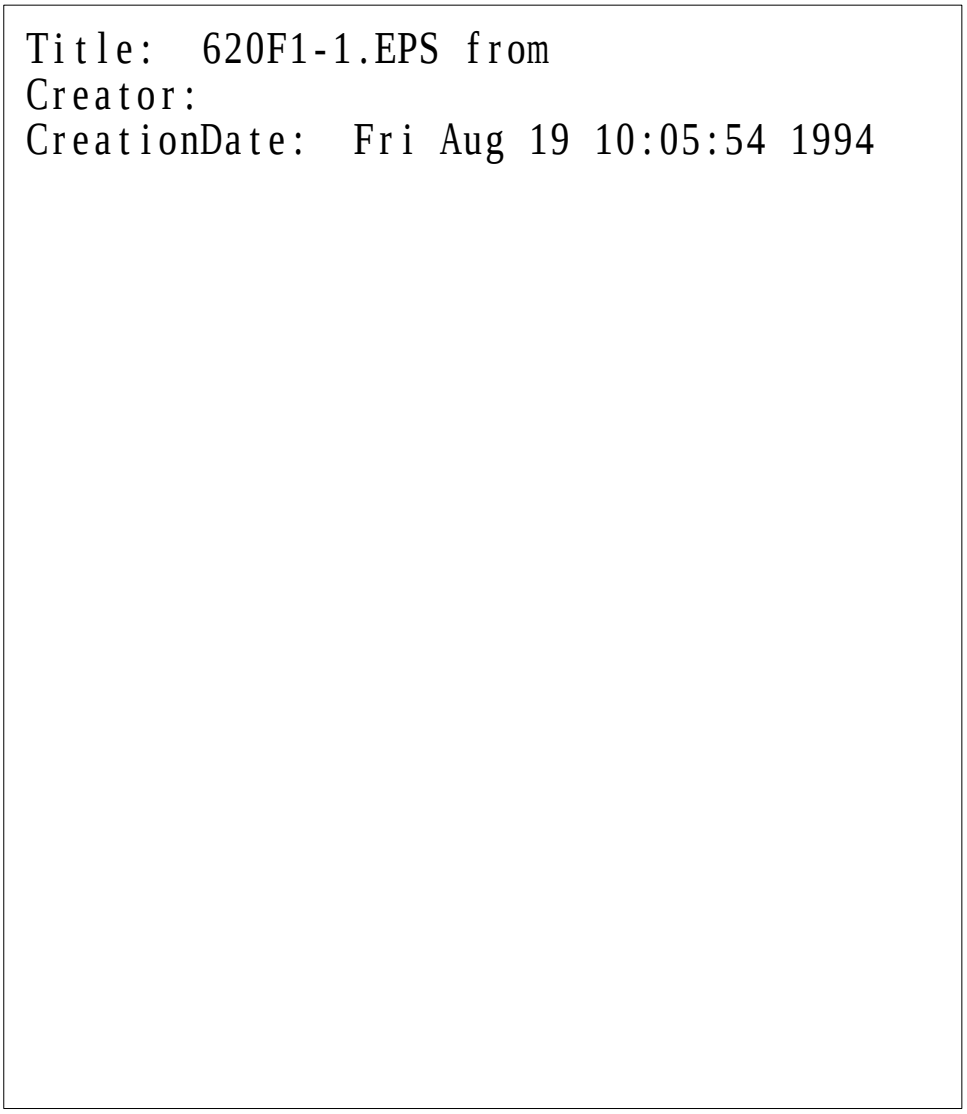


Figure 1.1 - 620 Vector Drive Exploded View

Item	Description	Item	Description
1	Chassis or Stack	5	LCD
2	Control Board Terminals	6	Fixing Points
3	Terminal Cover	7	MMI (LCD + Buttons)
4	Power Terminals	8	Status LEDs

TECHNICAL SPECIFICATION

The following paragraphs provide technical information regarding the features and performance characteristics of the 620 Vector Drives.

General

The MMI display menus provides full access to all the drive's parameters.

Output Frequency	0-400Hz
Switching Frequency	5 or 3kHz depending on type
Preset Speeds	8
Overload rating	150% for 60s
Speed control range	0-8 x base speed, 1000:1 of max. speed
Speed control precision	± 0.01% steady state of max. setpoint (digital setpoint) ± 0.1% steady state of max. setpoint (analogue setpoint).
Speed ref. resolution	± 0.01% digital ± 0.025% analogue (12 bit)
Stopping Modes	Ramp Fast stop Coast

Protection

The 620 Vector series drives will trip under the following conditions:

- Short circuit line - line
- Short circuit line - earth
- Earth fault
- Overcurrent >220%
- Overvoltage
- Undervoltage
- Stall
- Overspeed
- 5703 repeater error
- External trip
- Heatsink overtemperature
- Motor thermistor overtemperature

Diagnostics and monitoring

Full diagnostics/monitoring is provided by the MMI display and status LEDs.

Inputs and Outputs

The following range of inputs and outputs are provided:

5 Analogue Inputs (4 programmable)

2 Analogue Outputs (both programmable)

Digital Inputs (24V DC) for Run, Fast Stop, Coast Stop, Jog, Enable, Ramp Hold, Preset 1, 2, and 3 (the last 4 inputs are programmable.

Three programmable digital outputs are provided (24V DC).

A 24V DC supply is available for interfacing external digital inputs.

A +10V and -10V DC supply is available for interfacing external analogue inputs.

Electrical Ratings - Power Circuit

Input Voltage 380V to 460V ±10%, 50/60Hz	TYPE 4							TYPE 5		TYPE 6			
Power (kW)	0.75	1.1	1.5	2.2	4.0	5.5	7.5	11	15	18	22	30	37
Input Current (A)	3.0	4.5	6.0	8.0	11	15	18.0	25	31	40	46	61	72
Output Current (A)	2.3	3.3	4.5	6.3	9.4	13	16	24	30	39	46	61	72
Input power factor.	0.95					0.86							
Input Fuse (A)	10 ①				15 ①		20 ①	32 ②	40 ②	50 ②	63 ②	100 ②	125 ②
Approx. loss (W)	60	70	85	110	150	200	250	350	400	550	630	820	1050
Switching Frequency	5kHz												

Input Voltage 208V to 240V ±10%, 50/60Hz	TYPE 4					TYPE 5		TYPE 6			TYPE 7		
Power (kW)	0.75	1.1	1.5	2.2	4.0	5.5	7.5	11	15	18	22	30	37
Input Current (A)	5.5	7.5	9.5	12	19	25	31	46	61	72	86	120	145
Output Current (A)	4.3	6	8	10.5	17	24	30	46	61	72	86	120	145
Input p.f.	0.95			0.86									
Input Fuse (A)	10 ①		15 ①		20 ①	32 ②	40 ②	63 ②	100 ②		125 ②	160 ②	200 ②
Approx. loss (W)	70	90	100	130	210	270	360	510	680	830	980	1300	1600
Switching Frequency	5kHz										3kHz		

Common data		TYPE 4	TYPE 5	TYPE 6	TYPE 7
Output Voltage (max)		Input Voltage			
Output Overload		150% for 60s			
Output Frequency		0 to 240Hz			
Ambient Operating Temperature Range		0 to 50°C 0 to 40°C for 2.2kW (380 - 460V)			
	Nema 1	0 to 40°C			

Table 1-2 - 620 Electrical Specifications

Notes :-

① Class "T" Fuses.

② For installations requiring UL compliance, short circuit protection Semiconductor Fuses should be installed in the 3-phase supply to the 620 products. These fuses are suitable for branch circuit short-circuit protection of the solid-state motor controllers only. For installations NOT requiring UL compliance, use class"T" fuses.

Electrical Ratings - Control Circuit

The following ratings relate to all 620 variants.

Supplies

Reference Supplies (for all analogue inputs)	+10V ± 0.1V, 10mA max - 10V ± 0.1V, 10mA max
Supply (for all digital inputs)	+24V ± 10%, 200mA max. This is in addition to the digital outputs.

Table 1-3 Reference Inputs

Analogue I/O

	INPUT	OUTPUT
Impedance	100kΩ	Min load 3kΩ to 0v
Range	± 10V	± 10V
Resolution	12 bit (1 in 4096) + sign Approx. 2.5mV resolution	12 bit (1 in 4096) + sign
Sample Rate	Synchronous with block diagram Terminal C4 (Direct I/P) 1.1mS	Synchronous with block diagram
Current (max.)	1mA	3mA

Table 1-4 Analogue Interface Specification

Digital Inputs

Input voltage	Nominal 24V DC, Max. +30V DC
Input impedance	4k7Ω
Sample Rate	Synchronous with block diagram
Threshold	V_{in} low < +6V DC Typical +12V DC V_{in} high > +18V DC

Table 1-5 Digital Inputs

Digital Outputs

Digital outputs are open circuit when Off. The On specification is shown in Table 1-7.

On Voltage	+24V ±10%
Maximum On Current	50mA (Source).

Table 1-6 Digital Outputs

Pilot Output

Pilot output is an open collector output that is off while the drive is healthy. The specification is shown in Table 1-7.

Open Collector 0V to 24V	50mA (Current Sink).

Table 1-7 Pilot Output

Encoder Inputs

Input Voltage	-30V to +30V differential
Input Threshold Voltage	4V ± 1V DIL 7-12 switch on 9V ± 1V DIL 7-12 switch off
Input Current	10mA ± 3mA
Maximum Input Frequency	250kHz on each of A and B $MaxFreq = \frac{MaxSpeedRPM}{60} * NoOfLines$

Table 1-8 Control Terminal Specifications

Encoder Supply Output

Output Voltage	15 - 21V (0 to 200mA load) 16V ± 1V (Recommended load)
Recommended Load Current	50 - 200mA
Short Circuit Duration	Indefinite

Table 1-9 Encoder Supply Output Specifications

Mechanical Details

The mechanical details of all the 620 vector series controllers are shown in Tables 1-10 to 1-13. The general layout of the cases is shown in Chapter 3.

620 TYPE 4

DIMENSIONS	Refer to figure 3.1
ENCLOSURE	Chassis mounted IP20, with NEMA 1 option
MOUNTING ORIENTATION	Vertical
WEIGHT	8kg max.
AIR FLOW CLEARANCE	Refer to figure 3.1
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 wire (18 AWG). Terminals will accept up to 1.5mm^2 wire (16 AWG). Tightening torque 0.6Nm (0.4lb-ft)
	Spring terminal connectors for 1.5mm^2 wire (16 AWG). Terminals will accept up to 1.5mm^2 wire (16 AWG).

Table 1-10 620 type 4 mechanical details

620 TYPE 5

DIMENSIONS	Refer to figure 3.1
ENCLOSURE	Chassis mounted IP20.
MOUNTING ORIENTATION	Vertical
WEIGHT	12kg
AIR FLOW CLEARANCE	Refer to figure 3.1
POWER TERMINATIONS	M5 tapped bushes with slotted screws. Tightening torque 2.5Nm (1.8lb-ft).
CONTROL TERMINATIONS	Removable screw connectors for 0.75mm^2 wire (18 AWG). Terminals will accept up to 1.5mm^2 wire (16 AWG). Tightening torque 0.6Nm (0.4lb-ft)
	Spring terminal connectors for 1.5mm^2 wire (16 AWG). Terminals will accept 0.5 - 1.5mm^2 wire (16 AWG).

Table 1-11 620 type 5 mechanical details

620 TYPE 6

DIMENSIONS	Refer to figure 3.1
ENCLOSURE	Chassis mounted IP20.
MOUNTING ORIENTATION	Vertical
WEIGHT	31kg
AIR FLOW CLEARANCE	Refer to figure 3.1
POWER TERMINATIONS	Compact high current terminal blocks. Terminals accommodate 0 - 35mm^2 wire (0 - 1/0) cables Tightening torque 4Nm (5.4lb-ft). Clamping screw: cheese head, slotted M8
CONTROL TERMINATIONS	Removable screw connectors for 0.75mm^2 wire (18 AWG). Terminals will accept up to 1.5mm^2 wire (16 AWG). Tightening torque 0.6Nm (0.4lb-ft)
	Spring terminal connectors for 1.5mm^2 wire (16 AWG). Terminals will accept 0.5 - 1.5mm^2 wire (16 AWG).

Table 1-12 620 type 6 mechanical details

620 TYPE 7

DIMENSIONS	Refer to figure 3.1
ENCLOSURE	Chassis mounted IP20.
MOUNTING ORIENTATION	Vertical
WEIGHT	83kg
AIR FLOW CLEARANCE	Refer to figure 3.1
POWER TERMINATIONS	(a) Supply (L1-3), Motor (M1-3), Brake (DB1,2) and Earth: Compact high current terminal blocks. Terminals accommodate 25 - 95mm^2 (2 - 4/0) cables Tightening torque 20Nm (14.7lb-ft). Clamping screw: socket head, M8, 6.0 mm across flats. (b) D.C. interconnection terminals (DC+, DC-): Compact high current terminal blocks. Terminals accommodate 35-150mm^2 (2-6/0) cables Tightening torque 30 Nm (22lb-ft). Clamping screw: socket head, M10, 8.0mm across flats.
CONTROL TERMINATIONS	Removable screw connectors for 0.75mm^2 wire (18 AWG). Terminals will accept up to 1.5mm^2 wire (16 AWG). Tightening torque 0.6Nm (0.4lb-ft)
	Spring terminal connectors for 1.5mm^2 wire (16 AWG). Terminals will accept 0.5 - 1.5mm^2 wire (16 AWG).

Table 1-13 620 type 7 mechanical details

EMC Specification

Refer to Chapter 7.

Special Considerations

For installations requiring compliance with UL standards:

Motor Overload Protection

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

OR

Motor overload protection is provided in the controller by means of the thermal device in the motor winding. This protection cannot be evaluated by UL hence it is the responsibility of the installer and/or the local inspector to determine whether the overload protection is in compliance with the National Electrical Code or Local Code requirements.

Overcurrent Protection Requirements

Fuses must be installed upstream of the drive. For fuse rating and type see Chapter 1 "**Electrical Ratings - Power Circuit**".

Short Circuit Rating

Suitable for use on a circuit capable of delivering not more than 5000 RMS Symmetrical Amperes, 240/460V 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.

Motor Base Frequency

The motor base frequency rating is 240Hz maximum.

Operating Ambient Temperature

For operating ambient temperature range, see Chapter 1 "**Electrical Ratings - Power Circuit**".

Environmental Requirements

The environmental limits for the 620 Vector series controllers are shown in Table 1-14.

Humidity (max.)	85% relative humidity (non-condensing) at 40°C
Altitude	Above 1000m derate power by 1% per 100m up to a maximum 5000m
Atmosphere	Non flammable, non corrosive and dust free (Pollution Degree 2) .
Operating temperature range	0°C to 50°C (NEMA 1 option: 0°C to 40°C)
Storage temperature range	-20°C to +80°C short term (< 100 hours) 0°C to +60°C long term
Enclosure	IP20 (direct conduit connection and NEMA 1 options)

Table 1-14 620 Series environmental requirements

Product Code

All 620 units are fully identified using an eleven block alphanumeric code, as shown in figure 1-2. This code details the drive calibration and settings on despatch from the factory. The product code appears as the "Model No." on the rating label at the side of the unit.

Example code	620STD /	0750 /	400 /	0010 /	UK /	ENW /	0000 /	000 /	B1 /	000 /	000
Block number	1	2	3	4	5	6	7	8	9	10	11

Figure 1-2 Product code blocks

Details of each block of the product code are given in Table 1-15.

Block No.	Variable	Description
1	620STD 620L	620 Vector Standard 620 Vector Link
2	 0007 0011 0015 0022 0040 0055 0075 0110 0150 0180 0220 0300 0370 0450 0550 0750	Four numbers specifying the power rating in kW 0.75 kW 1.1 kW 1.5 kW 2.2 kW 4.0 kW 5.5 kW 7.5 kW 11 kW 15 kW 18 kW 22 kW 30 kW 37 kW 45 kW (380-460V only) 55 kW (380-460V only) 75 kW (380-460V only)
3	 230 400	Three numbers specifying the nominal input voltage rating 208 to 240V (±10%) 50/60Hz 380 to 460V (±10%) 50/60Hz
4	 00xx 01xx-99xx xx1x xx2x xx3x xx5x xx6x xxx0	Four digits specifying the mechanical package including livery and mechanical package style First two digits: Livery Standard Eurotherm Drives livery Defined customer liveries Third digit: Mechanical packaging style Standard (IP20), protected panel mounting IP20 and falling dirt protection (NEMA1) with glandplate cable entry Enclosed (IP20), through panel mounting IP20 with falling dirt protection (NEMA1) only IP20 with glandcable entry only Note: options 3 and 4 apply to certain power ratings only. Fourth digit: Operator Station Standard product (always 0) - Built in MMI

Block No.	Variable	Description
5	UK	Two characters specifying the user interface language These characters are the same as used for computer keyboard specifications: English
6	ENW	Three characters specifying any feedback option installed over and above the standard features of the product, e.g. Encoder (Wire-ended)
7	0000 N/A	Four characters specifying the communications protocol and its hardware implementation method No communications options fitted Indicates the particular communications option
8	000 N/A	Three characters specifying any optional loaded software No software options loaded Indicates the particular software option
9	00 B0 B1	Two characters specifying the braking option Brake power switch not fitted Brake power switch fitted - no braking resistors supplied Brake power switch fitted and default value braking resistors supplied **(standard)** Note: Extra braking resistors can be specified and ordered separately
10	000 TBA	Three characters specifying the mains filtering standard fitted No mains filtering option fitted Code for the filtering option installed
11	000 nnn	3 digits specifying engineering special options: No special options Code for the special engineering option installed

Table 1-15 - Product Code Block Descriptions

Example Code:

620STD/0750/400/0010/UK/ENW/0000/000/B1/000/000

This code indicates a drive which is:

- a 620 Standard product
- 75kW power rating
- 380-460v input supply
- Eurotherm Drives livery
- enclosed mechanical package (IP20)
- no additional optional operator station
- UK language
- wire-ended 15V encoder option
- no optional communications
- no optional loaded software
- brake switch fitted with default value resistors supplied
- no mains filtering option fitted
- no special options.

Chapter 2

PRE-INSTALLATION PLANNING

Contents Page

Chapter 2 PRE-INSTALLATION PLANNING

INTRODUCTION

This chapter contains a functional description of the 620 Vector Drive to enable a sound understanding of the system, and notes for consideration prior to installation.

FUNCTIONAL OVERVIEW

The 620 Vector enables very high performance control of 3-phase AC induction motors fitted with a compatible encoder. It offers the user great system flexibility, allowing easy integration into various control schemes. The plain language Man-Machine Interface (MMI) greatly simplifies setting up and commissioning the 620 Vector.

A simplified block diagram of a 620 is shown in Figure 2.2. This illustrates the basic internal arrangement of the drive with the circuitry split between the control circuits and power circuits.

The control circuits are common to all types of the 620 Vector Drive.

Chassis types 5 and 7 use a slightly different power circuit from types 4 and 6. The general principles of operation remain the same, however.

Control Circuits and Software

The control circuits and software element contain the intelligence of the 620 Vector series. They comprise a sophisticated microprocessor system with digital and analogue inputs and outputs, the MMI and circuits to interface between the microprocessor and the inverter circuits.

Speed feedback signals from the motor shaft encoder are processed by the microprocessor to determine the rotational speed of the shaft. An PI algorithm within the software uses this information to produce varying gate drive signals to the inverter circuits. These signals cause the inverter to output the required voltage and frequency for a particular motor speed.

Analogue inputs to the microprocessor are digitised and can be used to set parameters such as speed.

Digital inputs to the microprocessor signal various commands and conditions such as stop, start and required direction of rotation.

Digital outputs from the microprocessor (e.g. Health) can be used by external control equipment.

A detailed block diagram of the logical blocks which comprise the control circuits and software is shown in Figure 2.5.

Power Circuits

The 3-phase supply input on terminals L1, L2 and L3 is rectified to give a DC output to the DC Link capacitors, which smooth the DC power. The DC power is fed to the inverter circuits, which convert the fixed voltage DC into three phase variable frequency and voltage drive outputs to the motor. The frequency and voltage are set by the gate drive signals from the microprocessor.

During motor deceleration or at other times when the motor acts as a generator, energy flows from the motor into the DC link capacitors and causes the DC link voltage to rise. The drive will trip if the DC link voltage rises above a pre-set level, to avoid damage to the drive.

Dynamic Braking

If the dynamic braking option is fitted, an external brake resistor is switched across the DC Link by the Dynamic Brake Switch to dissipate the excess energy and prevent the drive from tripping.

Chapter 3 describes the power and resistance rating requirements for the dynamic braking resistor.

Built-in diagnostics

Number and logic diagnostics are values and settings that can be displayed via the diagnostic menu within the MMI. These values are read-only and are provided for the user to determine operating or fault conditions. Refer to Chapter 6 for further information and descriptions of the diagnostics.

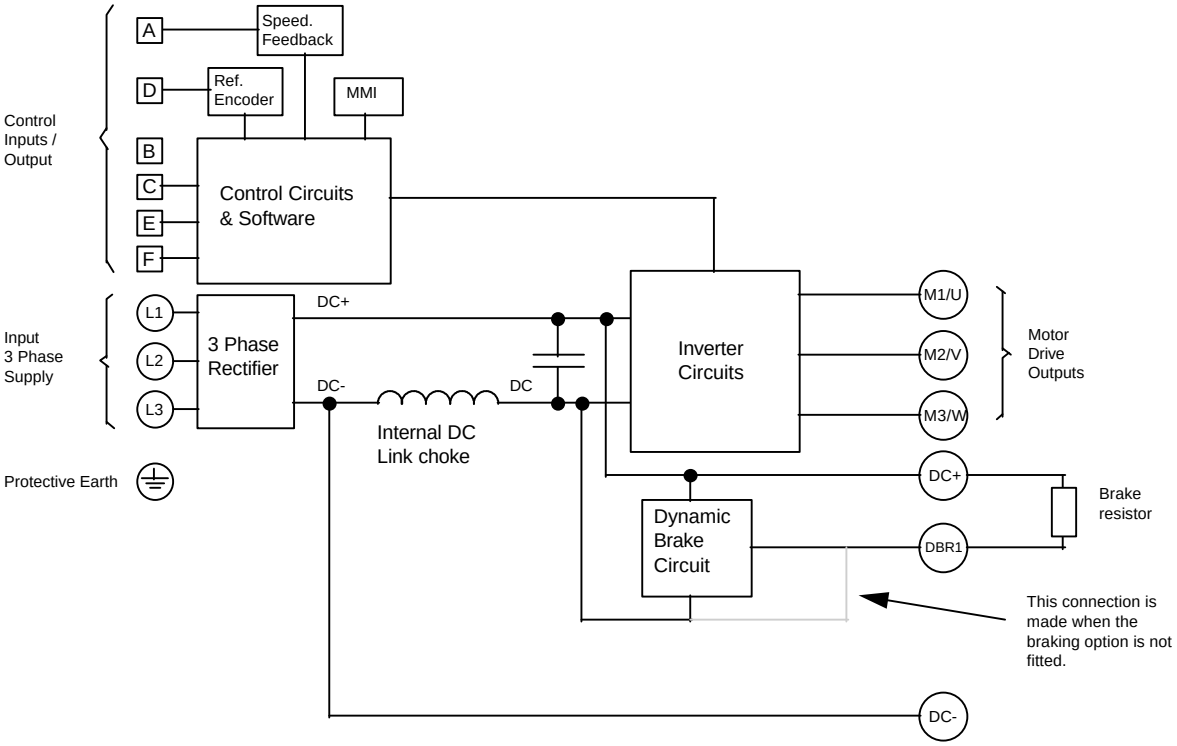


Figure 2.1 - Type 4 Simplified Block Diagram

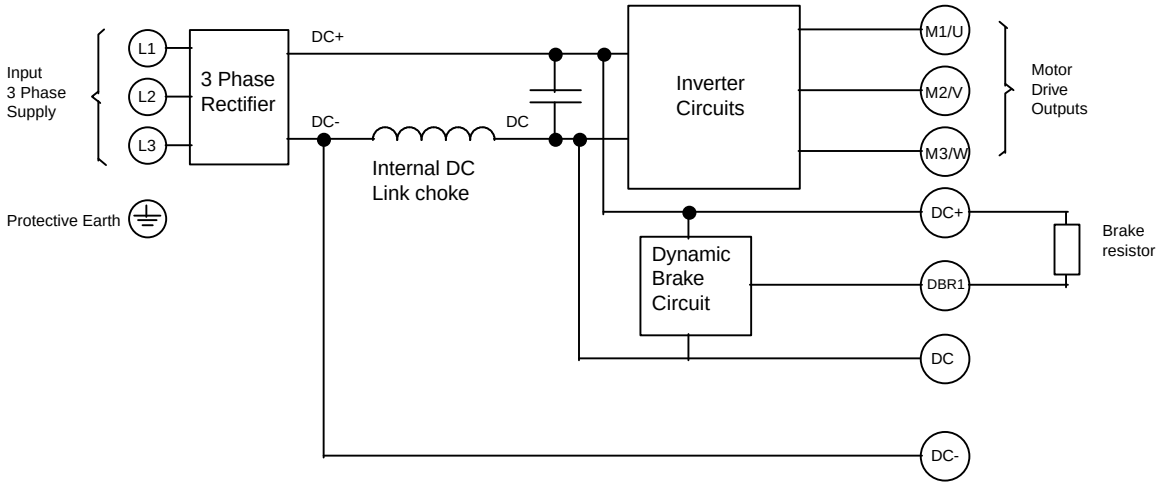


Figure 2.2 - Type 5 Simplified Block Diagram

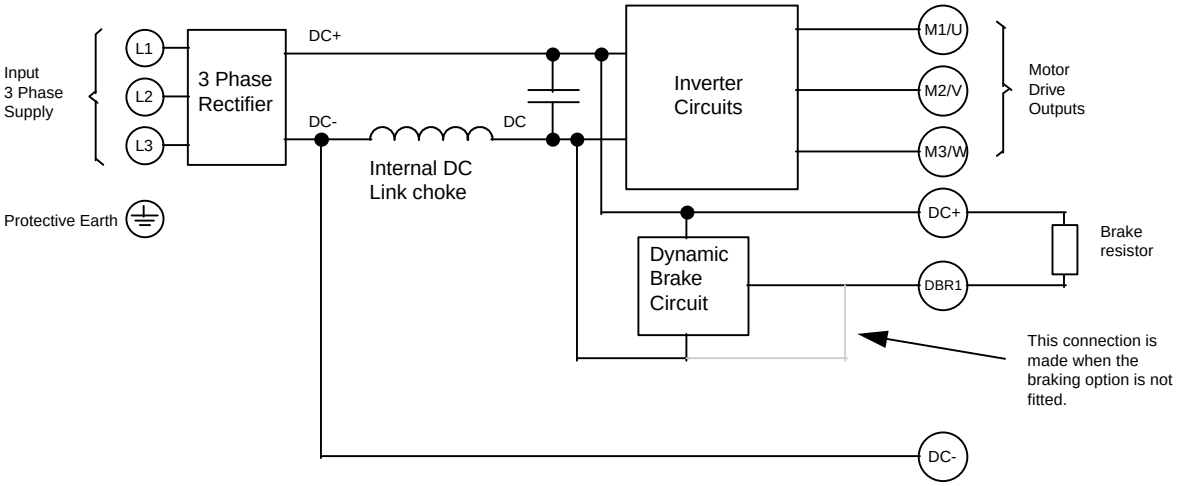


Figure 2.3 - Type 6 Simplified Block Diagram

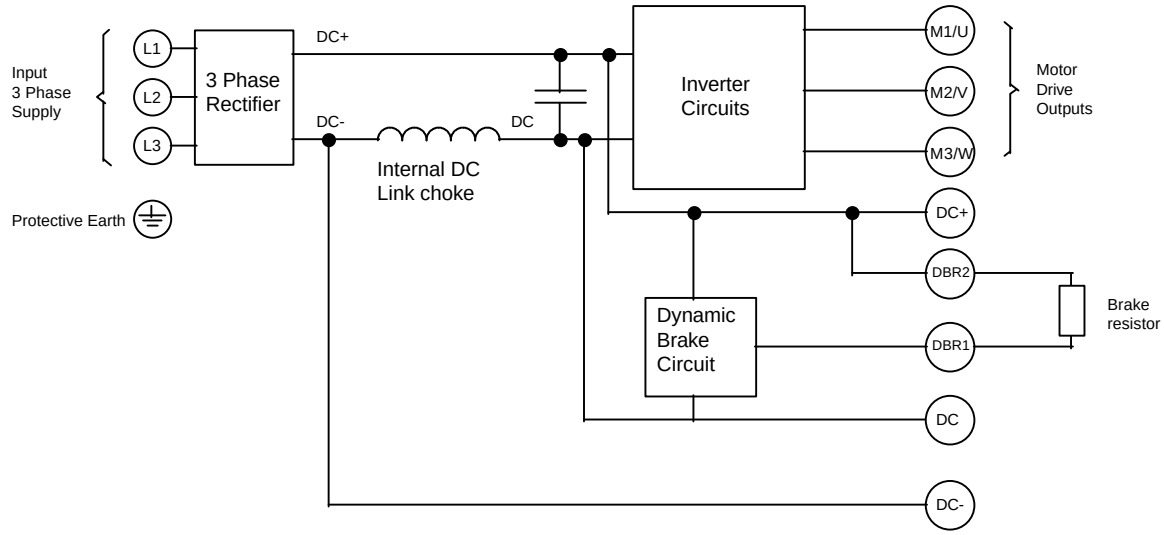


Figure 2.4 - Type 7 Simplified Block Diagram

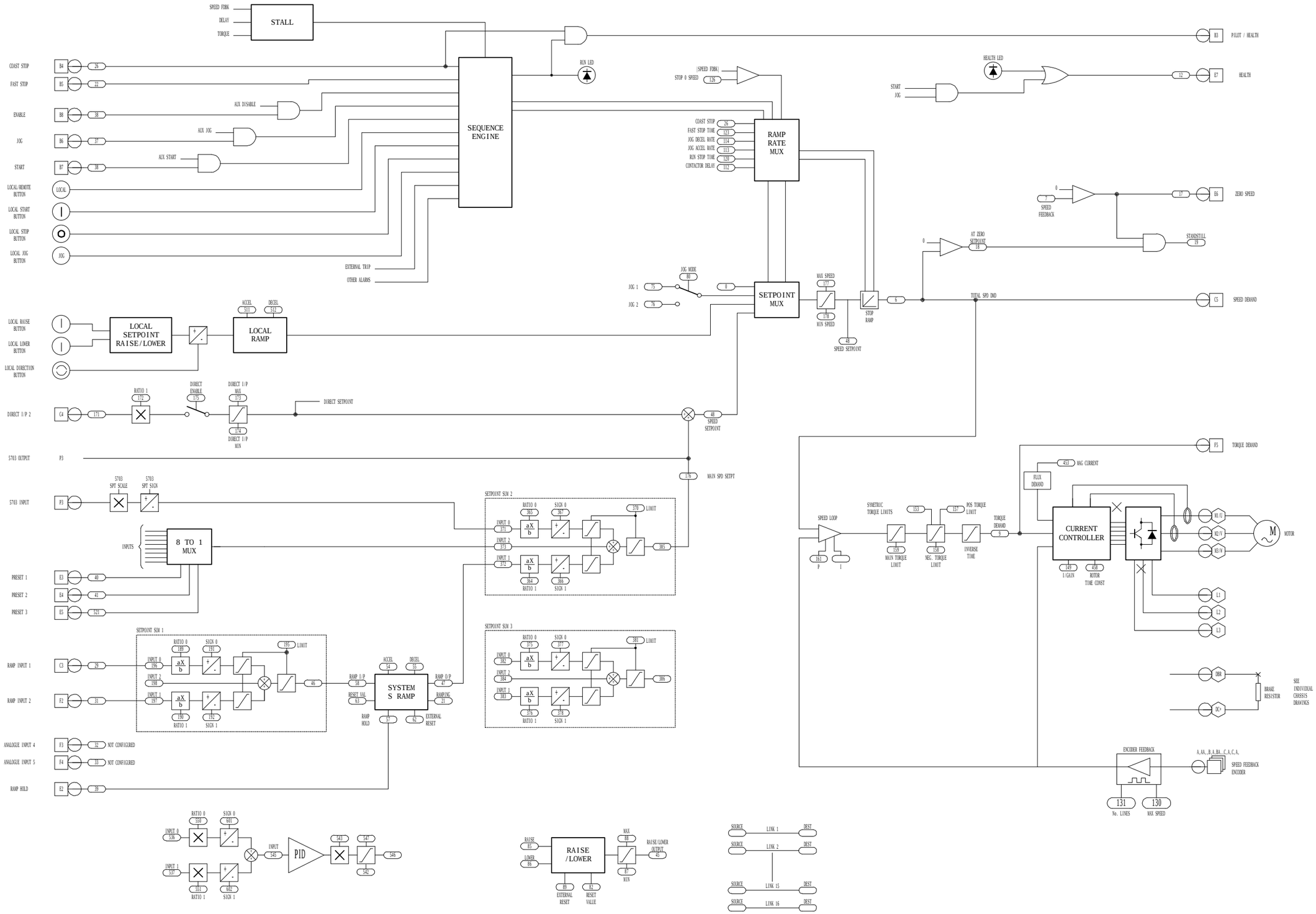


Figure 2.5 Functional Block Diagram

INSTALLATION WIRING DIAGRAMS

This section shows all the necessary wiring details for connecting up a 620 Vector series drive.

Figure 2.6 shows the minimum configuration required for basic operation of the Drives.

Figure 2.7 shows a full connection diagram to utilise all the features of the Drives.

All the 620 Vector Drives are wired similarly. The main difference between the variants (other than power rating and physical size) is the capacity of the upstream circuit breaker (MCB1 in Figure 2.7) and the layout of the power terminals. The MCB details are listed in Table 2-1, and the power terminals are shown in Figures 2.10 to 2.13.

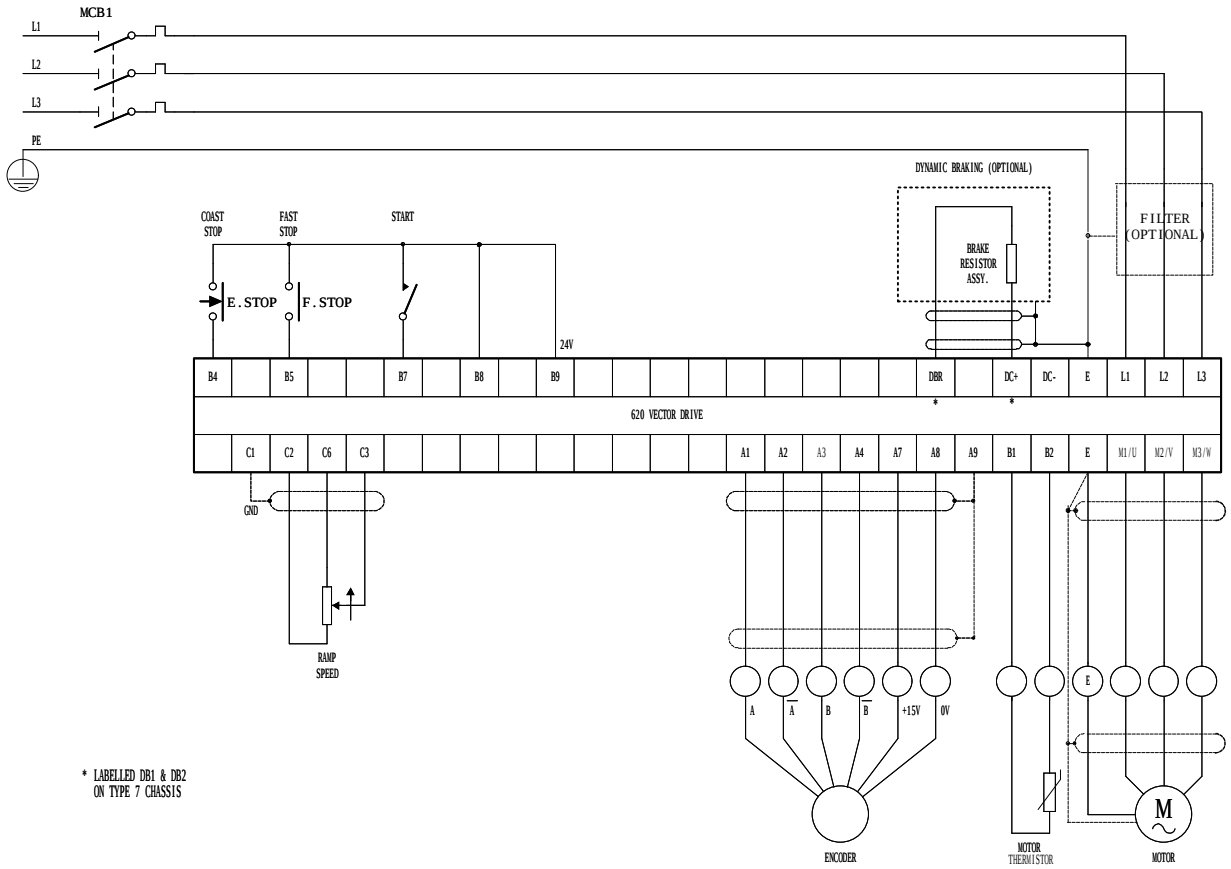


Figure 2.6 - Minimum wiring configuration for 620 series drives

Full Installation

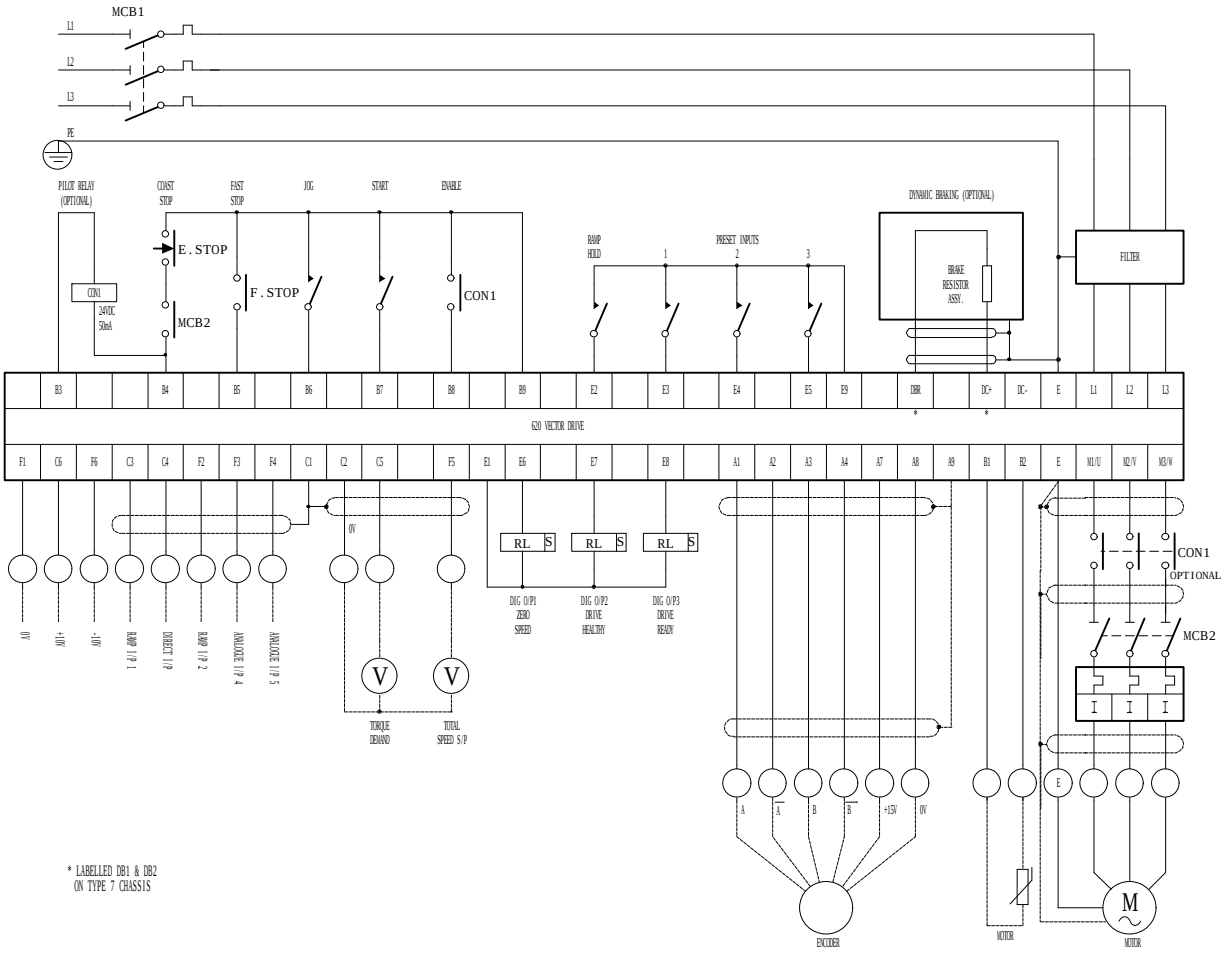


Figure 2.7 - Full wiring diagram for 620 series drives

Differences between Drives

Each of the drive variants requires different rating breakers for MCB1. The requirements are shown in Table 2-1. (Entries with N/A indicate that the drive rating is not available for that type at that voltage.)

MCB2 should be rated according to the full load current of the motor.

Table 2-1 MCB requirements

Type	Power (kW)	208-240v	380-460v
4	0.75	10 A	10 A
	1.1	10 A	N/A
	1.5	10 A	20 A
	2.2	20 A	10 A
	4.0	20 A	20 A
	5.5	N/A	20 A
	7.5	N/A	20 A
	5.5	30 A	N/A
5	7.5	40 A	N/A
	11.0	N/A	32 A
	15.0	N/A	40 A
6	11.0	63 A	N/A
	15.0	100 A	N/A
	18.0	N/A	50 A
	18.5	100 A	N/A
	22.0	N/A	63 A
	30.0	N/A	100 A
	37.0	N/A	100 A
7	22.0	125 A	N/A
	30.0	160 A	N/A
	37.0	200 A	N/A
	45.0	N/A	125 A
	55.0	N/A	160 A
	75.0	N/A	200 A

TERMINAL DESCRIPTIONS

Terminals are provided for both the control and power connections to allow reliable connections with external devices and power supplies. The function of these terminals is described in tables 2.2 to 2.7.

Control Board Terminals

The control board terminals are identical for all variants of the 620 Vector Drive. The layout of the control board terminals is given in Figure 2.9, and the functions are described in Table 2.5. See Chapter 1 "**ELECTRICAL RATINGS**" for control terminal specification.

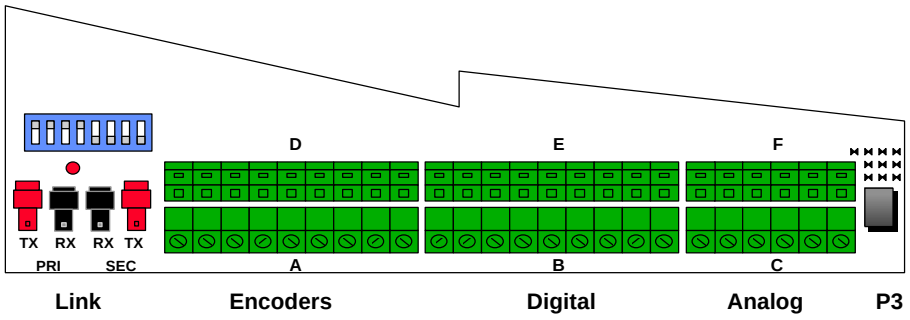


Figure 2.8 - Control Board Terminals

	Front / Lower	Back / Upper	
Link Fibre Optics. (620L only)	Red	N/A	Transmit Primary
	Black	N/A	Receive Primary
	Black	N/A	Receive Secondary
	Red	N/A	Transmit Secondary

	Feedback Encoder			**Reference Encoder (620Adv & 620L only)**	
	A	1	1	A	
	/A	2	2	/A	
	B	3	3	B	
	/B	4	4	/B	
A	Z	5	5	Z	**D**
	/Z	6	6	/Z	
	Power (15v)	7	7	Power (15v)	
	0v	8	8	0v	
	GND	9	9	GND	
	Digital I/O			**Aux. Digital I/O**	
	Thermistor 0v	1	1	0v	
	Thermistor	2	2	Digital I/P 1	
	Pilot / Health	3	3	Digital I/P 2	
	Coast Stop	4	4	Digital I/P 3	
B	Fast Stop	5	5	Digital I/P 4	**E**
	Jog	6	6	Digital O/P 1	
	Start	7	7	Digital O/P 2	
	Enable	8	8	Digital O/P 3	
	24v	9	9	24v	
	Analogue I/O			**Aux. Analogue I/O**	
	GND	1	1	0v	
	0v	2	2	Analogue I/P 3	
	Ramp I/P 1	3	3	Analogue I/P 4	
C	Direct I/P 2	4	4	Analogue I/P 5	**F**
	Analogue O/P 1	5	5	Analogue O/P 2	
	+10v	6	6	-10v	

Figure 2.9 - 620 Terminal Layout

Table 2.2 - Control Board Terminal Descriptions

Terminal Number	Terminal Description - *Feedback Encoder*
A1	A Channel A
A2	/A
A3	B Channel B
A4	/B
A5	Z Channel Z
A6	/Z
A7	15v Isolated Power supply for an encoder, connected internally to D7
A8	0v Isolated Power for an encoder, connected internally to D8
A9	GND connected internally to D9
NOTES	• For improved noise immunity run an individually shielded twisted pair per channel from the drive to the encoder. • In the case of a single-ended encoder, connect /A, /B and /Z from the drive to 0v at the encoder end. • See also DIP Switches page 12 • For electrical ratings, refer to Chapter 1.

Terminal Number	Terminal Description - *Digital I/O (Default configuration)*
B1	Thermistor/Microtherm 0v Terminals B1 and B2 must be linked if over temperature sensors are not used. The use of a motor temperature sensor is always recommended.
B2	Thermistor/Microtherm It is good practice to protect AC motors against sustained thermal overloads by fitting temperature sensitive resistors (thermistors) or switches in the windings of the machine. Thermistors have a low resistance (typically 200Ω) up to a reference temperature (125°C). Above this temperature, their resistance rises rapidly to greater than 2000Ω. Motor over temperature sensors should be connected in series between terminals B1 and B2. A motor over temperature alarm will be indicated if the external resistance between B1 and B2 exceeds 2.6kΩ ±200Ω. The alarm is reset at 1.1kΩ ±200Ω.

Terminal Number	Terminal Description - *Digital I/O (Default configuration)*
B3	Pilot/Health (Open Collector 50mA Sink) This output may be used to drive a pilot relay for an output contactor. The contactor will be brought in on power up or by a drive start by software. It is dropped out unconditionally, bypassing the software if COAST STOP (B4) is low or open circuit. It will also drop out in the event of an alarm becoming active.
B4	Coast Stop When the Coast Stop input is at +24v, the drive operates normally. When the Coast Stop is at 0v or open circuit, the drive no longer operates. The motor coasts to rest.
B5	Fast Stop When the Fast Stop input is held at 24v, the drive operates as required by the inputs. When the Fast Stop is at 0v or open circuit, the drive provides a controlled or fast stop as defined by the Fast Stop parameters.

Table 2.2 - Control Board Terminal Descriptions (Continued)

Terminal Number	Terminal Description - *Digital I/O (continued)*
B6	Jog[1] When the Jog input is held at 24v the drive jogs, provided input B7 (Start) is held low and B4 (Coast Stop), B8 (Enable) & B5(Fast Stop) are held high. When the Jog input is removed the drive will ramp down to zero at the Jog Ramp Rate.
B7	Start [2] When a high input is applied to this terminal the drive will operate provided there are no alarms, B6 (Jog) is held low, B4 (Coast Stop), B8 (Enable) & B5(Fast Stop) are held high. When the input is removed the drive will perform a regenerative stop to zero speed.
B8	Enable The Enable input provides a means of electronically inhibiting drive operation. If the enable input is low (false) all control loops[3] will be inhibited and the drive will not function.
B9	+24v power Internally generated +24v supply which can be used for digital inputs. Maximum load is 200mA.

Terminal Number	Terminal Description - *Analogue I/O (Default configuration)*
C1	GND Analogue screen connection.
C2	Signal 0v
C3	Ramp I/P 1 A bi-directional input that is summed with F2 to form the input to the System Ramp. +10v = Full speed - 10v = Reverse full speed
C4	Direct I/P 2 Trim input direct into speed loop with high speed coupling. Used for external loops, i.e. position controllers. +10v = 100% Speed trim - 10v = -100% Speed trim
C5	Analog O/P 1 Speed feed-back
C6	+10v Voltage reference

Terminal Number	Terminal Description - *Reference Encoder (620L version only)*
D1	A Channel A
D2	/A
D3	B Channel B
D4	/B
D5	Z Channel Z
D6	/Z
D7	15v Isolated Power supply for an encoder, connected internally to A7
D8	0v Isolated Power for an encoder, connected internally to A8
D9	GND connected internally to A9
NOTES	• For improved noise immunity run an individually shielded twisted pair per channel from the drive to the encoder. • In the case of a single-ended encoder, connect /A, /B and /Z from the drive to 0v at the encoder end. • See also DIP Switches page 12 • For electrical ratings, refer to Chapter 1.

[1] Jog is not operational in local mode.

[2] Start is not operational in local mode.

[3] Except the PID

Table 2.2 - Control Board Terminal Descriptions (Continued)

Terminal Number	Terminal Description - *Aux. Digital I/O (Default Configuration)*
E1	0v 0v for digital inputs.
E2	Digital I/P 1 (RAMP HOLD) If the input is held true, the System Ramp output is frozen at the last value irrespective of the Ramp Setpoint Input. When false, the System Ramp output follows the Ramped Setpoint with a delay determined by the Ramp time parameters. Ramp Hold is overridden by Ramp Reset.
E3 E4 E5	Digital I/P 2,3,4 (PRESET SELECT 1, 2, 3) These digital inputs are used to select 1 of 8 preset inputs as shown below: SELECT 3 / 2 / 1 — Preset Selection 0v / 0v / 0v — **PRESET 1** selected 0v / 0v / 24v — **PRESET 2** selected 0v / 24v / 0v — **PRESET 3** selected 0v / 24v / 24 — **PRESET 4** selected ... / ... / ... — ... 24v / 24v / 24v — **PRESET 8** selected The preset inputs are set using the MMI. By default the presets are connected to one of the speed demand inputs.
E6	Digital O/P 1 (ZERO SPEED) Default configuration. Active High at Zero speed. .
E7	Digital O/P 2 (Health) Default configuration. Active High while the drive is Health or START / JOG are low.
E8	Digital O/P 3 (Ready) Default configuration. Active High once the drive has successfully completed is pre-start checks and if Enabled will run.
E9	+24v power as terminal B9

Terminal Number	Terminal Description - *Aux. Analogue I/O*
F1	0v
F2	Analog I/P 3 Default configuration. Ramped input 2, a bi-directional input that is summed with C3 to form the input to the System Ramp. +10v = Full speed - 10v = Reverse full speed
F3	Analog I/P 4 Not configured by default.
F4	Analog I/P 5 Not configured by default.
F5	Analog O/P 2 Default configuration. Torque demand output. +10v = 150% forward output torque - 10v = 150% reverse output torque
F6	-10v Voltage reference

DIP Switches

The control PCB also houses a set of dual in-line package (DIP) switches, located to the left of the terminals. The twelve switches are numbered, starting with 1 on the left.

The switches are ON when in the UP position (towards the centre of the drive) and OFF when in the DOWN position (towards the edge of the drive).

Switches 1 to 4 are only significant on 620 Link versions of the drive, which are equipped with fibre-optic communications facilities. The switches control the transmitter output power as follows:

Table 2.3 Transmitter Power DIP Switches

TX Power	TX1 (left)		TX2 (right)	
	Switch 1	Switch 2	Switch 3	Switch 4
Low	Off	don't care	Off	don't care
Medium	On	Off	On	Off
High	On	On	On	On

Switches 5 and 6 are not used.

Switches 7 to 9 control the threshold sensitivity for the feedback encoder: switch 7 controls the A input, switch 8 the B input and 9 the Z input. Switches 10 to 12 control threshold sensitivity for the reference encoder (optional): switches 10 controls the sensitivity for the A input, switch 11 the B input and 12 the Z input.

When the switches are set ON, threshold sensitivity is 4V ± 1V.

When the switches are set to OFF, threshold sensitivity is 9V ± 1V.

Usually the switches will be set to give a threshold of 4V when using a differential encoder, and to 9V when using a single ended encoder.

Power Terminals

WARNING

ELECTRIC SHOCK HAZARD

THE POWER TERMINALS CARRY ELECTRICAL POWER WHICH CAN BE LETHAL. ISOLATE ALL POWER SUPPLIES AND THEN WAIT AT LEAST 3 MINUTES BEFORE REMOVING THE TERMINAL COVER OR WORKING ON ANY CONTROL EQUIPMENT OR MOTORS.

620 Type 4

Table 2.4 - 620 TYPE 4 Power Board Terminals

Terminal	Terminal Description
M1/U, M2/V, M3/W	Power outputs forming the 3-phase supply connection for the motor.
DC-	Power input/output. This terminal is used in conjunction with the DC+ terminal only when two or more controllers are coupled together. It carries a negative DC link voltage.
DC+	Power input/output. This terminal is used for connection to a braking resistor. It is also used in conjunction with the DC- terminal when two or more controllers are coupled together. It carries a positive DC link voltage (typically 600V referred to terminal DC-).
DBR1	Power input/output for the connection of a dynamic braking resistor. Refer to "DYNAMIC BRAKING" for further details. This terminal is connected to the negative side of the link capacitor when the brake option is not fitted.
L1, L2, L3	Power inputs. These terminals are the 3-phase mains supply input, 380 - 460V ± 10% or 208 - 240V ± 10% AC line-to-line.
⏚	Power earth. This terminal must be connected to a protective earth (ground).
	See Chapter 1, "MECHANICAL DETAILS" for tightening torque

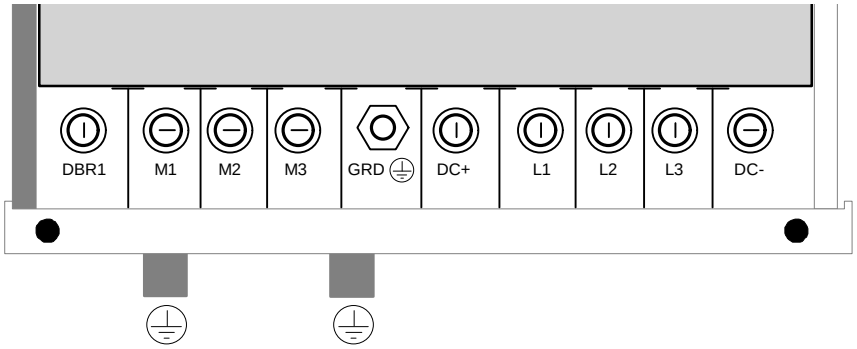


Figure 2.10 - 620 Type 4 Power Terminals

620 Type 5

Table 2.5 - 620 Type 5 Power Board Terminals

Terminal	Terminal Description
M1/U, M2/V, M3/W	Power outputs forming the 3-phase supply connection for the motor.
DC-	Power input/output. This terminal is used in conjunction with the DC+ terminal when two or more controllers are coupled together. It carries a negative DC link voltage.
DC+	Power input/output. This terminal is used for connection to a braking resistor. It is also used in conjunction with the DC- terminal when two or more controllers are coupled together. It carries a positive DC link voltage (typically 600V referred to terminal DC-).
DC	Power input/output. This terminal is connected to the negative side of the D.C. link capacitor. **No customer connection must be made to this terminal.**
DBR1	Power input/output for the connection of a dynamic braking resistor. Refer to "**DYNAMIC BRAKING**" for further details. This terminal is connected to the negative side of the link capacitor when the brake option is not fitted.
L1, L2, L3	Power inputs. These terminals are the 3-phase mains supply input, 380 - 460V ± 10% or 208 - 240V ± 10% AC line-to-line.
⏚	Power earth. This terminal must be connected to a protective earth (ground).
See Chapter 1, "**MECHANICAL DETAILS**" for tightening torque	

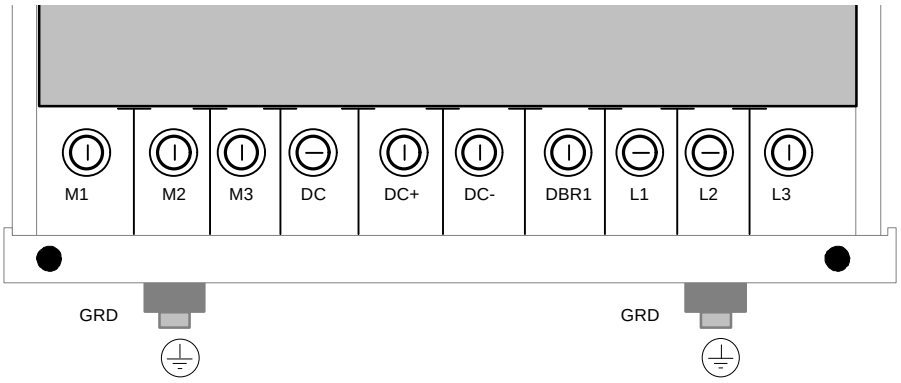


Figure 2.11 - 620 Type 5 Power Terminals

620 Type 6

Table 2.6 - 620 TYPE 6 - Power Terminals

Terminal	Terminal Description
M1/U, M2/V, M3/W	Power outputs forming the 3-phase supply connection for the motor.
DC-	Power input/output. This terminal is used in conjunction with the DC+ terminal when two or more controllers are coupled together. It carries a negative DC link voltage.
DC+	Power input/output. This terminal is used for connection to a braking resistor. It is also used in conjunction with the DC- terminal when two or more controllers are coupled together. It carries a positive DC link voltage (typically 600V referred to terminal DC-).
DBR1	Power input/output for the connection of a dynamic braking resistor. Refer to "DYNAMIC BRAKING" for further details. This terminal is connected to the negative side of the link capacitor when the brake option is not fitted.
L1, L2, L3	Power inputs. These terminals are the 3-phase mains supply input, 380 - 460V ± 10% or 208 - 240V ± 10% AC line-to-line.
⏚	Power earth. This terminal must be connected to a protective earth (ground).
	See Chapter 1, "MECHANICAL DETAILS" for tightening torque

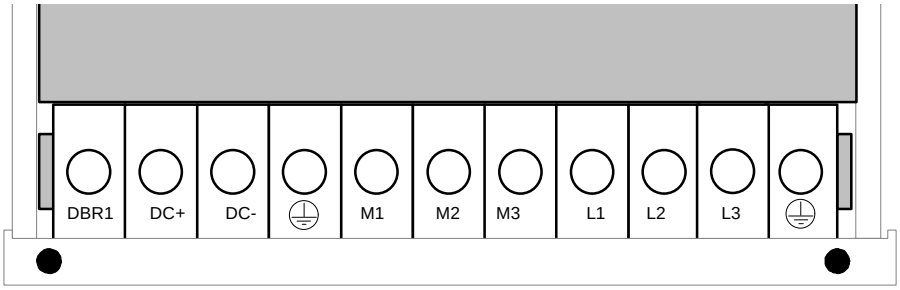


Figure 2.12 - 620 Type 6 Power Board Terminals

620 Type 7

Table 2.7 - 620 TYPE 7 - Power Terminals

Terminal	Terminal Description
M1/U, M2/V, M3/W	Power outputs forming the 3-phase supply connection for the motor.
DC-	Power input/output. This terminal is used in conjunction with the DC+ terminal when two or more controllers are coupled together. It carries a negative DC link voltage.
DC+	Power input/output. This terminal is used in conjunction with the DC- terminal only when two or more controllers are coupled together. It carries a positive DC link voltage (typically 600V referred to terminal DC-).
DBR1	Power output. This terminal is used for connection to a braking resistor. Refer to "DYNAMIC BRAKING" for further details. This terminal is connected to the negative side of the link capacitor when the brake option is not fitted.
DBR2	Power output. This terminal is used for connection to a braking resistor.
L1, L2, L3	Power inputs. These terminals are the 3-phase mains supply input, 380 - 460V ± 10% or 208 - 240V ± 10% AC line-to-line.
⏚	Power earth. This terminal must be connected to a protective earth (ground).
	See Chapter 1, "MECHANICAL DETAILS" for tightening torque

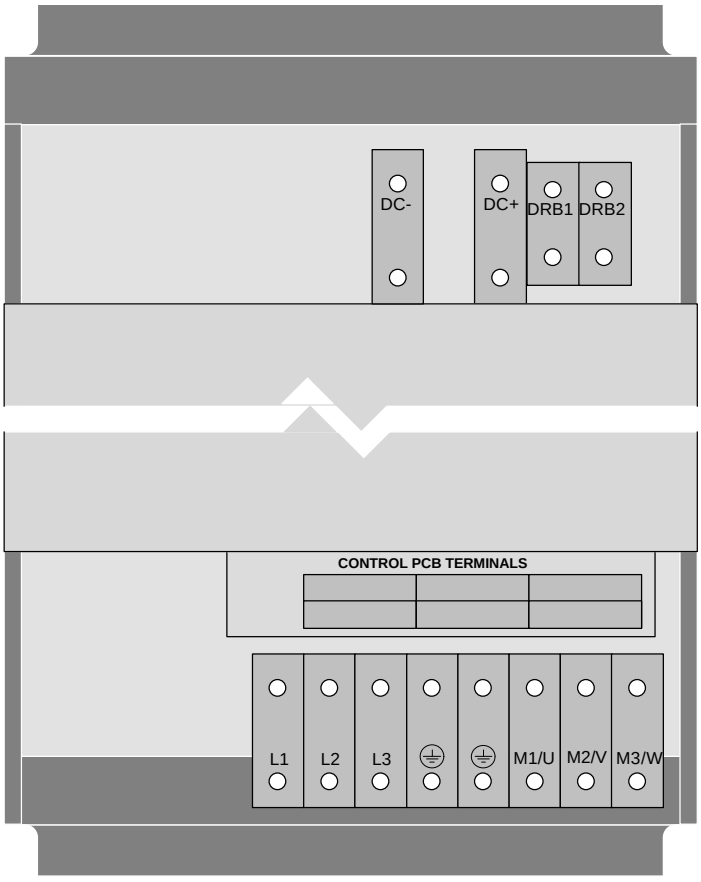


Figure 2.13 - 620 Type 7 Power Terminals

EMC

Refer to Chapter 3 for EMC Installation guidelines.

TERMINATIONS

UL Compression Lug Kit is available for the drives which provide a set of lugs suitable for the following ratings. These lugs must be applied with the correct tooling as described in the Installation Instructions provided with each Lug Kit.

The following terminal kit is available for the connection of Power Cabling.

Product	Supply Voltage	Constant Torque	Quadratic Torque	Kit No.	Lug Size	Amp Part No.
620	380 - 460V	11kW	---	LA389585	#8 AWG	52263-1
	380 - 460V	15kW	---			
	208 - 240V	5.5kW	---			
	208 - 240V	7.5kW	---			

Chapter 3

INSTALLATION PROCEDURE

Contents Page

Chapter 3 INSTALLATION PROCEDURE

INTRODUCTION

This chapter contains the procedures required to install a 620 Vector Drive.

INSTALLATION PRECAUTIONS

Caution

This product conforms to IP20 protection. Due consideration should be given to environmental conditions of installation for safe and reliable operation.

When installing the 620 Vector Drive, the following points must be considered.

1) Mechanically secure fixings must be used, as recommended in "**MOUNTING**".

2) The enclosure into which this product is mounted must be suitable for the working environment.

3) The cooling and airflow around this product must be as recommended in "**VENTILATION**".

4) The cables and wire terminations must be as recommended and securely clamped.

5) The installation and commissioning of this equipment must only be carried out by competent personnel in accordance with safe working practices.

MECHANICAL INSTALLATION

Mounting

Mounting dimensions and suitable fixing bolts are shown in Figure 3.1.

The 620 Vector Drive must be mounted vertically on a cool, solid, flat vertical surface. It must be fixed using 4 bolts or screws of the correct size through the fixing points provided at each corner at the rear of the unit. The fixing points are in the form of keyholes and slots to simplify fastening or removal.

Ventilation

In normal operation the drive dissipates heat and must be mounted to allow the free flow of air vertically through the unit. Care must be taken to ensure that the mounting surface is cool and that any heat generated by adjacent equipment is not transmitted to the 620 Vector Drive. Similarly, ensure that the heat generated by the drive will not adversely affect any other equipment or cabling.

For adequate ventilation of the Drive, minimum clearance as defined in Figure 3.1 Mechanical Outline Drawings must be maintained. Side-by-side mounting of two or more Drive is permissible providing the ambient operating temperature is not exceeded.

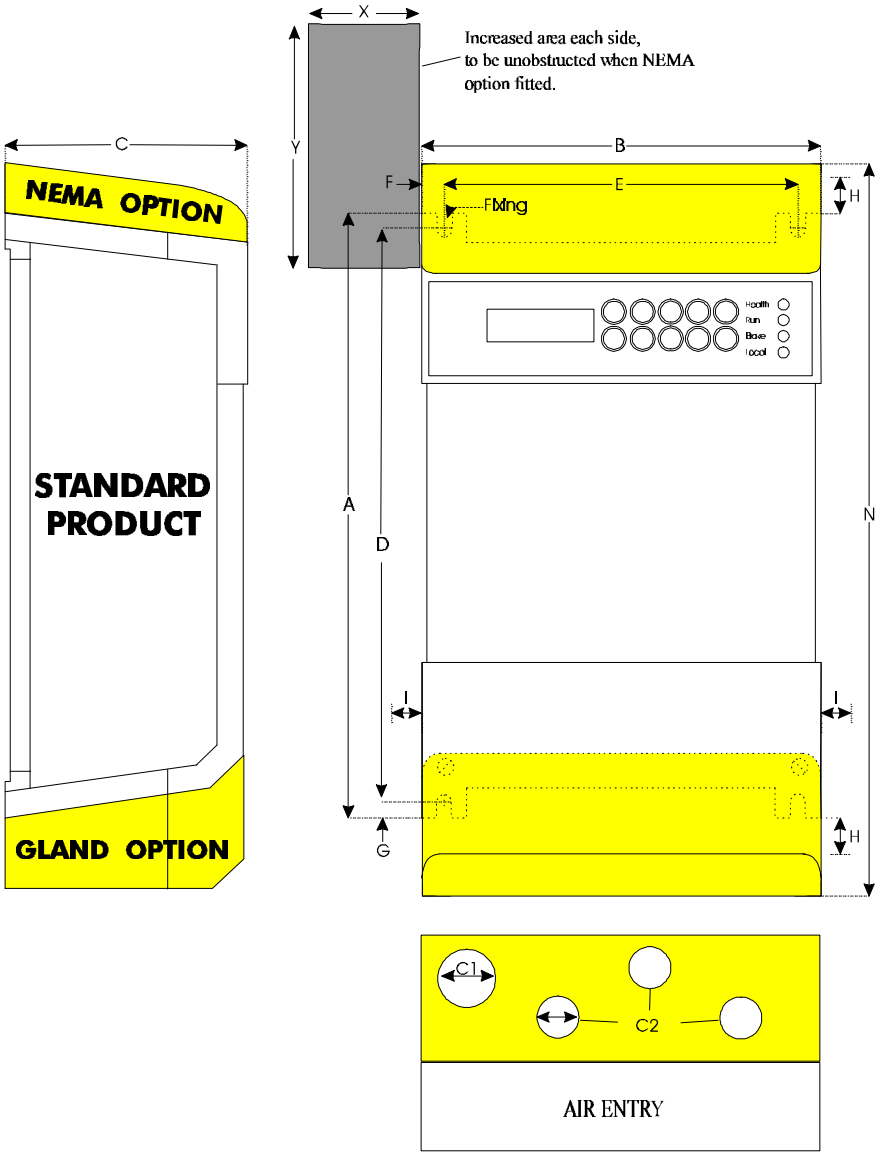


Figure 3.1 Mechanical Outline Drawings

Model	Outside Dimensions (mm)			Fixing Centres (mm)				Fixing Size	OPTIONS						
									Cooling air clearance (mm)		Overall height (mm)	Exit air clearance (mm)		Conduit hole size (mm)	
	A	B	C	D	E	F	G		H	I	N	X	Y	C1	C2
Type 4	318	228	157	300	200	14	9	M6	80	10	385	40	130	32	20-32
Type 5	468	228	157	450	200	14	9	M6	80	10	535	40	130	32	20-32
Type 6	672	234	298	650	200	17	11	M8	100	40	775	40	130	20-40	32-40
Type 7*	838	398	336	800	370	14	19	M10	250	50	1125	120	300	-	44-76

Table 3.1 - 620 Mounting Arrangements

* Full details of through panel mounting of type 7 not available at time of going to press. Please contact Eurotherm Drives Engineering department.

ELECTRICAL INSTALLATION

The following instructions describe the wiring requirements for operation of the 620 as basic speed controller. The variety of specific drive applications precludes the inclusion of diagrams showing all wiring options.

Power Wiring

Caution

Never perform high voltage resistance checks on the wiring without first disconnecting the drive from the circuit being tested.

Observe all national standards and local electricity supply company regulations while installing the 620 Vector drive.

The following considerations apply to all installations.

1) Power cables must be rated at a minimum of 110% of the expected supply current.

2) Power cables (particularly 3-phase motor cables) must be routed well away from cables carrying setpoints or feedback signals, screened motor feedback cables, and cables from other electronic equipment in the same plant.

3) The motor supply cables should be screened to avoid causing undue interference to other equipment in the area.

4) The mains power supply must be 3-phase and within the voltage tolerances specified in "**ELECTRICAL RATINGS - Power Circuit**" in Chapter 1 of this manual. The supply must be connected to power board terminals L1, L2 and L3 of the 620 Vector drive.

Minimum Cable Diameters and Supply Protection

The incoming mains supply should be protected as shown below:

Controller Rating 380 - 460 Volts	Controller Rating 208 - 240 Volts	Fuse or Circuit Breaker (Amps)	Cable Diameter (mm^2)	
			MIN	NORMAL
0.75	-	10	1.5	1.5
1.1	-	10	1.5	1.5
1.5	0.75	10	1.5	1.5
2.2	1.1	10	1.5	1.5
4.0	1.5	20	3.5	4
5.5	2.2	20	3.5	4
7.5	4.0	20	3.5	4
11	5.5	32	5.5	6
15	7.5	40	8.5	10
18	-	50	12.5	16
22	11	63	18	16
30	15	100	37	35
37	18	100	37	35
45	22	125	50	50
55	30	160	65	70
75	37	200	85	95

* - Cable diameters listed assume the conductors are in free air. Fuses are standard type with slow-blow characteristic or a circuit breaker. NOTE: These are typical values only. If in doubt please observe your national standards or local electricity supply regulations. For installations requiring compliance with UL standards, refer to **Special Considerations** and **Electrical Ratings - Power Circuit** in chapter 1.

Earthing

WARNING!

THE MOTOR MUST BE CONNECTED TO AN APPROPRIATE SAFETY EARTH. FAILURE TO DO SO CONSTITUTES AN ELECTRICAL SHOCK HAZARD.

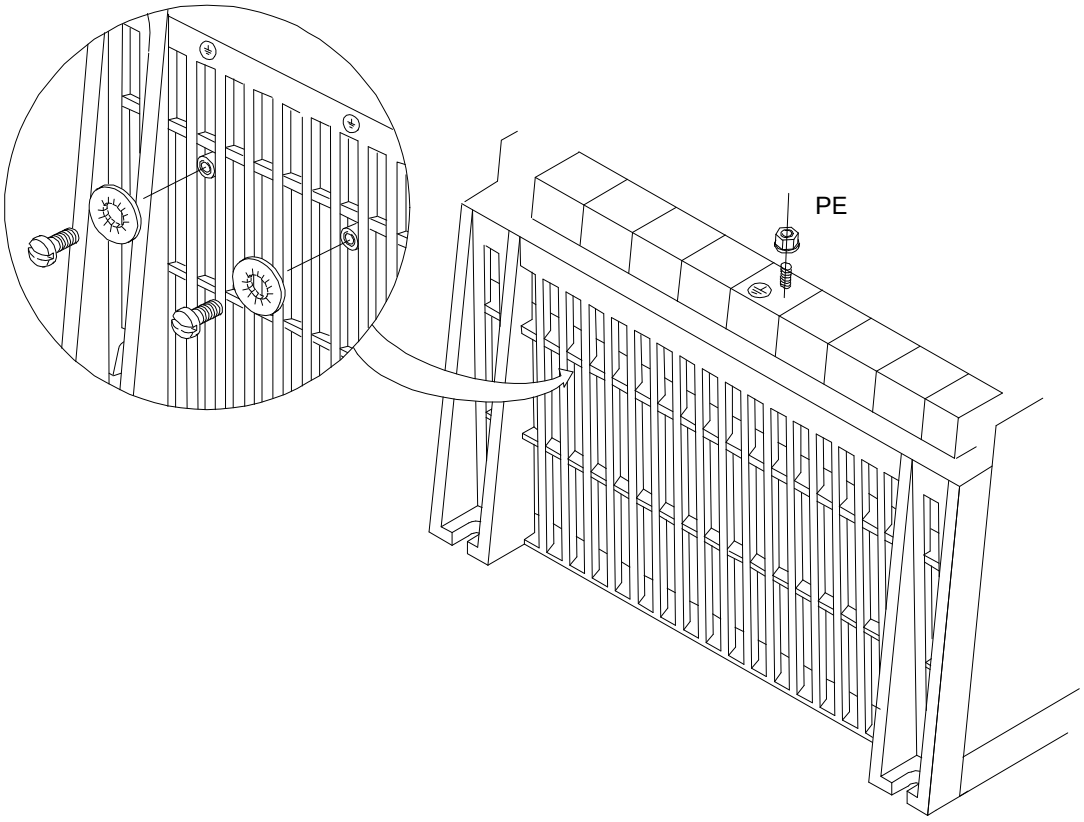
ALL FREQUENCY CONVERTERS MUST BE PERMANENTLY EARTHED

MODEL 620 TYPE 4 AND TYPE 5 SERIES

Cubicle-Mounted (IP20) Models

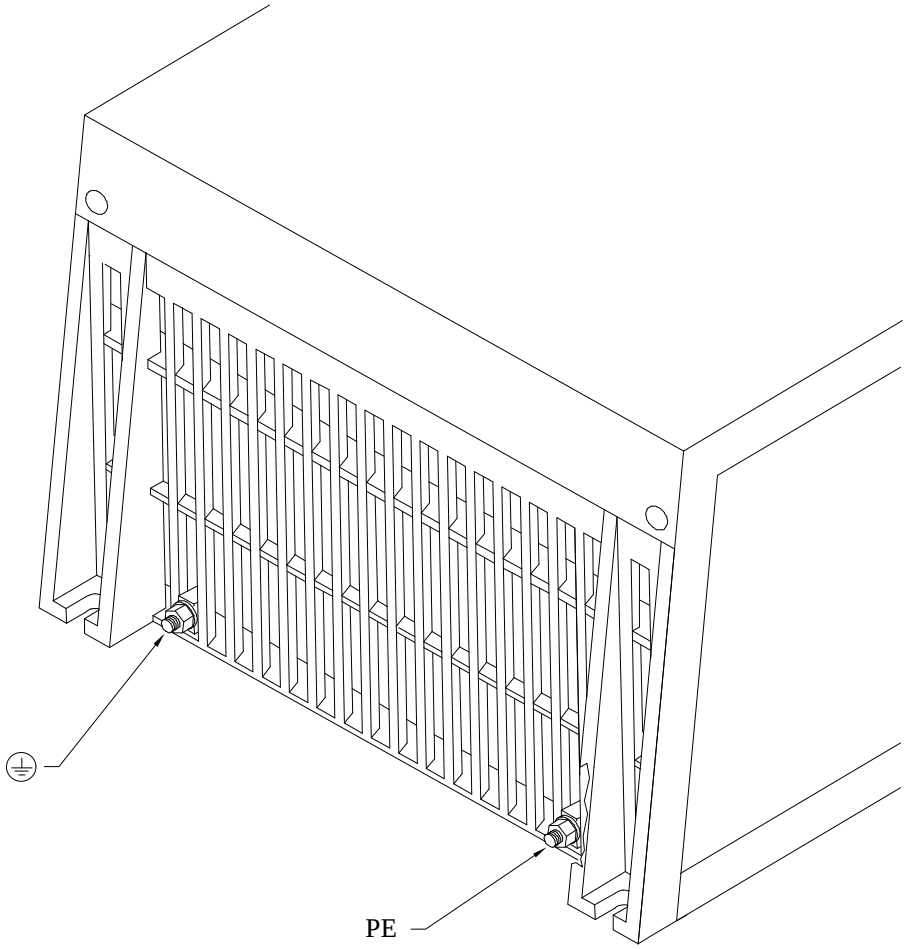
Model 620 Type 4 Series

Protective earthing arrangements for these models are provided by a single-size M4 diameter earth terminal located at the centre of the power terminal array, together with two further earth terminals consisting of size M4 diameter slot-head screws and washers located on the lower face of the drive, as shown in the drawing below. In all cases, the terminals are identified with the symbol ⏚ (IEC 417, Symbol 5019) and are intended to be used with protective conductors terminated with compression terminations sized to accept the M4 diameter bolt fitted and the conductor size selected. The incoming protective conductor shall be connected to the terminal marked “PE” whilst the motor protective conductor shall be connected to either earth terminal located on the lower face of the drive identified with the symbol ⏚ only.



Model 620 Type 5 Series

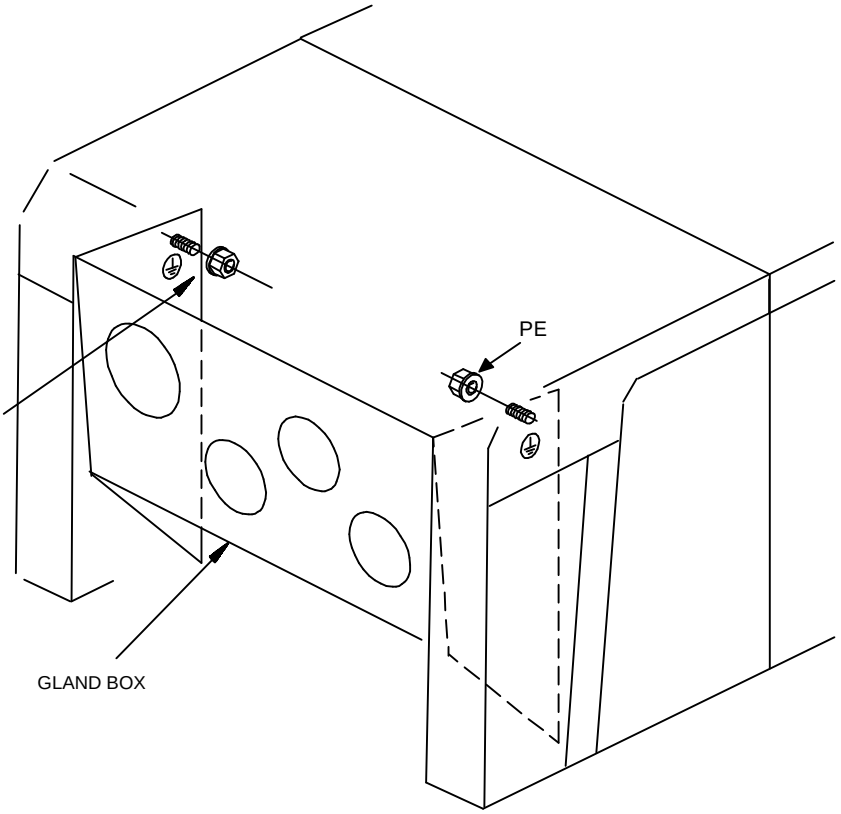
Protective earthing arrangements for these models are provided by two size M5 diameter terminals located on the lower face of the drive, as shown in the drawing below. The terminals are identified with the symbol ⏚ (IEC 417, Symbol 5019) and are intended to be used with protective conductors terminated with compression terminations sized to accept the M5 diameter bolt fitted and the conductor size selected. The incoming protective conductor shall be connected to the terminal marked “PE”, as shown in the drawing below, whilst the motor protective conductor shall be connected to the remaining earth terminal located on the lower face of the drive.



Direct Wall-Mounted Models

Model 620 Type 4 and Type 5 Series

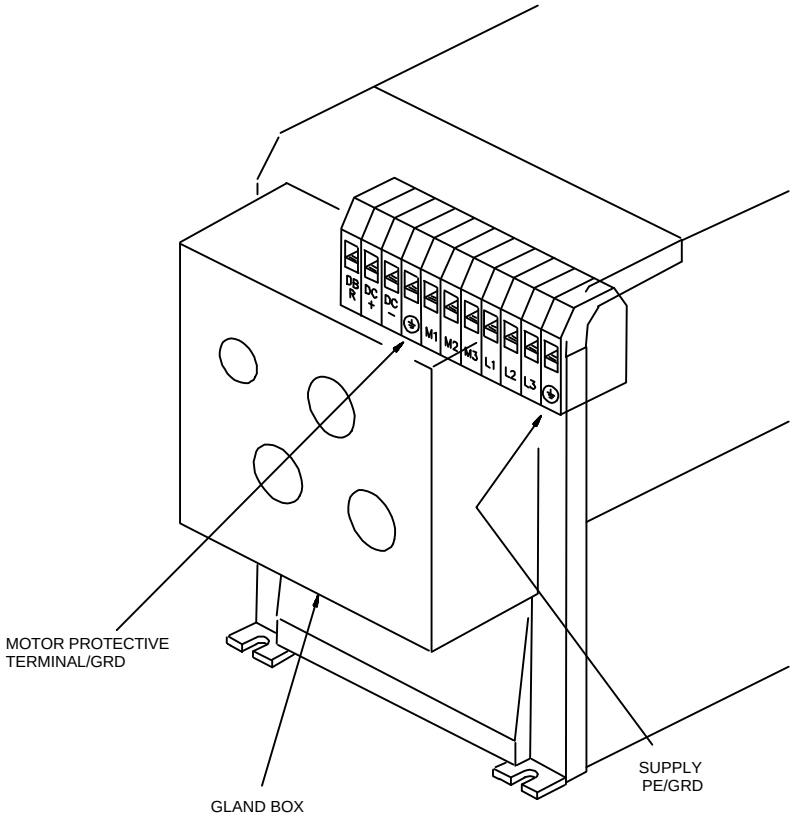
Protective earthing arrangements for wall-mounted models are provided by two size M5 diameter terminals mounted on either side of the internal faces of the sideplates of the conduit gland box as shown in the accompanying drawing. Both terminals are identified with the symbol ⏚ (IEC 417, Symbol 5019) and are intended to be used with protective conductors terminated with compression terminations sized to accept the M5 diameter bolt fitted and the conductor size selected. The incoming protective conductor shall be connected to the terminal marked “PE”, as shown in the drawing below, whilst the motor protective conductor shall be connected to the remaining earth terminal within the gland box.



DIRECT WALL-MOUNTING PE/GRD CONNECTIONS
620 TYPES 4 & 5

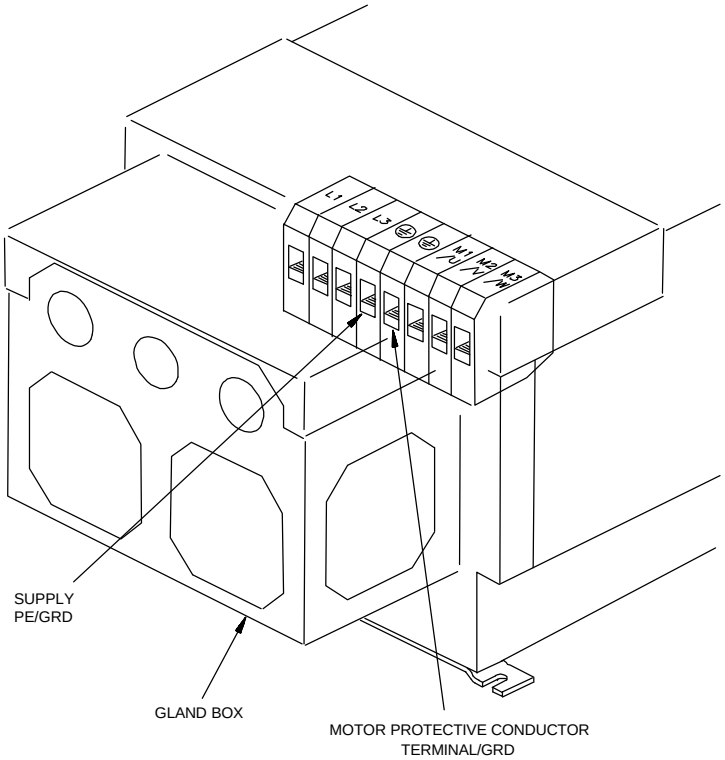
MODEL 620 TYPE 6 AND TYPE 7 SERIES

The protective earthing arrangements for these models consist of two green-yellow coloured terminal blocks located as part of the power terminal array, as shown in the accompanying drawings. The incoming protective conductor of suitable size shall be connected to the terminal marked “PE” as shown in the drawing below, whilst an adequately rated motor protective conductor shall be connected to the remaining earth terminal block.



CUBICLE AND WALL MOUNTING PE/GRD CONNECTIONS

620 TYPE 6



CUBICLE AND WALL MOUNTING PE/GRD CONNECTIONS

620 TYPE 7

Control Wiring

General wiring diagrams for the 620 are provided in Chapter 2.

Control cables should be 0.75mm^2 (18AWG) minimum. It is recommended that screened cable is used, with the screen connected at the drive end only. Control wiring should be kept separate from power and motor wiring.

For normal speed control operation, the speed demand signals are connected to the speed inputs (control board terminals C3, C4 and F2) as required. Terminal C2 or F1 may be used for the 0V connection associated with the SPEED SETPOINT and DIRECT INPUT signals. The maximum speed, and other associated parameters, are set from the MMI.

The START signal to the 620 Vector drive is provided by connecting a single holding contact between control board terminal B7 (START) and terminal B9 (+24V). When the contact is open, the motor stops. When the contact is closed and both COAST STOP and FAST STOP are at +24V, the motor will run.

A digital output indicating that the drive is healthy is provided on terminals E7 of the 620 Vector drive. Any alarm which causes the drive healthy output to de-activate is internally latched by the drive until both START and JOG go low (0V or open circuit). The cause of the alarm is displayed by the MMI. Once latched, such an alarm can be cleared only by removing and re-applying the START or JOG signal.

DYNAMIC BRAKING

Introduction

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 810V for the 400V build (or 420V for the 230V build) 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 overvoltage. Dynamic braking increases the braking capability of the drive by dissipating the excess energy in a high power resistor connected across the DC link (refer to Figure 3.2).

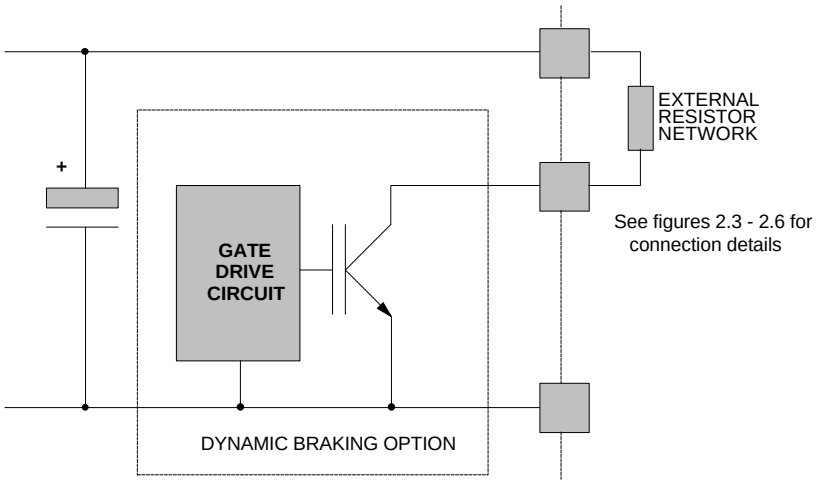


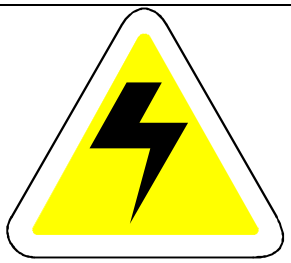
Figure 3.2 - The Dynamic Braking Option

The dynamic braking option is a PCB with an extra IGBT power device fitted. This is fitted inside the drive package and is connected to the negative side of the DC link as shown in Figure 3.2.

When the DC link voltage rises above 750V for the 400V build (385V for the 230V build), 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 the threshold level. The amount of energy produced by the motor during regeneration depends upon the RAMP DOWN TIME parameter and the inertia of the load.

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

All 620 units are supplied without braking resistors by default. The following paragraphs should be used as a guide to calculate the braking requirements of the system.



WARNING!

Connecting a brake resistor to a drive not fitted with brake option (see product code) will result in damage to this unit. In the case when an internal brake option is not present the DBR terminal may be used to connect an external braking unit

Brake Resistor Selection

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

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

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

J	- total inertia (kgm^2)
n_1	- initial speed (rpm)
n_2	- final speed (rpm)
t_b	- braking time (s)
t_c	- cycle time (s)

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 over.

By connecting these resistors in series and in parallel the braking capacity can be selected for the application.

The minimum resistance of the combination should not be less than that specified in Table 3.2.

The resistor(s) must be specified to the maximum DC link voltage (810V for the 400V build, 420V for the 230V build).

Brake Resistor Specification

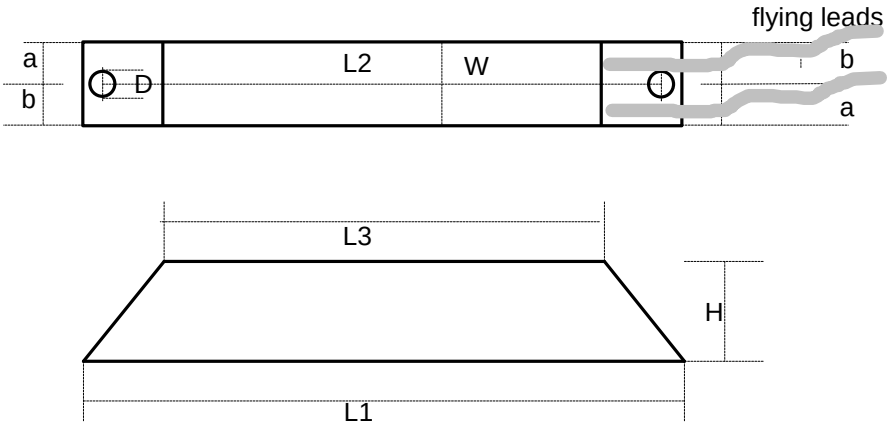
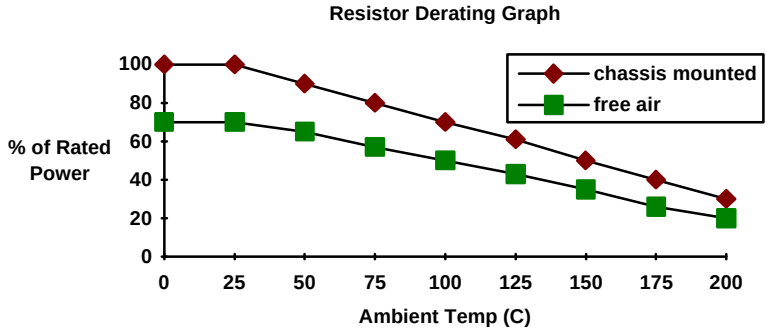


Figure 3.3 Mechanical outline of default brake resistors.

Part number	CZ388397	CZ388396
Resistance	56ohms	36ohms
Max Wattage	200W	500W
5 second rating	500%	500%
3 second rating	833%	833%
1 second rating	2500%	2500%
Dimensions L1 (mm)	165	335
L2 (mm)	146	316
L3 (mm)	125	295
W (mm)	30	30
H (mm)	60	60
D (mm)	5.3	5.3
a (mm)	13	13
b (mm)	17	17
Flying lead length (mm)	500	500
Electrical Connection	M5 spade	M5 ring



These resistor should be mounted on a heatsink (back panel) and covered to prevent injury from burning.

Specification of the Dynamic Braking Switch

Chassis type 4		
Typical motor rating	(380 - 460 Volts)	0.75kW to 7.5kW
Typical motor rating	(208 - 240 Volts)	0.75kW to 4.0kW
Current rating	(20s max)	15A
Max duty cycle		30%
Min resistor value	(380 - 460 Volts)	50Ω
Min resistor value	(208 - 240 Volts)	25Ω

Chassis type 5		
Typical motor rating	(380 - 460 Volts)	11kW to 15kW
Typical motor rating	(208 - 240 Volts)	5.5kW to 7.5kW
Current rating	(20s max)	30A
Max duty cycle		30%
Min resistor value	(380 - 460 Volts)	25Ω
Min resistor value	(208 - 240 Volts)	12.5Ω

Chassis type 6					
Typical motor rating	(380 - 460 Volts)	18kW	22kW	30kW	37kW
Typical motor rating	(208 - 240 Volts)	-	11kW	15Kw	18kW
Current rating	(20s max)	45A	45A	65A	75A
Max duty cycle		30%	30%	30%	30%
Min resistor value	(380 - 460 Volts)	17Ω	17Ω	11.5Ω	10Ω
Min resistor value	(208 - 240 Volts)	-	8.5Ω	6Ω	5Ω

Chassis type 7				
Typical motor rating	(380 - 460 Volts)	45kW	55kW	75kW
Typical motor rating	(208 - 240 Volts)	22kW	30kW	37kW
Current rating	(20s max)	90A	110A	150A
Max duty cycle		30%	30%	30%
Min resistor value	(380 - 460 Volts)	8.3Ω	6.9Ω	5.0Ω
Min resistor value	(208 - 240 Volts)	4.2Ω	3.5Ω	2.6Ω

Table 3.2 Dynamic Braking Switch Ratings

Brake Resistor Selection - Further notes.

There are several criteria which must be fulfilled when selecting a braking resistor for safe and proper operation. These include peak and average power dissipation, resistance and voltage rating. This section describes how to select the right resistor for the application.

When the motor is decelerating a load, the amount of power it creates is determined by the inertia of the load and the time the change in speed takes. The rate of change is determined by the MMI parameter **RAMP DOWN TIME**.

Calculating Power Dissipation

The power dissipation of the resistor needs to be calculated for both peak and average power. The relationship between these two figures is shown in Figure 3.4.

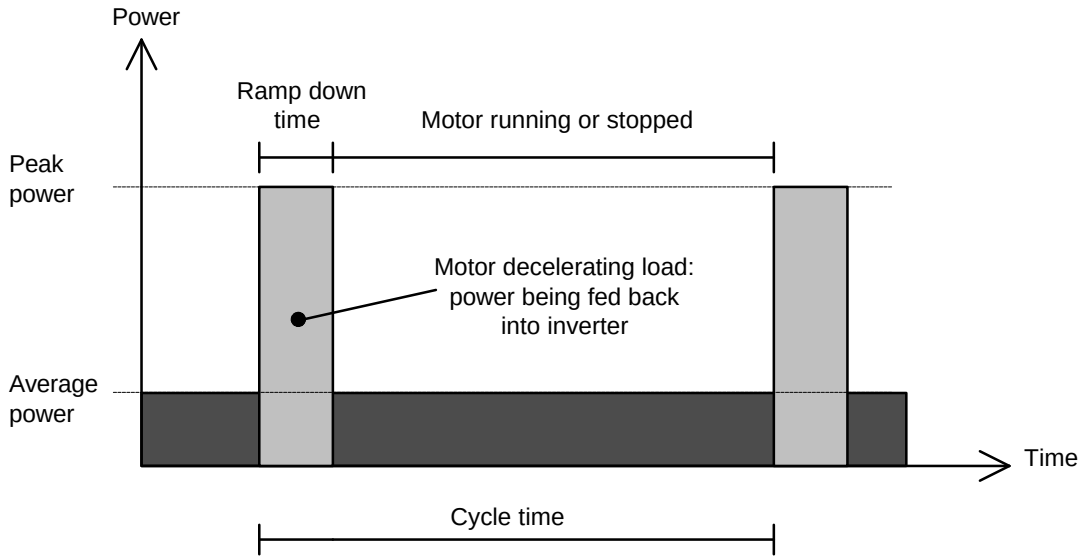


Figure 3.4 Peak and Average power

The peak power dissipation depends on the change in motor rotational speed, how quickly the change is achieved, and the inertia of the load. This is calculated as follows:

$$\text{Peak power dissipation (in W)} = \frac{0.0055 \text{ x total inertia } \left(\text{in kgm}^2\right) \text{ x } \left(\text{initial RPM}^2 \text{ - final RPM}^2\right)}{\text{ramp down time}}$$

or,

$$P_{pk} = \frac{0.0055 \text{ x J x } \left(N_1^2 - N_2^2\right)}{t_b}$$

where J = total inertia in kgm^2, N_1 is the initial motor speed in RPM, N_2 is the final speed and t_b is the braking time in seconds.

The average power dissipation calculated as follows:

$$\text{Average power (W)} = \frac{\text{peak power in W} \times \text{ ramp down time}}{\text{cycle time in seconds}}$$

or,

$$P_{av} = \frac{P_{pk}}{t_c} \times t_b$$

where t_c is the cycle time in seconds (refer to Figure 3.4)

For example, for a system with a total inertia of 1 kgm^2 decelerating from 1500 RPM to 500 RPM in 10 seconds and a cycle time of 110 seconds, the calculations are:

$$\text{Peak power (W)} = \frac{0.0055 \text{ x } 1 \text{ x } \left(1500^2 - 500^2\right)}{10}$$

$$= \frac{0.0055 \text{ x } \left(2250000 - 250000\right)}{10}$$

$$= \frac{0.0055 \text{ x } \left(2000000\right)}{10}$$

$$= \frac{11000}{10}$$

$$= 1100\text{W (1.1kW) Peak for 10 Seconds}$$

$$\text{Average power (W)} = \frac{\text{peak power}}{\text{cycle time in seconds}} \text{ x braking time in seconds}$$

$$= \frac{1100}{110} \text{ x } 10$$

$$= 100\text{W}$$

The brake resistor must be rated to cope with both the peak and average power. For the above example, a resistor capable of dissipating 1100W peak for 10 seconds and an average power of 100W will be required.

Information on the peak power rating and the average power rating of 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.

The resistance of the resistor is an important factor. Each of the 620 Vector drives has a specified minimum load resistance. Under no circumstances must a resistor of lower value be used, as this will cause serious damage to the electronic switch. The minimum resistor values and the maximum permissible peak power dissipation for a maximum of 20 seconds are listed in Table 3.1.

If the power dissipation is to be significantly less than half the maximum allowable, a higher resistance value may be used if this is convenient, up to a maximum of five times the minimum resistance. A rule of thumb calculation for this is as follows:

$$\text{Maximum resistance } (\Omega) = R_{max} = R_{min} \text{ x } \frac{P_{max}}{2 \text{ x } P_{pk}} \quad \text{but note: } R_{max} \leq 5 \text{ x } R_{min}$$

No damage will be caused if any resistance between this value and the minimum specified in Table 3.1 is used. Always use a lower resistance rather than a higher resistance if the calculated value is not available.

Series/parallel Networks

In order to obtain the necessary power rating, it will usually be necessary to build up a series/parallel network of resistors, as shown in Figure 3.5.

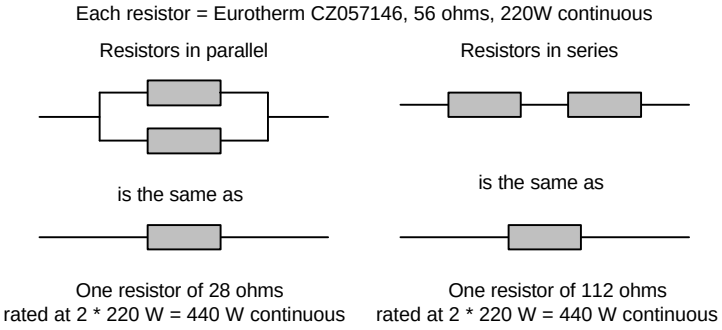


Figure 3.5 Example parallel and series networks

By connecting resistors in series and in parallel the braking capacity can be selected for the application. **Always use identical resistors in series/parallel combinations for braking applications.**

The formula to calculate the effects of series and parallel combinations are as follows.

Resistors in series: Total resistance = the sum of all the resistances (i.e. R1 + R2 + R3 +R4 etc.).

$$\text{Resistors in parallel} \quad : \quad \text{Total resistance} \quad = \quad \frac{\text{resistor value}}{\text{total number of resistors}}$$

Power dissipation: the number of resistors times the individual power dissipation of each resistor.

For example, four Eurotherm CZ057146 56 Ω 220W continuous resistors in series:

Total resistance = 56 Ω + 56 Ω + 56 Ω + 56 Ω = 224 Ω

Four Eurotherm CZ057146 56 Ω 220W continuous resistors in parallel:

$$\text{Total resistance} \quad = \quad \frac{56 \ \text{W}}{4} \quad = \quad 14 \ \text{W}$$

Continuous power ratings in both cases are 880W (four times 220W). Peak powers are similarly multiplied by four.

Series and parallel networks can be combined as shown in Figure 3-5. The calculations are then simply combined: add up the series resistances first, then calculate the effect of having the appropriate numbers in parallel.

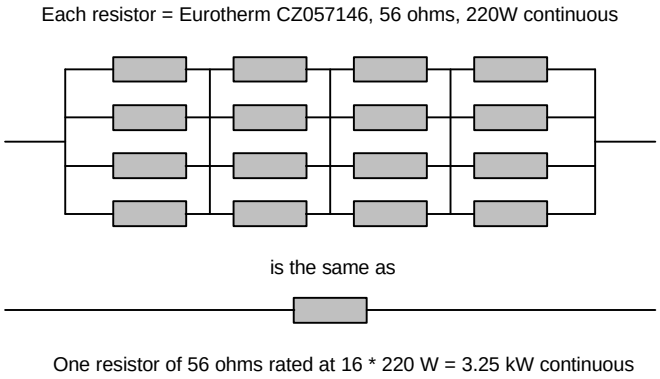


Figure 3.6 Series/parallel network

A special case is for 'square' series/parallel networks where the number of series elements is the same as the number of parallel elements, as in Figure 3.6. In such an array the total resistance is always the same as one resistor; the power rating is the rating of one resistor multiplied by the number of resistors.

Resistor Voltage Ratings

The resistor(s) must be specified for the maximum DC link voltage (800V for the 380-460V version, 405V for the 208-240V version).

EMC INSTALLATION GUIDELINES

Introduction

This section provides installation guidelines for drive modules and systems to maximise their '**E**lectro Magnetic **C**ompatibility' (EMC) in their intended operating environment. All installers must read this section and apply the advice which is relevant to their application. **Pass on this information to others as is appropriate.**

All power drive systems have the potential to produce electrical emissions, both radiated and conducted back into the AC supply. This is due to the inherent operation of all drives by switching large voltages and currents rapidly in order to control the motor. Because the drives internal control electronics operates continuously in very close proximity to the electrically noisy power switching elements, drives are inherently immune to any additional external electrical noise.

Great care has been taken in the design and selection of suitable EMC filters to provide the correct level of interface suppression, ease of installation and to ensure that electrical safety is not compromised. The EMC performance can only be guaranteed to be within the limits specified when the 620 drive modules are installed together with the recommended EMC filters in accordance with the following instructions.

The subject of EMC is explored in more detail in a separate Eurotherm Application Manual entitled "EMC Installation Guidelines for modules and systems', part number HA388879, available from your local Eurotherm office.

EMC Filters to Reduce Line Conducted Noise

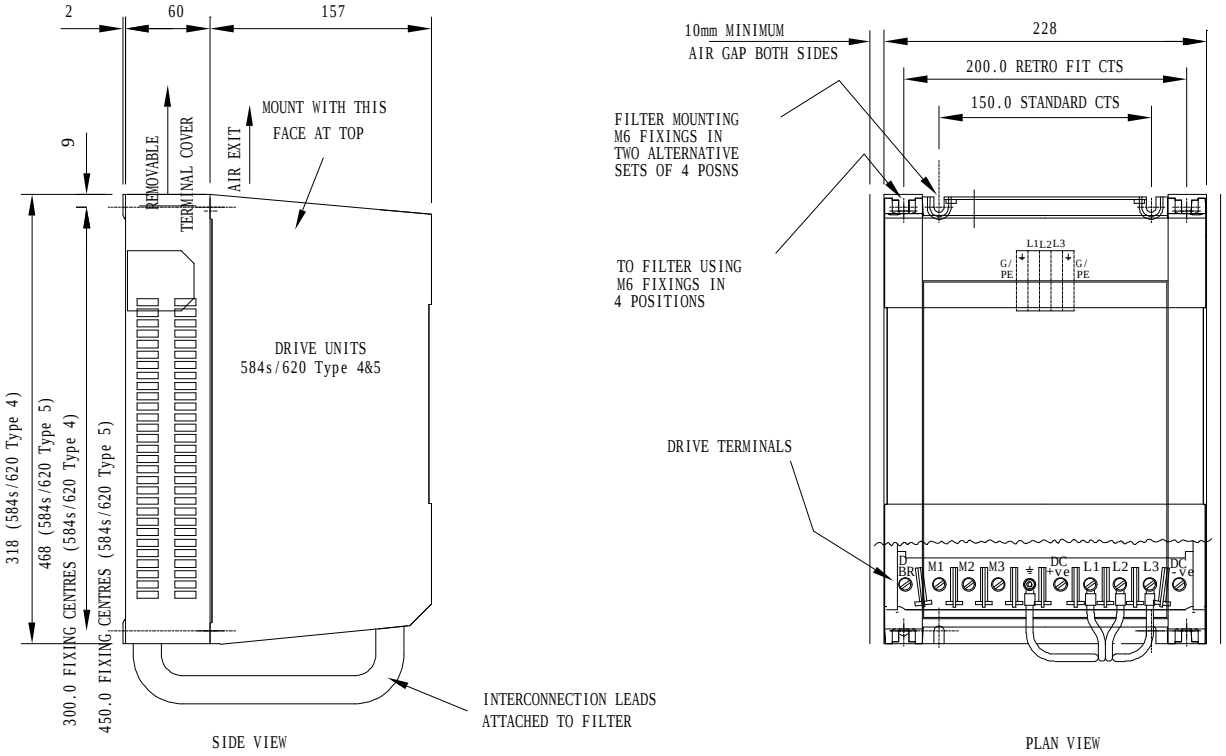
An EMC supply filter may be used with each 620 drive module to reduce the line conducted noise. The recommended filters are listed in table 3.3 below.

Table 3.3 AC Supply Filter Part Numbers for Conformance with EN55011 Class B (suitable for both generic environments)

Eurotherm Product	Rating	Eurotherm Filter Part Number
620 Type 4	0.75kW - 5.5kW (380V to 460V) & 0.75kW - 2.2kW (208V to 240V) constant torque	CO388966U021
620 Type 4	7.5kW (380V to 460V) & 4kW (208V to 240V) constant torque	CO388966U035
620 Type 5	All	CO388966U045
620 Type 6	All	CO388966U095
620 Type 7	All	CO388966U200

The recommended EMC filters for the type 4 and 5 620 are to be mounted behind the drive module (underfloor mounting) and share the same footprint. They are suitable as standard for cubicle mount applications, as shown in figure 3-7. For wall mounting a purpose designed pressed steel conduit (Part No. BA388844) is supplied with the gland box, for mounting between the filter body and gland box is shown in the mechanical mounting drawing figures 3-8.

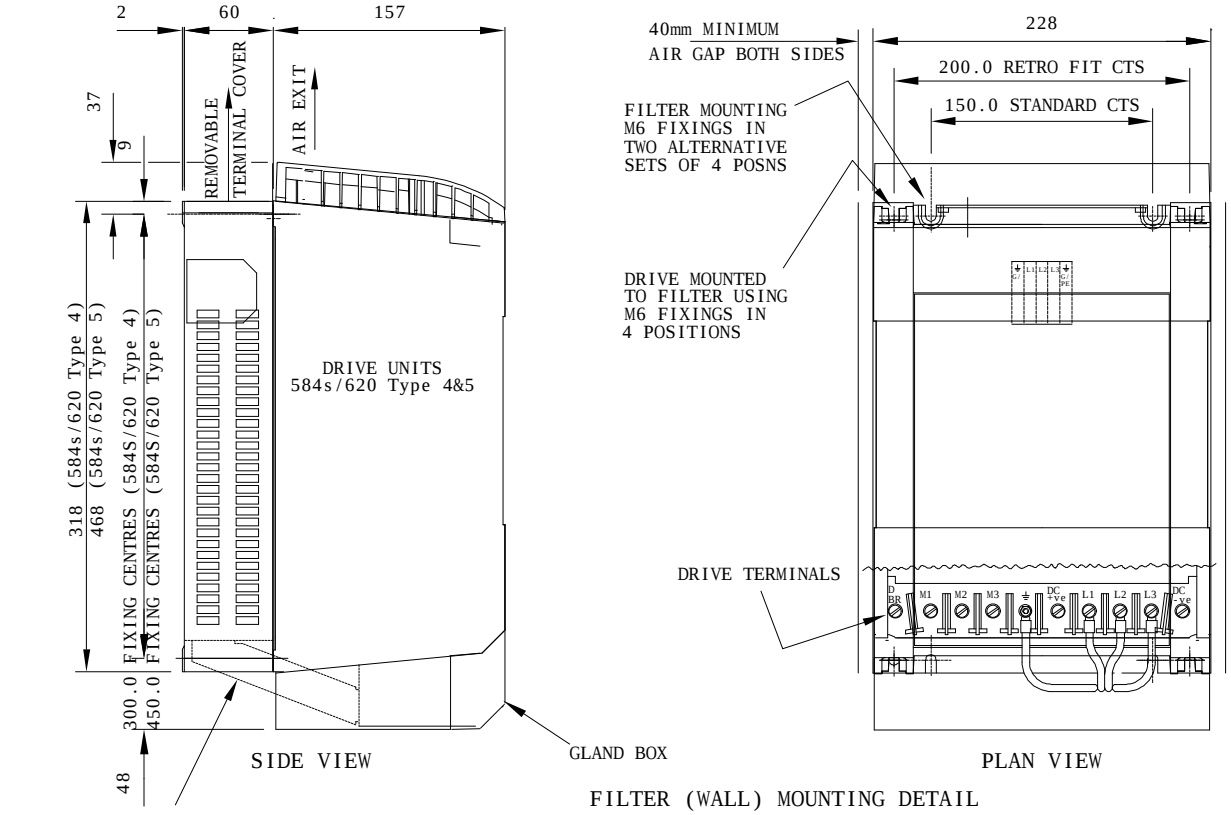
Figure 3-7. Filter Cubicle Mounting Details (620 types 4 & 5)



FILTER (CUBICLE) MOUNTING DETAIL

FILTERS:- CO388966U021 (18amp FOR 584s/620 Type 4)
CO388966U035 (24amp FOR 584s/620 Type 4)
CO388966U045 (38amp FOR 584s/620 Type 5)

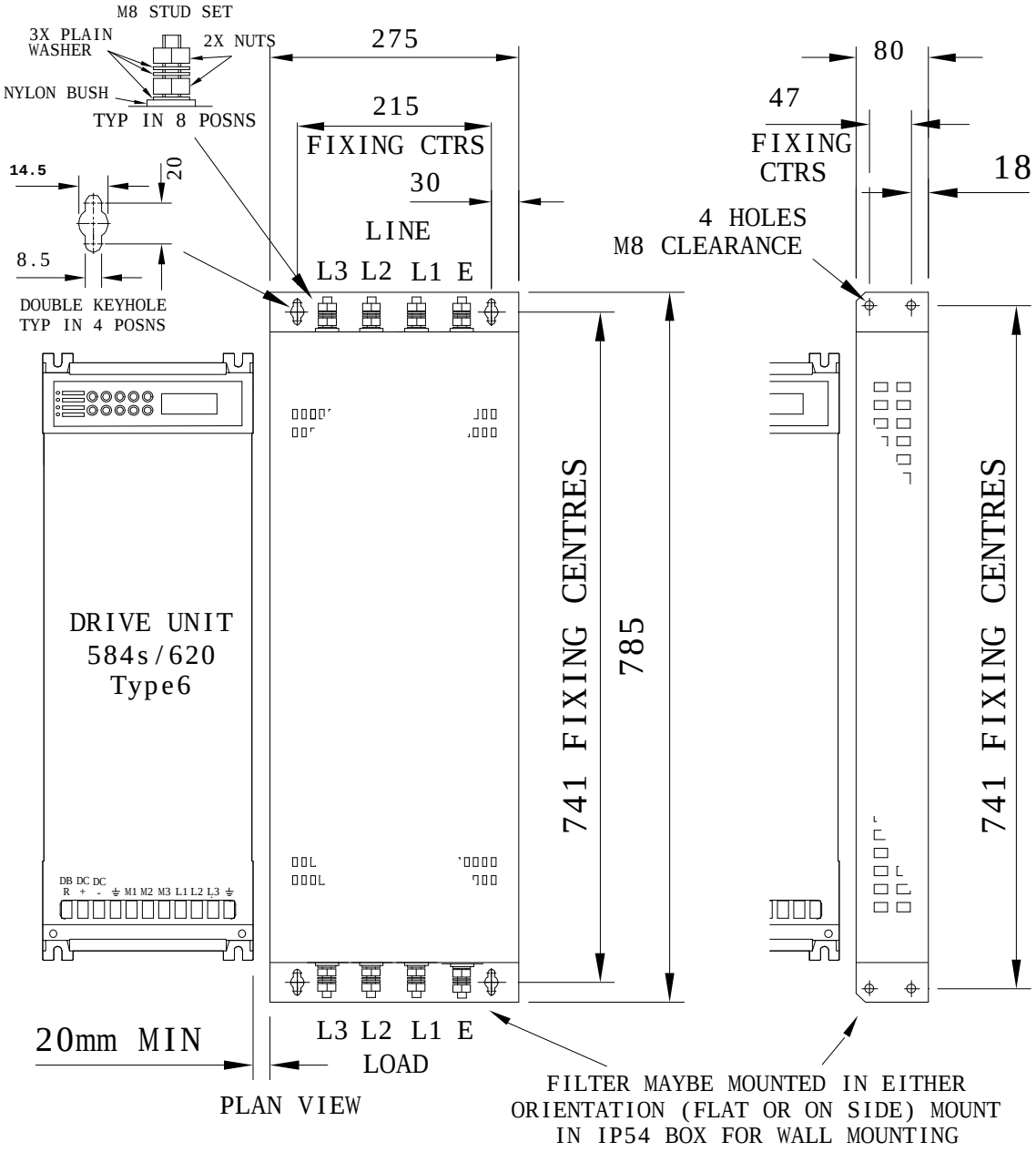
Figure 3-8. Filter Wall Mounting Details (620 types 4 & 5).



FILTER (WALL) MOUNTING DETAIL

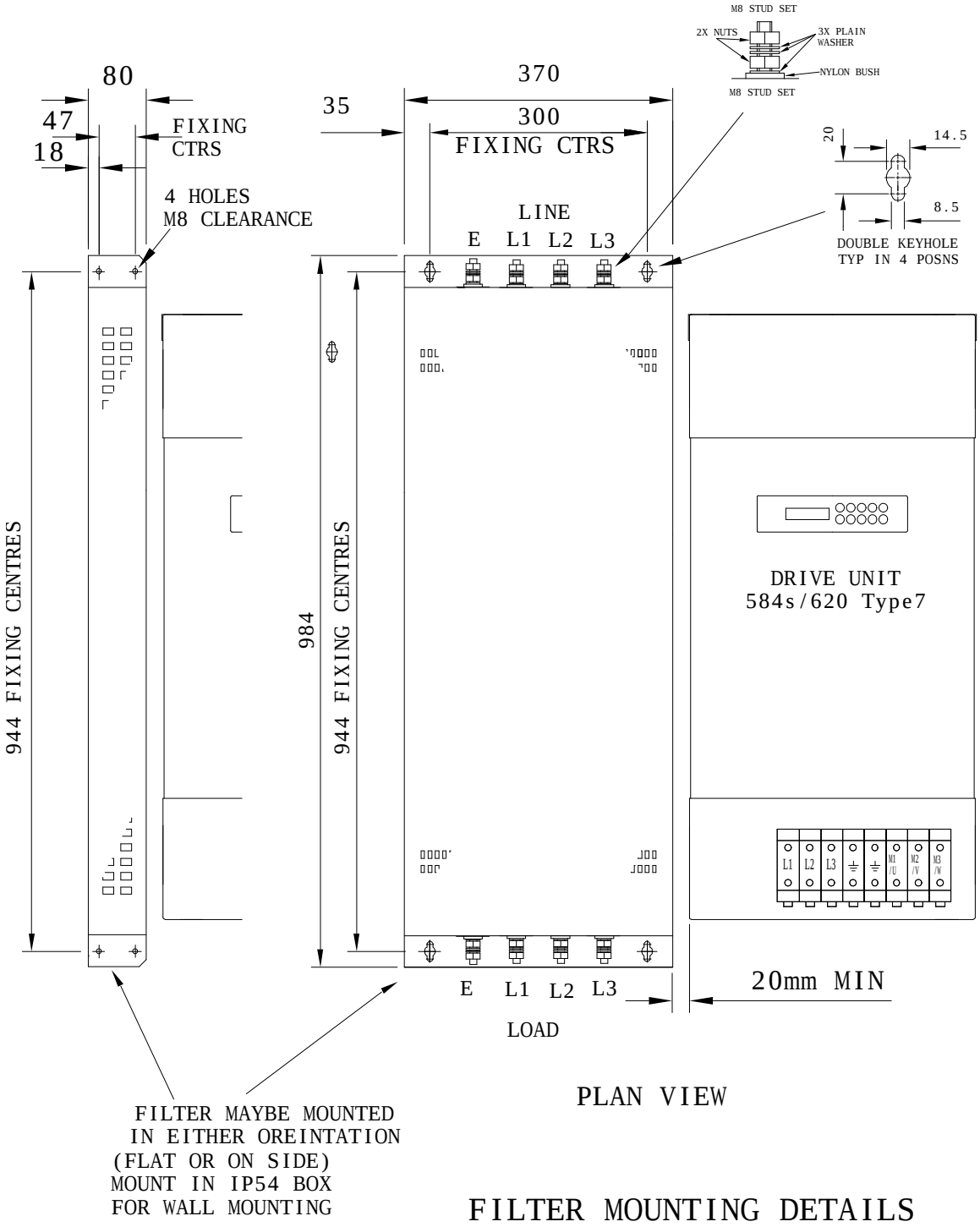
FILTERS:- CO388966U021 (18amp FOR 584s/620 Type 4)
CO388966U035 (24amp FOR 584s/620 Type 4)
CO388966U045 (38amp FOR 584s/620 Type 5)

Figure 3-9. Filter Mounting Details (620 Type 6).



FILTER MOUNTING DETAILS PART NUMBER
CO388966U095 FOR 584S/620 TYPE 6

Figure 3-10. Filter Mounting Details (620 Type 7).



FILTER MOUNTING DETAILS
Part No CO388966U200
FOR 584s/620 Type 7

The type 6 and 7 620 filters are not of the footprint mounting design. These filters may be mounted to the left, right, above, below or spaced behind the product, but can be mounted in two orientations i) flat against the wall or ii) projecting over from the wall, mounting arrangements are shown in figures 3-9 and 3-10. Wallmount applications require the EMC filter to be mounted in a separate suitable enclosure, and the gland box to be fitted to the 620.

The EMC filter should be mounted as close to the 620 drive module as possible. The connection between the 620 and filter must always be as short as possible taking care not to obstruct any ventilation spacing and **be segregated from all other cables**. If this cable/busbar exceeds 0.3m in length then it must be replaced with a screened/armoured cable, with the screen/armour earthed at both the filter and inverter ends with large-area contact surfaces, preferably with metal cable glands. The connection between the 620 drive module and the motor must be installed away from all other cables or wires. Ideally the filter will be mounted onto the same metallic panel as the drive. The RF connection between the inverter, filter and panel should be enhanced as follows:

- Remove any paint/insulation between the mounting points of the EMC filter, 620 drive module and panel.
- Liberally apply petroleum jelly over the mounting points and securing threads to prevent corrosion. Alternatively conducting paint could be used on mounting panels.
- If the proceeding is not possible, then the RF earth bond between the filter and 620 drive module is usefully improved by making an additional RF earth connection using wire braid of at least 10 mm^2 cross sectional area (due to skin effect).
- For wall mount application, ensure that the cable between the EMC filter and the 620 drive module cable is passed through conduit mounted between the filter and the Gland Box. This cable must be as short as possible and segregated from all other cables. The conduit must be electrically connected to the filter and drive module gland box.

NOTE: **M**etal surfaces such as eloxized or yellow chromed e.g. with cable mounting or 35 mm DIN rails, screws and bolts have a high RF impedance which can be very detrimental for EMC performance.

Care should be taken to ensure that the protective earth (PE) conductor exiting from the filter is connected to the protective earth connection of the 620 drive module. Any additional RF earth such as a cable screen **is not a protective earth**. The EMC filter must be **permanently earthed** to prevent the risk of electric shock under abnormal operating instances (such as the loss of one phase of the AC supply). Permanent earthing can be achieved by either:

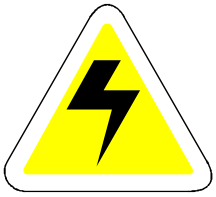
- Using a copper protective earth conductor of at least 10 mm^2 or
- Installing a second conductor in parallel connection with the protective conductor to a separate protective earth terminal.

Each conductor shall on its own meet the requirements for a protective earth conductor. On all recommended underfloor EMC filters two protective earth connections are provided for permanent earthing.

The recommended EMC filters are designed to operate from normal three-phases supplies which are balanced with respect to earth (earth referenced supplies). This minimises the earth leakage current due to the filter capacitors between phase and earth. On some specific customer sites the supply may not be balanced with respect to earth (non-earth referenced supplies). The earth leakage currents would increase and interfere with the operation of any earth-fault monitoring equipment. In addition the EMC performance of the filter will be degraded. Eurotherm Drives do not recommend the use of AC supply filters on non earth-referenced supplies.

As with all power electronic drives the conducted emissions increase with motor cable length. EMC conformance to the stringent limits is only guaranteed up to a cable length of 50 m (types 4 and 5) and 5m (types 6 and 7). This length can be increased. Refer to section entitled Motor Cable-length Limitations in this chapter.

If **one EMC filter** is to be used in an enclosure, then this filter should be mounted as close to the incoming AC supply to the enclosure as possible.



IMPORTANT WARNINGS !

The recommended EMC filters are designed to work with supplies which are balanced with respect to earth (i.e. earthed referenced supplies). On some specific customer sites the supply may not be balanced with respect to earth. The recommended standard EMC filters are not recommended be used on such supplies. Refer to Eurotherm Drives for more information.

The EMC filters contain capacitors phase-to-phase and phase-to-earth. Discharge resistors are fitted, but the filters, terminals and wiring must not be touched for a period of 5 minutes after the removal of the AC supply. **Not adhering to this warning can result in electric shock.**

The EMC filter must only be used with **a permanent earth** connection using one of the following alternatives:

a) Using a copper protective earth conductor of at least 10 mm^2 or

b) Installing a second conductor in parallel with the protective conductor to a separate protective earth terminal on the filter or inverter. The conductor on its own shall meet the requirements for a protective earth conductor.

Thermal performance of the EMC filter is only guaranteed up to a maximum equivalent cable length of 150 m.

Refer to the following section regarding safety considerations with earth-fault detection systems.

Interaction With Earth-fault Monitoring Systems and Safety Considerations

Due to the EMC filter internal capacitors between phase and earth, on initial connection of the AC supply a pulse of current will flow in the earth. This has been minimised in the recommended EMC filters, but may still trip out any RCD (Resident Current Detector) in the earth system. In addition high frequency and DC components of earth leakage currents will flow under normal operating conditions. Under certain fault conditions, larger DC protective earth currents may flow. The protective function of some RCDs cannot be guaranteed under such operating conditions. Eurotherm Drives do not recommend the use of RCDs, but where their use is mandatory, they should be capable of correct operation with DC and AC protective earth currents (such as type B RCDs as in amendment 2 of IEC755) and have adjustable trip amplitude and time characteristics, to prevent nuisance tripping on initial power connection. RCDs used with 620 drive modules and other similar equipment are **not suitable for personnel protection**. Another means of providing personal safety must be provided for, see prEN50178/VDE0160.

Minimising Radiated Emissions

All 620 drive modules can be made to comply with the most stringent radiated emission limits of EN55011 (1991) Class B by simply mounting inside an enclosure with 10 dB attenuation between 30 and 100 MHz (which would typically be the attenuation provided by a metal cabinet with no aperture greater than 0.15m) and screening any control and signal cabling outside of the enclosure. The control and signal cables should be terminated at the entrance to the enclosure. Outside of an enclosure (wall mount) all 620 drive modules will meet the Class A requirements with screening of the signal and control cables. Inside the enclosure the radiated magnetic and electric fields will be high, due to proximity, and any components fitted inside the enclosure must be sufficiently immune. Remember that the EN55011 radiated emission measurements are made between 30 MHz and 1 GHz in the far field, at a distance of between 10m and 30 m. No limits are specified lower than 30 MHz, or in close proximity. Emissions from individual components tend to be additive.

The cable between the enclosure and the motor must be screened or armoured and also contains the motor protective earth connection. The screen/armour must be earthed at both ends by connecting it to both the motor frame and the entrance to the cubicle (or gland box for wall mount), ideally in 360° termination's via cable glands (to meet the most stringent emission requirements). Screen to earth connections via 360° bonding is 75% more effective than earthing via pigtails (Note some motor gland boxes and conduit glands are made of plastic, if this is the case then braid must be connected between the screen and the chassis, in addition at the motor end ensure that the screen is electrically connected to the motor frame since some terminal boxes are insulated from the frame by gasket/paint). Often the screens are terminated on a power screen rail at the entrance to the enclosure using ‘u’ clips to achieve a near 360° screen band. The integrity of the screen must be maintained over the entire length of the cable between the enclosure and motor. If the cable is broken to insert terminals, contactors, chokes, fuses etc., then the screen must be connected over the shortest possible distance.

Note some hazardous area installations may preclude direct earthing at both ends of the screen, in this case earth the other end via a 1 µF, 50VAC capacitor. The motor protective earth should be connected to the drive module motor protective earth connection.

If a shielded cable is not available, lay unshielded motor cables in a metal conduit which will act as a shield. The conduit must be continuous with a direct electrical contact to the drive module and motor housing. If links are necessary, use braid with a minimum cross sectional area of 10 mm^2 .

Safety earthing always takes precedence over EMC earthing.

The use of screened cable without an EMC filter is not recommended, as line-conducted interference will increase substantially and the capacitive coupling of the output cable to earth will result in high earth-leakage currents.

To ensure the correct operation of the 620 drive module, some control and signal cables (encncoder, all analogue inputs and communications) have to be screened back to the inverter terminals. The screen integrity must be continuous right back to the drive if not connected to the cubicle. Always minimise the length of screen stripped back to make this connection. The screen should only be connected at the drive end. If high frequency noise is still a problem, earth at the non drive end via a 0.1 µF capacitor.

Screening and Earthing When Mounted in an Enclosure

Make sure the requirements of EN60204 are adhered to with electrical equipment for machines. Satisfactory EMC performance is only achievable when the 620 drive module, filter and associated equipment is mounted on a conducting metal mounting panel. Beware of constructions using insulating mounting panels or undefined mounting structures A single point earthing strategy should be followed for a single drive module mounted in an enclosure as shown in figure 3-11. The protective earth connection (PE) to the motor must run inside the screened cable between the motor and 620 drive module, where it is to be connected to the motor protective earth terminal on the drive module. (Note in accordance with EN60204 only one protective earth conductor is permitted at each earth terminal contacting point). Local wiring regulations may require the protective-earth connection of the motor to be connected locally but this will not cause shielding problems due to the relatively high RF impedance of the local earth connection.

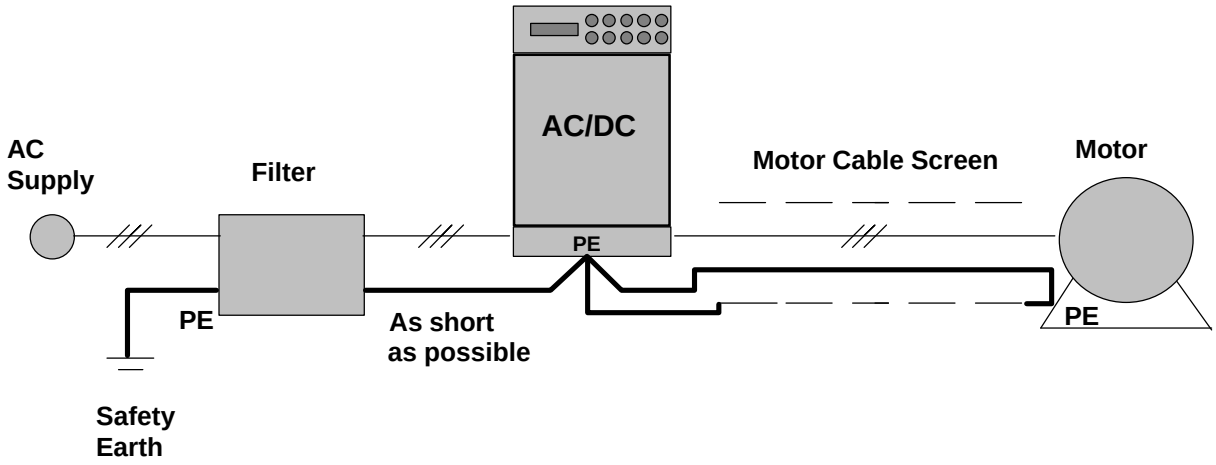


Fig. 3-11: Screening and earthing of a single 620 drive module.

When more than one piece of electrical equipment is fitted inside an enclosure, care must be taken to ensure that noise flowing in the earth connection does not couple into other equipment. A star-point earthing policy separating noisy from quiet earths is strongly recommended. Five separate earths branches should be provided for:

- Clean earth busbar — The Clean earth busbar is used as a reference point for all signal and control cabling. This may the further subdivided into an analogue and a digital reference busbar, each separately connected to the star earthing point. The digital reference is also used for any 24V control.

- Dirty earth busbar — The dirty earth busbar is used for all power earths (i.e. protective earth connections)
- Enclosure metalwork busbar — The enclosure metalwork busbar is used for all parts of the cubicle including panels, doors and back plate. It is also used as a reference for any 110 or 220V control used and for the control transformer screen.
- Power screen busbar — The power screen busbar is only for power screened cables which **do not** have to go directly to the 620 drive module (such as motor cables, braking choppers and their resistors) or to other drive modules (refer to appropriate Product Manual to identify these). Noise coupled onto the incoming screens must flow to earth directly so as not to contaminate the rest of the cubicle. Hence the power screen busbar should be placed as close to the point of cable entry as possible.
- Signal/control screen busbar — The signal/control screen busbar is to be used for signal/control screened cables which do not have to go directly to the 620 drive module. This busbar should also be placed as close as to the point of cable entry as possible.

For optimum EMC performance, copper rails with a substantial cross-section should be used for the busbar. Screened cables are best 'u' clamped to the busbars to ensure an optimum HF connection.

The five separate earth busbars should be insulated from the mounting panel and connected to a single earth point (star point) near the PE or PEN terminal of the main supply. Flexible large cross-section cable to ensure a low HF impedance should be used. The arrangement of the busbars should be such that the connection to the single earth point are as short as possible. Fig. 3-12 shows an implementation of a star-point earthing policy.

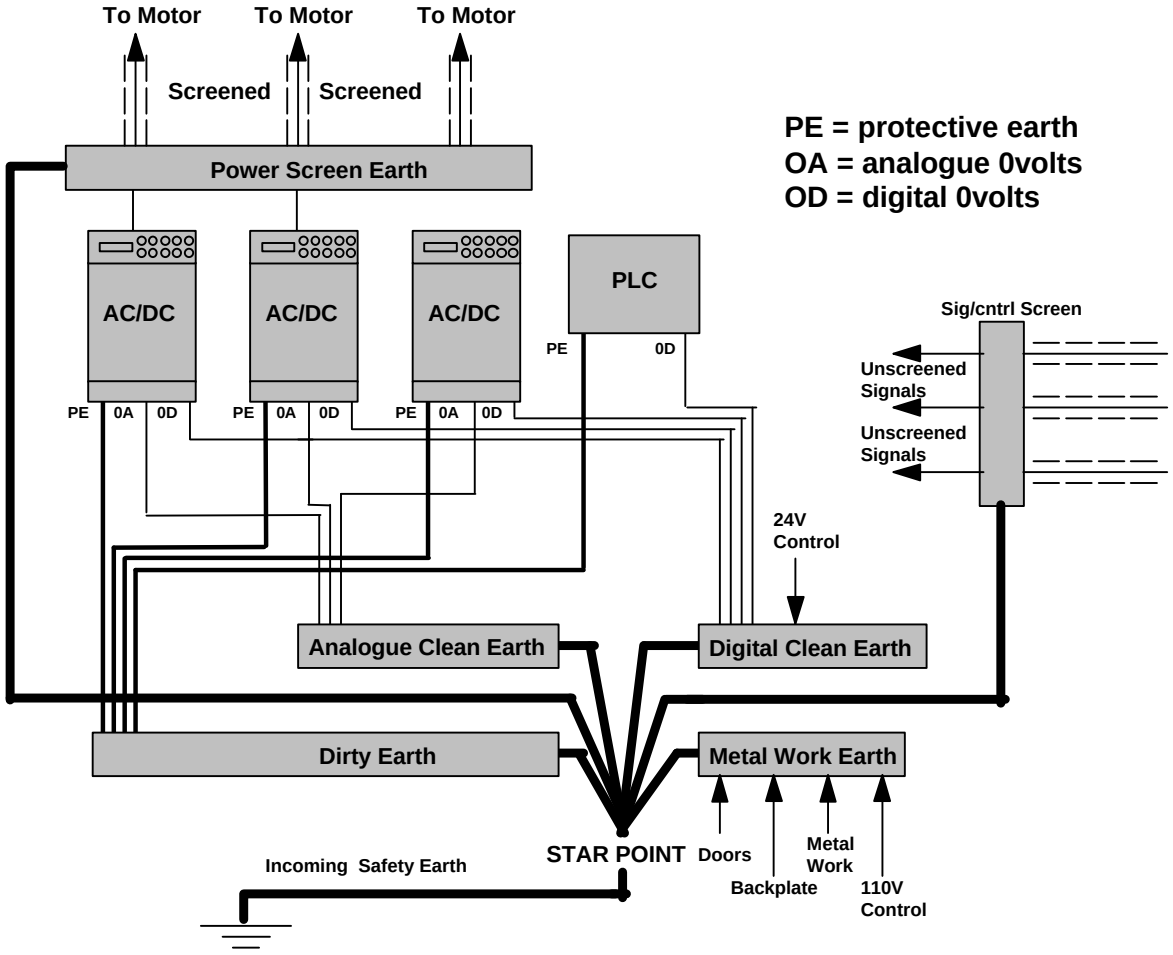


Fig. 3-12: Implementation of star-point earthing policy for multi-drive installation

Screening and Earthing When Wall Mounted

To provide for good EMC performance the recommended EMC filter must be fitted and the cables between the wall-mount 620 drive module and the motor screened or armoured. Also screening of control and signal cables may be required. Refer to the previous instructions on minimising radiated emission (page 3-22). In addition any connections to the DC link must also be screened/armoured, with the screen connected at both ends (e.g. to the protective earth of the dynamic brake resistor).

All 620 drive modules comply with the radiated emission limits of EN55011 (1991) Class A when wall mounted to these instructions, using the recommended EMC filter and screened motor control and signal cabling. Products which meet the limits of Class A can be made to meet the more stringent limits of Class B by mounting inside an enclosure with 10 dB attenuation between 30 and 100 MHz (which would typically be the attenuation provided by a metal cabinet with no aperture at a dimension greater than 0.15m) and screening any control and signal cabling outside of the cubicle. Minimise the length of unshielded cable inside the cubicle to prevent increased radiated emission.

A single-point earthing policy as shown in Fig. 3-11 is required.

The protective earth connection (PE) to the motor must run inside the screened cable between the motor and 620 drive module where it is to be connected to the protective earth terminal in the gland box or on the drive module (note, in accordance with EN60204 only one protective earth conductor is permitted at each earth terminal contacting point) . Local wiring regulations may require the protective-earth connection of the motor to be connected locally but this will not cause shielding problems due to relatively high RF impedance of the local earth connection.

The EMC filter must be permanently earthed in accordance with recommendations and warnings in the section "**EMC Filters to Reduce Line Conducted Noise"**, page 3-16.

Motor Cable-length Limitations

Screened/armoured cable has significant capacitance between the conductors and the screen which increases linearly with cable length. Typically this is 200 pF per metre but this will vary with cable type and current rating. Long cable lengths may have the following undesirable effects:

- Tripping on 'over current' as the cable capacitance is charged and discharged at the switching frequency,
- Producing increased conducted emissions which degrade the performance of the EMC filter due to saturation. EMC compliance is only guaranteed up to a maximum cable length of 50m (type 4 and 5) and 5m (type 6 and 7).
- Causes RCDs (Residential Current Detection) to trip out due to increased high frequency earth current.
- Produces increased heating inside the EMC AC supply filter from the increased conducted emissions. Eurotherm Drives only guarantee the thermal performance of the filters up to a specified cable length of 150m with screened cable.

These effects can be overcome by adding chokes at the output of the 620 drive module. In applications where multiple motors are connected to a single drive, minimise the length of screened/armoured cable connected to the drive by using a single length of cable to a star junction point, from where all the other motor cables are attached. Maintain the integrity of the shield. If the cable is interrupted to insert contactors or other components, the screen must be connected over the shortest possible route. Table A1 in the appendix gives information on the recommended output chokes for use with long cables, cables connected in parallel, or when EMC output filters are used with cables greater than that specified for EMC compliance.

Output filters can also be used to achieve EMC and filter thermal conformance with longer cable lengths than that specified. These output filters also ensure a long motor life by reducing the high dV/dt and over voltage stresses applied to the motor windings by inverters. These filters should be mounted as close to the 620 drive module as possible. Refer to Eurotherm Drives for the selection of suitable filters.

Other Layout Considerations

The proximity between the source and victim circuit has a large effect on radiated coupling. The electromagnetic fields produced by drive modules falls off rapidly with distance from the cabling/enclosure. It should be remembered that the radiated fields from EMC compliant drive systems are measured at least 10m from the equipment over the frequency band 30 to 1000 MHz (as required by EN55011, referenced by the

generics and the drive product specific standard). Any equipment placed closer to the drive system than this will see larger magnitude fields, particularly very close to the drive. No magnetic/electric field sensitive equipment should be placed within 0.25m of the following parts of a drive system:

- 620 Drive module
- EMC output filters
- Input or output chokes/transformers
- Cable between 620 Frequency Inverter and Motor (even when screened/armoured)
- Connections to external braking chopper and resistor (even when screened/armoured)
- AC/DC brushed motors (due to commutation)
- DC link connections (even when screened/armoured)
- Relays and contactors (even if they are suppressed)

Often the coupling between electrically 'noisy' and 'sensitive' cables is a problem. This can be minimised by separating parallel runs by at least 0.25m, and minimising the length of parallel runs. For long parallel runs (>10 m) the separation should be increased proportionally. For example if the parallel runs were 50 m then the separation would be $(50/10) \times 0.25$ m = 1.25 m.

In addition the coupling between two cables which must cross is minimised if they cross over at 90°. Hence sensitive cables should cross the cables to the motor, DC link and braking chopper circuit at 90°, and should never be run close to them or in parallel for any great length.

Never run supply, DC link or motor cables in the same bundle as the signal/control and feedback cables, even if they are screened.

From experience the following equipment is defined as particularly sensitive and care must be taken in the installation:

- Any transducers which produce low level analogue outputs (<1 volt) e.g. load cells, strain gauges, thermocouples, piezoelectric transducers, anometers, LVDT's
- A.M. radios (long and medium wave only)
- Video cameras and closed circuit TV
- Office personal computers
- Capacitive devices such as proximity sensors and level transducers
- Mains borne communication systems
- Equipment not suitable for operation in the intended EMC environment i.e. with insufficient immunity to new EMC standards

Chapter 4

SETTING-UP AND COMMISSIONING

Contents Page

Chapter 4 SETTING-UP AND COMMISSIONING

INTRODUCTION

This chapter describes how to use the Man-Machine Interface (MMI), the necessary steps to set up and commission an installed 620 Vector Drive.

In order to commission the drive successfully it is necessary to understand the basic operation of the MMI.

PHYSICAL DESCRIPTION

The 620 Vector Drives feature an MMI panel, shown in Figure 4.1 Man-Machine Interface (MMI), comprising a 2x16 character liquid crystal display (LCD), four function keys six command keys and four status LEDs. Programming commands and data are entered into the drive by using the function keys to navigate the MMI menu structure and setting various parameters. The LCD and function keys provide a means of tailoring the drive for individual application requirements, monitoring performance and basic operation of the drive. The status LEDs show the condition of the drive.

The Command keys provide a means of locally operating the drive.

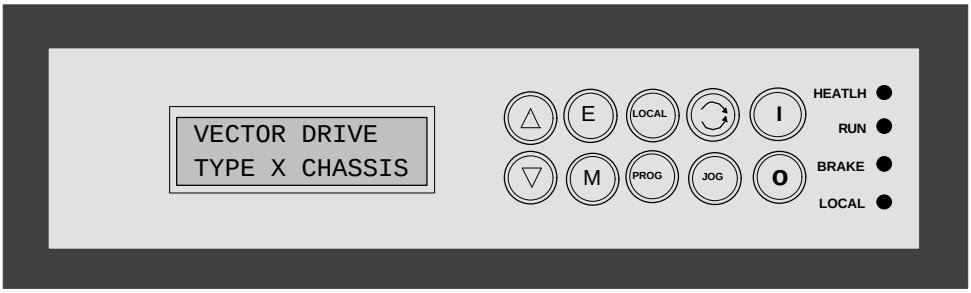


Figure 4.1 Man-Machine Interface (MMI)

MAN-MACHINE INTERFACE (MMI)

The physical parts of the MMI comprise the LCD display and function keys. The software element comprises an extensive menu system.

Display and Menu

The MMI display comprises two lines of plain text information to provide access to the various menu options and parameters. The top line contains the title of the current menu or parameter and the second contains either one of the options within the menu, or the value or status of the parameter.

NOTE:

There are two user views of the MMI, REDUCED and FULL. The reduced view significantly simplifies the MMI structure by removing the more advanced menu entries.

These views may be selected under

MENUS::FULL MENUS = TRUE/FALSE.

Definition of terms

Certain terms have specific meanings in the context of the MMI. The most common of these are defined as follows.

Default	A value which is pre-programmed into the 620 Vector drive during manufacture and which may be changed if required. Note that it is possible to completely reset all parameters to their default settings by following the procedure "Reset to Defaults" later in this chapter.
Diagnostic	A displayed status indicator which can be used to determine the health or operational mode of the drive. Diagnostics are Read Only.
Local Mode	A special operational mode of the drive where basic operations are controlled directly from the front panel (MMI) rather than by reference to external inputs. The opposite to this is Remote.

Operator station	The MMI, when it is being used in LOCAL MODE to control the motor speed setpoint directly. Can Also be used to describe the MMI and command buttons as a whole.
Parameter	Any variable (user input number) such as `RAMP ACCEL TIME` etc. Parameter names are shown in this chapter **`LIKE THIS`**. They are usually shown with their associated menu trail (i.e. how you get to them from the top level), such as **`DIAGNOSTICS::SPEED FEEDBACK`**, where the double colon indicates a progression through one menu level. (A complete menu map the appendix).
Setpoint	The speed at which a motor is set to run at (expressed as a percentage of the maximum speed which is programmed for the set-up).
Parameter Save	The PARAMETER SAVE option enables the user to store the setup parameters after adjustment. Unless the user carries out this operation the entered settings will be lost if the power is removed from the Drive.

Function Keys

The four function keys allow the user to move around the menu structure on the display, alter parameters or manually control the drive. Each key is identified by a legend. The following section identifies each key by its legend and describes its function.

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.
Pressing this key while in LOCAL MODE (LOCAL LED illuminated) shows the actual speed of the motor as a percentage of the maximum speed.

If `FULL MENUS` are enabled then pressing the ‘M’ key while displaying a tag value

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 previous point where you were working.

UP

When in the menu structure, pressing the UP key steps through the options or settings for the currently displayed menu option. This will either result in displaying different menu options or stepping through available settings for the selected parameter. Numerical values are incremented by the UP key.

Pressing this key while in LOCAL MODE (LOCAL LED illuminated) increases the speed reference. The speed of the motor is shown on the display (while the button is pressed) as a percentage of the maximum speed.

DOWN

When in the menu structure, pressing the DOWN key steps through the options or settings for the currently displayed menu option. When you are stepping through text displays (e.g. menu options), the DOWN key steps in the opposite direction from the UP key.
Numerical values are decremented by the DOWN key.
Pressing this key while in LOCAL MODE (LOCAL LED illuminated) decreases the speed reference. The speed of the motor is shown on the display (while the button is pressed) as a percentage of the maximum speed.

Command Keys

The six command keys allow the user to start / stop and jog the drive directly from the op station. The following section identifies each key by its legend and describes its function. The Up and Down Keys also take on command functions in Local mode.

LOCAL/REMOTE

This key toggles between the normal operating mode (REMOTE) and the LOCAL control mode. It only works when the motor is stopped.
When in LOCAL MODE the LOCAL LED is illuminated, and the MMI buttons START, STOP, JOG, REVERSE, UP and DOWN can be used to control the motor speed and direction.
Press the LOCAL button to return to REMOTE MODE, the MMI will return to the last accessed place in the main menu.

PROG

When in LOCAL MODE, pressing the PROG button switches back to the main MMI menu. At the point it was last accessed from REMOTE MODE, while still remaining in LOCAL MODE. This enables changes to be made to parameters not available in the LOCAL MODE menu.
This button has no function in REMOTE MODE.

FORWARD/REVERSE

When in LOCAL MODE, the FORWARD/REVERSE button changes the sign of the speed reference. When you press this button, the display changes to indicate the new direction of rotation.
When in JOG mode (see below), this key selects between the two jog speeds.
This button has no function in REMOTE MODE.

JOG

When in LOCAL MODE, pressing this button runs the motor at the speed set by the **JOG SPEED**[1] parameters. The motor only runs in jog mode while the button is pressed.
This button has no function in REMOTE MODE.

START

When in LOCAL MODE, pressing this button starts the motor running[1]The motor will continue to run at the selected speed until the STOP button is pressed .
This button has no function in REMOTE MODE.

[1] JOG and START require the inputs COAST STOP, FAST STOP and ENABLE to be high before they will operate.

STOP

When in LOCAL MODE, pressing this button stops the motor if it is running. While stopped, the drive remembers the direction and speed at which the motor was running and will resume to those settings if the START button is pressed.
This button has no function in REMOTE MODE.

Summary of MMI Keys

Goes down a level

Goes up a level.

EITHER Accesses other parameters in the same menu level

OR Modifies the selected parameter.

Status LEDs

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

HEALTH	The drive is powered up and there are no alarms present (the drive is healthy). HEALTH is reset by RUN going high and the drive running.
RUN	The RUN digital input is active, the motor is running and there are no alarms present. If the LED is flashing fast, this indicates that the output current has exceeded the selected I*T threshold. The LED flashes slowly during Autotune (described later).
BRAKE	If this LED is on, it indicates that the DC link voltage inside the drive has risen above the dynamic braking threshold. Chapter 3 "**DYNAMIC BRAKING**" describes this in more detail.
LOCAL	This LED indicates the drive is in LOCAL MODE when illuminated.

NAVIGATING THE MMI MENU STRUCTURE

The MMI comprises several hundred menu options (shown in Figure 4.3). The M E △ and ▽ buttons navigate through the menus.

When the 620 Vector drive is initially powered up, the MMI displays the start-up screen. Pressing M activates the menu structure.

The △ and ▽ buttons step between main menu options of the same level.

The M button selects the displayed menu option, which will either lead to a further sub-menu or to an adjustable parameter.

When an adjustable parameter is displayed, the △ and ▽ buttons adjust the value up and down.

The E button steps up a level (either from a parameter to a menu option or from a menu option to the next highest level menu).

The process of stepping through the menus and adjusting parameters is illustrated in Figure 4.2.

Figure 4.2 - Using the MMI

Menu Structure

The options available to the user from the main menu are given in Figure 4.3. These options are briefly described in the following paragraphs which include references for further details.

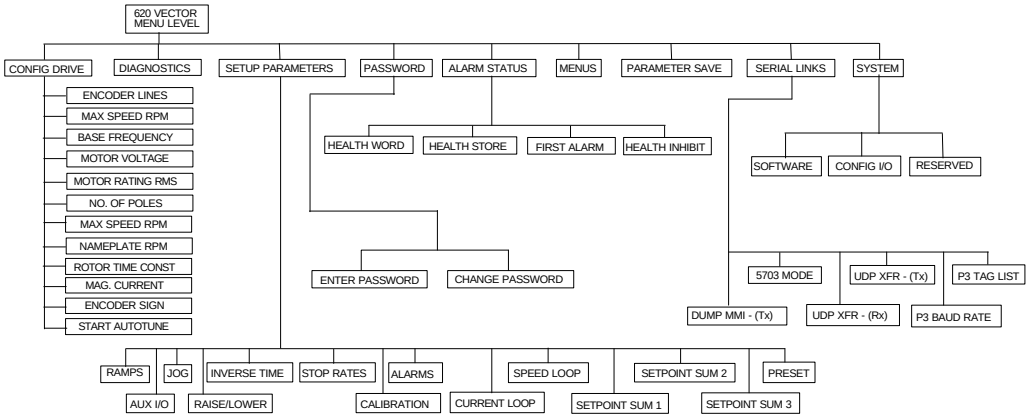


Figure 4.3 - Main Menu Options

Configure Drive

The CONFIGURE DRIVE option provides a fast track to commissioning a new 620 Vector drive. It contains all the parameters necessary for basic operation, grouped together under one menu. This will be described under ‘Setup Step 4’ later in this chapter.

Diagnostics

The DIAGNOSTIC option provides the user with access to read-only displays of the various drive status parameters. Refer to Chapter 5 for further details.

Set-up Parameters

The SETUP PARAMETERS option provides the user with the facility to adjust and set a large number of drive parameters. Refer to "**SETUP PARAMETERS**" in this chapter for further details.

Password

The PASSWORD option allows the user to protect the setup parameters from being changed by an unauthorised user. Procedures for setting and changing passwords are included in "**PASSWORD**" in this chapter.

Alarms

The ALARMS option provides access to the last alarm message. If the drive trips, the MMI display immediately shows an alarm message indicating the reason for the trip. This message can be cleared using the ESCAPE key (E), but can be re displayed via the ALARMS menu. Possible alarm messages are explained in Chapter 5.

Menus

The MENUS option allows the user to select the language in which the text appears.

Parameter Save

The PARAMETER SAVE option enables the user to store the setup parameters after adjustment.

Serial Links

The SERIAL LINKS option allows access to the serial link setup parameters which are used to configure the RS232 port: P3 (fitted as standard).

System

The SYSTEM option enables the user to set re configurable input and output control board connections. Refer to "**SYSTEM**" for further details.

SETTING-UP PROCEDURE

Warning

ELECTRIC SHOCK HAZARD

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

Setup Step 1 Before You Start

1. Before power is applied to the system the following items should be checked:
2. Mains power supply voltage is correct for the drive type.
3. Motor is of correct voltage rating and is connected in either star or delta as appropriate.
4. An encoder of the correct type is fitted to the motor properly with no plug. A, Ä, B and B are connected to the drive. See Table 2.2.
5. All external wiring circuits such as Power connections, Control connections, Motor connections, Earth connections are properly connected and secure.
6. Check for damage to equipment. Do not attempt to operate the equipment if damage is found.
7. Check for loose ends, clippings, drilling swarf, etc., lodged in the drive or ancillary equipment. Do not attempt to operate the equipment until any such foreign objects have been completely removed.
8. If possible check that the motor can be turned freely and that the motor cooling fan is intact and free of obstructions.

Setup Step 2 Ensure The Safety Of The Complete System

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

1. That no personnel are at risk of injury or inconvenience when the drive system is energised.
2. That rotation of the motor in either direction will not cause damage.
3. That other equipment will not be adversely affected by powering up.

Caution

Before carrying out any high voltage insulation resistance checks with a Megger or similar device or performing point to point checking with a buzzer it is essential to completely disconnect the 620 Vector drive. Failure to comply may result in equipment damage and/or misleading results.

Setup Step 3 Prepare To Energise

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 refer to Chapter 2, Table 2.5 to check whether these unused terminals need to be tied high or low.
4. Check the external run contacts are open.
5. Check the external speed setpoint controls are all set to zero.

Setup Step 4 Power On

Once all the preceding steps are completed and understood, the supply fuses or circuit breaker may be replaced and power applied to the drive.

Setting up the drive consists of:

Setting up basic motor parameters via the MMI.

Running Autotune to set up magnetising current and slip.

Tuning the speed loop for the particular application.

Initial Setup.

When the 620 Vector drive is switched on, the HEALTH LED should light. The remaining 3 LEDs should be off and the power-up message should appear on the MMI display as follows:

620 VECTOR DRIVE
TYPE X CHASSIS

1. Press (M) (M). The display will show **'MENU LEVEL / DIAGNOSTICS'**. Pressing the (△) and (▽) buttons will enable you to move around the top level menu. Press (△) until the display shows **CONFIGURE DRIVE** (if you miss **CONFIGURE DRIVE** or any other menu item, either use the (▽) button to get back or keep pressing (△) until **CONFIGURE DRIVE** is displayed again). You will be navigating the Initial Setup menus shown at the extreme left of Fig 4.3.
2. Ensure that the **'CONFIGURE DRIVE'** menu is selected on the display. Press (M) to enter this menu. When you enter the menu, the first parameter to appear on the display will be **ENCODER LINES**. Other parameters may be selected by means of the (△) and (▽) buttons. Locate **ENCODER LINES** and press (M) to select this parameter. Use the (△) and (▽) buttons to enter the number of lines on the encoder. When you have entered the correct number of encoder lines, press (E) to return to the previous level where the remaining parameters may be accessed.
3. Press (▽) to select **MAX SPEED RPM** and then press (M). This entry sets the maximum rotation speed for the process, and can be up to 9 times the motor base speed printed on the nameplate if required. (This speed will be the 100% speed referred to elsewhere in the MMI). Use the (△) and (▽) buttons to set the **MAX SPEED RPM** parameter to the required figure. Press (E).
   It is important at this stage to set **MAX SPEED RPM** to the highest value that you are likely to be using. This is because the autotune will only set up the magnetising current values up to this speed. If at a later stage you wish to run the motor faster then it will be necessary to re-run the autotune. To avoid this inconvenience, set up **MAX SPEED RPM** to a high value now, and reduce it after autotune if required. The maximum motor speed should not of course be exceeded.
4. Press (▽) to select **BASE FREQUENCY** and then press (M). Read the motor power supply frequency from the motor nameplate (typically 50Hz or 60 Hz) and use the (△) and (▽) buttons to set the **BASE FREQUENCY** parameter to the same figure. Press (E).
5. Press (▽) to select **MOTOR VOLTAGE** and then press (M). Read the motor power supply voltage from the motor nameplate and use the (△) and (▽) buttons to set the **MOTOR VOLTAGE** parameter to the same figure. Press (E).
6. Press (▽) to select **MOTOR RATING RMS** and then press (M). Read the motor full-load current from the motor nameplate and use the (△) and (▽) buttons to set the **MOTOR RATING RMS** parameter to the same figure. Press (E).
7. Press (▽) to select **NO.OF POLES** and then press (M). Read the number of poles from the motor nameplate. This number must be divisible by 2, e.g. 2, 4, 6, 8 etc. or an error will be generated later. Use the (△) and (▽) buttons to set the **NO.OF POLES** parameter. Press (E).
8. Press (▽) to select **NAMEPLATE RPM** and then press (M). Read the base speed from the motor nameplate, and use the (△) and (▽) buttons to set the **NAMEPLATE RPM** parameter to the specified figure. Press (E). It is important to enter this value exactly as it appears on the nameplate. For example, if it appears on the nameplate as 1450rpm, DO NOT round it up to 1500rpm.

9. Press ▽ to select **MAG CURRENT %** and then press M. Read the "no load current" from the motor nameplate, and use the △ and ▽ buttons to set the **MAG CURRENT %** parameter to the specified figure ((No Load Current / Motor Rating RMS) * 100%). Press E.
   If the "no load current" is not available, set the **MAG CURRENT %** to 30-40% for motors less than 30kw and 20-30% for motors > 30kw.

10. Press ▽ to select **ROTOR TIME CONST** and then press M. This parameter sets up an initial estimate of the rotor time constant which Autotune will later optimise. For motors up to 2.2kW use 100.0ms, between 2.2kW and 7.5kW use 200.0ms, between 7.5kw and 22kW use 400.0ms and for larger motors use 800.0ms. Use the △ and ▽ buttons to set the **ROTOR TIME CONST** parameter to the required figure. Press E.

11. At this point almost all of the required basic parameters have been entered and further parameters can only be determined by running the drive. All the parameters should now be saved. To save the parameters, press E △ M which will select **SAVE PARAMETERS** option, and then press M. Press △ to save the parameters. The display will say **FINISHED** after a second or so when the process is complete. Press E ▽ M to return to the Configure Drive menu.

Setup Step 5 Run the drive

The next step is to run the drive.

- **UNPREDICTABLE MOTION,** ESPECIALLY IF MOTOR PARAMETERS ARE INCORRECT.
- ENSURE NO PERSONNEL ARE IN THE VICINITY OF THE MOTOR OR ANY CONNECTED MACHINERY.
- ENSURE THAT THE EMERGENCY STOP CIRCUITS FUNCTION CORRECTLY BEFORE RUNNING THE MOTOR FOR THE FIRST TIME.
- WHEN THE DRIVE IS RUN FOR THE FIRST TIME ROTATION WILL BE OF UNKNOWN DIRECTION, MAY BE JERKY AND SPEED CONTROL MAY NOT OPERATE CORRECTLY.
- ENSURE THAT NO MACHINERY CONNECTED TO THE MOTOR WILL BE DAMAGED BY UNPREDICTABLE MOTION.

1. Press LOCAL to put the drive into LOCAL MODE. The LOCAL LED should light.

2. Use the △ and ▽ buttons to set a speed demand of between 5% and 10% of full speed (the actual value is not critical).

3. Press I to start the motor. The RUN LED should illuminate. (If any error messages occur on the MMI, refer to Chapter 6, "**Diagnostics**").

4. Listen to and look at the motion of the motor. If the encoder sign is correct the motor will rotate smoothly and respond to changes in speed demand or direction. To check this, use the △ and ▽ buttons to increase the speed to about double the first figure, and then use the ◯ button to change the direction of rotation. If it accelerates and changes direction smoothly, this confirms that the encoder sign is set correctly.

5. If the ENCODER SIGN is incorrect, the motor will rotate in a jerky and/or noisy manner. Alternatively, it may rotate smoothly at a very low speed but not respond to changes in speed demand or direction. In either case the encoder sign must be changed. Paragraph 7 describes how to change the encoder sign.

6. If the motor rotates in the wrong direction, press 0 to stop the motor then power down the entire drive assembly, wait 3 minutes for the DC Link capacitors to discharge then swap motor drive cables M1 and M2. Re-start the Initial Setup procedure from step 1. The encoder sign will have been changed by the change in motor direction as described in step 4.

7. Press 0 to stop the motor, then press LOCAL to put the drive back into REMOTE MODE.

8. If the **ENCODER SIGN** needs changing, go into the **'CONFIGURE DRIVE'** menu and select **ENCODER SIGN** , then press M. Use the △ and ▽ buttons to set the **ENCODER SIGN** parameter to the other setting. Press E.

9. This completes the initial part of the setting up phase. At this point the motor is running under control, but it is not optimised for smooth, efficient running. The next step is to Autotune the drive to automatically set up the remaining basic parameters.

Setup Step 6 Autotuning the Drive

The purpose of the Autotune function is to set up the magnetising current and rotor time constant for this motor.

This is a two-stage process. The first stage runs the drive up to various speeds to tune the magnetisation current. The second stage calculates the rotor time constant from the **MAG CURRENT** and motor nameplate details which you entered.

Caution

When the Autotune is carried out, the motor will run at base speed for several minutes.

It is essential that no load is applied to the output shaft for the Autotune to function correctly. A gearbox may be permissible provided it does not significantly load the motor, but it should be disconnected where possible.

Ensure that you are in the **'CONFIGURE DRIVE'** menu. Scroll around the menu with the △ or ▽ buttons until you locate **AUTOTUNE**. Press M . Press △ to set the **AUTOTUNE** flag **TRUE**. Then restart the drive.

The drive will now accelerate first to base speed, and then to a number of other speeds, up to the value set in **MAX SPEED RPM**. At each speed it will set up the magnetising current for this motor. When it has finished, it will then calculate the rotor time constant. If any error messages occur on the MMI, refer to Chapter 6, "**Alarms**".

If the autotune fails to run, but no error message appears on the MMI, this may be due to a wrong configuration in the autotune menu. This menu contains 2 flags which control the autotune action. 'Mag I Autotune' must be set true to ensure that the mag current autotune is carried out, and 'Set Tr < Rtd Spd' must be true for the rotor time constant calculation to be done. Go into the autotune menu, under 'Setup Parameters (see 'Menu Structure' on page4-6) and ensure these flags are set to be true.

When Autotune has finished, the 620 Vector drive is set up with all the information required for basic operation as a speed controller. It is now necessary to save this information in non volatile memory, so that it will be retained when power is removed. This is done via the PARAMETER SAVE menu. See 'Parameter Save' under 'Menu Structure' on page 4-6.

At the end of the autotune process, the drive will calculate a new value of rotor time constant. If it is significantly different from the old value, it may be advisable to run the autotune again. The values of magnetising current obtained on the second pass will then be slightly more accurate, as the drive will now be using a more accurate value of rotor time constant.

Reset To Factory Defaults

Disconnect the power to the drive.

Hold down the △ and ▽ buttons while re-applying power and keep both buttons depressed for at least two seconds after power-up

Note: The start input must also be low [B7].

The MMI display will read

SELF TEST
EEPROM NOT READ

Press E.

The drive is now safely configured to the factory defaults. On the 620L and 620Adv these factory defaults are saved automatically, on the 620Std the factory defaults must be saved using “Parameter Save” if wished.

NOTE:

Although it is not advised the 620L and 620Adv also support this function but they display the message

SELF TEST
EEPROM FAILED

And there configurations need to be restored by ConfigEd.

Change Stack Size

This is only be necessary if you are installing a new control board on an existing stack.

SELECTING A DIFFERENT STACK SIZE FROM THAT INDICATED ON THE STACK RATING LABEL WILL DAMAGE THE STACK AND OR MOTOR

Disconnect the power to the drive.

Hold down the ▼, M and P (prog)buttons while re-applying power and keep both buttons depressed for at least two seconds after power-up.

Note: The start input must also be low [B7].

The MMI display will read

DRIVE RATING
75 kW 380-460v

At this stage the 620 Vector drive thinks that it is a 75kW model. **It is vitally important that it is configured for the correct power rating or irreparable damage may occur to the drive when it attempts to run the motor.** Press the ▲ and ▼ buttons to step through the range of power ratings until the displayed value is the same as the rating on the identification label on the side of the drive.

Press the E. to exit. This saves the new settings in EEprom (non volatile memory)

Note: The drives setup parameters are unchanged.

Note: The 620L / 620Adv need to have the power cycled to reinitialise the co-processor after this procedure.

Should it ever be necessary to reset all the parameters to their factory defaults (e.g. when swapping out a drive), use the following procedure.

Chapter 5

Function Blocks

Contents Page

Chapter 5 Function Blocks

SETUP PARAMETERS

Introduction

This section provides reference information for the more advanced programming capabilities of the 620 Vector series controllers.

Each section describes a particular functional area and the associated menu options which are used to alter the parameters. Where appropriate, a functional block diagram illustrates the how the function operates. Reference to the Functional Description and Microprocessor Block Diagram in Chapter 2 may be of assistance in understanding the relationship between these functional diagrams.

Each of the menu options (refer to Figure 5.1) has an associated 'Tag' number associated with it, which provides a unique identification. These tag numbers are shown within this section and also within Chapter 9, which holds a complete list of all tags with there ranges and defaults.

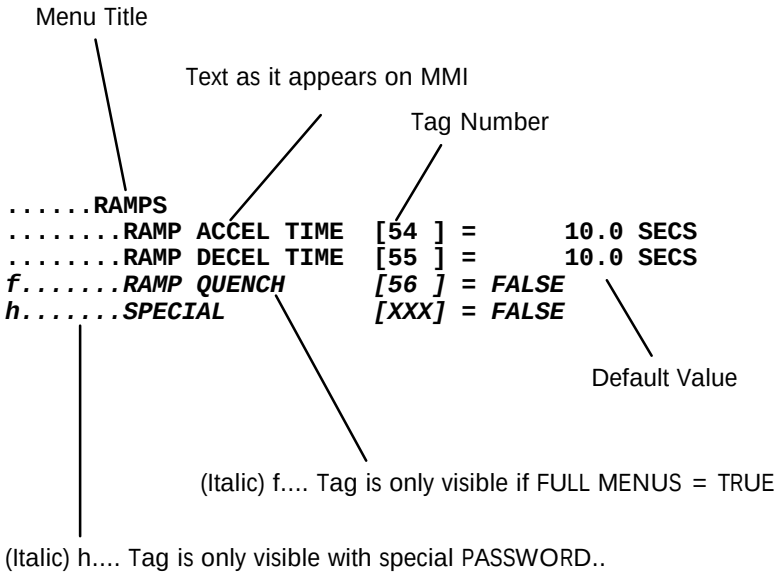


Figure 5.1 Set-up Parameter entry.

These tag numbers may be used to reconfigure the block diagram if the default configuration (shown in figure 2.5) does not provide the functionality required.

Reconfiguring is done using:

source tags

destination tags

internal links.

Analogue and digital inputs have destination tags. See section 'Configure I/O' on page 5-35. An analogue or digital input may be connected to a function block input by setting its destination tag equal to the tag number of the block input as required.

Analogue and digital outputs have source tags. See section 'Configure I/O' on page 5-35. A function block output may be connected to an analogue or digital output by setting the analogue or digital output source tag equal to the tag number of the block output as required.

Function blocks have destination tags. A function block output may be connected to the input of another function block by setting its destination tag equal to the tag number of the block input or analogue/digital output, as required. Function blocks do not have source tags. A function block output may therefore be routed to any variable, but only parameters which have a destination tag can be connected to its inputs.

Internal links are used to route variables which do not have source tags or destination tags associated with them.

Source and destination tags are found in the menu 'Configure I/O' under 'System'. See 'Menu Structure' in chapter 4. This menu contains sub menus 'Analogue Inputs', 'Digital Inputs', 'Analogue Outputs', 'Digital Outputs', 'Block Diagram', and 'Internal Links'. Destination tags for analogue and digital inputs may be found under 'Analogue Inputs' and 'Digital Inputs'. Source tags for analogue and digital outputs may be found under 'Analogue Outputs' and 'Digital Outputs'. Destination tags for function blocks may be found in 'Block Diagram'. A full description of the source and destination tags available is given in section 'Configure I/O' on page 5-35.

The menu also contains the flag 'Configure Enable' which must be set to true before any re-configuring can be done. See section 'Configure I/O' on page 5-35.

Example 1

Re-route digital input 1 (terminal E2) to the 'System Ramp' 'External Reset' (It is normally connected to 'ramp hold' by default). See 'System Ramp' diagram on page 5-3. This will cause the system ramp output to return to its reset value whenever a '1' is applied to digital input 1.

1. Go into 'System' menu, then into 'Configure I/O'.
2. Select 'Configure Enable' and set this flag to true.
3. Find 'Digital Inputs' menu and select 'DIGIN 1 (E2)'.
4. Go into this menu and find 'Destination Tag'. Set this to the 'External Reset' tag number 62, which may be found in section 'System Ramp' or in the tag number list in the appendix, chapter 9.
5. Return to 'Configure Enable' flag and set this to false.

Example 2

Bring Current Feedback to analogue output 2 (torque demand is normally connected to this output by default).

1. Go into 'System' menu, then into 'Configure I/O'.
2. Select 'Configure Enable' and set this flag to true.
3. Find 'Digital Inputs' menu and select 'ANOUT 2 (F5)'.
4. Go into this menu and find 'Source Tag'. Set this to the 'Current Feedback' tag number 78, which may be found in the MMI list in the appendix, chapter 9, under diagnostics.
5. Return to 'Configure Enable' flag and set this to false.

Example 3

Connect Speed Feedback to System Ramp Reset Value. This would allow the drive to start a spinning motor in a smooth manner. System Ramp Reset Value is a parameter which does not have a source tag associated with it, as it is normally a fixed value set via the MMI. Speed Feedback does not have a destination tag. So the only way to do this is via an internal link.

1. Go into 'System' menu, then into 'Configure I/O'.
2. Select 'Configure Enable' and set this flag to true.
3. Set Link 1 Source to 11 (i.e. tag number of speed feedback).
4. Set Link 1 Destination to 63 (i.e. tag number of Reset Value).
5. Return to 'Configure Enable' flag and set this to false.

Ramps

MMI Entries

```
......RAMPS
........RAMP ACCEL TIME   [54 ] =      10.0 SECS
........RAMP DECEL TIME   [55 ] =      10.0 SECS
f.......RAMP QUENCH       [56 ] = FALSE
........RAMP HOLD         [57 ] = FALSE
........RAMP INPUT        [58 ] =      0.00 %
........% S-RAMP          [59 ] =      0.00 %
........RAMPING THRESH.   [60 ] =      1.00 %
........AUTO RESET        [61 ] = TRUE
........EXTERNAL RESET    [62 ] = FALSE
........RESET VALUE       [63 ] =      0.00 %
```

Block Diagram

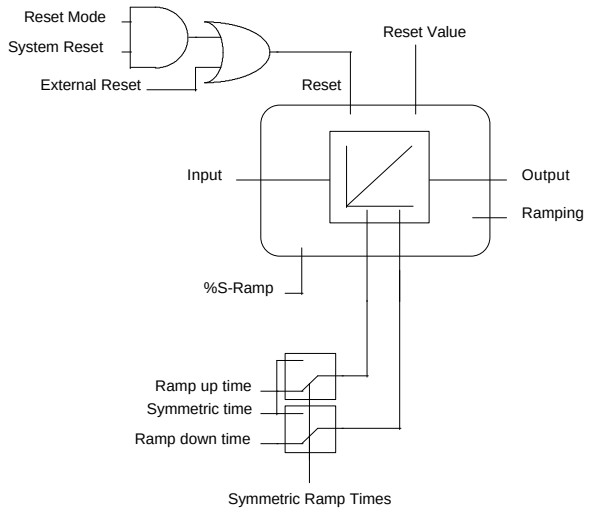


Figure 5.2 System Ramp

Parameters

RAMP ACCEL / DECEL TIME Acceleration / Deceleration time. The times are for an output change from 0 to 100%.

Example:

A change of Ramp Input from 20% to 50% with an acceleration time of 60 Seconds will take. $\frac{50\%-10\%}{100\%}\times 60 Secs$

Effect of %S on Ramp times.

$$Actual\ Ramp\ Time\ =\ Ramp\ Time\ \text{x}\left[\frac{3.5}{100}\ \text{x}\ (\%S-Ramp)+1\right]$$

Zero ramp times are a special case where the ramp can be effectively by-passed.

RAMP QUENCH While **TRUE** the ramp input is held at zero. NOTE: This parameter is automatically set TRUE during a normal stop if USE SYSTEM RAMP is TRUE.

RAMP HOLD While **TRUE** the ramp output is held at its last value. This is overridden by External Reset.

RAMP INPUT Ramp Input TAG.

% S-RAMP Percentage of ramp with S-shaped rate of change. A value of zero is equivalent to a linear ramp. Changing this value affects the ramp times. See **RAMP ACCEL/DECEL TIME** equation.

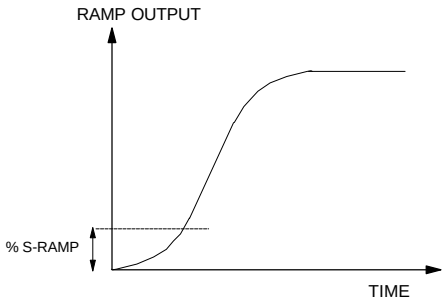


Figure 5.3 S-Ramp

RAMPING THRESH. Ramping flag threshold level. The threshold is used to detect whether the ramp is active, shown by the ramping TAG.

```
if( |RAMP OUTPUT - RAMP INPUT| > RAMPING THRESH)
      RAMPING := TRUE
else
      RAMPING := FALSE
endif
```

AUTO RESET If **AUTO RESET** is **TRUE** then the ramp is reset whenever **SYSTEM RESET** is **TRUE**, that is each time the Speed / Current loop is unquenched. If the drive is restarted befor the stop sequence has reached stop zero speed the System Ramp will not be reset.

If **FALSE** then the ramp is only reset by **EXTERNAL RESET**.

System Reset is an internal flag that is set **TRUE** for one cycle after the Speed / Current loop is enabled i.e. every time the drive is started.

EXTERNAL RESET If **EXTERNAL RESET** is **TRUE** then the ramp is held in reset. **EXTERNAL RESET** does not depend on **AUTO RESET** for its operation.

Ramp Reset Definition:

Ramp Reset = (**SYSTEM RESET** AND **AUTO RESET**) OR **EXTERNAL RESET**.

RESET VALUE This value is pre-loaded directly into the output while Ramp Reset is **TRUE** or at power-up. In order to catch a spinning load smoothly ("bumpless transfer" or "Fly Catching") connect speed feedback TAG 7 (Source) to this reset value TAG 63 (Destination) using an internal link.

Note: The System ramp may also be used for stopping the drive if **STOP RATES::USE SYSTEM RAMP** is **TRUE**, **AUTO RESET** is **TRUE** and **EXTERNAL RESET** is **FALSE**, in this case the Sequencer will set **RAMP QUENCH** to be **TRUE**. This will force the ramp input to zero, and only when the ramp output is zero will the stop ramp be invoked. **RAMP QUENCH** is not normally shown on the MMI.

Op-station

MMI Entries

```
......OP-STATION
........START UP VALUES
..........SETPOINT          [503] =       0.0 %
..........REV DIRECTION     [504] = FALSE
f.........PROGRAM           [505] = FALSE
..........LOCAL             [506] = FALSE
........LOCAL RAMP
..........RAMP ACCEL TIME   [511] =      10.0 SECS
..........RAMP DECEL TIME   [512] =      10.0 SECS
h.........RAMP QUENCH       [513] = FALSE
h.........RAMP HOLD         [514] = FALSE
h.........RAMP INPUT        [515] =      0.00 %
..........% S-RAMP          [516] =      0.00 %
h.........RAMPING THRESH.   [517] =      1.00 %
h.........AUTO RESET        [518] = TRUE
h.........EXTERNAL RESET    [519] = FALSE
h.........RESET VALUE       [520] =      0.00 %
h.........RAMP OUTPUT       [509] =      0.00 %
```

Parameters

START UP VALUES

SETPOINT	Default Value of local setpoint on power up.
REV DIRECTION	Default Value of Direction.
LOCAL	Default mode of op-station **local** key on power up.
LOCAL RAMP	See Ramps.

Note: See Jog for parameters effecting the local jog.

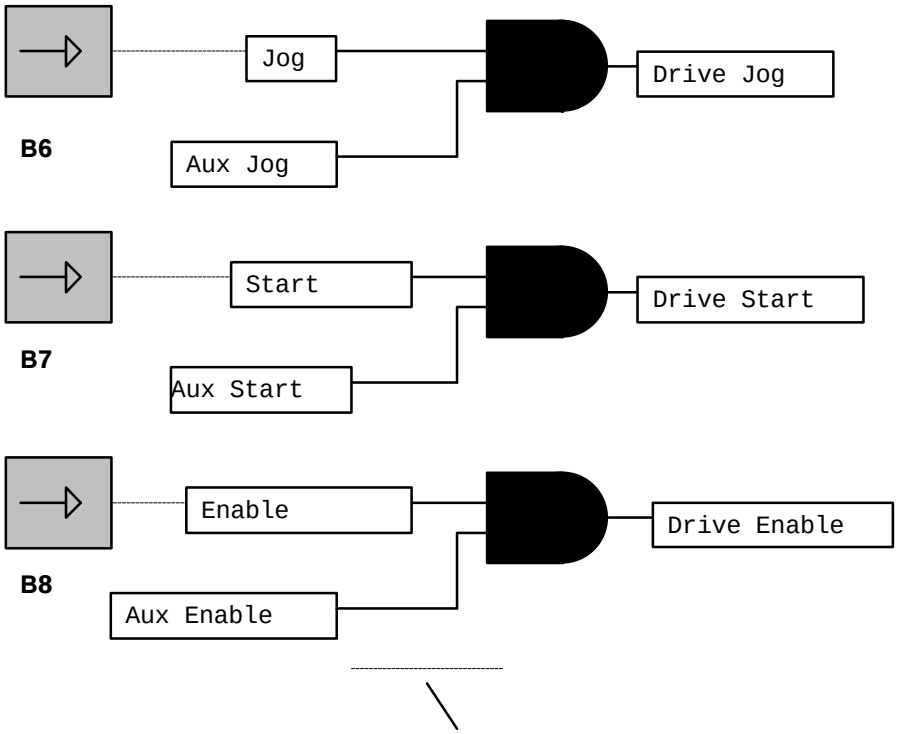
Aux. I/O

MMI Entries

```
......AUX I/O
........AUX START        [66 ] = TRUE
........START            [70 ] = FALSE
........AUX JOG          [67 ] = TRUE
........JOG INPUT        [71 ] = FALSE
........AUX ENABLE       [68 ] = TRUE
........ENABLE           [72 ] = FALSE
```

Parameters

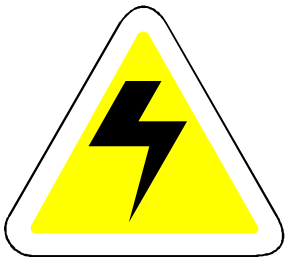
Aux. Start, Aux. Jog, and **Aux. Enable,** Allow the drive to be started and stopped by software, only applicable to the 620 Link.



Dotted lines denote default connections.

Figure 5.4 Aux. I/O

Start, Jog, and **Enable,** Also allow the drive to be started and stopped by software alone. These parameters are by default connected to there respective terminals.



WARNING!

CARE MUST BE TAKEN IN RECONFIGURING THE START, JOG AND ENABLE INPUTS AS THESE TAGS MAY DIRECTLY ENABLE THE DRIVE.

IF THERE ARE TO BE RECONFIGURED THEN COAST STOP INPUT SHOULD UNDER OPERATOR CONTROL. THIS WILL ALLOW THE ENABLE COMMANDS TO BE OVERRIDDEN.

Jog

MMI Entries

```
........JOG SPEED 1       [75 ] =     10.00 %
........JOG SPEED 2       [76 ] =    -10.00 %
........MODE              [80 ] = FALSE
........JOG ACCEL RATE    [113] =      10.0 SECS
........JOG DECEL RATE    [114] =      10.0 SECS
```

Parameters

JOG SPEED 1 Drive setpoint during Jog if Mode = FALSE

JOG SPEED 2 Drive setpoint during Jog if Mode = TRUE

MODE	Selects Jog Speed to be used.
JOG ACCEL RATE	Acceleration rate used by Jog
JOG DECEL RATE	Deceleration rate used by Jog
NOTE:	The ACCEL / DECEL rates and the setpoints apply to both local and normal operating modes.

Raise Lower Ramp

MMI Entries

```
......RAISE/LOWER
........RESET VALUE      [82 ] =      0.00 %
........RAMP RATE        [83 ] =      60.0 SECS
........RAISE INPUT      [85 ] = FALSE
........LOWER INPUT      [86 ] = FALSE
........MIN VALUE        [87 ] =   -100.00 %
........MAX VALUE        [88 ] =    100.00 %
........EXTERNAL RESET   [89 ] = FALSE
```

Block Diagram

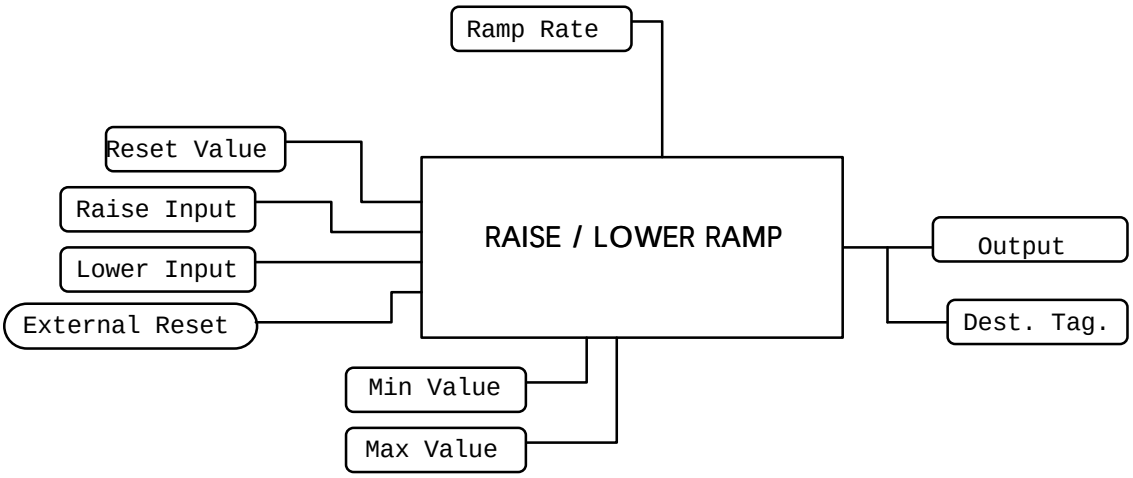


Figure 5.5 Raise Lower Ramp

Parameters

RESET VALUE	This reset value is pre-loaded directly into the output when **EXTERNAL RESET** is **TRUE** or at power-up. It is clamped by **MIN** and **MAX. VALUE**s.
RAMP RATE	This is the rate of change of output value. The raise and lower rates are always equal.
RAISE INPUT	
LOWER INPUT	Command to raise / lower output. These are normally connected to digital inputs in order to be useful.
MAX VALUE	
MIN VALUE	Maximum / minimum ramp output clamp. This is a plain clamp, not a ramped "**MIN SPEED**" setting.

EXTERNAL RESET — If **EXTERNAL RESET** is **TRUE** the output of the raise / lower block is set to the reset value. If an auto-reset feature is required then the System Reset TAG can be linked to the external reset.

Inverse Time

MMI Entries

```
h.....INVERSE TIME
h.......AIMING POINT      [116] =    105.00 %
h.......DELAY             [117] =      60.0 SECS
h.......DOWN RATE         [118] =      10.0 SECS
h.......UP RATE           [148] =     120.0 SECS
```

The inverse time function carries out two separate functions, a) Protects the stack against over heating by winding back the current after a defined period. b) clamps the torque demand in the field weakening region to ensure that it does not exceed the motor current limit.

At speeds greater than base speed the output of the inverse time will normally be less that 150 % due to the Magnetisation. Current element of Motor Current.

NOTE: The inverse time function is the only limit that works in motor current, all others work in Torque limit. Torque limit takes no account the Magnetisation. Current.

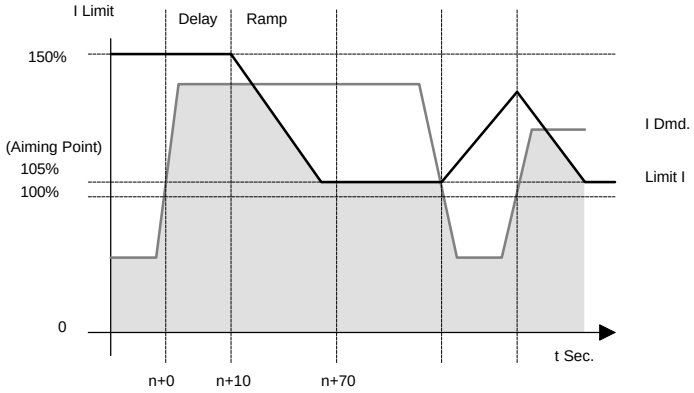


Figure 5.6 Inverse Time

Parameters

AIMING POINT — The level to which the inverse time function will wind back the current limit.

DELAY — The delay before the inverse time starts to operate.

DOWN RATE — The Rate at which the current is wound back

UP RATE — The rate at which the inverse time function recovers.

Stop Rates

MMI Entries

```
......STOP RATES
........RUN STOP TIME     [120] =      10.0 SECS
........RUN STOP LIMIT    [121] =      60.0 SECS
........FAST STOP TIME    [123] =       1.0 SECS
........FAST STOP LIMIT   [124] =      60.0 SECS
........USE SYSTEM RAMP   [125] = TRUE
f.......PRE-START DELAY   [122] =     0.500 SECS
f.......READY DELAY       [352] =     0.000 SECS
........CONTACTOR DELAY   [112] =       0.5 SECS
```

```
.........STOP ZERO SPEED  [126] =      1.00 %
.........PROG STOP I-LIM  [622] =    150.00 %
```

Stop Hierarchy

Coast Stop

- Disables the drive and opens the output contactor via the pilot output.

Enable

- Suspends And Resets The Control Loops

Fast Stop

- Independent Ramp Time
- Timer
- Independent Zero Speed.

Normal Run / Stop

- Independent Ramp Time

Parameters

RUN STOP TIME	Sets deceleration rate for the Stop ramp operation.
RUN STOP LIMIT	Sets the maximum time the drive will allow the Stop function to operate, if the drive has not reached zero speed in this period the drive will coast to a stop. If USE SYSTEM RAMP = TRUE then timer is started once the o/p of the system ramp of local ramp reaches zero.
FAST STOP TIME	Sets deceleration rate for the Fast Stop ramp operation.
FAST STOP LIMIT	Sets the maximum time the drive will allow the Fast Stop function to operate, if the drive has not reached zero speed in this period the drive will coast to a stop.
USE SYSTEM RAMP	Forces the drive to quench the input to the system ramp / local ramp and wait for the ramp output to reach zero before doing a normal stop. Not applicable for Fast Stop.
PRE-START DELAY	Delays the enabling of the drive to allow time for an o/p contactor to close before current is passed.
READY DELAY	See below for a more detailed description.
CONTACTOR DELAY	Sets the time during which the drive will maintain zero speed after the motor has stopped. NOTE: This does not effect the operation of the pilot output. The term contactor delay comes from the 590 DC drive.
STOP ZERO SPEED	Sets the threshold at which the contactor delay timer is started.
PROG STOP I-LIM	Sets the current limit used during a program stop. This will not override the inverse time output.

NOTES: **USE SYSTEM RAMP.**

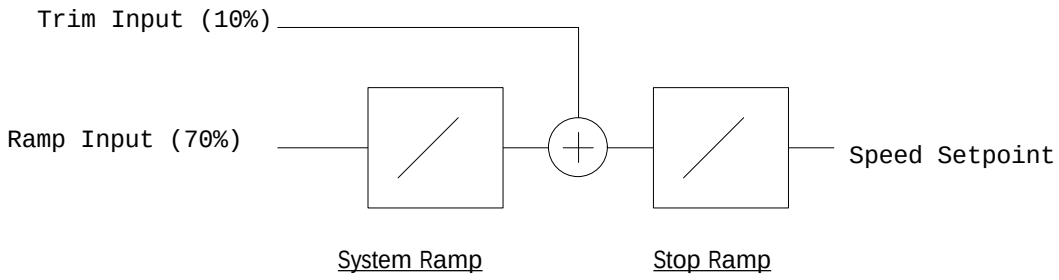


Figure 5.7 Example

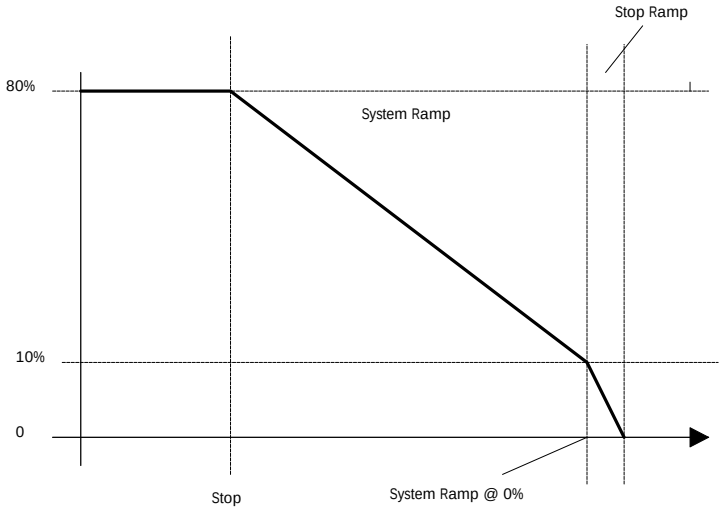


Figure 5.8 Use System Ramp

NOTES: Ready Output

The Ready output will go high “ready delay” seconds after the drive has been stated and is ready to make current.

The ready output remains high until the drive is stopped, then if “ready delay” > 0 then it goes low as soon as the drive reaches “stop zero speed” else as the drive is quenched.

In case of a fault / trip the ready line will also go low.

MODE 1 Ready Delay = 0

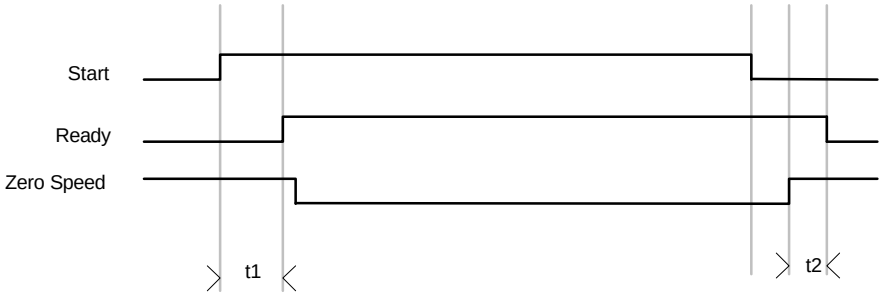


Figure 5.9 Ready Timing Ready delay = 0

t1 Pre-Start Checks

t2 Contactor Delay

Setting Ready delay to 0 (default) causes ready to be set once the drive has be initialised and is healthy. Ready is held high until the drive is quenched by /Start, Program stop, Coast Stop or the drive becoming unhealthy.

NOTE:

- Ready is independent of Enable.

- In this mode Start and Jog are synonymous.

MODE 2 Ready Delay ≠ 0

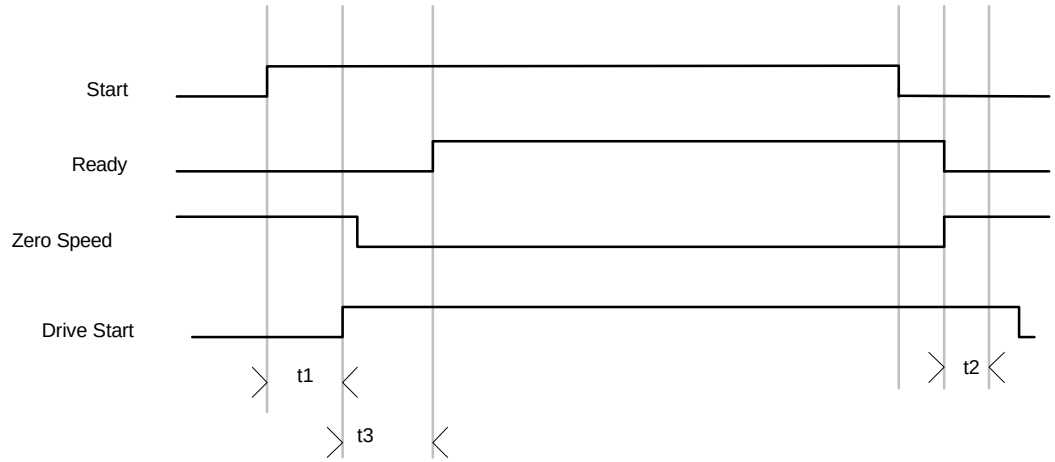


Figure 5.10 Ready Timing Ready delay ¹ 0

t1 Pre-Start Checks

t2 Contactor Delay

t3 Ready Delay

Setting Ready delay to none 0 causes ready to be set a fixed delay after the drive becoming ready. Ready is held high until the drive is stooped by /Start, Program stop, Coast Stop or the drive becoming unhealthy. In the case of a /Start command Ready will be low during the contactor delay period.

More Notes:

- Ready is independent of Enable.
- The delay is only inserted for Start and not for JOG

Alarms

MMI Entries

```
......ALARMS
........EXTERNAL TRIP     [144] = FALSE
h.......MOTOR TEMP        [141] =     26.88 %
h.......MOTOR TMP.TRIP    [128] =     75.00 %
h.......MOTOR TMP.RST.    [309] =     50.00 %
........MOTR.TMP.INHIBIT  [146] = FALSE
h.......HEATSINK LEVEL    [129] =     17.00 %
h.......ACK ALARM         [166] = TRUE
........STALL INHIBIT     [143] = FALSE
........STALL TORQUE      [136] =    100.00 %
........STALL SPEED       [138] =    100.00 %
........STALL DELAY       [137] =    100.00
........OVER SPD INHIBIT  [145] = FALSE
........OVER SPEED LEVEL  [139] =    150.00 %
........5703 RCV.INHIBIT  [142] = FALSE
```

EXTERNAL TRIP If set generates a user alarm / trip.

MOTOR TEMP Reserved.

MOTOR TMP.TRIP Reserved.

MOTOR TMP.RST. Reserved.

MOTOR.TMP.INHIBIT Disables operation of the Motor thermistor alarm

HEATSINK LEVEL Reserved.

ACK ALARM Reserved.

Stall

STALL INHIBIT Disables the stall alarm.

STALL TORQUE The threshold at which torque must reach to be deemed as stalled.

STALL SPEED The threshold for speed feedback below which the stall condition is looked for. Note the speed demand must also be above this threshold.

STALL DELAY Time stall has to be present before if generates an alarm.

Algorithm

IF ((|**SPEED_DEMAND**| > **STALL_SPEED**) AND (|**SPEED_FEEDBACK**| < **STALL_SPEED**) AND |**TORQUE_DEMAND**| > **STALL_TORQUE**)) THEN Start Stall Timer

OVER SPD INHIBIT Disables the overspeed alarm.

OVER SPEED LEVEL Threshold above which the over speed an alarm is generated.

5703 RCV.INHIBIT Disables the 5703 alarm. This only applies for 5703 slaves, if enabled the drive will trip if it stops receiving valid 5703 messages from its master.

Calibration

MMI Entries

```
......CALIBRATION
........ENCODER LINES     [131] =      2048
........MAX SPEED RPM     [130] =      1500 RPM
........BASE FREQUENCY    [448] =      50.0 Hz
........MOTOR VOLTS       [486] =       415 VOLTS
........MOTOR RATING RMS  [134] =       1.0 AMPS
........NO.OF POLES       [399] =         4
........NAMEPLATE RPM     [135] =      1440 RPM
```

Parameters

ENCODER LINES The exact number of lines on the encoder.

MAX SPEED RPM Motor top speed setting, equates to 100% setpoint. This may be adjusted to suit your process.

BASE FREQUENCY Base speed of the motor usually 50 or 60Hz.

MOTOR VOLTS Actual motor volts from motor nameplate, or motor data sheet.

MOTOR RATING RMS The motor rating current in amps from the motor nameplate. For the best performance this value should be at least 50% of the drive rating.

If you are derating your motor for “inverter” use then you should use the non derated value of current.

NO OF POLES Number of poles in the motor; must be divisible by 2, e.g. 2,4,6,8.

NAMEPLATE RPM Motor speed, taking slip into account. Obtained from motor nameplate.

Torque Loop

Background

The current in an induction motor may be split into a torque producing component (iq) and a magnetising component (id). The vector drive will attempt to control both these components. The magnetising current controls the flux in the motor. When the motor turns, this flux produces a back emf, which is proportional to flux and rotor speed. The voltage at the motor terminals will be approximately equal to this back emf, plus a small stator voltage drop.

At light load, i.e. when the motor is rotating with bare shaft only, there is no torque component and the current flowing is entirely magnetising current. If the motor flux is correct, then the terminal volts at base speed should be approximately equal to the rated motor voltage. This enables the magnetising current to be set up. In practice the terminal volts should be about 95% of rated volts, to allow for the extra stator voltage drop under load.

At light load, the applied magnetising current will rotate synchronously with the motor shaft. As the load increases, the vector controller will cause the applied current to rotate slowly with respect to the motor shaft. This is called 'slip'. This slip frequency will increase linearly as load is applied to the motor, and may be typically of the order of 1Hz at rated load. That is, if the motor shaft is rotating at 50Hz, then the motor current will be rotating at 51Hz. This slip frequency is necessary to split the motor current into a magnetising component and a torque component.

The slip frequency is given by the value of the rotor time constant. It is important to get it correct in order to ensure the correct split of the motor current into the torque component and the magnetising component. If the slip frequency is zero, then 100% of the motor current goes to magnetise the rotor, and none produces torque. As the slip frequency is increased, the proportion of magnetising current decreases. Slip frequency is inversely proportional to rotor time constant.

The aim is to maintain constant magnetising current for all load conditions by linearly increasing the slip frequency as load increases. If the slip frequency is increased too much as load is applied, the magnetising current will be too small, and the terminal voltage will drop. If the slip frequency is increased by too little, the magnetising current will be too large, and the terminal voltage will increase. This enables the rotor time constant to be set up. After setting up the magnetising current as above, with no load on the motor, the motor is then fully loaded, and the value of rotor time constant is adjusted to give the correct slip frequency to give the correct motor terminal volts. Alternatively it is possible to calculate the value of rotor time constant which will give the slip frequency written on the motor nameplate. This is less accurate but it doesn't require a load rig.

Increasing rotor time constant	Decreases slip frequency	Increases motor terminal volts
Decreasing rotor time constant	Increases slip frequency	Decreases motor terminal volts

Mag. Current Caculation

If an Autotune can not be performed then an approximation of Mag current can be found from either the motors “no load current” ((No Load Current/Motor Rating RMS) * 100%) or using the motors power factor cos.∠ and the table below.

cos ∠	MAG CURRENT %
.60	72%
.65	70%
.70	60%
.75	55%
.80	49%
.85	38%
.90	26%
.92	25%

Figure 5.11

MMI Entries

```
......TORQUE LOOP
........MAG CURRENT %    [453] =     30.00 %
........ROTOR TIME CONST [458] =     100.0 mSECS
........1 / GAIN         [149] =        70
........POS TORQUE LIMIT [157] =    150.00 %
........NEG TORQUE LIMIT [158] =   -150.00 %
........MAIN TORQUE LIM. [159] =    100.00 %
........SYMETRIC TQ.LIM. [153] = TRUE
........AUX TORQUE DMD   [599] =      0.00 %
........TORQ.DMD.ISOLATE [596] = FALSE
........CURRENT LIMIT    [585] =    150.00 %
```

Parameters

ROTOR TIME CONST [458] set by Autotune

MAG CURRENT % [453] set by Autotune

1 / GAIN [149] Current loop gain is not a critical parameter and it should not normally be necessary to change it from the factory default value provided the motor is a standard type whose rating is reasonably close to the rating of the drive. See Appendix A, "Current Loop Gain".

Torque Limits

These limits the torque to the motor, not the current. The Current to the motor is made up of two component a Torque producing component, Iq and a "Field" producing component. The vector sum of these to is motor current.

The torque limits are limited to 0 to 150% and 0 to -150% and there can not be used to generate torque demand.

POS TORQUE LIMIT Positive Torque Limit see below.

NEG TORQUE LIMIT Negative Torque Limit see below.

MAIN TORQUE LIMIT Main Torque Limit see below.

SYMMETRIC TQ.LIMIT Selects whether the negative limit is used or not.

Symmetric Limits

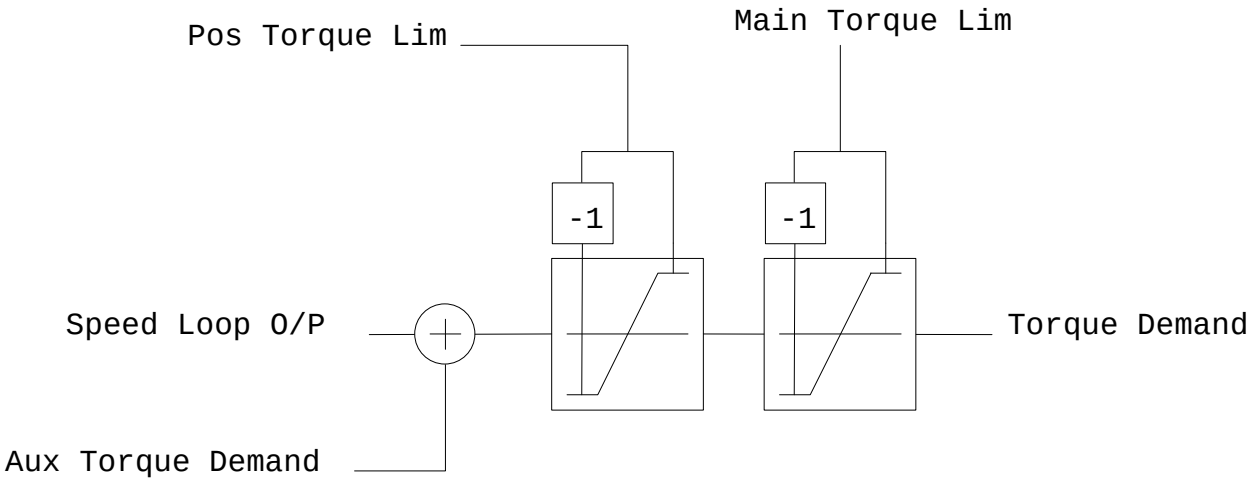


Figure 5.12 Symmetric Limits

Asymmetric Limits

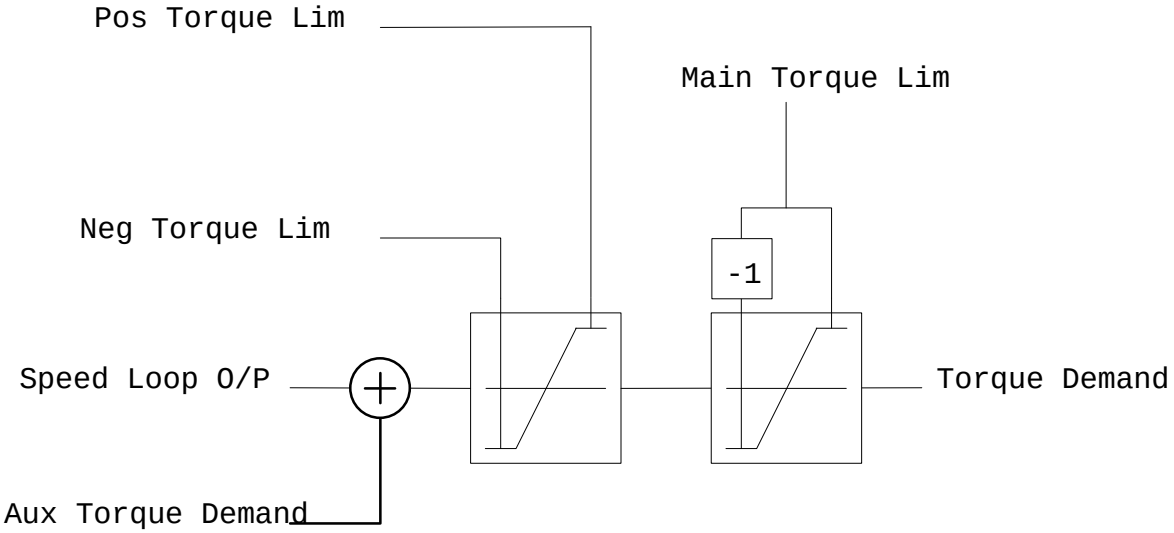


Figure 5.13 Asymmetric Limits

Algorithm

```
/* Clamp POS Limit  > NEG Limit */
if (NEG > POS)
        if (POS >= 0)
                /* POS clamp is positive so clamp NEG clamp to POS */
                 NEG := POS;
        else if (NEG <= 0)
                 /* NEG clamp is negative so clamp POS clamp to NEG */
                POS := NEG;
        else
                 /* Clamps have crossed over so set to zero */
                 NEG := POS = 0;
        endif
endif
```

Direct Torque Control

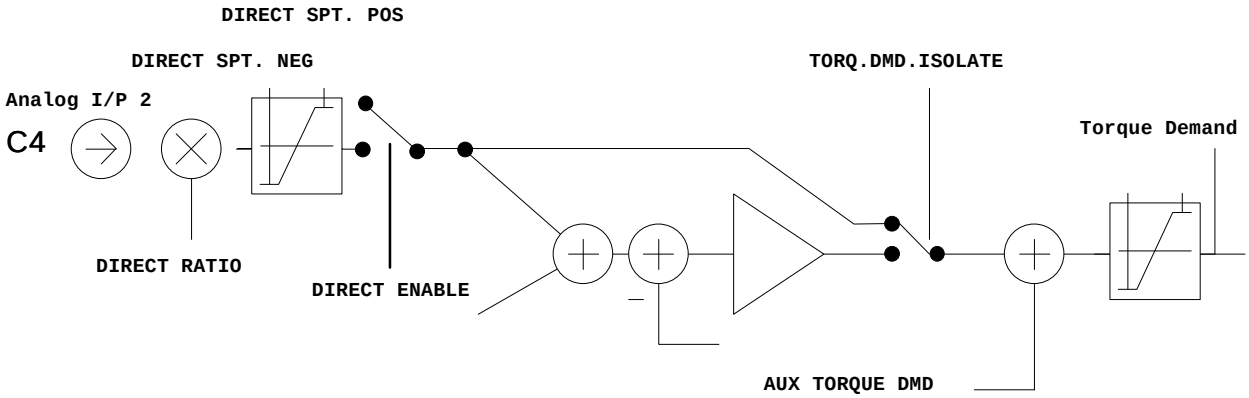


Figure 5.14 Speed Loop

AUX TORQUE DMD Additional torque demand.

TORQ.DMD.ISOLATE Bypasses the speed loop.

CURRENT LIMIT Current Limit in “Motor Amps” taking into account both the magnetisation and torque components iq and id.

Speed Loop

MMI Entries

```
......SPEED LOOP
........SPD. PROP. GAIN  [161] =     10.00
........SPD. INT. TIME   [162] =       100 mSECS
f.......INT. DEFEAT      [163] = FALSE
........ENCODER SIGN     [164] = NEG
........SPEED FBK FILTER [165] = TRUE
........SPEED SETPOINTS
..........DIRECT SPT1      [171] =      0.00 %
..........DIRECT RATIO     [172] =    0.1000
..........DIRECT SPT. MAX  [173] =    100.00 %
..........DIRECT SPT. MIN  [174] =   -100.00 %
..........DIRECT ENABLE    [175] = FALSE
..........MAIN SPD.SPT.    [176] =     0.00 %
..........MAX SPEED        [177] =    100.00 %
..........MIN SPEED        [178] =   -100.00 %
..........ZERO SPD HYST    [132] =      0.10 %
..........ZERO SPEED LEVEL [252] =      0.50 %
```

Speed Loop Tuning

PROP GAIN Speed loop PI proportional gain adjustment. A gain value of 1.00 is unity.

INT. TIME CONST. Speed loop PI integral gain adjustment.

INT. DEFEAT Turn speed loop in to a P only controller.

The PI is designed as a saturating loop, i.e. it is normal for the output to reach saturation. In order to prevent integral wind up during saturation the integral term is held constant while the output is saturated.

Saturation is deemed to be when the output is ≥ to the prevailing torque limit.

Speed Feedback

The 620 requires an encoder feedback device tightly coupled to the motor shaft to achieve its high level of performance. This is because accurate real time measurement of shaft position is used in the vector calculations. The number of encoder lines is also important to achieve high performance, the higher the number of lines the greater the speed loop gain. Also as a result of more lines the high frequency ripple in the torque is also reduced, reducing audible noise.

The number of lines on the encoder is set in the **SETUP PARAMETERS::CALIBRATION** menu. An incorrect number of lines will prevent the drive from operating smoothly and in some circumstances may cause the drive to operate in an uncontrolled manner.

ENCODER SIGN — If the Encoder sign is incorrect the motor will not operate smoothly. The sign of the encoder can be changed either in hardware by swapping the A and B channels or by toggling this parameter. A third way of matching encoder sign to motor direction is to swap any two motor output phases.

SPEED FBK FILTER — Enables a simple filter function applied to speed feedback to reduce ripple caused by low line count encoders.

Speed Setpoints

The Speed setpoint can come from one of two sources (Local or Remote). In Local mode the setpoint is derived directly from the Op-Station value and the reset of the drives block diagram is running but not used in the calculation of the setpoint.

The Speed Demand has a 10% over-range, although input 0 only has the range ± 105.00%. This allows take up slack to operate over the whole speed range.

DIRECT SPT1 — This setpoint processing is synchronous with the speed loop (every 1.1 ms) and can be used by an external trim loop (positioning systems etc.). When not in use this should be disabled.

DIRECT SPT. MAX

DIRECT SPT. MIN — Limits the range of the scaled Direct input.

DIRECT ENABLE — Disables the processing of analogue input C4, this must be enabled to make use of this feature. The Direct setpoint is automatically disabled while the stop ramps are active and in Local mode.

MAIN SPD.SPT. — This is the main setpoint from the block diagram.

MAX SPEED

MIN SPEED — These are intended to prevent the speed setpoint from going negative and not to create an offset. Offsets may be generated elsewhere, probably before the system ramp.

ZERO SPD HYST — Hysterises level for zero speed detection.

ZERO SPEED LEVEL — Zero speed threshold.

Autotune

MMI Entries

```
......AUTOTUNE
........AUTOTUNE FLAG     [482] = FALSE
```

```
........MAG I AUTOTUNE    [483] = TRUE
........SET Tr < RTD SPD  [484] = TRUE
........AUTOCAL MAX RPM   [629] = 30000 RPM
```

Parameters

AUTOTUNE FLAG — If set the drive will begin its Autotune routine next time the drive is started.

MAG I AUTOTUNE — Enables the tuning of the Magnetisation Current phase of the Autotune, this requires the motor to rotate at base speed.

SET TR < RTD SPD — Enables the Rotor Time Constant calculation phase of Autotune.

AUTOCAL MAX RPM — The speed in rpm at which the last successful mag current autotune was carried out. If at any later date the user increases MAX SPEED RPM to more than 30% above this value, an error will be flagged. This parameter is set to a high default value so that the drive may run before any autocal has been carried out.

Setpoint Sum 1- 3

MMI Entries

```
......SETPOINT SUM 1
........RATIO 0           [189] =    1.0000
........RATIO 1           [190] =    1.0000
........SIGN 0            [191] = POS
........SIGN 1            [192] = POS
........DIVIDER 0         [193] =    1.0000
........DIVIDER 1         [194] =    1.0000
........LIMIT             [195] =    100.00 %
........INPUT 0           [196] =     74.61 %     *
........INPUT 1           [197] =      0.02 %     *
........INPUT 2           [198] =      0.00 %
......SETPOINT SUM 2
........RATIO 1           [365] =    1.0000
........RATIO 0           [364] =    1.0000
........SIGN 1            [367] = POS
........SIGN 0            [366] = POS
........DIVIDER 1         [369] =    1.0000
........DIVIDER 0         [368] =    1.0000
........LIMIT             [370] =    100.00 %
........INPUT 0           [371] =      0.00 %
........INPUT 1           [372] =     74.68 %     *
........INPUT 2           [373] =      0.00 %
......SETPOINT SUM 3
........RATIO 1           [376] =    1.0000
........RATIO 0           [375] =    1.0000
........SIGN 1            [378] = POS
........SIGN 0            [377] = POS
........DIVIDER 1         [380] =    1.0000
........DIVIDER 0         [379] =    1.0000
........LIMIT             [381] =    100.00 %
........INPUT 0           [382] =      0.00 %
........INPUT 1           [383] =      0.00 %
........INPUT 2           [384] =      0.00 %
```

Block Diagram

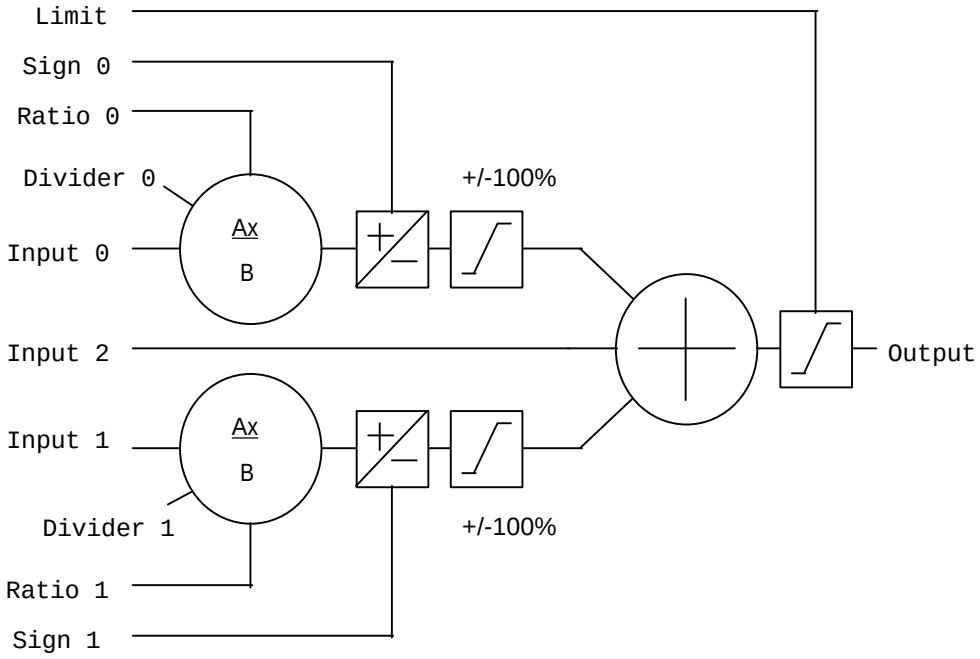


Figure 5.15 Setpoint Sum

Algorithm

$$Output = \left(\begin{array}{l} \left(\left(\frac{Input0_n \times Ratio0_n + Input0_{n-1}\%Ratio0_{n-1}}{Divider0} \right)_{-limit}^{limit} \times sign0_{-1}^{+1} \right) + \\ \left(\left(\frac{Input1_n \times Ratio1_n + Input1_{n-1}\%Ratio1_{n-1}}{100\%} \right)_{-limit}^{limit} \times sign1_{-1}^{+1} \right) + \\ Input2_n \end{array} \right)_{-limit}^{limit}$$

Equation 5.1 Setpoint Sum

RATIO 0/RATIO 1 — Input scaling, a signed quantity +/- 3.0000. Resolution is maintained by re-addition of all remainders, ensuring no information is lost.

SIGN 0/SIGN 1 — Input 1 polarity. The sign is displayed as **NEG** or **POS** with 0 being negative and 1 being positive .

DIVIDER 0/DIVIDER 1 — Input scaling. Divisions by zero are trapped and the result is set to zero.

LIMIT — The Setpoint Sum programmable limit is symmetrical and has the range 0.00% to 300.00%. The limit is applied both to the intermediate results of the RATIO calculation and the total output.

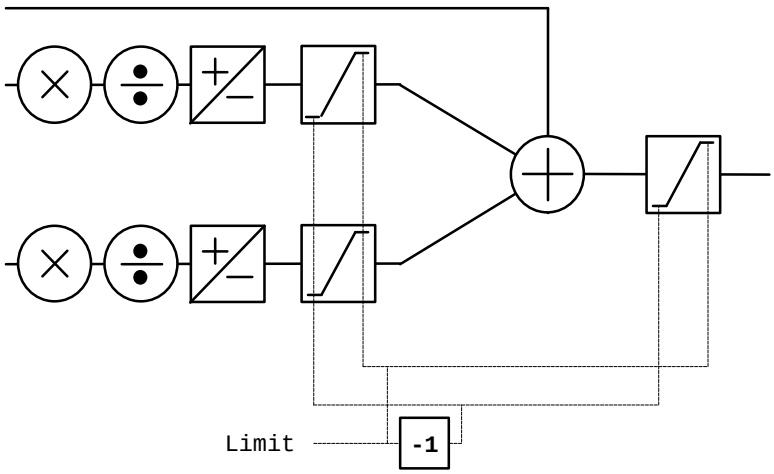


Figure 5.16 Setpoint Sum

INPUT 0/INPUT 1/INPUT 2 Input values.

Reference Encoder

MMI Entries

```
f..... REF ENCODER
f.......SPEED
f.........REFSPEED          [357] =      0.00 %
f.........MAX SPEED RPM     [353] =      1500 RPM
f.........ENCODER LINES     [356] =      2048
f.......PHASE
f.........OFFSET            [447] =         0
f.........OFFSET SCALE      [609] =         1
f.........RESET             [600] = FALSE
f.........POS CALC ENABLE   [337] = FALSE
f.........POSITION ERROR    [338] =         0
f.........MAX POSITION ERR  [342] =    100.00
f.........REF SCALE A       [343] =       100
f.........REF SCALE B       [344] =       100
f.........REF ENCODER I/P   [359] =         0
f.........SATURATED         [610] = FALSE
f.........OVERFLOW          [611] = FALSE
f.......INCH
f.........INCH ADVANCE      [604] = FALSE
f.........INCH RETARD       [605] = FALSE
f.........INCH RATE         [606] =      10.0
```

Block Diagram

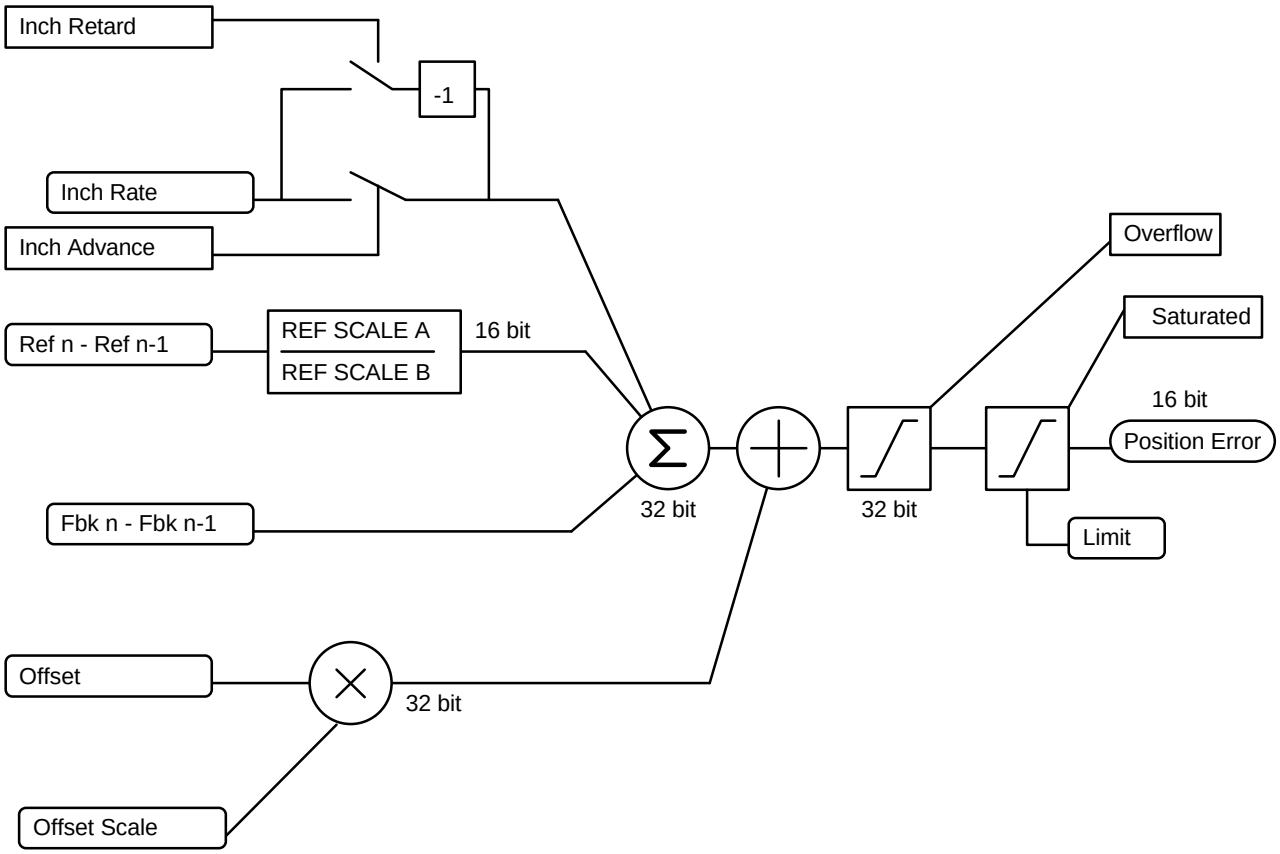


Figure 5.17 Phase Loop

Speed

Only available on the 620L

REFSPEED Speed diagnostic calculated from Reference encoder.

MAX SPEED RPM 100% for reference encoder.

ENCODER LINES Number of lines on the reference encoder used for the calculation of reference speed.

Phase

OFFSET Fixed offset into error calculator in encoder counts[1].

OFFSET SCALE Scalar for offset to allow greater range.

RESET Set and hold the Error to zero.

POS CALC ENABLE Enable the computation of position error, disabling this also zeros the position error.

POSITION ERROR Clamped Error output.

[1] Note: Encoder counts are equale to four times the number of lines on the encoder per revolution.

MAX POSITION ERR	Limit clamp for position error.
REF SCALE A	Multiplicand for reference encoder.
REF SCALE B	Divisor for reference encoder. Example: Reference encoder has 1000 line and Master has 2048 lines then for 1:1 phase locking Ref. Scale A and B should be set to 2048 and 1000 respectively.
REF ENCODER I/P	Diagnostic for incoming encoder counter (unscaled).
SATURATED	Position Error output has been clamped.
OVERFLOW	Position Error has overflowed and phase information has been lost. This is because the error has exceeded +/- 1,000,000,000 counts, about 120,000 revolutions with a 2048 line encloder.

Inch

INCH ADVANCE	Boolean flag that when TRUE will trickle `INCH RATE` counts into the position Error each millisecond. This can be used to align the master motor to the reference motor.
INCH RETARD	As above in the other sense.
INCH RATE	The number of counts to be trickled into the Position error accumulator every millisecond.

PID

The PID Block allows the drive to be used in applications where a trim is required from an external loop. The PID input can be load cell tension, dancer position or any other transducer feedback such as pressure, flow etc.

The most commonly encountered applications in web transfer and winding are:

Section Control with PID trim on speed demand. The PID input is either load cell tension or dancer position feedback.

Features

1. Independent adjustment of gain and time constants.
2. Additional first-order filter (F).
3. Functions P, PI, PD, PID with/without F individually selected.
4. Ratio and divider for scaling each input.
5. Independent positive and negative limits.
6. Output scalar (Trim).

Block Diagram

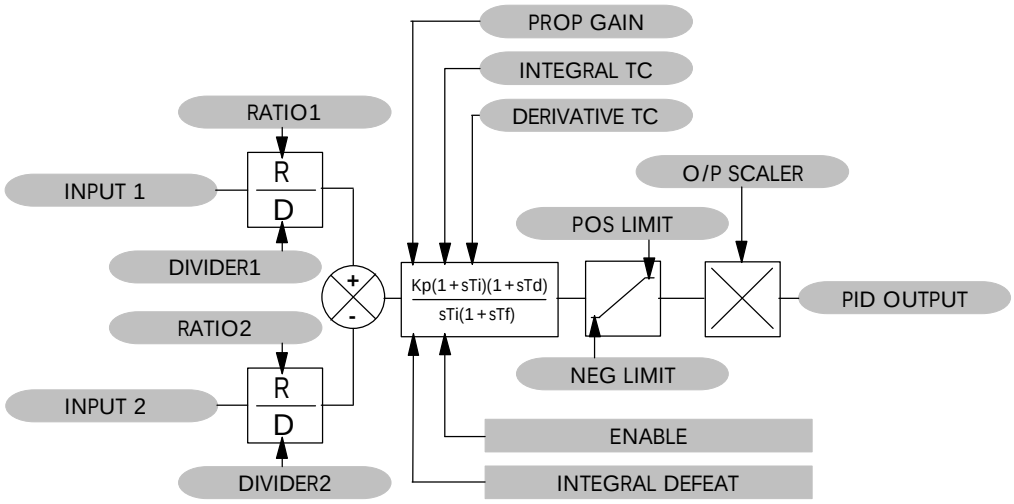


Figure 5.18 PID

MMI Entries:

```
f.....PID
f.......INPUT             [545] =      0.00 %
f.......ENABLE            [534] = TRUE
f.......PROP.GAIN         [549] =       1.0
f.......INT.TIME CONST.   [539] =      5.00 SECS
f.......INT.DEFEAT        [538] = FALSE
f.......DERIVATIVE TC     [531] =     0.000 SECS
f.......FILTER TC         [535] =     0.100 SECS
f.......POSITIVE LIMIT    [547] =    100.00 %
f.......NEGATIVE LIMIT    [542] =   -100.00 %
f.......O/P SCALER(TRIM) [543] =    1.0000
f.......ERROR CALC
f.........INPUT 1           [536] =      0.00 %
f.........INPUT 2           [537] =      0.00 %
f.........RATIO 1           [550] =    1.0000
f.........RATIO 2           [551] =    1.0000
f.........SIGN 1            [601] = POS
f.........SIGN 2            [602] = POS
f.........DIVIDER 1         [532] =    1.0000
f.........DIVIDER 2         [533] =    1.0000
f.........LIMIT             [553] =    100.00 %
f.........ERROR OUTPUT      [500] =      0.00 %
f.......PROFILER
f.........MODE              [541] =         0
f.........MIN PROFILE GAIN [540] =      0.00 %
f.........PROFILED GAIN     [548] =       0.0
f.........PROFILE INPUT     [554] =      0.00 %
f.........PROFILE MININPUT [555] =      0.00 %
f.......OUTPUT              [546] =      0.00 %
f.......CLAMPED             [544] = TRUE
```

Inputs

INPUT 1 This can be either a position/tension feedback or a reference/offset.

RATIO 1 This multiplies **INPUT 1** by a factor (**RATIO 1**).

DIVIDER 1 — This divides **INPUT 1** by a factor (**DIVIDER 1**).

INPUT 2 — This can be either a position/tension feedback or a reference/offset.
Range: ±300.00%
Default: 0.00%

RATIO 2 — This multiplies **INPUT 2** by a factor (**RATIO 2**).

DIVIDER 2 — This divides **INPUT 2** by a factor (**DIVIDER 2**).

INT. DEFEAT — This is a digital input which resets the integral term when TRUE. The block transfer function then becomes P+D only.

ENABLE — This is a digital input which resets the (total) PID Output as well as the integral term when FALSE.

Outputs (Diagnostic)

PID OUTPUT — This is the output of the PID block and is found in the Diagnostics menu.

PID ERROR — This is the difference of (**INPUT 1** - **INPUT 2**) and is found in the Diagnostics menu.

PID CLAMPED — This is a logic output indicating whether the PID limits are active and is found in the Diagnostics menu.

Parameters

PROP. GAIN (P) — This is a pure gain factor which shifts up or down the whole Bode PID transfer function leaving the time constants unaffected. A value of P = 10.0 means that, for an error of 5%, the proportional part (initial step) of the PID output will be:

10 * [1 + (Td/Ti)] * 5 % ,.e. approx. 50% for Td << Ti.

INT. TIME CONST. (Ti) — This is the integrator time constant.

DERIVATIVE (Td) — This is the differentiation time constant. When Td = 0 the transfer function of the block becomes a P+I.

FILTER TC (Tf) — In order to attenuate high-frequency noise a first order filter is added in conjunction with the differentiation. The ratio k of the Derivative Time Constant (Td) over the Filter Time Constant (Tf) (typically 4 or 5) deterMINes the high-frequency lift of the transfer function. For Tf = 0 this filter is eliminated.

POSITIVE LIMIT — This is the upper limit of the PID algorithm.

NEGATIVE LIMIT — This is the lower limit of the PID algorithm.

O/P SCALAR (TRIM) — This is the ratio which the limited PID output is multiplied by in order to give the final PID Output. Normally this ratio would be between 0 and 1.

User Interface

Configuring The PID Function

Input Connections

The two PID inputs (Input 1 & Input 2) by default are not connected to any signals and are only adjustable via the MMI up/down arrow keys.

If the application requires setpoint and/or feedback coming from other sources, then these signals should be configured to point to Inputs 1 and Input 2 respectively.

Output Connection

The default destination for the PID Output is 0 which means that the block will not be operating unless its output is redirected to some other destination, typically a speed setpoint. This can be implemented by using the Block Diagram section of the CONFIGURE I/O menu.

Internal Limit Functions

PID Error

The PID Error is internally clamped to ±105.00%.

Integral Term

The Integral Term is internally clamped to the prevailing values of "Positive Limit" and "Negative Limit" respectively as per PID Output.

It is also held while the PID Output is being clamped.

Preset Block

MMI Entries:

```
......PRESET
........SELECT 1          [92 ] = FALSE
........SELECT 2          [93 ] = FALSE
........SELECT 3          [94 ] = FALSE
........SIGN              [109] = NEG
........INPUT 1           [95 ] =      0.00 %
........INPUT 2           [96 ] =     25.00 %
........INPUT 3           [97 ] =     50.00 %
........INPUT 4           [98 ] =    100.00 %
........INPUT 5           [99 ] =      0.00 %
........INPUT 6           [100] =    -25.00 %
........INPUT 7           [101] =    -50.00 %
........INPUT 8           [102] =   -100.00 %
```

Overview

The Preset block allows the user to select 1 of 8 preset inputs, which in turn may be connected to other blocks of inputs.

Block Diagram

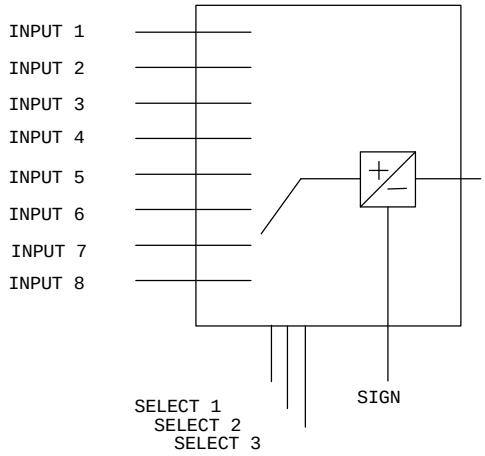


Figure 5.19 Preset Block

Presets

Input 1,2..8	Pre-set input variables.
Select 1,2,3	Select inputs 1
SIGN	Sets the sign of the output.

Selection Table

Three Boolean variables used to select between one of the 8 preset values.

Select 3	Select 2	Select 1	Input
FALSE	FALSE	FALSE	1
FALSE	FALSE	TRUE	2
FALSE	TRUE	FALSE	3
FALSE	TRUE	TRUE	4
TRUE	FALSE	FALSE	5
TRUE	FALSE	TRUE	6
TRUE	TRUE	FALSE	7
TRUE	TRUE	TRUE	8

Table 1 Preset input logic

S-Ramp

MMI Entries:

```
f.....S-RAMP
f.......INPUT              [597] =      0.00 %
f.......RESET              [104] = FALSE
f.......RESET VALUE        [105] =      0.00 %
f.......ACCELERATION       [106] =     10.00
f.......JERK               [107] =     10.00
f.......QUENCH             [108] = FALSE
f.......AT SPEED           [316] = FALSE
f.......AT SPEED LEVEL     [612] =      1.00 %
h.......ACCEL O/P          [253] =      0.00
h.......OVERSHOOT THRESH   [254] =      5.00 %
f.......OUTPUT             [598] =      0.00 %
```

Useful Equations

V is the maximum speed the drive must reach. In % / sec

A is the maximum allowable acceleration in %/sec^2

J is the maximum allowable value for jerk, in %/sec^3

The time needed to stop or accelerate is :

$$t = \frac{V}{A} + \frac{A}{J} \text{ [seconds]}$$

as the speed is symmetrical the average speed is V/2, therefore the stopping / acceleration distance can be calculated.

$$s = \frac{V}{2}\left(\frac{V}{A} + \frac{A}{J}\right) \text{ [meters]}$$

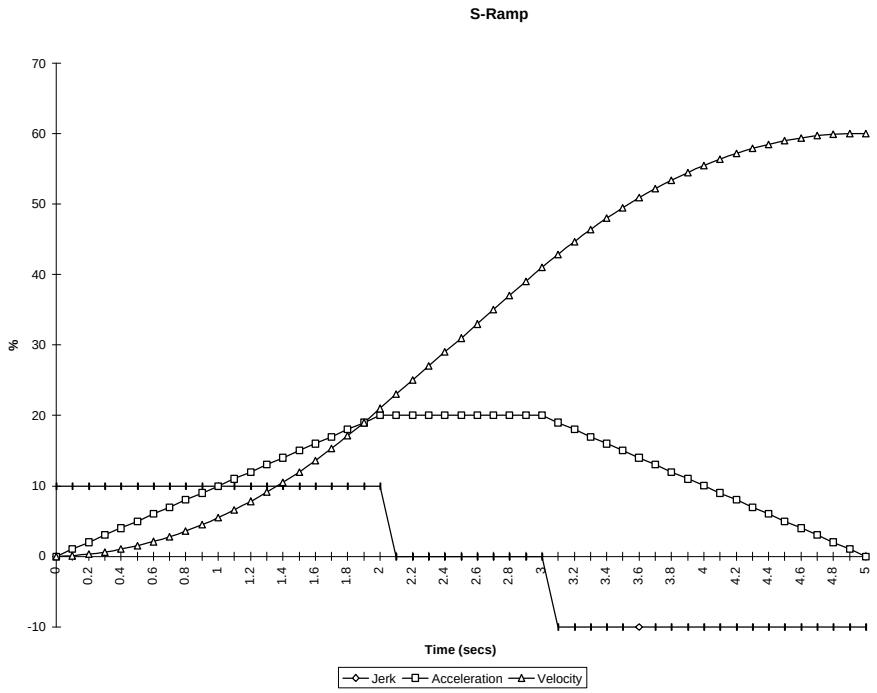


Figure 5.20 S-Ramp

Example acceleration graph for a velocity 60 %/s max. acceleration of 20 %/s^2 and a jerk of 10 %/s^3

Block Diagram

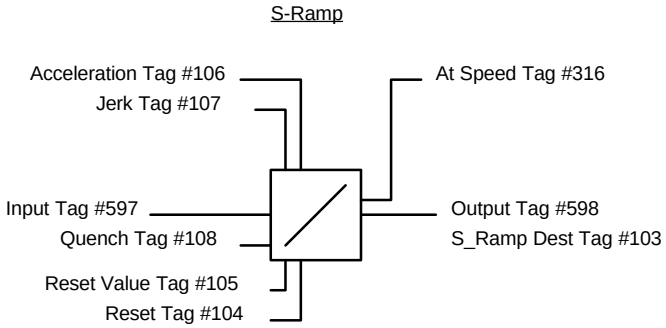


Figure 5.21 S-Ramp Block Diagram

Home

If Enabled the drive will use a position loop to stop the drive in a set number of encoder counts. This mode is triggered from an external input, usually from a mark at a fixed distance from the floor. One of two velocity profiles may be chosen, linear or square root, the square root profile leads to a linear deceleration where as linear profile will give as “s” shaped deceleration.

MMI Entries:

```
f.....HOME
f.......HOME              [397] = FALSE
f.......HOMING DISTANCE   [396] =      2048
f.......1/ENCODER SCALE   [398] =      4.00
f.......LINEAR  O/P       [388] = FALSE
f.......HOME INPUT        [394] =      0.00 %
f.......HOME OUTPUT       [395] =      0.00 %
```

Block Diagram

Speed Demand is the input to the speed loop.

Position Error is the distance in encoder pluses between the current position and Target position.

The homing distance is the stopping distance in encoder pulses.

$$SpeedDemand = \frac{PositionError}{HomingDistance} * SRampOutput$$

NOTES: Possible homing errors

Motor:

100% Speed = 1500 RPM

5000 line encoder.

Gearbox 18:1 @ 2.5m/s)

Pulley 650mm diameter.

@ 2.5 m/s 1 revolution = 110 mm

Internally the encoder is multiplied by 4 so 1 rev. = 20,000 counts.

Relationship between encoder counts and travel in mm on the lift car.

@ 2.5 m/s 1 count = 0.0055mm

How far does the car travel between the detection of the homing sensor and the drive seeing the command ?

It will be assumed that the drive will be travelling relatively slowly when it receives the home command 1.5Hz = 0.75 RPM = 15 counts / ms = 0.0825 mm / ms.

The worst case levelling error will therefore be 0.08 * (cycle time of lift controller + cycle time of vector drive) = 0.08 * (10+15) = 2mm.

This can be halved to +/- 1mm by adjusting the stopping distance by 1mm.

Block Diagram

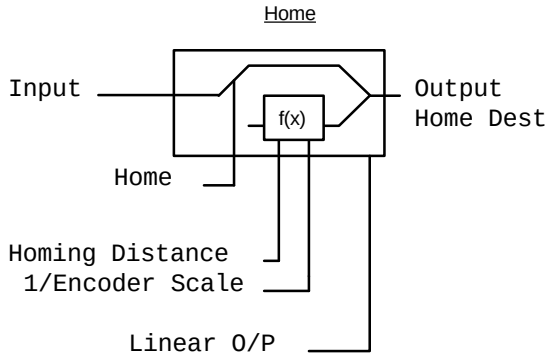


Figure 5.22 Home Block Diagram

Parameters

HOMING DISTANCE	Homing distance is specified in Encoder Counts * 1 / Encoder Scale, a 2048 line encoder equates to 8192 counts per revolution.
1/ENCODER SCALE	Scalar for homing dstance.
HOME	Trigger Input

LOCAL MODE BLOCK DIAGRAM

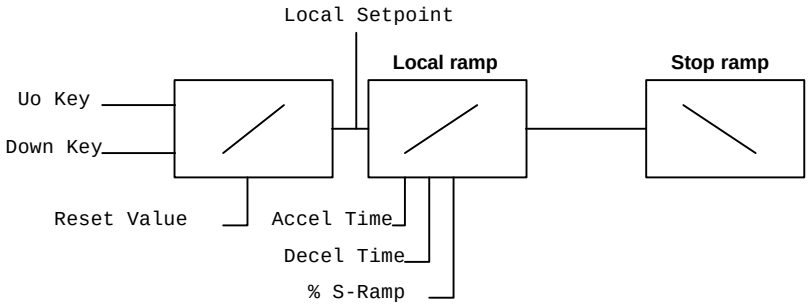


Figure 5.23 Local Setpoint

Only active when the drive is in Local mode.

Start Up Values

SETPOINT	Default setpoint used on power up.
REV DIRECTION	Default Direction used on power up.
PROGRAM	Mode used on power up.
LOCAL	Mode used on power up.

Local Ramp

ACCEL TIME	Ramp up time.
RAMP DECEL TIME	Ramp up time.

FILE TRANSFER

MMI Entries

DUMP MMI (TX)	Starts transmission of MMI Text file **XFER (TX)]** Starts transmission of UDP binary file **XFER (RX)]** Starts reception of UDP binary file

Summary

The P3 port can be used to transfer an ASCII representation of the drive's settings between a 620 and a host computer.

The transfer uses simple ASCII file structure and XON / XOFF protocol. This is provided by most communications packages. Host computers tested include IBM PC XT and AT, running both Windows and MS-DOS, Psion Organiser 3 and many more.

Transferring data from the 620 to a host computer is defined as downloading (TX) whereas transferring data from a host computer to the 620 is defined as uploading (RX).

Communication Port Set-up

9600 Baud (configurable from MMI)

1 stop bit (fixed)

No parity (fixed)

8 bits (fixed)

XON/XOFF handshaking (fixed)

Dump

This is the transfer of the MMI description from the 620 to a host computer. This information fully documents the 620's settings in a textual format that is clear and easy to read. The listing is of the drive's current settings, **not** the settings held in EEprom.

1. Connect the 620 to the host using the appropriate lead.
2. Using a standard communications package prepare the host to receive an ASCII file. Ensure the host's serial port is set-up first.
3. Save the 620's settings using the Parameter Save feature. This ensures the Dump matches the drive settings.
4. Set the **P3 MODE** to **OPTION BOARDS**.
5. Get the host ready to receive a file; use the file extension .MMI to differentiate it from .UDP format files.
6. Start downloading on the 620 by selecting **DUMP MMI (TX)**.
7. The file ends in a ctrl-z; some packages this automatically closes the file. If this is not the case, when the 620 says it has finished and the host has stopped scrolling text, close the file by hand.
8. The file can now be treated like any normal file.

UDP Download (UDP XFER TX)

This is the transfer of parameters from the 620 to a host computer. This information fully describes the 620's settings in a binary format. The listing is of the drive's settings currently held in EEprom, i.e. those that have been saved.

1. Connect the 620 to the host using the appropriate lead.
2. Using a standard communications package prepare the host to receive an ASCII file. Ensure the host's serial port is set-up first.
3. Save the 620's settings using the Parameter Save feature. This ensures the UDP file matches the drive settings.
4. Set the **P3 MODE** to **OPTION BOARDS**.
5. Get the host ready to receive a file; use the file extension .UDP to differentiate it from .MMI format files.
6. Start downloading on the 620 by selecting **UDP XFER (TX)**.
7. The file ends in a ctrl-z; some packages this automatically closes the file. If this is not the case, when the 620 says it has finished and the host has stopped scrolling text, close the file by hand. The last line should read **:00000001FF**
8. The file can now be treated like any normal file.

UDP Upload (UDP XFER RX)

Caution

The 620 UDP files are not compatible with any other EUROTHERM Product.
Uploading a corrupted UDP file cause loss of data.

This is the transfer of parameters from the host computer to the 620. This information is written directly to EEprom, so all the drive's current settings will be overwritten.

1. Connect the 620 to the host using the appropriate lead.
2. Using a standard communications package prepare the host to transfer an ASCII file. Ensure the host's serial port is set-up first.
3. Set the **P3 MODE** to **DISABLE**.

4. Start uploading on the 620 by selecting **UDP XFER (RX)**.
5. When the 620 says "RECEIVING", begin the file transmission.
6. The file ends in a which the 620 uses to close the file.
7. The 620 must now be reset by pressing the 'E' key, as the message on the MMI indicates.

Serial Link Port P3 Lead

There is 24V On Pin 2 of the P3 Port. This may damage your PC or the 620 if connected to the serial port.

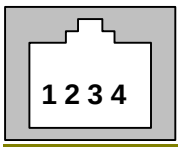


Figure 5.24 P3 Port

P3 Port	Signal	Female DB9	Male DB9	Female DB25	Male DB25
1	Ov	5	5	7	7
2	24v	N/C	N/C	N/C	N/C
3	TX	2	3	2	3
4	RX	3	2	3	2

Table 2 P3 Lead pin allocation

Display Station (D.P.M.)

For infomation only.

Newport 6155AS Revision B onwards

More infomation on the Newport 6 Digit serial input remote display is avalible from:

USA
Newport Electronics Inc.
Phone (714) 540-4914
Fax: (714) 546-3022

Germany
Newport Electronics GmbH
Phone: (07056) 3017
Fax: (07056) 8540

France
Newport Electronics S.A.R.L
Phone: (1) 30.62.14.00
Fax: (1) 30.69.91.20

Benelux (NL)
Newport Electronics B.V.
Phone: (020) 6418405
Fax: (020) 6434643

UK
Newport Electronics U.K.
Phone: (01455) 285998
Fax: (01455) 285604

ASCII hex	Code	Keyboard Character	Function
04	EOT	Ctrl D	Switches display to BS4504 Mode
02	STX	Ctrl B	Start Message
03	ETX	Ctrl C	End Message

Table 3 ASCII Codes

Message Format

<EOT><GID><GID><UID><UID><STX><Indicator><DATA><ETX>

<GID> is fixed at '1' defined by Newport standard.

<UID> is calculated from the position in the tag list, the first tag has address '1'

<Indicator> This toggles the indicator led on the op station to signal data updates.

<DATA> 6 characters padded with spaces containing an ASCII representation of the data with any necessary formatting.

<ETX> the message.

DIP Switch Settings

1	2	3	4	5	6	7	8		
1	0	0	0	0	0	1	0		
1	0	0	0					=	Address 11 GID UID. This is the best address for TAG #1
				0	0			=	Baud 9600
						10		=	Strobed the characters are displayed once a CR is received

Jumpers

DFI (â 15V RS232)

SERIAL LINK

P3 Mode

Selects the operating mode of the P3 Serial port,

Option Board

5703 Master

5703 Slave

Newport

For file transfer select Option Board. During file transfers the mode is automatically set to the correct value. During MMI Download this is set to Busy.

P3 Baud rate

Sets baud rate for P3 serial port.

300, 600, 1200, 2400, 4800, **9600**, and 19200. Baud rates higher than 9600 may become unreliable with a PC.

Setpoint Repeater 5703

This unit provides the facility to run a line of drives in speed-lock without the use of a 5720 Quadraloc controller; for accurate speed-holding, encoder feedback is required. Ratioed speed-locking is supported, although the unit is not intended to supplant Quadraloc in applications requiring high accuracy.

A 16-bit signal is passed between drives through a fibre-optic link and the P3 port on each 620 drive. The port operates RS232-compatible signal levels, which the 5703 converts to light for fibre-optic transmission, and from fibre-optic to RS232 for reception.

Hardware

The 5703 is housed in a DIN rail mounted box and is provided with a ribbon cable to connect it to the P3 port. While cable is of a fixed maximum length of 400mm to limit transmission errors, the primary unit to unit interconnection is intended to be achieved by a fibre-optic cable.

The 5703 unit itself is simply an electric signal-to-light converter, and as such does not alter the signal in any way. This is achieved within the software of the 620 converter.

The 5703 is fitted with one fibre-optic receiver and two fibre-optic transmitters. The receiver has a fixed function to receive data from the 'preceding' unit while one of the transmitters sends data to the 'following' unit. The

additional transmitter can be used either to re-transmit the incoming signal or provide a second transmission of the output signal, giving the unit wide functionality. When the link is in the normal right-hand position (assuming the board is mounted with the fibre-optics downward) the second transmitter repeats the output signal. In the left-hand position it repeats the input signal.

$$Output = \left(\frac{Input_n \times Ratio_n + Input_{n-1} \% Ratio_{n-1}}{100\%} \right)_{-limit}^{limit} \times sign_{-1}^{+1}$$

The 5703 can be configured to point to any relevant parameter in the block diagram, the default connections are such that the scaled input is connected to the 'additional speed demand' and the output to the 'speed demand'.

Possible additions include the sending of multiple parameters and the ability for masters to receive as well as transmit data.

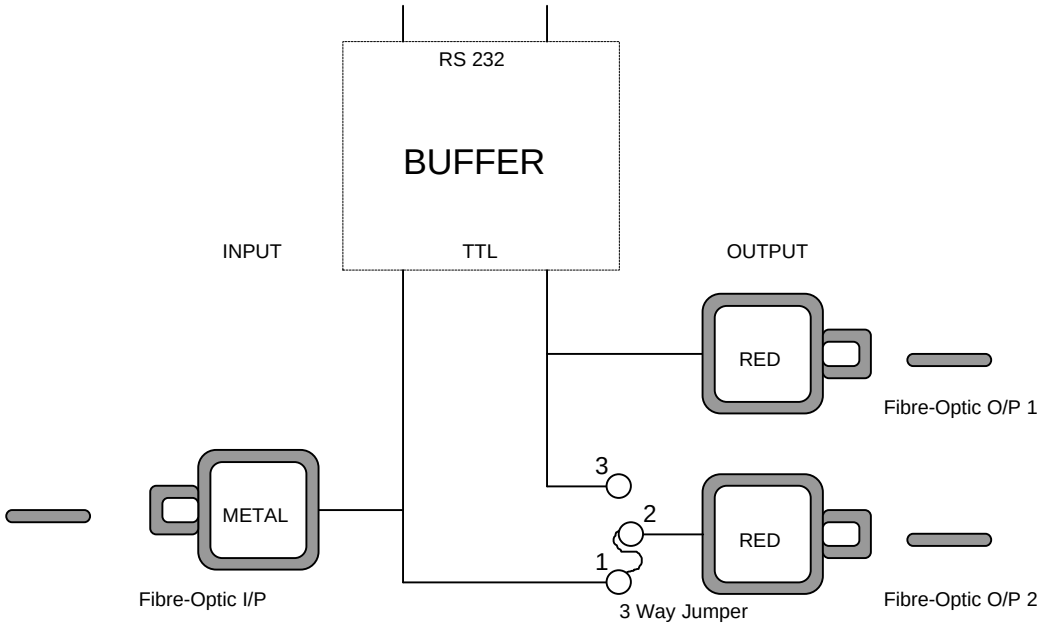


Figure 5.25 5703 Block Diagram

RCV Error

The P3 serial port in the 5703 support mode (i.e. setpoint repeater) receives and transmits information to other 620 controllers. During the receive cycle it checks that the data received is valid. If invalid, it raises an alarm. This is only applicable in the SLAVE mode of operation.

Alarm delay time: 1.5 Secs.

MMI Entries

Setpt. Ratio	Scalar input
Setpt. Sign	Changes sign of input
Scaled Input	Input diagnostic (Raw Input x Scale x Sign)
Raw Input	Raw input diagnostic
Output	Diagnostic of P3 output.

P3 Protocol specification

This describes the protocol used for the drive to drive communications serial link, or "P3 Port". It is commonly used with the 5703 fibre optic isolation interface products for drive to drive communications.

Protocol

The character format is fixed at:

Single parameter, no acknowledgement.

8 Data Bits

1 Stop Bit

No Parity

First char.	n+1	n+2	n+3	End Char.
%	Low Data Byte	High Data Byte	Checksum	<CR>

Table 4 5703 Telegram

% - the percent character. This is the message start character.

Checksum - the sum of The Low and High data bytes

<CR> - Carriage return character. This is the message end character.

If any errors occur during transmission, the message is discarded by the receiver, alarm is generated by the receiver (slave) if too many consecutive errors or time outs occur.

At 19200 Baud, the approximate maximum transmission rate is 1 message every cycle of the block diagram. This is the maximum transmission rate.

PASSWORD

MMI Entries

```
....PASSWORD
......ENTER PASSWORD   [200] =  0x0000
......CHANGE PASSWORD  [201] =  0x0000
```

The 620 Vector Drives have a password system which can be used to prevent unauthorised access to the set-up parameters. Once the user has set a password then the set-up parameters become read-only. 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 follows:

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

CHANGE PASSWORD — This option is used to change the password or to initially a user password. a password has been set up, the **PARAMETER SAVE** menu be used to save the password in non-volatile.

CLEAR PASSWORD — This option is used to clear the password value displayed under the **ENTER PASSWORD** menu. this menu is accessed the **ENTER PASSWORD** value is to "**0000**". the **CHANGE PASSWORD** value is-zero then the set-up parameters will be locked.

Example 1: programming of password

1) Access the **CHANGE PASSWORD** menu. 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. display will show, for example:

CHANGE PASSWORD
0x1234

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

4) Press the 'E' key to take you out of the CHANGE PASSWORD menu. Display will show:

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

6) Access the **CLEAR PASSWORD** menu and press the 'M' key. Display will show:

CLEAR PASSWORD
PASSWORD CLEARED

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

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

CHANGE PASSWORD
****

Example 2: set-up parameters when the password is set

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

ENTER PASSWORD
0x0000

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 set-up parameters again.

Example 3: 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 set-up parameters.

7) Remember to use **SAVE PARAMETERS** to save the new password value in non-volatile memory.

ALARM STATUS

MMI Entries

```
....ALARM STATUS
......HEALTH STORE      [203] =  0x0000
......HEALTH WORD       [217] =  0x0000
......FIRST ALARM       [218] =  0x0000
h.....HEALTH INHIBIT    [219] =  0x0000
```

MENUS

MMI Entries

```
....MENUS
......FULL MENUS        [205] = FALSE
......CONTRAST          [220] =       128
f.....MENU DELAY        [206] =         0
f.....DATA DELAY        [207] =        50
```

Parameters

Full

PARAMETERS SAVE

This menu is used to save all of the drive parameters in the non-volatile memory. The UP arrow as instructed on the second line of the MMI display (UP TO ACTION) to save the drive parameters.

SYSTEM / CONFIGURATION

Software

This shows the software release number. The 620 UDP parameter files are compatible between releases w.x and y.z where z > 1.

Configure I/O

Configure Enable

During the process of reconfiguration there is a danger that Tag numbers will be connected to wrong parameters. To avoid this possibility all configuration links must be temporarily "disconnected" during the configuration process and the flag set to "enabled" to allow the activity. Failure to reset the flag to "disabled" after reconfiguration will cause an alarm to be generated, "Configure Enabled", which will prevent drive operation.

Analogue Inputs

MMI Entries

```
f.......ANALOG INPUTS
f.........ANIN 1 (C3)
f...........CALIBRATION      [248] =    100.00 %
f...........OFFSET           [358] =      0.00 %
f...........MAX VALUE        [249] =    100.00 %
f...........MIN VALUE        [250] =   -100.00 %
f...........DESTINATION TAG  [251] =       196
f...........SCALED INPUT     [390] =     74.51 %
f.........ANIN 3 (F2)
f...........CALIBRATION      [256] =    100.00 %
f...........OFFSET           [360] =      0.00 %
f...........MAX VALUE        [257] =    100.00 %
f...........MIN VALUE        [258] =   -100.00 %
f...........DESTINATION TAG  [259] =       197
f...........SCALED INPUT     [391] =      0.00 %
f.........ANIN 4 (F3)
f...........CALIBRATION      [261] =    100.00 %
```

```
f..........OFFSET           [361] =      0.00 %
f..........MAX VALUE        [262] =    100.00 %
f..........MIN VALUE        [263] =   -100.00 %
f..........DESTINATION TAG  [264] =         0
f..........SCALED INPUT     [392] =      0.01 %
f........ANIN 5 (F4)
f..........CALIBRATION      [266] =    100.00 %
f..........OFFSET           [362] =      0.00 %
f..........MAX VALUE        [267] =    100.00 %
f..........MIN VALUE        [268] =   -100.00 %
f..........DESTINATION TAG  [269] =         0
f..........SCALED INPUT     [393] =      0.00 %
```

Block Diagram

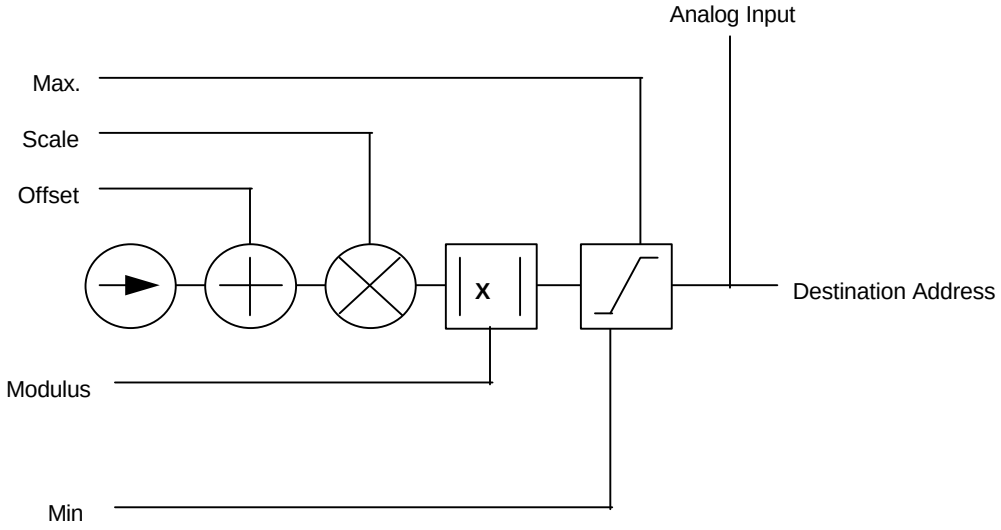


Figure 5.26 Analog I/P

ANIN 1 (C3), ANIN 3 (F2), ANIN 4 ((F3) and ANIN 5 (F4)

CALIBRATION Analogue input scaling ratio.

OFFSET maximum value of scaled analogue input.

MAX. VALUE maximum value of scaled analogue input.

MIN VALUE Minimum value of scaled analogue input.

DESTINATION TAG Destination N° of scaled analogue input value.

SCALED INPUT Diagnostic

ANIN 2 (C4)

Analogue Input 2 (terminal A3) is not reconfigurable. The calibration for this channel is found in **SETUP PARAMETERS::SPEED LOOP::SETPOINTS::RATIO 2 (A3).**

Analogue input 2 is a direct input into the speed loop / current loop and it is scanned synchronously with the current loop (typically every 1.1.mSecs) rather than every micro cycle time. Therefore it should be used for any signal whose response is critical e.g. a trim input from microloc, cut to length applications etc.

CALIBRATION Analogue input scaling ratio.

POS. VALUE maximum value of scaled analogue input.

MIN VALUE minimum value of scaled analogue input.

Analogue Outputs

MMI Entries

```
f.......ANALOG OUTPUTS
f.........ANOUT 1 (C5)
f...........% TO GET 10V     [272] =    100.00 %
f...........OFFSET           [332] =      0.00 %
f...........CALIBRATION      [330] =    100.00 %
f...........MODULUS          [335] = FALSE
f...........ANOUT 1          [354] =      0.00 %
f...........SOURCE TAG       [273] =         7
f.........ANOUT 2 (F5)
f...........% TO GET 10V     [275] =    150.00 %
f...........OFFSET           [333] =      0.00 %
f...........CALIBRATION      [331] =    100.00 %
f...........MODULUS          [336] = FALSE
f...........ANOUT 2          [355] =      0.00 %
f...........SOURCE TAG       [276] =         9
```

Block Diagram

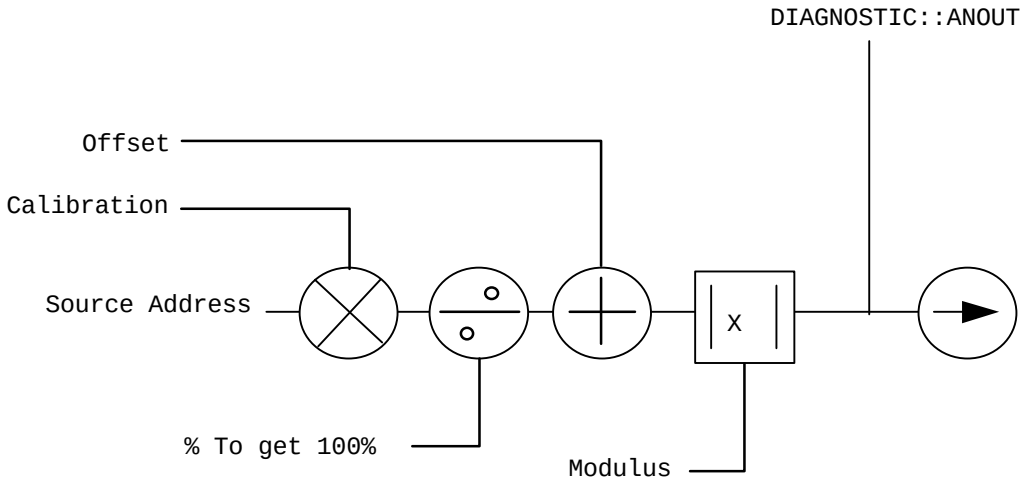


Figure 5.27 Analog O/P Block Diagram

ANOUT 1 (C5) and ANOUT 2 (C6)

% TO GET 10V Scalar value which produces 10 V output.

OFFSET Offset value added to the normal output value after the scalar and before the modulus.

CALIBRATION Output scalar.

MODULUS Unsigned analogue output enable.

SOURCE TAG N° Source of output value.

ANOUT X Diagnostic after scaling block if source tag is non zero else it could be used as a destination tag.

Inputs

Block Diagram

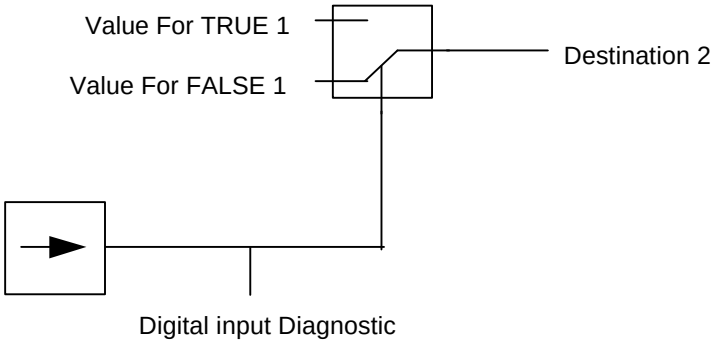


Figure 5.28 Digital Input Block Diagram

The Destination for a digital input can be any valid TAG N°; this means that a digital input can be used to select one of two values for a given parameter. It is also possible to treat the values for TRUE and FALSE as destination Tags from other functions or inputs.

MMI Entries

```
f.......DIGITAL INPUTS
f.........DIGIN 1 (E2)
f...........VALUE FOR TRUE   [279] =      0.01 %
f...........VALUE FOR FALSE  [280] =      0.00 %
f...........OUTPUT           [527] =      0.00 %
f...........DESTINATION TAG  [281] =        57
f.........DIGIN 2 (E3)
f...........VALUE FOR TRUE   [283] =      0.01 %
f...........VALUE FOR FALSE  [284] =      0.00 %
f...........OUTPUT           [528] =      0.00 %
f...........DESTINATION TAG  [285] =        92
f.........DIGIN 3 (E4)
f...........VALUE FOR TRUE   [287] =      0.01 %
f...........VALUE FOR FALSE  [288] =      0.00 %
f...........OUTPUT           [529] =      0.00 %
f...........DESTINATION TAG  [289] =        93
f.........DIGIN 4 (E5)
f...........VALUE FOR TRUE   [523] =      0.01 %
f...........VALUE FOR FALSE  [524] =      0.00 %
f...........OUTPUT           [508] =      0.00 %
f...........DESTINATION TAG  [525] =        94
f...........DIGIN 4 (E5)     [521] = FALSE
f.........DIGIN B6 DEST    [451] =        71
f.........DIGIN B7 DEST    [450] =        70
f.........DIGIN B8 DEST    [452] =        72
```

DIGIN 1 (E2), DIGIN 2 (E3), DIGIN 3 (E4), DIGIN 4 (E5)

VALUE FOR TRUE — Value that Destination TAG assumes when input is TRUE.

VALUE FOR FALSE — Value that Destination TAG assumes when input is FALSE.

OUTPUT — Diagnostic.

DESTINATION TAG — Destination of assumed value.

DIGIN B6

DIGIN B6 DEST — Destination of digital input B6.(JOG by default) see also AUX IO

DIGIN B7

DIGIN B7 DEST — Destination of digital input B7.(START by default) see also AUX IO

DIGIN B8

DIGIN B8 DEST	Destination of digital input B8.(ENABLE by default) see also AUX IO

Digital outputs

Block Diagram

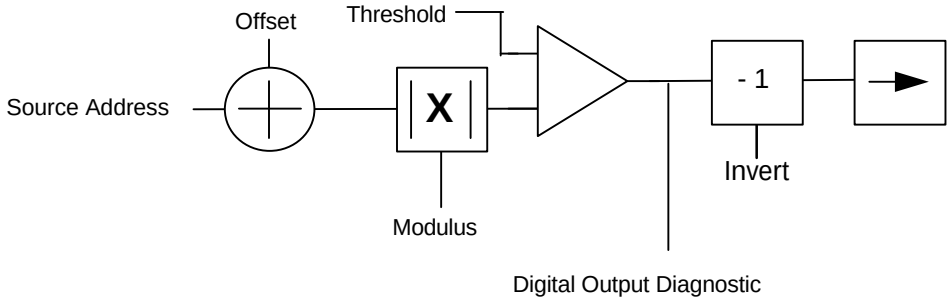


Figure 5.29 Digital Output

```
f.......DIGITAL OUTPUTS
f.........DIGOUT 1
f...........THRESHOLD (>)     [292] =      0.00 %
f...........INPUT             [324] =      0.00 %
f...........OFFSET            [321] =      0.00 %
f...........MODULUS           [293] = FALSE
f...........INVERT            [327] = FALSE
f...........SOURCE TAG        [294] =        17
f.........DIGOUT 2
f...........THRESHOLD (>)     [296] =      0.00 %
f...........INPUT             [325] =      0.00 %
f...........OFFSET            [322] =      0.00 %
f...........MODULUS           [297] = FALSE
f...........INVERT            [328] = FALSE
f...........SOURCE TAG        [298] =        12
f.........DIGOUT 3
f...........THRESHOLD (>)     [300] =      0.00 %
f...........INPUT             [326] =      0.00 %
f...........OFFSET            [323] =      0.00 %
f...........MODULUS           [301] = TRUE
f...........INVERT            [329] = FALSE
f...........SOURCE TAG        [302] =       559
```

DIGOUT 1 (E6), DIGOUT 2 (E7) and DIGOUT 3 (E8)

THRESHOLD (>)	Threshold which the must exceed to set output TRUE.
INPUT	DIAGNOSTIC.
OFFSET	Offset.
MODULUS	Output set true for absolute or modulus of N° value.
INVERT	Select inverted output.
SOURCE TAG	Source TAG of used to set output.

Configure 5703

See also page 5-31 Setpoint Repeater 5703.

MMI Entries

```
f.......CONFIGURE 5703
f.........SOURCE TAG       [304] =       176
f.........DESTINATION TAG  [305] =       371
```

Block diagram

MMI Entries

```
f.......BLOCK DIAGRAM
f.........RAISE/LOWER DEST [307] =         0
f.........RAMP O/P DEST    [308] =       372
f.........PRESET DEST      [111] =       373
f.........S-RAMP DEST      [103] =         0
f.........HOME DEST        [389] =         0
f.........SPT SUM1 OP DEST [345] =        58
f.........SPT SUM2 OP DEST [346] =       176
f.........SPT SUM3 OP DEST [347] =         0
f.........PID O/P DEST     [552] =         0
f.........PID ERROR DEST   [556] =       545
f.........POSITION DEST    [341] =         0
```

Internal links

MMI Entries

```
f.......INTERNAL LINKS
f.........LINK 1 SOURCE    [180] =         0
f.........LINK 1 DEST      [181] =         0
f.........LINK 2 SOURCE    [182] =         0
f.........LINK 2 DEST      [183] =         0
f.........LINK 3 SOURCE    [184] =         0
f.........LINK 3 DEST      [185] =         0
f.........LINK 4 SOURCE    [186] =         0
f.........LINK 4 DEST      [187] =         0
f.........LINK 5 SOURCE    [560] =         0
f.........LINK 5 DEST      [561] =         0
f.........LINK 6 SOURCE    [562] =         0
f.........LINK 6 DEST      [563] =         0
f.........LINK 7 SOURCE    [564] =         0
f.........LINK 7 DEST      [565] =         0
f.........LINK 8 SOURCE    [566] =         0
f.........LINK 8 DEST      [567] =         0
f.........LINK 9 SOURCE    [568] =         0
f.........LINK 9 DEST      [569] =         0
f.........LINK 10 SOURCE   [570] =         0
f.........LINK 10 DEST     [571] =         0
f.........LINK 11 SOURCE   [572] =         0
f.........LINK 11 DEST     [573] =         0
f.........LINK 12 SOURCE   [574] =         0
f.........LINK 12 DEST     [575] =         0
f.........LINK 13 SOURCE   [576] =         0
f.........LINK 13 DEST     [577] =         0
f.........LINK 14 SOURCE   [578] =         0
f.........LINK 14 DEST     [579] =         0
f.........LINK 15 SOURCE   [580] =         0
f.........LINK 15 DEST     [581] =         0
f.........LINK 16 SOURCE   [582] =         0
f.........LINK 16 DEST     [583] =         0
```

The internal links are an extension of the drive's reconfigurability. They allow two categories of connections:

1. Connect an internal output to an internal input directly, without having to come out to the drive terminals and then back in again. This would waste terminal allocation and suffer conversion inaccuracies from analogue to digital and vice-versa.
2. Connect a given input terminal to more than one destination, e.g. select a different value for "Ramp Accel Time" and "Ramp Decel Time" via the same digital input.

Data is copied from source tag to destination tag.

Chapter 6

Diagnostics And Fault Finding

Contents Page

Chapter 6 Diagnostics And Fault Finding

INTRODUCTION

The 620 Vector Drives provide comprehensive diagnostic, alarm and trip facilities. These facilities minimise the possibility of damage to the drive, motor and associated components under unusual or fault conditions. The diagnostics and alarm information, available at the MMI display, enable ready identification of conditions. In the event that a fault is traced to the drive, the drive should be returned to the manufacturer - no corrective maintenance should be attempted.

DIAGNOSTICS

```
....DIAGNOSTICS
......TOTAL SPD.DMD.    [6  ] =      0.00 %
h.....SPEED FB UNFIL    [7  ] =      0.00 %
......SPEED FEEDBACK    [11 ] =      0.00 %
......SPEED ERROR       [8  ] =      0.00 %
......TORQUE DEMAND     [9  ] =      0.00 %
......TORQUE FEEDBACK   [10 ] =      0.00 %
......CURRENT FEEDBACK  [78 ] =      0.00 %
f.....TERMINAL VOLTS    [480] =         0 VOLTS
f.....DC LINK VOLTS     [613] =       597 VOLTS
f.....TERM V INTEGRAL   [623] =    100.00 %
......ACTUAL POS I LIM  [13 ] =      0.00 %
......ACTUAL NEG I LIM  [14 ] =      0.00 %
......INVERSE TIME O/P  [15 ] =      0.00 %
......AT CURRENT LIMIT  [16 ] = FALSE
......AT ZERO SPEED     [17 ] = TRUE
......AT ZERO SETPOINT  [18 ] = TRUE
......AT STANDSTILL     [19 ] = TRUE
......STALL TRIP        [20 ] = OK
......RAMPING           [21 ] = FALSE
......DRIVE START       [23 ] = FALSE
......DRIVE ENABLE      [24 ] = FALSE
......OPERATING MODE    [25 ] =  STOPPED
......HEALTHY           [27 ] = TRUE
......HEALTH OUTPUT     [12 ] = TRUE
......READY             [559] = FALSE
......RUN               [28 ] = FALSE
f.....CO-PRO PRESENT    [150] = TRUE
......ANIN 1 (C3)       [29 ] =     7.453 VOLTS
......ANIN 3 (F2)       [31 ] =     0.002 VOLTS
......ANIN 4 (F3)       [32 ] =     0.002 VOLTS
......ANIN 5 (F4)       [33 ] =     0.003 VOLTS
......ANOUT 1 (C5)      [34 ] =     0.000 VOLTS
......ANOUT 2 (F5)      [35 ] =     0.000 VOLTS
......COAST STOP        [26 ] = TRUE
......PROGRAM STOP      [22 ] = TRUE
......DIGIN B6 START    [37 ] = FALSE
......DIGIN B7 JOG      [36 ] = FALSE
......DIGIN B8 ENABLE   [38 ] = TRUE
......DIGIN 1 (E2)      [39 ] = FALSE
......DIGIN 2 (E3)      [40 ] = FALSE
......DIGIN 3 (E4)      [41 ] = FALSE
......DIGIN 4 (E5)      [521] = FALSE
......DIGOUT 1 (E6)     [42 ] = TRUE
......DIGOUT 2 (E7)     [43 ] = TRUE
......DIGOUT 3 (E8)     [44 ] = FALSE
......RAISE/LOWER O/P   [45 ] =      0.00 %
......SPT SUM O/P 1     [46 ] =     74.61 %
......SPT SUM O/P 2     [385] =     74.65 %
......SPT SUM O/P 3     [386] =      0.00 %
......RAMP OUTPUT       [47 ] =     74.65 %
```

```
......PRESET O/P       [110] =      0.00 %
......SPEED SETPOINT   [48 ] =     74.66 %
f.....SEQ RUN INPUT    [49 ] =     74.63 %
f.....SEQ OUTPUT       [50 ] =      0.00 %
......ENCODER          [51 ] =         0 RPM
```

The Diagnostics menu allows the user to monitor the operation of the drive. Diagnostics that can be monitored are described in the following paragraphs. These diagnostics are read-only.

TOTAL SPD.DMD.	Speed loop total setpoint after the ramp-to-zero block.
SPEED FB UNFIL	Raw speed feedback, usualy used for analog outputs.
SPEED FEEDBACK	Speed loop feedback.
SPEED ERROR	Speed loop error.
TORQUE DEMAND	Current loop demand (speed error PI output or external current demand clamped by all the current limits).
TORQUE FEEDBACK	Scaled and filtered torque.
CURRENT FEEDBACK	Scaled and filtered current.
TERMINAL VOLTS	Scaled motor output volts.
DC LINK VOLTS	DC link volts.
TERM V INTEGRAL	Output out motor volts compensation loop..
ACTUAL POS I LIM	Overall positive current limit value.
ACTUAL NEG I LIM	Overall negative current limit value.
INVERSE TIME O/P	Inverse time clamp output level.
AT CURRENT LIMIT	Current demand is being restrained by the overall current limit.
AT ZERO SPEED	At zero speed feedback.
AT ZERO SETPOINT	At zero speed demand.
AT STANDSTILL	"**AT ZERO SPEED**" and "**AT ZERO SETPOINT**".
STALL TRIP	Armature current is above "**STALL THRESHOLD**" and "**AT ZERO SPEED**" but **not** "**AT ZERO SETPOINT**".
RAMPING	If the difference between the ramp input and the ramp output is greater than the "**RAMP THRESHOLD"**, then "**RAMPING**" is **TRUE**.
DRIVE START	Controller start / run command .
DRIVE ENABLE	Drive speed and current loop are enabled / quenched.
OPERATING MODE	Indicates whether the drive is in RUN, JOG 1....STOP etc.
HEALTHY	
HEALTH OUTPUT	
READY	

RUN

CO-PRO PRESENT	Indicates that there is a co-processor fitted and working normally, only applicable to the 620L and 620Adv.
ANIN 1 (C3)	Diagnostic displaying the current state of the analog input 1 (C3), by default this is connected to Speed setpoint no. 1.*
ANIN 2 (C4)	Diagnostic displaying the current state of the analog input 2 (C4), by default this is connected to Direct speed setpoint no. 2 / current demand.
ANIN 3 (F2)	Diagnostic displaying the current state of the analog input 3 (F2), by default this is connected to Speed setpoint no. 3 (ramped).*
ANIN 4 (F3)	Diagnostic displaying the current state of the analog input 4 (F3), by default this is unconnected.
ANIN 5 (F4)	Diagnostic displaying the current state of the analog input 5 (F4), by default this is unconnected.
ANOUT 1 (C5)	Diagnostic displaying the current state of the analog output 1 (C5), by default this is connected to Speed feedback.*
ANOUT 2 (F5)	Diagnostic displaying the current state of the analog output 2 (F5), by default this is connected to Torque demand. *

COAST STOP

PROGRAM STOP	State of program stop (terminal B8). When B8 is at 24V then "**PROGRAM STOP**" is **FALSE**
START (B7)	Diagnostic displaying the current state of the start input 2 (B7), by default this is connected to Start terminal.
JOG INPUT (B6)	Diagnostic displaying the current state of the Jog input 2 (B6), by default this is connected to Jog Input terminal.
ENABLE (B8)	Diagnostic displaying the current state of the Enable input (B8), by default this is connected an Electronic Enable (ON = Enabled).
DIGIN 1 (E2)	Diagnostic displaying the current state of the digital input 1 (E2), by default this is connected to Ramp hold input (ON = Hold).*
DIGIN 2 (E3)	Diagnostic displaying the current state of the digital input 2 (E3), by default this is connected to Preset Select input 1. *
DIGIN 3 (E4)	Diagnostic displaying the current state of the digital input 3 (E4), by default this is connected to Preset Select input 2. *
DIGIN 4 (E5)	Diagnostic displaying the current state of the digital input 4 (E5), by default this is connected to Preset Select input 3. *
DIGOUT 1 (E6)	Diagnostic displaying the current state of the digital output 1 (E6), by default this is connected to At zero speed.
DIGOUT 2 (E7)	Diagnostic displaying the current state of the digital output 2 (E7), by default this is connected to Drive HEALTH. and is always ON when the start is low. This differs from Health as displayed on a front panel l.e.d. which remains of until health is reset by the drive being restarted.

DIGOUT 3 (E8)	Diagnostic displaying the current state of the digital output 3 (E8), by default this is connected to drive READY
RAISE/LOWER O/P	Value of the raise / lower ramp function.
PRESET O/P	**O**utput of Preset function block.
SPT SUM O/P 1	**O**utput of Setpoint Sum 1 function block.
SPT SUM O/P 2	**O**utput of Setpoint Sum 2 function block.
SPT SUM O/P 3	**O**utput of Setpoint Sum 3 function block.
RAMP OUTPUT	**O**utput of Ramp function block.
SPEED SETPOINT	Speed loop total setpoint including the ramp output before the ramp-to-zero function. The ramp-to-zero function block is only used while during the stopping states, Normal Stop, Program Stop and Coast Stop.
ENCODER	Encoder speed feedback diagnostic in RPM.

Speed Feedback

There are two speed feedback diagnostics available in the DIAGNOSTICS menu:

ENCODER	This displays the speed setpoint in RPM.
SPEED FEEDBACK	This displays the speed setpoint as a percentage.

Alarm Status :: First Alarm, Alarm Status :: Health Store and Alarm Status :: Health Store.

First Alarm, Health Store and Health Word are displayed as 16bit hexadecimal status words where every bit has unique meaning described in the table below. These parameters are in the Alarms section of the MMI.

In Health Store and First Alarm only one bit is set at any one time, All active bits are set in Health Word immediately the alarm condition is detected.

HEALTH OVERSPEED	0x0001	Over Speed
HEALTH 2	0x0002	Reserved
HEALTH 4	0x0004	Reserved
HEALTH HEATSINK	0x0008	Fin Temp
HEALTH MOTOR TEMP	0x0010	Motor Temp
HEALTH OVER VOLTS	0x0020	Over Volts
HEALTH UNDER VOLTS	0x0040	Under Volts
HEALTH 80	0x0080	Reserved
HEALTH 100	0x0100	Reserved
HEALTH STACK TRIP	0x0200	Gate drive shut down due to Over Current or Over Volts.
HEALTH AUTOTUNE	0x0400	Autotune Error
HEALTH 5703 RECEIVE	0x0800	P3 in slave mode is not receiving valid messages
HEALTH STALL TRIP	0x1000	The motor has stalled
HEALTH OVER CURRENT	0x2000	Over Current Trip

HEALTH EXTERNAL TRIP	0x4000	External Trip
HEALTH OTHER	0x8000	Other Alarms

Alarm Error Codes

Calibration Error Messages

Error no.	Cause	Action
E000	Number of encoder lines too high.	Set the encoder lines to a sensible value.
E001	Number of encoder lines (or value of max speed) too small	Set encoder lines (or max speed) to a sensible value.
E002	Mag current greater than drive rating.	Set mag current to a sensible value.
E003	Mag current greater than motor current.	Set mag current to a sensible value.
E004	Current loop 'gain' parameter value too small value (i.e. actual gain is very large)	Set current loop 'gain' parameter to a sensible value.
E005	Motor rating is greater than 3 X Drive Rating.	Reduce motor rating.
E006	Max speed exceeds the allowable range, i.e. 5 times the nameplate rpm value.	Reduce max speed to less than or equal to 5 times the nameplate rpm value.
E007	Max speed X encoder lines exceeds the maximum encoder frequency of 250kHz (equivalent to 5000 lines, 3000 rpm)	Reduce max speed, or fit an encoder with fewer lines.
E009	Rotor time constant too small.	Set rotor time constant to a sensible value.
E010	Max speed is set to a value which is more than 30% higher than the value of 'max speed rpm' which existed when autotune was last carried out. Autotune gathers data on the motor up to 'max speed rpm' plus 30%, and no higher. Therefore any attempt to run the motor faster than this will degrade performance.	Either: 1. Reduce max speed to less than or equal to 'autocal max rpm' plus 30%. Note that 'autocal max rpm' is a parameter which may be found in the 'Autotune' menu under 'Setup Parameters'. It records the value of 'max speed rpm' which existed when autotune was last carried out. Or 2. Re-run autotune with 'max speed rpm' set to a higher value.

Autotune Errors

Error no.	Cause	Action
D100	Drive was stopped in the middle of the Autotune process.	If necessary, re-run Autotune.
D101	Motor was unable to reach the required speed - timeout occurred.	Ensure that motor is able to spin freely. Alternatively, ensure that that the drive has been set up and is able to control the motor. See instructions for Autotune.
D102	Low mains. The mains voltage is not high enough to enable the autotune to be carried out.	Retry when the mains has recovered.
D103	Drive was not able to set up the magnetising current - timeout occurred.	Check motor data is correct, especially nameplate rpm and motor volts. Check also that the motor is correctly rated for the drive.
D104	Mag current greater than motor or drive rating.	As above.
D105	'Max Speed Rpm' is set to a value lower than the motor 'Nameplate Rpm'.	Set 'Max Speed Rpm' to a value greater than or equal to 'Nameplate Rpm'. This restriction will no longer apply after autotune has been completed.
D106	Mag current greater than drive rating.	The motor is too large for the drive.
D107	Mag current greater than motor current.	As error D103.
D108	Nameplate rpm set to a value greater than the base speed of the motor.	Set nameplate rpm to the correct value exactly as given on the nameplate.
D109	Calculated value of rotor time constant is too large. Probably due to an incorrect value of nameplate rpm.	As above.
D110	Calculated value of rotor time constant is too small. Probably due to an incorrect value of nameplate rpm.	As above.

Error no.	Cause	Action
F001	AUTOTUNE_ERROR	Autotune failed to complete.
F002	AUTOTUNE_ABORT	Autotune aborted by user.
F003	PRE_READY_FAULT	Fault in pre_ready state
F100	CAM_FULL_INIT	Internal software error
F200	CFG_INHIBIT	Config Enable high - Set to low and retry
F300	SEQ_STATE_MACHINE	Internal software error
F400	SYSTEM_TIME_FREEZE	Internal software error

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 RUN. The alarm message can be cleared from the display by pressing the "E" key. It can be retrieved by using the **FIRST ALARM** menu.

The possible alarm messages are:

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;
(c) One of the three phases of the supply is missing.

LINK OVERVOLTAGE 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.

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 circuit between motor phases;
(e) Short circuit between motor phase and earth;
(f) Too long output cables or too many parallel motors;
(g) Voltage boost set too high.

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) A drive cooling fan has failed.;
(c) Poor ventilation.

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; / Mag Current set too high.

MOTOR STALLED

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

(a) Motor loading too great;
(b) **MOTOR I LIMIT** parameter set too low;
(c) **STALL TRIP TIME** parameter too low;

EXTERNAL TRIP

A Tag that can optionally be connected to a digital input. The drive will trip if this is set high.

CONFIG ENABLE

The "Enable Configuration" flag has been left in the enable state. This needs to be disabled in order to run the drive.

CHECKSUM FAILED

Hardware error.

EE VERSION ERROR

Hardware error.

EEPROM ERROR

Hardware error. Or 620L or 620Adv has been reset to factory defaults.

Chapter 7

The European Directives and the 'CE' Mark

Contents Page

Chapter 7 The European Directives and the 'CE' Mark

CEMEP

Until recently each European drives manufacturer and importer has been interpreting the EMC directive and 'CE' marking requirements differently. This has led to considerable confusion and frustration in the market place. To provide a unified approach, the European machines and drives manufactures, via their national trade associations have formed **the 'European Committee of Manufacturers of Electrical Machines and Power Electronics'**, termed CEMEP. This committee has produced a document entitled "Recommendations for Application of Power Drive Systems (PDS), European Council Directives - CE Marking and Technical Standardisation", which will be followed by all major European Drives manufacturer. A copy is available from your local trade association or from your local Eurotherm Drives office.

EMC DIRECTIVE

'CE' EMC Responsibility

The subject of CE marking and EMC is explored in more detail in a separate Eurotherm Application manual entitled 'EMC Installation Guidelines for modules and systems', part number HA388879, available from your local Eurotherm Drives office. The following sections are the minimum necessary for basic understanding.

Eurotherm Drives are adhering to the CEMEP recommendations on 'CE' marking for EMC. According to SI No. 2372, implementing the EMC directive into UK law, the requirement to CE mark for EMC, applies only to '**relevant apparatus**' that has '**intrinsic function'** to the '**end user**' and which is placed on the market (**supplied**). The majority of drive modules/systems sold by Eurotherm Drives will be incorporated into a higher system/apparatus or machine which includes (at least) the motor, cable and a driven load before providing '**intrinsic function**' to the '**end user**'. As such the majority of Eurotherm Drives products are categorised as '**components**' (CEMEP validity field 2) and it would be incorrect for Eurotherm Drives to apply the CE mark or produce an EC Declaration of Conformity in respect of EMC. It is the manufacturer/supplier/installer of the relevant apparatus (with the '**intrinsic function**' to the '**end user**') who must demonstrate conformance to the EMC directive

However, in a minority of cases, single drives may have '**intrinsic function**' to the '**end user**'. An example is that of '**add on**' '**intrinsic function**', where an existing fixed speed motor application (such as a fan or a pump) is converted to variable speed with an '**add on**' drive module (CEMEP validity field 1). In this application Eurotherm Drives CE mark its drive module and issue an EC declaration of conformity. Because the validity of the 'CE' mark for EMC is not known when the product is manufactured, the 'CE' mark will be applied via the product manual, and will not be on the product label. From 1997, when the 'CE' mark for the Low Voltage Directive becomes mandatory, the CE mark will appear on the product label, but its validity for EMC can only be identified from the product manual.

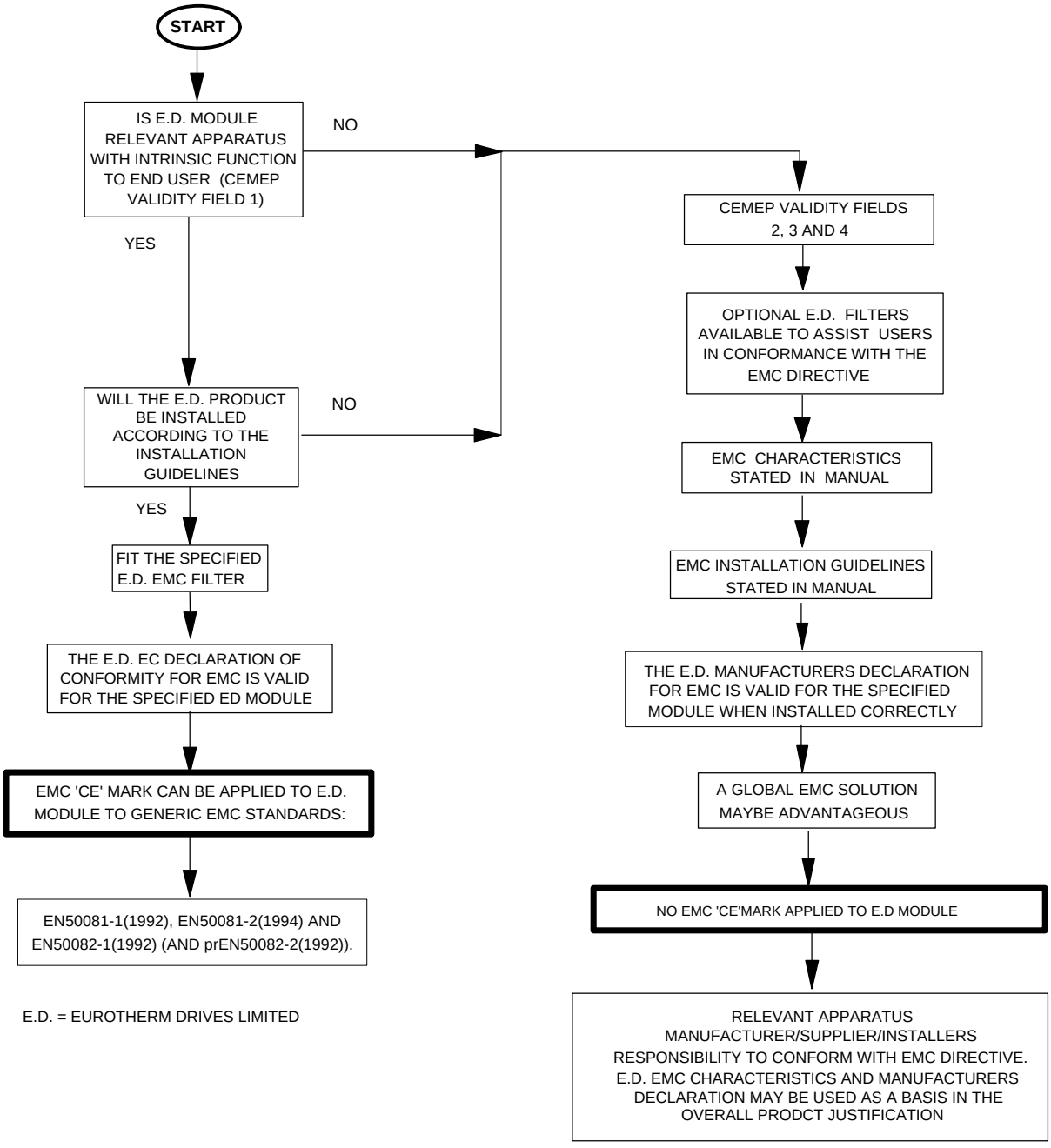
The validity of the 'CE' mark can be identified from the flowchart in figure 7.1, refer to SI No. 2372 for clarification of relevant apparatus.

To assist manufacturers/suppliers/installers of relevant apparatus, Eurotherms 620 Vector drive modules are EMC compliant to EN50081-1 (1992), EN50082-1 (1992), EN50081-2 (1994) and prEN50082-2 (1992), when fitted with the specified filter and installed according to these instructions, (as confirmed by the Manufacturers EMC declaration to be found at the end of this chapter).

Manufacturers/suppliers/installers of relevant apparatus (CEMEP validity fields 3 & 4) may use this compliance and manufacturers EMC declaration as a basis for their own justification of overall compliance with the EMC Directive.

It must be clearly understood by the customer before installation commences who is legally responsible for conformance with the EMC Directive. Misappropriation of the CE mark is a criminal offence.

Figure 7.1 Eurotherm EMC 'CE' Mark Validity Chart



Consideration of EMC Environment

When considering the relevant EMC emission and immunity standards it is important to distinguish between the following classes of EMC environments:

	Residential, supplied directly from public electricity supply 		**Commercial and light industry, supplied directly from public electricity supply** 		**Industrial installation with a separate transformer station** 	
	RF emission	**Immunity**	**RF emission**	**Immunity**	**RF emission**	**Immunity**
Basic and Generic Standards	EN55011 (Class B) or EN50081-1(1992)	EN50082-1(1992) see below for referenced standards	EN55011 (Class B) or EN50081-1(1992)	EN50082-1(1992) see below for referenced standards	EN55011 (Class A) or EN50081-2(1994)	EN50082-2 (1992) see below for referenced standards
New EMC Product Standard (draft) for Power Drive Systems IEC-22G/31/FDIS+ (will become EN 61800-3)	Unrestricted distribution (CEMEP-1): < 25 A Class B > 25 A Class A Restricted distribution (CEMEP-2) Class A	see below ↓	EMC measures do not have to be implemented If interference in a neighbouring installation occurs, the operator is responsible for taking measures to prevent interference. In this case the required emission levels must be adhered to at the point of supply to the effected neighbouring installation.	see below ↓	EMC measures do not have to be implemented If interference in a neighbouring installation occurs, the operator is responsible for taking measures to prevent interference. In this case the required emission levels must be adhered to at the point of supply to the effected neighbouring installation.	see below ↓

Standards for immunity:

IEC801-2 (IEC1000-4-2*):	Electrostatic discharge (e.g. from electrostatically charged persons)
IEC801-3 (IEC1000-4-3/6*):	Electromagnetic fields (e.g. from portable telephones)
IEC801-4 (IEC1000-4-4*):	Fast electrical transients (burst) (e.g. from opening contacts in inductive circuits)
IEC801-5 (IEC1000-4-5):	Voltage surges (e.g. on local lightning strikes).

+ This new Product Standard Draft has not yet been finally passed and more important, is not EC approved. An EC Declaration of Conformity for EMC can only be issued with the approval of a "Competent Body". It is anticipated this standard will be officially released during Q 3/4 1996.

* New standards to be introduced in the near future

Fig. 7-2: EMC Emission and Immunity Standards applicable to 620 Vector drive modules and similar equipment

When using the generic EMC standards, the 'Residential, commercial and light industry' emission limits (Class B) are more stringent than the 'Industrial' (class A) limits, and so equipment which meets EN50081-1(1992) automatically meets EN50081-2(1994). Similarly, the 'Industrial' immunity requirements are more stringent than the 'Residential, commercial and light industry' requirements, and equipment which meets prEN50082-2(1992) automatically meets EN50082-1(1992).

More and more Product Specific standards are being released with less onerous EMC requirements than the Generic Standards. When the new EMC Drive Product Standard for Power Drive System (EN61800-3) becomes available (Q 3/4 1996), EMC filters will only be **mandatory** in 'residential' type EMC environments (if this is the most appropriate standard to use for demonstrating conformance of the relevant apparatus). EMC competent bodies are today using the draft EMC Drive Product Standard to demonstrate conformance using the technical construction file route. The EMC Drive Product Standard as CEMEP is discussed in more detail in the Eurotherm Application manual entitled 'EMC Installation Guidelines for modules and systems', part number HA388879, available from your local Eurotherm Drives office.

It is important for the customer to identify what EMC standards are to be applied to the final machine/system and in what EMC environment it will operate, so that any additional compliance costs can be minimised. It should be remembered that when two or more EMC compliant components are combined to form the final machine/system, the resulting machine/system may not be compliant. Emissions from combined components tend to be additive, whilst the immunity remains constant.

Filter Selection

620 Vector drive modules can be **'CE'** marked (as in CEMEP validity field 1) when used with the specified specially designed EMC filters to comply with the mains terminal limits of EN55011 Class B (or EN50081-1) as indicated previously, and when installed in accordance with the **EMC installation instructions** in this Product Manual (chapter 3). The Class B limit is the most stringent limit applied in Europe to date, and allows product to be used in either the 'residential, commercial and light industrial' or 'industrial' EMC environments. Refer to **Consideration of EMC environments**, in this chapter for more details. The specified EMC filters for the 620 Vector drive modules are summarised in table 3-3 in Chapter 3. The fitment of the specified EMC filter is **mandatory** where **'CE'** marking is applied.

If the customer is treating the 620 Vector drive module as a **component for supply to EMC competent professional assemblers** (CEMEP validity field 2)and is taking the EMC responsibility, then the filters are optional and may assist the customer in achieving EMC compliance. In this situation the customer may also achieve compliance by less expensive more global measures depending on the limits to be achieved, such as the use of a combination of global or local filtering and screening methods, natural mitigation through distance or use of distributed parasitic elements of the existing installation.

Filter Installation

The required EMC emission and immunity performance, and 'CE' marking of 620 Vector drive modules can only be achieved when the **EMC installation instructions** in Chapter 3 are adhered to.

Specification of Achievable EMC Emission and Immunity

620 Vector drive modules with the option to be **'CE'** marked meet the following EMC emission limits provided they are installed with the specified EMC filters for **'CE'** marking in accordance with the EMC installation instructions.

Port	Phenomenon	Basic standard	Level	Generic standard
Enclosure Port	radiated	EN55011 (1991)	Class B (cubicle mount)	EN50081-1 (1992)
			Class A (wall mount)	EN50081-2 (1994)
AC Power Port	conducted (with specified filter)	EN55011 (1991)	Class B	EN50081-1 (1992)
AC Power Port	conducted (**no filter**)	EN55011 (1991)	130dBµV @ 150kHz* (common mode) 130dBµV @ 150kHz* (differential mode) Reducing with frequency by 20dB/decade	

* 6kHz switching frequency, 50 metres screened motor cable.

All 620 Vector drive modules meet the following EMC immunity performance criteria as defined in prEN50082-2 (1992) when installed and used as recommended.

Port	Phenomenon	Test Standard	Level	Acceptance Criterion	Generic Standard
Enclosure Port	ESD RF Field	IEC 801-2* IEC 801-3	4 kV CD, 8 kV AD 10 V/m, 1 kHz AM	self recovery no change	EN50082-1 (1992) Draft prEN50082-2 (1992)
Power Ports	Fast Transient Burst, Surge	IEC 801-4, IEC 801-5	2 kV 1 kV (P-P), 2 kV (P-E) available early 1996	self recovery self recovery	
Signal & Control	Fast Transient Burst	IEC 801-4	2 kV	self recovery	
Power Interfaces	Fast Transient Burst	IEC 801-4	2 kV	self recovery	

* only for cubicle mount (wall mount available 1/96)

The EMC filters for 620 Vector drive modules may be flash tested in circuit up to DC 2850 V for 1 min Ensure all other equipment that may be damaged by such flash testing has been suitably isolated/removed/short circuited as applicable. Due to the internal capacitors between phase and earth, the DC voltage should be wound up slowly, to prevent excessive earth current. For similar reasons AC flash testing cannot be performed due to the excessive earth leakage current. Repeated flash testing is not recommended as it may degrade the insulation.

EMC Responsibility of MANUFACTURERS/SUPPLIERS/INSTALLERS

For end users of 620 Vector drive modules, a correctly installed power drive system (PDS) created from the supplied 620 Vector drive will be compliant with the generic emission standards EN50081-1(1992) & EN50081-2(1994) and for immunity EN50082-1(1992) & prEN50082-2(1992) as previously indicated. Manufacturers/suppliers/installers of relevant apparatus may use this compliance as a basis for their own justification of overall compliance with the EMC Directive.

If it is the responsibility of the manufacturer/supplier/installer to establish EMC conformity and to 'CE' mark. There are three methods of demonstrating conformity:

1) Self certification to a relevant standard

2) Third party testing to a relevant standard

3) Writing a technical construction file stating the technical rationale as to why the relevant apparatus is compliant. An EMC "competent body" must then assess this and issue a technical report or certificate to demonstrate compliance.

Upon demonstrating EMC compliance an EC-Declaration of Conformity for the apparatus or machine may be issued and a **'CE'** mark applied.

Professional end users with EMC expertise who are using drive modules and cubicle systems defined as components who supply, place on the market or install the relevant apparatus must take responsibility for demonstrating EMC conformance and applying the 'CE' mark and issuing an EC Declaration of Conformity.

Eurotherm Guide

More information is available in a separate Eurotherm Guide entitled “Short Form Overview of European Directives for Variable Speed Drives and Applications” part number HA389770 available from your local Eurotherm Drives office.

EC Declaration of Conformity for EMC

CE

EUROTHERM
DRIVES

EC DECLARATION OF CONFORMITY

In accordance with the EEC Directive 89/336/EEC,

Article 10 and Annex 1, (EMC DIRECTIVE)

We Eurotherm Drives Ltd, address as below, declare under our sole responsibility that the following electronic products

620 Vector Drives

when installed, used and CE marked in accordance with the instructions in the product manual (provided with each piece of equipment) using the specified EMC filters to which this declaration refers is in conformity with the following standards:-

BSEN50081-1 (1992), BS EN50081-2 (1994)

BSEN50082-1 (1992) & draft prEN50082-2* (1992)

Following provisions of EEC-Directive

89/336/EEC with amendments 92/31/EEC and 93/68/EEC

.....	.....	.....
Dr Martin Payn,	Dr Dan Slattery,	Date
Conformance Officer	Technical Director	
Eurotherm Drives Ltd	Eurotherm Drives Ltd	

* For information only

EUROTHERM DRIVES LIMITED
NEW COURTWICK LANE, LITTLEHAMPTON, WEST SUSSEX BN17 7PD
TELEPHONE: 01903 721311 FAX: 01903 723938
Registered number: 1159876 England. Registered Office: Leonardslee, Lower Beeding, Horsham, West Sussex RH13 6PP

Manufacturers EMC Declaration

EUROTHERM
DRIVES

MANUFACTURERS EMC DECLARATION

In accordance with the EEC Directive 89/336/EEC,

Article 10 and Annex 1, (EMC DIRECTIVE)

We Eurotherm Drives Ltd, address as below, declare under our sole responsibility that the following electronic products

620 Vector Drives

when installed and used in accordance with the instructions in the product manual (provided with each piece of equipment) and using the specified EMC filters to which this declaration refers is in conformity with the following standards:-

BSEN50081-1 (1992), BSEN50081-2 (1994)

BSEN50082-1[#] (1992) & draft prEN50082-2[#] (1992)

.....	.....	.....
Dr Martin Payn,	Dr Dan Slattery,	Date
Conformance Officer	Technical Director	
Eurotherm Drives Ltd	Eurotherm Drives Ltd	

[#] Compliant with these immunity standards without specified EMC filters

EUROTHERM DRIVES LIMITED
NEW COURTWICK LANE, LITTLEHAMPTON, WEST SUSSEX BN17 7PD
TELEPHONE: 01903 721311 FAX: 01903 723938
Registered number: 1159876 England. Registered Office: Leonardslee, Lower Beeding, Horsham, West Sussex RH13 6PP

Machinery Directive

The MACHINERY DIRECTIVE requires **'CE'** marking of the complete machine. 620 Vector Drive modules are classified as components and therefore **'CE'** marking to the MACHINERY DIRECTIVE is not applicable. However a 'Manufacturers Declaration' (not to be confused with a 'Declaration of Incorporation') defining safety consideration may be required by some machine builders. For this reason the following declaration has been issued.

EUROTHERM
DRIVES

MANUFACTURERS DECLARATION

The following electronic products

620 Vector Drives

are components to be incorporated into machinery and may not be operated alone.

The complete machinery or installation using this equipment may only be put into service when the safety considerations of the Directive 89/392/EEC are fully adhered to.

Particular reference should be made to

EN60204-1 (Safety of Machinery - Electrical Equipment of Machines).

All instructions, warnings and safety relevant information of the Product Manual must also be adhered to.

.....	.....	.....
Dr Martin Payn, Conformance Officer Eurotherm Drives Ltd	Dr Dan Slattery, Technical Director Eurotherm Drives Ltd	Date

EUROTHERM DRIVES LIMITED
NEW COURTWICK LANE, LITTLEHAMPTON, WEST SUSSEX BN17 7PD
TELEPHONE: 01903 721311 FAX: 01903 723938

Registered number: 1159876 England. Registered Office: Leonardslee, Lower Beeding, Horsham, West Sussex RH13 6PP

Low Voltage Directive

Modules and Systems

The Low Voltage Directive 73/23/EEC as amended by 93/68/EEC implemented by S.I. 1989/728 requires ‘CE’ marking of applicable electrical items from 1/1/97.

Eurotherm Drives Ltd build to the standards required by the Low Voltage Directive.

Eurotherm Drives Modules

Eurotherm Drives Ltd will CE Mark new and existing modules to the Low Voltage Directive from the ‘compliance

Eurotherm Drives Systems

Eurotherm Drives Ltd will CE mark the manufactured system to the Low Voltage Directive when all the applicable specified components are available in compliance with the same Low Voltage Directive.

Chapter 8

SERVICING

Contents Page

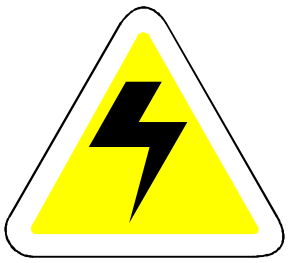
Chapter 8 SERVICING

ROUTINE MAINTENANCE

Routine maintenance of the 620 Vector Drives comprises a periodic inspection to check for a build-up of dust or other obstructions that may affect the ventilation of the unit. Obstructions should be removed and any dust must be cleared using dry air.

REPAIR

The 620 Vector Drives must not be repaired by the user. If repair is necessary return the unit to Eurotherm Drives, refer to "**SALES AND SERVICE**" in this chapter.



WARNINGS!

BEFORE DISCONNECTING THIS UNIT, ENSURE ISOLATION OF THE MAIN SUPPLY TO TERMINALS M1, M2 AND M3.

WAIT FOR AT LEAST 3 MINUTES FOR THE DC LINK TERMINALS (DC+ & DC-) TO DISCHARGE TO SAFE VOLTAGE LEVELS (<50V), FAILURE TO DO SO CONSTITUTES AN ELECTRICAL SHOCK HAZARD.

RETURNED MATERIAL

The following procedures are recommended in the unlikely event of a fault which necessitates return of a controller (or part) to Eurotherm Drives.

a) Contact your nearest Eurotherm Drives service centre to arrange return of the controller, if necessary. (Refer to the list of Eurotherm Drives service centres at the end of this Chapter). Eurotherm Drives will request the model number and serial number of the controller, please have this information to hand prior to making contact.

b) On contacting your local Eurotherm Drives service centre, a Returned Material Authorisation (RMA) code will be issued, if necessary, which must be used as a reference on paperwork returned with the controller.

c) Package and despatch the controller.

NOTE: In the unlikely event that a 620 is to be returned to Eurotherm Drives, it must be suitably packaged. If Styrofilä chips, or equivalent, are being used as a packing material then the controller must first be sealed in a polythene bag or similar, to prevent ingress of the packing material.

EUROTHERM DRIVES COMPANIES

UK Regional Sales and Service

Head Office & South-East Area
Eurotherm Drives Limited
New Courtwick Lane
Littlehampton
West Sussex BN17 7PD
Telephone (01903) 721311
Fax (01903) 723938

North-East Area
Eurotherm Drives Limited
Armstrong House
Armstrong Estate, District 2
Washington
Tyne & Wear NE37 1PR
Telephone (0191) 4155536
Fax (0191) 4155538

Scotland
Eurotherm Drives Limited
Unit 59
Stirling Enterprise Park
Player Road
Stirling FK7 7RP
Telephone (01786) 71674
Fax (01786) 451095

Midlands Area
Eurotherm Drives Limited
Miller House
Corporation Street
Rugby
Warwickshire CV21 2DW
Telephone (01788) 576222
Fax (01788) 550032

North-West Area
Eurotherm Drives Limited
4 & 5 Chetham Court
Winwick Quay, Calver Road
Warrington
Cheshire WA2 8RF
Telephone (01925) 572111
Fax (01925) 445567

South-West Area
Eurotherm Drives Limited
Almondsbury Business Centre
Great Park Road
Almondsbury
Bristol BS12 4QH
Telephone (01454) 616677
Fax (01454) 615903

OVERSEAS COMPANIES

Australia (Sydney)
Eurotherm International Pty Ltd
Unit 6
6 - 18 Bridge Road, Hornsby
New South Wales 2077
Sydney
Telephone (2) 477 7022
Fax (2) 477 7756

Canada
Eurotherm Drives
530 Seaman Street
Unit #3, Stoney Creek
Ontario L8E 3X7
Telephone (905) 664 8911
Fax (905) 664 5869

Holland
Eurotherm BV
Johan Frisostraat 1
2382 HJ Zoeterwoude
Telephone (71) 411 841
Fax (71) 414 526

Australia (Melbourne)
Eurotherm International Pty Ltd
12 Overseas Drive, Noble Park
Victoria 3174
Telephone (3) 795 4155
Telex 071 35343
Fax (3) 795 1521

Denmark
Eurotherm Danmark A/S
Finsensvej 86
DK-2000 Frederiksberg
Telephone (31) 871622
Fax (31) 872124

Hong Kong
Eurotherm Ltd
Unit D, 18/F Gee Chang Hong Centre
65 Wong Chuk Hang Road, Aberdeen
Telephone (8522) 8733826
Telex 802 69257 EIFEL HX
Fax (8522) 8700148

Austria
Eurotherm GmbH
Geiereckstrasse 18/1
A1110 Vienna
Telephone (1) 798 7601
Telex 1132000 EIAUT A
Fax (1) 798 7605

France
Eurotherm Vitesse Variable SA (Drives)
27 Avenue du Quebec
ZA de Courtaboeuf
91951 Les Ulis Cedex
Telephone (691) 85151
Fax. (691) 85159

India
Eurotherm India Limited
152 Developed Plots Estate
Perungudi
Madras-600 096
Telephone 91-44-4928129
Fax 91-44-4928131

Belgium
Eurotherm BV
Herentalsebaan 71-75
B-2100 Deurne, Antwerpen
Telephone (3) 23322 3870
Fax (3) 23321 7363

Germany
Eurotherm Antriebstechnik GmbH
(Drives)
Birkenweg 8
D-64665 Alsbach-Hahnlein 1
Telephone (6257) 3005
Fax (6257) 62094

Ireland
Eurotherm Ireland Ltd
I.D.A. Industrial Estate
Monread Road, Naas
Co. Kildare
Telephone (45) 879937
Fax (45) 875123

Italy
Eurotherm Drives SPA
Via Gran Sasso 9
20030 Lentate Sul Seveso
Milano
Telephone (362) 557308
Fax (362) 557312

Japan
Eurotherm (Japan) Ltd
Matsuo Building 2F
3-14-3 Honmachi
Shibuya-Ku
Tokyo 151
Telephone (3370) 2951
Fax (3370) 2960

Korea
Seoho Electric Ltd
194-53 Anyang 7-Dong
Anyang City
Kyunggi-Do
Korea
Telephone (34368) 6611
Fax (34368) 3311

South Africa
EP Normand SA (Pty) Ltd.
PO Box 1073
Edenvale 1610
Telephone (11609) 7250
Fax (11609) 7369

Spain
Eurotherm Espana SA
Calle La Granja 74
Pol. Ind Alcobendas
Madrid
Telephone (1) 6616001
Fax (1) 6619093

Sweden
Eurotherm Drivteknik AB
Box 9084
S-30009 Halmstad
Telephone (35) 108707
Fax (35) 108407

Switzerland
Eurotherm Produkte (Schweiz) AG
Kanalstrasse 17
CH-8152 Glattbrugg
Telephone (810) 3646
Fax (810) 8920

United Kingdom
Eurotherm Drives Limited
New Courtwick Lane
Littlehampton
West Sussex BN17 7PD
Telephone (01903) 721311
Fax (01903) 723938

U.S.A
Eurotherm Drives Inc
1808 Michael Faraday Court
Reston
Virginia 22090 - 5303
Telephone (703) 471 4565
Fax (703) 471 0723

IA058413C Issue AD 04.09.95

Sales and Service in over 30 countries
For countries not listed above all enquiries/orders to:
Eurotherm Drives Limited
New Courtwick Lane, Littlehampton, West Sussex, BN17 7PD, England.
Telephone (01903) 721311 Fax (01903) 723938

Chapter 9

APPENDICES

Contents Page

Chapter 9 APPENDICES

APPENDIX A

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:

a) At rest the motor is braked;

b) 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;

c) 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.

d) Inverters can be used to control the speed of conical rotor brake motors since the drive maintains the motor magnetic field constant over the speed range. Note: These motors may be unsuitable for operation above base speed.

Using Line Chokes

Line chokes are not required to limit input current to Eurotherm Drives inverters. The purpose of these chokes is to reduce the ripple current in the DC Link capacitors. 620s up to 4kW do not require a choke. From 5.5kW upwards 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.

Using Motor Chokes

Installations with motor cable runs in excess of 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 in Table A.1.

Table A.1 - Recommended Choke Values For Cables Up To 500m

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

Using Multiple Motors On A Single Drive

It is not possible to use a single inverter to supply several motors.

Current Loop Gain

Motors which are designed for high speed operation at several times base speed will tend to have lower impedance. It may then be necessary to reduce the current loop gain.

In this case it is necessary to go into the 'test functions' menu. This is found under 'system/reserved'. Select test function 2. This will cause the software to generate a square wave current demand. The amplitude, period, and offset may be set by the parameters 'current amplitude', 'current period', and 'current offset' respectively. It is convenient best to set these numbers to 200, 40, and zero respectively.

Return to the 'current loop' menu under 'setup parameters'. Select 'gain'. This is a number which may vary between 0 and 255. This number will typically be around 70 for most motors, but for higher speed motors it may need to be increased. **Note that to increase the gain, the number in 'GAIN' needs to be decreased.**

Turn on the drive and observe the actual current with an oscilloscope on the diagnostic test pin. See diagram Figure 8.1 for the location of the two current feedback signals.

If the current loop gain is correct, or too low, the current feedback should follow the square wave current demand in a smooth controlled manner with no overshoot. When it has reached the new level it should settle down to a smooth waveform with a small amount of ripple.

As the gain is increased (i.e. the number in 'gain' is decreased) the current will follow the demand with less delay. As the gain is increased further (i.e. the number in 'gain' is decreased further) the point will be reached where the ripple (in the steady state when it has reached its new level) will suddenly increase. When this happens, the gain should be reduced until the ripple drops back to the low level.

The aim is to get the current to follow the demand with minimum delay, while ensuring the steady state ripple remains at a minimum.

Diagnostic Test Pins

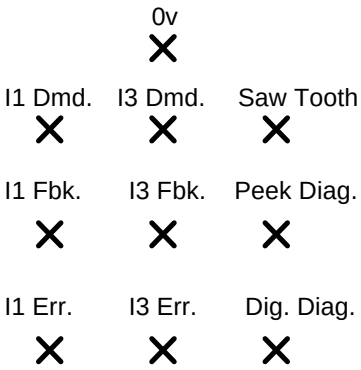


Figure 8.1

Diagnostic Scaling.

Feedback: 100% = 1.59v pk
Demand: 220% = 5v pk (Centred on -5v)

APPENDIX B - 620 STD MMI LISTING

```
RELEASE  2.1
VECTOR DRIVE
4.0 kW 380-460v
..MENU LEVEL
....DIAGNOSTICS
......TOTAL SPD.DMD.    [6  ] =      0.00 %
h.....SPEED FB UNFIL    [7  ] =      0.00 %
......SPEED FEEDBACK    [11 ] =      0.00 %
......SPEED ERROR       [8  ] =      0.00 %
......TORQUE DEMAND     [9  ] =      0.00 %
......TORQUE FEEDBACK   [10 ] =      0.00 %
......CURRENT FEEDBACK  [78 ] =      0.00 %
f.....TERMINAL VOLTS    [480] =         0 VOLTS
f.....DC LINK VOLTS     [613] =       594 VOLTS
f.....TERM V INTEGRAL   [623] =    100.00 %
......ACTUAL POS I LIM  [13 ] =     31.44 %
......ACTUAL NEG I LIM  [14 ] =    -31.44 %
......INVERSE TIME O/P  [15 ] =     31.44 %
......AT CURRENT LIMIT  [16 ] = FALSE
......AT ZERO SPEED     [17 ] = TRUE
......AT ZERO SETPOINT  [18 ] = TRUE
......AT STANDSTILL     [19 ] = TRUE
......STALL TRIP        [20 ] = OK
......RAMPING           [21 ] = FALSE
......DRIVE START       [23 ] = FALSE
......DRIVE ENABLE      [24 ] = FALSE
......OPERATING MODE    [25 ] =  STOPPED
......HEALTHY           [27 ] = TRUE
......HEALTH OUTPUT     [12 ] = TRUE
......READY             [559] = FALSE
......RUN               [28 ] = FALSE
f.....CO-PRO PRESENT    [150] = FALSE
......ANIN 1 (C3)       [29 ] =     0.000 VOLTS
......ANIN 3 (F2)       [31 ] =     0.000 VOLTS
......ANIN 4 (F3)       [32 ] =     0.000 VOLTS
......ANIN 5 (F4)       [33 ] =     0.000 VOLTS
......ANOUT 1 (C5)      [34 ] =     0.000 VOLTS
......ANOUT 2 (F5)      [35 ] =     0.000 VOLTS
......COAST STOP        [26 ] = FALSE
......PROGRAM STOP      [22 ] = FALSE
......DIGIN B6 JOG      [37 ] = FALSE
......DIGIN B7 START    [36 ] = FALSE
......DIGIN B8 ENABLE   [38 ] = FALSE
......DIGIN 1 (E2)      [39 ] = FALSE
......DIGIN 2 (E3)      [40 ] = FALSE
......DIGIN 3 (E4)      [41 ] = FALSE
......DIGIN 4 (E5)      [521] = FALSE
......DIGOUT 1 (E6)     [42 ] = TRUE
......DIGOUT 2 (E7)     [43 ] = TRUE
......DIGOUT 3 (E8)     [44 ] = FALSE
......RAISE/LOWER O/P   [45 ] =      0.00 %
......SPT SUM O/P 1     [46 ] =      0.00 %
......SPT SUM O/P 2     [385] =      0.00 %
......SPT SUM O/P 3     [386] =      0.00 %
......RAMP OUTPUT       [47 ] =      0.00 %
......PRESET O/P        [110] =      0.00 %
......SPEED SETPOINT    [48 ] =      0.00 %
f.....SEQ RUN INPUT     [49 ] =      0.00 %
f.....SEQ OUTPUT        [50 ] =      0.00 %
......ENCODER           [51 ] =         0 RPM
....SETUP PARAMETERS
......RAMPS
........RAMP ACCEL TIME  [54 ] =      10.0 SECS
........RAMP DECEL TIME  [55 ] =      10.0 SECS
f.......RAMP QUENCH      [56 ] = FALSE
........RAMP HOLD        [57 ] = FALSE
........RAMP INPUT       [58 ] =      0.00 %
........% S-RAMP         [59 ] =      0.00 %
........RAMPING THRESH.  [60 ] =      1.00 %
........AUTO RESET       [61 ] = TRUE
........EXTERNAL RESET   [62 ] = FALSE
........RESET VALUE      [63 ] =      0.00 %
......OP-STATION
........SET UP
..........SETPOINT         [507] =       0.0 %
..........LOCAL KEY ENABLE [632] = TRUE
........START UP VALUES
..........SETPOINT         [503] =       0.0 %
..........REV DIRECTION    [504] = FALSE
f.........PROGRAM          [505] = FALSE
..........LOCAL            [506] = FALSE
........LOCAL RAMP
..........RAMP ACCEL TIME  [511] =      10.0 SECS
..........RAMP DECEL TIME  [512] =      10.0 SECS
h.........RAMP QUENCH      [513] = FALSE
h.........RAMP HOLD        [514] = FALSE
h.........RAMP INPUT       [515] =      0.00 %
..........% S-RAMP         [516] =      0.00 %
h.........RAMPING THRESH.  [517] =      1.00 %
h.........AUTO RESET       [518] = TRUE
h.........EXTERNAL RESET   [519] = FALSE
h.........RESET VALUE      [520] =      0.00 %
h.........RAMP OUTPUT      [509] =      0.00 %
......AUX I/O
........AUX START        [66 ] = TRUE
........START            [70 ] = FALSE
........AUX JOG          [67 ] = TRUE
........JOG INPUT        [71 ] = FALSE
........AUX ENABLE       [68 ] = TRUE
........ENABLE           [72 ] = FALSE
......JOG
........JOG SPEED 1      [75 ] =     10.00 %
........JOG SPEED 2      [76 ] =    -10.00 %
........MODE             [80 ] = FALSE
........JOG ACCEL RATE   [113] =      10.0 SECS
........JOG DECEL RATE   [114] =      10.0 SECS
......RAISE/LOWER
........RESET VALUE      [82 ] =      0.00 %
........RAMP RATE        [83 ] =      60.0 SECS
........RAISE INPUT      [85 ] = FALSE
........LOWER INPUT      [86 ] = FALSE
........MIN VALUE        [87 ] =   -100.00 %
........MAX VALUE        [88 ] =    100.00 %
........EXTERNAL RESET   [89 ] = FALSE
h.....INVERSE TIME
h.......AIMING POINT     [116] =    105.00 %
h.......DELAY            [117] =      60.0 SECS
h.......DOWN RATE        [118] =      10.0 SECS
h.......UP RATE          [148] =     120.0 SECS
......STOP RATES
........RUN STOP TIME    [120] =      10.0 SECS
........RUN STOP LIMIT   [121] =      60.0 SECS
........FAST STOP TIME   [123] =       1.0 SECS
........FAST STOP LIMIT  [124] =      60.0 SECS
........USE SYSTEM RAMP  [125] = TRUE
f.......PRE-START DELAY  [122] =     0.500 SECS
f.......READY DELAY      [352] =     0.000 SECS
........CONTACTOR DELAY  [112] =       0.5 SECS
........STOP ZERO SPEED  [126] =      1.00 %
........PROG STOP I-LIM  [622] =    150.00 %
......ALARMS
........EXTERNAL TRIP    [144] = FALSE
h.......MOTOR TEMP       [141] =    100.00 %
h.......MOTOR TMP.TRIP   [128] =     75.00 %
h.......MOTOR TMP.RST.   [309] =     50.00 %
........MOTR.TMP.INHIBIT [146] = FALSE
h.......HEATSINK LEVEL   [129] =     17.00 %
h.......ACK ALARM        [166] = FALSE
........STALL INHIBIT    [143] = FALSE
........STALL TORQUE     [136] =    100.00 %
........STALL SPEED      [138] =    100.00 %
........STALL DELAY      [137] =    100.00
........OVER SPD INHIBIT [145] = FALSE
........OVER SPEED LEVEL [139] =    120.00 %
........5703 RCV.INHIBIT [142] = FALSE
......CALIBRATION
........ENCODER LINES    [131] =      2048
........MAX SPEED RPM    [130] =      1500 RPM
........BASE FREQUENCY   [448] =      50.0 Hz
........MOTOR VOLTS      [486] =       415 VOLTS
........MOTOR RATING RMS [134] =       1.0 AMPS
........NO.OF POLES      [399] =         4
........NAMEPLATE RPM    [135] =      1440 RPM
......TORQUE LOOP
........MAG CURRENT %    [453] =     30.00 %
........ROTOR TIME CONST [458] =     100.0 mSECS
........1 / GAIN         [149] =        70
........POS TORQUE LIMIT [157] =    150.00 %
........NEG TORQUE LIMIT [158] =   -150.00 %
........MAIN TORQUE LIM. [159] =    100.00 %
........SYMETRIC TQ.LIM. [153] = TRUE
........AUX TORQUE DMD   [599] =      0.00 %
........TORQ.DMD.ISOLATE [596] = FALSE
........CURRENT LIMIT    [585] =    150.00 %
......SPEED LOOP
........SPD. PROP. GAIN  [161] =     10.00
........SPD. INT. TIME   [162] =       100 mSECS
f.......INT. DEFEAT      [163] = FALSE
........ENCODER SIGN     [164] = NEG
........SPEED FBK FILTER [165] = TRUE
........SPEED SETPOINTS
..........DIRECT SPT1      [171] =      0.00 %
..........DIRECT RATIO     [172] =    0.1000
..........DIRECT SPT. MAX  [173] =    100.00 %
..........DIRECT SPT. MIN  [174] =   -100.00 %
..........DIRECT ENABLE    [175] = FALSE
..........MAIN SPD.SPT.    [176] =      0.00 %
..........MAX SPEED        [177] =    100.00 %
..........MIN SPEED        [178] =   -100.00 %
..........ZERO SPD HYST    [132] =      0.10 %
..........ZERO SPEED LEVEL [252] =      0.50 %
......AUTOTUNE
........AUTOTUNE FLAG    [482] = FALSE
........MAG I AUTOTUNE   [483] = TRUE
```

```
........SET Tr < RTD SPD [484] = TRUE
.......AUTOCAL MAX RPM  [629] =     30000 RPM
......SETPOINT SUM 1
........RATIO 0          [189] =    1.0000
........RATIO 1          [190] =    1.0000
........SIGN 0           [191] = POS
........SIGN 1           [192] = POS
........DIVIDER 0        [193] =    1.0000
........DIVIDER 1        [194] =    1.0000
........LIMIT            [195] =    100.00 %
........INPUT 0          [196] =      0.00 %
........INPUT 1          [197] =      0.00 %
........INPUT 2          [198] =      0.00 %
......SETPOINT SUM 2
........RATIO 1          [365] =    1.0000
........RATIO 0          [364] =    1.0000
........SIGN 1           [367] = POS
........SIGN 0           [366] = POS
........DIVIDER 1        [369] =    1.0000
........DIVIDER 0        [368] =    1.0000
........LIMIT            [370] =    100.00 %
........INPUT 0          [371] =      0.00 %
........INPUT 1          [372] =      0.00 %
........INPUT 2          [373] =      0.00 %
......SETPOINT SUM 3
........RATIO 1          [376] =    1.0000
........RATIO 0          [375] =    1.0000
........SIGN 1           [378] = POS
........SIGN 0           [377] = POS
........DIVIDER 1        [380] =    1.0000
........DIVIDER 0        [379] =    1.0000
........LIMIT            [381] =    100.00 %
........INPUT 0          [382] =      0.00 %
........INPUT 1          [383] =      0.00 %
........INPUT 2          [384] =      0.00 %
f.....REF ENCODER
f.......PHASE
f.........OFFSET           [447] =         0
f.........OFFSET SCALE     [609] =         1
f.........RESET            [600] = FALSE
f.........POS CALC ENABLE  [337] = FALSE
f.........POSITION ERROR   [338] =         0
f.........MAX POSITION ERR [342] =    100.00
f.........REF SCALE A      [343] =       100
f.........REF SCALE B      [344] =       100
f.........REF ENCODER I/P  [359] =         0
f.........SATURATED        [610] = FALSE
f.........OVERFLOW         [611] = FALSE
f.......INCH
f.........INCH ADVANCE     [604] = FALSE
f.........INCH RETARD      [605] = FALSE
f.........INCH RATE        [606] =      10.0
f.....PID
f.......INPUT            [545] =      0.00 %
f.......ENABLE           [534] = TRUE
f.......PROP.GAIN        [549] =       1.0
f.......INT.TIME CONST.  [539] =      5.00 SECS
f.......INT.DEFEAT       [538] = FALSE
f.......DERIVATIVE TC    [531] =     0.000 SECS
f.......FILTER TC        [535] =     0.100 SECS
f.......POSITIVE LIMIT   [547] =    100.00 %
f.......NEGATIVE LIMIT   [542] =   -100.00 %
f.......O/P SCALER(TRIM) [543] =    1.0000
f.......ERROR CALC
f.........INPUT 1          [536] =      0.00 %
f.........INPUT 2          [537] =      0.00 %
f.........RATIO 1          [550] =    1.0000
f.........RATIO 2          [551] =    1.0000
f.........SIGN 1           [601] = POS
f.........SIGN 2           [602] = POS
f.........DIVIDER 1        [532] =    1.0000
f.........DIVIDER 2        [533] =    1.0000
f.........LIMIT            [553] =    100.00 %
f.........ERROR O/P        [500] =      0.00 %
f.......PROFILER
f.........MODE             [541] =         0
f.........MIN PROFILE GAIN [540] =      0.00 %
f.........PROFILED GAIN    [548] =       0.0
f.........PROFILE INPUT    [554] =      0.00 %
f.........PROFILE MININPUT [555] =      0.00 %
f.......OUTPUT           [546] =      0.00 %
f.......CLAMPED          [544] = TRUE
......PRESET
........SELECT 1         [92 ] = FALSE
........SELECT 2         [93 ] = FALSE
........SELECT 3         [94 ] = FALSE
........SIGN             [109] = NEG
........INPUT 1          [95 ] =      0.00 %
........INPUT 2          [96 ] =     25.00 %
........INPUT 3          [97 ] =     50.00 %
........INPUT 4          [98 ] =    100.00 %
........INPUT 5          [99 ] =      0.00 %
........INPUT 6          [100] =    -25.00 %
........INPUT 7          [101] =    -50.00 %
........INPUT 8          [102] =   -100.00 %
f.....S-RAMP
f.......INPUT            [597] =      0.00 %
f.......RESET            [104] = FALSE
f.......RESET VALUE      [105] =      0.00 %
f.......ACCELERATION     [106] =     10.00
f.......JERK             [107] =     10.00
f.......QUENCH           [108] = FALSE
f.......AT SPEED         [316] = FALSE
f.......AT SPEED LEVEL   [612] =      1.00 %
h.......ACCEL O/P        [253] =      0.00
h.......OVERSHOOT THRESH [254] =      5.00 %
f.......OUTPUT           [598] =      0.00 %
f.....HOME
f.......HOME             [397] = FALSE
f.......HOMING DISTANCE  [396] =      2048
f.......1/ENCODER SCALE  [398] =      4.00
f.......LINEAR  O/P      [388] = FALSE
f.......HOME INPUT       [394] =      0.00 %
f.......HOME OUTPUT      [395] =      0.00 %
....PASSWORD
......ENTER PASSWORD   [200] =  0x0000
......CHANGE PASSWORD  [201] =  0x0000
....ALARM STATUS
......HEALTH STORE     [203] =  0x0000
......HEALTH WORD      [217] =  0x0010
......FIRST ALARM      [218] =  0x0000
h.....HEALTH INHIBIT   [219] =  0x0000
....MENUS
......FULL MENUS       [205] = FALSE
......CONTRAST         [220] =       128
f.....MENU DELAY       [206] =         0
f.....DATA DELAY       [207] =        50
....SERIAL LINKS
f.....P3 MODE          [237] = BUSY
f.....5703 SUPPORT
f.......SETPT. RATIO     [233] =    1.0000
f.......SETPT. SIGN      [234] = NEG
f.......SCALED INPUT     [235] =      0.00 %
f.......RAW INPUT        [584] =      0.00 %
f.......OUTPUT           [236] =      0.00 %
......DUMP MMI (TX)    [238] = UP TO ACTION
h.....MEMORY DUMP      [221] = FALSE
......UDP XFER (TX)    [240] = UP TO ACTION
......UDP XFER (RX)    [239] = UP TO ACTION
f.....P3 BAUD RATE     [241] = 9600
f.....P3 TAG LIST
f.......TAG 1            [212] =         7
f.......TAG 2            [213] =         0
f.......TAG 3            [214] =         0
f.......TAG 4            [215] =         0
f.......TAG 5            [216] =         0
f.......FULL TAG LIST    [334] = FALSE
....SYSTEM
......SOFTWARE
........RELEASE          [0  ] = 2.1
f.....CONFIGURE I/O
f.......CONFIGURE ENABLE [245] = FALSE
f.......ANALOG INPUTS
f.........ANIN 1 (C3)
f...........CALIBRATION      [248] =    100.00 %
f...........OFFSET           [358] =      0.00 %
f...........MAX VALUE        [249] =    100.00 %
f...........MIN VALUE        [250] =   -100.00 %
f...........DESTINATION TAG  [251] =       196
f...........SCALED INPUT     [390] =      0.00 %
f.........ANIN 3 (F2)
f...........CALIBRATION      [256] =    100.00 %
f...........OFFSET           [360] =      0.00 %
f...........MAX VALUE        [257] =    100.00 %
f...........MIN VALUE        [258] =   -100.00 %
f...........DESTINATION TAG  [259] =       197
f...........SCALED INPUT     [391] =      0.00 %
f.........ANIN 4 (F3)
f...........CALIBRATION      [261] =    100.00 %
f...........OFFSET           [361] =      0.00 %
f...........MAX VALUE        [262] =    100.00 %
f...........MIN VALUE        [263] =   -100.00 %
f...........DESTINATION TAG  [264] =         0
f...........SCALED INPUT     [392] =      0.00 %
f.........ANIN 5 (F4)
f...........CALIBRATION      [266] =    100.00 %
f...........OFFSET           [362] =      0.00 %
f...........MAX VALUE        [267] =    100.00 %
f...........MIN VALUE        [268] =   -100.00 %
f...........DESTINATION TAG  [269] =         0
f...........SCALED INPUT     [393] =      0.00 %
f.......ANALOG OUTPUTS
f.........ANOUT 1 (C5)
f...........% TO GET 10V     [272] =    100.00 %
f...........OFFSET           [332] =      0.00 %
f...........CALIBRATION      [330] =    100.00 %
f...........MODULUS          [335] = FALSE
f...........ANOUT 1          [354] =      0.00 %
f...........SOURCE TAG       [273] =         7
f.........ANOUT 2 (F5)
```

```
f..........% TO GET 10V     [275] =    150.00 %
f..........OFFSET           [333] =      0.00 %
f..........CALIBRATION      [331] =    100.00 %
f..........MODULUS          [336] = FALSE
f..........ANOUT 2          [355] =      0.00 %
f..........SOURCE TAG       [276] =         9
f.......DIGITAL INPUTS
f.........DIGIN 1 (E2)
f..........VALUE FOR TRUE   [279] =      0.01 %
f..........VALUE FOR FALSE  [280] =      0.00 %
f..........OUTPUT           [527] =      0.00 %
f..........DESTINATION TAG  [281] =        57
f.........DIGIN 2 (E3)
f..........VALUE FOR TRUE   [283] =      0.01 %
f..........VALUE FOR FALSE  [284] =      0.00 %
f..........OUTPUT           [528] =      0.00 %
f..........DESTINATION TAG  [285] =        92
f.........DIGIN 3 (E4)
f..........VALUE FOR TRUE   [287] =      0.01 %
f..........VALUE FOR FALSE  [288] =      0.00 %
f..........OUTPUT           [529] =      0.00 %
f..........DESTINATION TAG  [289] =        93
f.........DIGIN 4 (E5)
f..........VALUE FOR TRUE   [523] =      0.01 %
f..........VALUE FOR FALSE  [524] =      0.00 %
f..........OUTPUT           [508] =      0.00 %
f..........DESTINATION TAG  [525] =        94
f..........DIGIN 4 (E5)     [521] = FALSE
f.........DIGIN B6 DEST    [451] =        71
f.........DIGIN B7 DEST    [450] =        70
f.........DIGIN B8 DEST    [452] =        72
f.......DIGITAL OUTPUTS
f.........DIGOUT 1
f..........THRESHOLD (>)    [292] =      0.00 %
f..........INPUT            [324] =      0.00 %
f..........OFFSET           [321] =      0.00 %
f..........MODULUS          [293] = FALSE
f..........INVERT           [327] = FALSE
f..........SOURCE TAG       [294] =        17
f.........DIGOUT 2
f..........THRESHOLD (>)    [296] =      0.00 %
f..........INPUT            [325] =      0.00 %
f..........OFFSET           [322] =      0.00 %
f..........MODULUS          [297] = FALSE
f..........INVERT           [328] = FALSE
f..........SOURCE TAG       [298] =        12
f.........DIGOUT 3
f..........THRESHOLD (>)    [300] =      0.00 %
f..........INPUT            [326] =      0.00 %
f..........OFFSET           [323] =      0.00 %
f..........MODULUS          [301] = TRUE
f..........INVERT           [329] = FALSE
f..........SOURCE TAG       [302] =       559
f.......CONFIGURE 5703
f.........SOURCE TAG       [304] =       176
f.........DESTINATION TAG  [305] =       371
f.......BLOCK DIAGRAM
f.........RAISE/LOWER DEST [307] =         0
f.........RAMP O/P DEST    [308] =       372
f.........PRESET DEST      [111] =       373
f.........S-RAMP DEST      [103] =         0
f.........HOME DEST        [389] =         0
f.........SPT SUM1 OP DEST [345] =        58
f.........SPT SUM2 OP DEST [346] =       176
f.........SPT SUM3 OP DEST [347] =         0
f.........PID O/P DEST     [552] =         0
f.........PID ERROR DEST   [556] =       545
f.........POSITION DEST    [341] =         0
f.......INTERNAL LINKS
f.........LINK 1 SOURCE    [180] =         0
f.........LINK 1 DEST      [181] =         0
f.........LINK 2 SOURCE    [182] =         0
f.........LINK 2 DEST      [183] =         0
f.........LINK 3 SOURCE    [184] =         0
f.........LINK 3 DEST      [185] =         0
f.........LINK 4 SOURCE    [186] =         0
f.........LINK 4 DEST      [187] =         0
f.........LINK 5 SOURCE    [560] =         0
f.........LINK 5 DEST      [561] =         0
f.........LINK 6 SOURCE    [562] =         0
f.........LINK 6 DEST      [563] =         0
f.........LINK 7 SOURCE    [564] =         0
f.........LINK 7 DEST      [565] =         0
f.........LINK 8 SOURCE    [566] =         0
f.........LINK 8 DEST      [567] =         0
f.........LINK 9 SOURCE    [568] =         0
f.........LINK 9 DEST      [569] =         0
f.........LINK 10 SOURCE   [570] =         0
f.........LINK 10 DEST     [571] =         0
f.........LINK 11 SOURCE   [572] =         0
f.........LINK 11 DEST     [573] =         0
f.........LINK 12 SOURCE   [574] =         0
f.........LINK 12 DEST     [575] =         0
f.........LINK 13 SOURCE   [576] =         0
f.........LINK 13 DEST     [577] =         0
f.........LINK 14 SOURCE   [578] =         0
f.........LINK 14 DEST     [579] =         0
f.........LINK 15 SOURCE   [580] =         0
f.........LINK 15 DEST     [581] =         0
f.........LINK 16 SOURCE   [582] =         0
f.........LINK 16 DEST     [583] =         0
h.....RESERVED
h.......SSD USE ONLY
h.........DO NOT ALTER !!
h..........Id Iq LOOPS
h............Id PROP GAIN     [401] =         2
h............Id INT GAIN      [402] =       500
h............MAX Id DEMAND    [403] =      7500
h............MIN Id DEMAND    [404] =     -2000
h............MAX Id INTEGRAL  [405] =      7500
h............MIN Id INTEGRAL  [406] =     -2000
h............Iq INT GAIN      [407] =     10000
h............MAX Iq INTEGRAL  [408] =      4000
h............MIN Iq INTEGRAL  [409] =     -4000
h............MAX Id HI WORD   [415] =         0
h............MIN Id HI WORD   [416] =        -1
h..........MISCELLANEOUS
h............584S CHASSIS     [169] = TRUE
h............BYPASS PASSWORD  [69 ] = FALSE
h............SKIP CO-PRO INIT [154] = FALSE
h............BRAKE THRESHOLD  [411] =       936
h............MODN INDEX       [412] =      9000
h............AD POS THRESHOLD [413] =         6
h............AD NEG THRESHOLD [414] =         6
h............DRIVE STATUS     [168] = FALSE
h............DRIVE RATING RMS [133] =       9.4 AMPS
h............MID VOLTS        [151] = TRUE
h............CHASSIS TYPE     [152] =       584
h............RESET VEC VARS   [167] = FALSE
h............RESET EAT        [155] = FALSE
h............MIN MMI CYCLE TM [313] =       200
h............MAX MMI CYCLE TM [314] =      4000
h............CYCLE TIME       [315] =      8000
h............SYS TIME         [351] =  0x733E
h............ENCODER COUNTER  [77 ] =         0
h............SPD.FBK. TC      [319] =     0.010 SECS
h............TORQUE.FBK.TC    [320] =     0.010 SECS
h............P3 TAG LIST TC   [318] =     0.010 SECS
h............IFB ADJUST       [495] =     115.0 %
h............TOTAL TRIP COUNT [624] =  0x0000
h............SYSTEM RESET     [64 ] = FALSE
h..........TEST FUNCTIONS
h............SELECT FUNCTION  [418] =         0
h............SPEED PERIOD     [419] =      1000
h............SPEED AMPLITUDE  [420] =       500
h............SPEED OFFSET     [421] =         0
h............CURRENT PERIOD   [422] =        40
h............CURR AMPLITUDE   [423] =       200
h............CURRENT OFFSET   [424] =         0
h..........TRACE
h............TRACE MODE       [426] =         1
h............PRESET COUNT     [427] =         0
h............NO OF PASSES     [428] =         1
h............TRACE 16 ITEMS   [429] = FALSE
h............TRACE ADDRESS 1  [430] =  0x00AC
h............TRACE ADDRESS 2  [431] =  0x0068
h............TRACE ADDRESS 3  [432] =  0x00A4
h............TRACE ADDRESS 4  [433] =  0x0066
h............TRACE ADDRESS 5  [434] =  0x00AA
h............TRACE ADDRESS 6  [435] =  0x00B4
h............TRACE ADDRESS 7  [436] =  0x00A6
h............TRACE ADDRESS 8  [437] =  0x00B2
h............TRACE ADDRESS 9  [438] =  0x00BE
h............TRACE ADDRESS 10 [439] =  0xF450
h............TRACE ADDRESS 11 [440] =  0x00B6
h............TRACE ADDRESS 12 [441] =  0xF452
h............TRACE ADDRESS 13 [442] =  0xF44E
h............TRACE ADDRESS 14 [443] =  0x0086
h............TRACE ADDRESS 15 [444] =  0xDD46
h............TRACE ADDRESS 16 [445] =  0x00B0
h..........FIELD WK VARS
h............MAG I SCALE 0    [454] =     100.0 %
h............MAG I SCALE 1    [455] =      77.0 %
h............MAG I SCALE 2    [456] =      63.0 %
h............MAG I SCALE 3    [457] =      50.0 %
h............MAG I SCALE 4    [586] =      40.0 %
h............MAG I SCALE 5    [459] =      35.0 %
h............MAG I SCALE 6    [460] =      30.0 %
h............MAG I SCALE 7    [461] =      25.0 %
h............MAG I SCALE 8    [462] =      20.0 %
h............MAG I SCALE 9    [630] =      11.1 %
h............TR SCALE 0       [587] =     100.0 %
h............TR SCALE 1       [588] =     100.0 %
h............TR SCALE 2       [589] =     100.0 %
h............TR SCALE 3       [590] =     100.0 %
h............TR SCALE 4       [591] =     100.0 %
h............TR SCALE 5       [592] =     100.0 %
h............TR SCALE 6       [593] =     100.0 %
h............TR SCALE 7       [594] =     100.0 %
h............TR SCALE 8       [595] =     100.0 %
```

```
h.............TR SCALE 9       [631] =     100.0 %
h...........AUTOTUNE MISC
h.............KIMR_INT          [487] =      1000
h.............AUTO RAMP INCRMT [488] =         2
h.............LINK V FILT GAIN [489] =       500
h.............TERM V FILT GAIN [490] =       500
h.............TERM V FLTGN DSP [491] =        50
h.............AUTOCAL MAX RPM  [492] =         0 RPM
h.............LOAD FACTOR @BS  [493] =      95.0 %
h.............LOAD FACTOR @2BS [494] =      90.0 %
h.............MIN LINK V RATIO [628] =     85.00 %
h...........TERM V CONTROL
h.............% LOAD @BASE SPD [614] =      5.00 %
h.............TVolts INT RANGE [615] =     50.00 %
h.............SPD @ TV INT =0  [616] =     50.00 %
h.............IQ @TV INTGN=MIN [617] =     100.0 %
h.............IQ @TV INTGN=MAX [618] =     200.0 %
h.............LOOP RESPNSE=nTr [619] =        20
h.............FAST RESPONSE %  [620] =    102.50 %
h...........DIAGNOSTICS RESD
h.............SLIP FREQUENCY   [625] =      0.00 Hz
h.............RUN SLIP F DIAG  [627] = FALSE
f.....PEEK
f.......PEEK DATA        [349] = [0xC000] = 0000
f.......PEEK SCALE       [350] =    100.00 %
....PARAMETER SAVE   [208] = UP TO ACTION
......SAVE (U/D)
....CONFIGURE DRIVE
......ENCODER LINES    [131] =      2048
......MAX SPEED RPM    [130] =      1500 RPM
......BASE FREQUENCY   [448] =      50.0 Hz
......MOTOR VOLTS      [486] =       415 VOLTS
......MOTOR RATING RMS [134] =       1.0 AMPS
......NO.OF POLES      [399] =         4
......NAMEPLATE RPM    [135] =      1440 RPM
......MAG CURRENT %    [453] =     30.00 %
......ROTOR TIME CONST [458] =     100.0 mSECS
......ENCODER SIGN     [164] = NEG
......MAIN TORQUE LIM. [159] =    100.00 %
......AUTOTUNE FLAG    [482] = FALSE
......SPD. PROP. GAIN  [161] =     10.00
......SPD. INT. TIME   [162] =       100 mSECS
```

NOTES:
* Parameter is not at factory default.
f Menu is only visible with FULL MENU = TRUE.
h Menu is hidden and is for engineering use only.

APPENDIX C - 620LNK AND 620ADV MMI LISTING

```
RELEASE  2.1
VECTOR DRIVE
4.0 kW 380-460v
..MENU LEVEL
....DIAGNOSTICS
......TOTAL SPD.DMD.   [6  ] =      0.00 %
h.....SPEED FB UNFIL   [7  ] =      0.00 %
......SPEED FEEDBACK   [11 ] =      0.00 %
......SPEED ERROR      [8  ] =      0.00 %
......TORQUE DEMAND    [9  ] =      0.00 %
......TORQUE FEEDBACK  [10 ] =      0.00 %
......CURRENT FEEDBACK [78 ] =      0.00 %
f.....TERMINAL VOLTS   [480] =         0 VOLTS
f.....DC LINK VOLTS    [613] =       594 VOLTS
f.....TERM V INTEGRAL  [623] =    100.00 %
......ACTUAL POS I LIM [13 ] =     31.44 %
......ACTUAL NEG I LIM [14 ] =    -31.44 %
......INVERSE TIME O/P [15 ] =     31.44 %
......AT CURRENT LIMIT [16 ] = FALSE
......AT ZERO SPEED    [17 ] = TRUE
......AT ZERO SETPOINT [18 ] = TRUE
......AT STANDSTILL    [19 ] = TRUE
......STALL TRIP       [20 ] = OK
......RAMPING          [21 ] = FALSE
......DRIVE START      [23 ] = FALSE
......DRIVE ENABLE     [24 ] = FALSE
......OPERATING MODE   [25 ] =  STOPPED
......HEALTHY          [27 ] = TRUE
......HEALTH OUTPUT    [12 ] = TRUE
......READY            [559] = FALSE
......RUN              [28 ] = FALSE
f.....CO-PRO PRESENT   [150] = TRUE
......ANIN 1 (C3)      [29 ] =     0.000 VOLTS
......ANIN 3 (F2)      [31 ] =     0.000 VOLTS
......ANIN 4 (F3)      [32 ] =     0.000 VOLTS
......ANIN 5 (F4)      [33 ] =     0.000 VOLTS
......ANOUT 1 (C5)     [34 ] =     0.000 VOLTS
......ANOUT 2 (F5)     [35 ] =     0.000 VOLTS
......COAST STOP       [26 ] = TRUE
......PROGRAM STOP     [22 ] = TRUE
......DIGIN B6 JOG     [37 ] = FALSE
......DIGIN B7 START   [36 ] = TRUE
......DIGIN B8 ENABLE  [38 ] = TRUE
......DIGIN 1 (E2)     [39 ] = FALSE
......DIGIN 2 (E3)     [40 ] = FALSE
......DIGIN 3 (E4)     [41 ] = FALSE
......DIGIN 4 (E5)     [521] = FALSE
......DIGOUT 1 (E6)    [42 ] = TRUE
......DIGOUT 2 (E7)    [43 ] = TRUE
......DIGOUT 3 (E8)    [44 ] = FALSE
......RAISE/LOWER O/P  [45 ] =      0.00 %
......SPT SUM O/P 1    [46 ] =      0.01 %
......SPT SUM O/P 2    [385] =      0.00 %
......SPT SUM O/P 3    [386] =      0.00 %
......RAMP OUTPUT      [47 ] =      0.00 %
......PRESET O/P       [110] =      0.00 %
......SPEED SETPOINT   [48 ] =      0.00 %
f.....SEQ RUN INPUT    [49 ] =      0.00 %
f.....SEQ OUTPUT       [50 ] =      0.00 %
......ENCODER          [51 ] =         0 RPM
....SETUP PARAMETERS
......RAMPS
........RAMP ACCEL TIME  [54 ] =      10.0 SECS
........RAMP DECEL TIME  [55 ] =      10.0 SECS
f.......RAMP QUENCH      [56 ] = FALSE
........RAMP HOLD        [57 ] = FALSE
........RAMP INPUT       [58 ] =      0.00 %
........% S-RAMP         [59 ] =      0.00 %
........RAMPING THRESH.  [60 ] =      1.00 %
........AUTO RESET       [61 ] = TRUE
........EXTERNAL RESET   [62 ] = FALSE
........RESET VALUE      [63 ] =      0.00 %
......OP-STATION
........SET UP
..........SETPOINT         [507] =       0.0 %
..........LOCAL KEY ENABLE [632] = TRUE
........START UP VALUES
..........SETPOINT         [503] =       0.0 %
..........REV DIRECTION    [504] = FALSE
f.........PROGRAM          [505] = FALSE
..........LOCAL            [506] = FALSE
........LOCAL RAMP
..........RAMP ACCEL TIME  [511] =      10.0 SECS
..........RAMP DECEL TIME  [512] =      10.0 SECS
h.........RAMP QUENCH      [513] = FALSE
h.........RAMP HOLD        [514] = FALSE
h.........RAMP INPUT       [515] =      0.00 %
..........% S-RAMP         [516] =      0.00 %
h.........RAMPING THRESH.  [517] =      1.00 %
h.........AUTO RESET       [518] = TRUE
h.........EXTERNAL RESET   [519] = FALSE
h.........RESET VALUE      [520] =      0.00 %
h.........RAMP OUTPUT      [509] =      0.00 %
......AUX I/O
........AUX START        [66 ] = TRUE
........START            [70 ] = FALSE
........AUX JOG          [67 ] = TRUE
........JOG INPUT        [71 ] = FALSE
........AUX ENABLE       [68 ] = TRUE
........ENABLE           [72 ] = FALSE
......JOG
........JOG SPEED 1      [75 ] =     10.00 %
........JOG SPEED 2      [76 ] =    -10.00 %
........MODE             [80 ] = FALSE
........JOG ACCEL RATE   [113] =      10.0 SECS
........JOG DECEL RATE   [114] =      10.0 SECS
......RAISE/LOWER
........RESET VALUE      [82 ] =      0.00 %
........RAMP RATE        [83 ] =      60.0 SECS
........RAISE INPUT      [85 ] = FALSE
........LOWER INPUT      [86 ] = FALSE
........MIN VALUE        [87 ] =   -100.00 %
........MAX VALUE        [88 ] =    100.00 %
........EXTERNAL RESET   [89 ] = FALSE
h.....INVERSE TIME
h.......AIMING POINT     [116] =    105.00 %
h.......DELAY            [117] =      60.0 SECS
h.......DOWN RATE        [118] =      10.0 SECS
h.......UP RATE          [148] =     120.0 SECS
......STOP RATES
........RUN STOP TIME    [120] =      10.0 SECS
........RUN STOP LIMIT   [121] =      60.0 SECS
........FAST STOP TIME   [123] =       1.0 SECS
........FAST STOP LIMIT  [124] =      60.0 SECS
........USE SYSTEM RAMP  [125] = TRUE
f.......PRE-START DELAY  [122] =     0.500 SECS
f.......READY DELAY      [352] =     0.000 SECS
........CONTACTOR DELAY  [112] =       0.5 SECS
........STOP ZERO SPEED  [126] =      1.00 %
........PROG STOP I-LIM  [622] =    150.00 %
......ALARMS
........EXTERNAL TRIP    [144] = FALSE
h.......MOTOR TEMP       [141] =     26.97 %
h.......MOTOR TMP.TRIP   [128] =     75.00 %
h.......MOTOR TMP.RST.   [309] =     50.00 %
........MOTR.TMP.INHIBIT [146] = FALSE
h.......HEATSINK LEVEL   [129] =     17.00 %
h.......ACK ALARM        [166] = FALSE
........STALL INHIBIT    [143] = FALSE
........STALL TORQUE     [136] =    100.00 %
........STALL SPEED      [138] =    100.00 %
........STALL DELAY      [137] =    100.00
........OVER SPD INHIBIT [145] = FALSE
........OVER SPEED LEVEL [139] =    120.00 %
........5703 RCV.INHIBIT [142] = FALSE
......CALIBRATION
........ENCODER LINES    [131] =      2048
........MAX SPEED RPM    [130] =      1500 RPM
........BASE FREQUENCY   [448] =      50.0 Hz
........MOTOR VOLTS      [486] =       415 VOLTS
........MOTOR RATING RMS [134] =       1.0 AMPS
........NO.OF POLES      [399] =         4
........NAMEPLATE RPM    [135] =      1440 RPM
......TORQUE LOOP
........MAG CURRENT %    [453] =     30.00 %
........ROTOR TIME CONST [458] =     100.0 mSECS
........1 / GAIN         [149] =        70
........POS TORQUE LIMIT [157] =    150.00 %
........NEG TORQUE LIMIT [158] =   -150.00 %
........MAIN TORQUE LIM. [159] =    100.00 %
........SYMETRIC TQ.LIM. [153] = TRUE
........AUX TORQUE DMD   [599] =      0.00 %
........TORQ.DMD.ISOLATE [596] = FALSE
........CURRENT LIMIT    [585] =    150.00 %
......SPEED LOOP
........SPD. PROP. GAIN  [161] =     10.00
........SPD. INT. TIME   [162] =       100 mSECS
f.......INT. DEFEAT      [163] = FALSE
........ENCODER SIGN     [164] = NEG
........SPEED FBK FILTER [165] = TRUE
........SPEED SETPOINTS
..........DIRECT SPT1      [171] =      0.00 %
..........DIRECT RATIO     [172] =    0.1000
..........DIRECT SPT. MAX  [173] =    100.00 %
..........DIRECT SPT. MIN  [174] =   -100.00 %
..........DIRECT ENABLE    [175] = FALSE
..........MAIN SPD.SPT.    [176] =      0.00 %
..........MAX SPEED        [177] =    100.00 %
..........MIN SPEED        [178] =   -100.00 %
..........ZERO SPD HYST    [132] =      0.10 %
..........ZERO SPEED LEVEL [252] =      0.50 %
......AUTOTUNE
........AUTOTUNE FLAG    [482] = FALSE
........MAG I AUTOTUNE   [483] = TRUE
```

```
........SET Tr < RTD SPD [484] = TRUE
.......AUTOCAL MAX RPM  [629] =     30000 RPM
......SETPOINT SUM 1
........RATIO 0          [189] =    1.0000
........RATIO 1          [190] =    1.0000
........SIGN 0           [191] = POS
........SIGN 1           [192] = POS
........DIVIDER 0        [193] =    1.0000
........DIVIDER 1        [194] =    1.0000
........LIMIT            [195] =    100.00 %
........INPUT 0          [196] =      0.00 %
........INPUT 1          [197] =      0.00 %
........INPUT 2          [198] =      0.00 %
......SETPOINT SUM 2
........RATIO 1          [365] =    1.0000
........RATIO 0          [364] =    1.0000
........SIGN 1           [367] = POS
........SIGN 0           [366] = POS
........DIVIDER 1        [369] =    1.0000
........DIVIDER 0        [368] =    1.0000
........LIMIT            [370] =    100.00 %
........INPUT 0          [371] =      0.00 %
........INPUT 1          [372] =      0.00 %
........INPUT 2          [373] =      0.00 %
......SETPOINT SUM 3
........RATIO 1          [376] =    1.0000
........RATIO 0          [375] =    1.0000
........SIGN 1           [378] = POS
........SIGN 0           [377] = POS
........DIVIDER 1        [380] =    1.0000
........DIVIDER 0        [379] =    1.0000
........LIMIT            [381] =    100.00 %
........INPUT 0          [382] =      0.00 %
........INPUT 1          [383] =      0.00 %
........INPUT 2          [384] =      0.00 %
f.....REF ENCODER
f.......SPEED
f.........REFSPEED         [357] =      0.00 %
f.........MAX SPEED RPM    [353] =      1500 RPM
f.........ENCODER LINES    [356] =      2048
f.......PHASE
f.........OFFSET           [447] =         0
f.........OFFSET SCALE     [609] =         1
f.........RESET            [600] = FALSE
f.........POS CALC ENABLE  [337] = FALSE
f.........POSITION ERROR   [338] =         0
f.........MAX POSITION ERR [342] =    100.00
f.........REF SCALE A      [343] =       100
f.........REF SCALE B      [344] =       100
f.........REF ENCODER I/P  [359] =         0
f.........SATURATED        [610] = FALSE
f.........OVERFLOW         [611] = FALSE
f.......INCH
f.........INCH ADVANCE     [604] = FALSE
f.........INCH RETARD      [605] = FALSE
f.........INCH RATE        [606] =      10.0
f.....PID
f.......INPUT            [545] =      0.00 %
f.......ENABLE           [534] = TRUE
f.......PROP.GAIN        [549] =       1.0
f.......INT.TIME CONST.  [539] =      5.00 SECS
f.......INT.DEFEAT       [538] = FALSE
f.......DERIVATIVE TC    [531] =     0.000 SECS
f.......FILTER TC        [535] =     0.100 SECS
f.......POSITIVE LIMIT   [547] =    100.00 %
f.......NEGATIVE LIMIT   [542] =   -100.00 %
f.......O/P SCALER(TRIM) [543] =    1.0000
f.......ERROR CALC
f.........INPUT 1          [536] =      0.00 %
f.........INPUT 2          [537] =      0.00 %
f.........RATIO 1          [550] =    1.0000
f.........RATIO 2          [551] =    1.0000
f.........SIGN 1           [601] = POS
f.........SIGN 2           [602] = POS
f.........DIVIDER 1        [532] =    1.0000
f.........DIVIDER 2        [533] =    1.0000
f.........LIMIT            [553] =    100.00 %
f.........ERROR O/P        [500] =      0.00 %
f.......PROFILER
f.........MODE             [541] =         0
f.........MIN PROFILE GAIN [540] =      0.00 %
f.........PROFILED GAIN    [548] =       0.0
f.........PROFILE INPUT    [554] =      0.00 %
f.........PROFILE MININPUT [555] =      0.00 %
f.......OUTPUT           [546] =      0.00 %
f.......CLAMPED          [544] = TRUE
......PRESET
........SELECT 1         [92 ] = FALSE
........SELECT 2         [93 ] = FALSE
........SELECT 3         [94 ] = FALSE
........SIGN             [109] = NEG
........INPUT 1          [95 ] =      0.00 %
........INPUT 2          [96 ] =     25.00 %
........INPUT 3          [97 ] =     50.00 %
........INPUT 4          [98 ] =    100.00 %
........INPUT 5          [99 ] =      0.00 %
........INPUT 6          [100] =    -25.00 %
........INPUT 7          [101] =    -50.00 %
........INPUT 8          [102] =   -100.00 %
f.....S-RAMP
f.......INPUT            [597] =      0.00 %
f.......RESET            [104] = FALSE
f.......RESET VALUE      [105] =      0.00 %
f.......ACCELERATION     [106] =     10.00
f.......JERK             [107] =     10.00
f.......QUENCH           [108] = FALSE
f.......AT SPEED         [316] = FALSE
f.......AT SPEED LEVEL   [612] =      1.00 %
h.......ACCEL O/P        [253] =      0.00
h.......OVERSHOOT THRESH [254] =      5.00 %
f.......OUTPUT           [598] =      0.00 %
f.....HOME
f.......HOME             [397] = FALSE
f.......HOMING DISTANCE  [396] =      2048
f.......1/ENCODER SCALE  [398] =      4.00
f.......LINEAR  O/P      [388] = FALSE
f.......HOME INPUT       [394] =      0.00 %
f.......HOME OUTPUT      [395] =      0.00 %
....PASSWORD
......ENTER PASSWORD   [200] =  0x0000
......CHANGE PASSWORD  [201] =  0x0000
....ALARM STATUS
......HEALTH STORE     [203] =  0x0000
......HEALTH WORD      [217] =  0x0000
......FIRST ALARM      [218] =  0x0000
h.....HEALTH INHIBIT   [219] =  0x0000
....MENUS
......FULL MENUS       [205] = FALSE
......CONTRAST         [220] =       128
f.....MENU DELAY       [206] =         0
f.....DATA DELAY       [207] =        50
....SERIAL LINKS
f.....P3 MODE          [237] = BUSY
f.....5703 SUPPORT
f.......SETPT. RATIO     [233] =    1.0000
f.......SETPT. SIGN      [234] = NEG
f.......SCALED INPUT     [235] =      0.00 %
f.......RAW INPUT        [584] =      0.00 %
f.......OUTPUT           [236] =      0.00 %
......DUMP MMI (TX)    [238] = UP TO ACTION
h.....MEMORY DUMP       [221] = FALSE
......UDP XFER (TX)     [240] = UP TO ACTION
......UDP XFER (RX)     [239] = UP TO ACTION
f.....P3 BAUD RATE      [241] = 9600
f.....P3 TAG LIST
f.......TAG 1             [212] =         7
f.......TAG 2             [213] =         0
f.......TAG 3             [214] =         0
f.......TAG 4             [215] =         0
f.......TAG 5             [216] =         0
f.......FULL TAG LIST     [334] = FALSE
....SYSTEM
......SOFTWARE
........RELEASE           [0  ] = 2.1
f.....CONFIGURE I/O
f.......CONFIGURE ENABLE [245] = FALSE
f.......ANALOG INPUTS
f.........ANIN 1 (C3)
f...........CALIBRATION      [248] =    100.00 %
f...........OFFSET           [358] =      0.00 %
f...........MAX VALUE        [249] =    100.00 %
f...........MIN VALUE        [250] =   -100.00 %
f...........DESTINATION TAG  [251] =       196
f...........SCALED INPUT     [390] =      0.00 %
f.........ANIN 3 (F2)
f...........CALIBRATION      [256] =    100.00 %
f...........OFFSET           [360] =      0.00 %
f...........MAX VALUE        [257] =    100.00 %
f...........MIN VALUE        [258] =   -100.00 %
f...........DESTINATION TAG  [259] =       197
f...........SCALED INPUT     [391] =      0.00 %
f.........ANIN 4 (F3)
f...........CALIBRATION      [261] =    100.00 %
f...........OFFSET           [361] =      0.00 %
f...........MAX VALUE        [262] =    100.00 %
f...........MIN VALUE        [263] =   -100.00 %
f...........DESTINATION TAG  [264] =         0
f...........SCALED INPUT     [392] =      0.00 %
f.........ANIN 5 (F4)
f...........CALIBRATION      [266] =    100.00 %
f...........OFFSET           [362] =      0.00 %
f...........MAX VALUE        [267] =    100.00 %
f...........MIN VALUE        [268] =   -100.00 %
f...........DESTINATION TAG  [269] =         0
f...........SCALED INPUT     [393] =      0.00 %
f.......ANALOG OUTPUTS
f.........ANOUT 1 (C5)
f...........% TO GET 10V     [272] =    100.00 %
f...........OFFSET           [332] =      0.00 %
f...........CALIBRATION      [330] =    100.00 %
```

```
f...........MODULUS          [335] = FALSE
f...........ANOUT 1          [354] =      0.00 %
f...........SOURCE TAG       [273] =         7
f.........ANOUT 2 (F5)
f...........% TO GET 10V     [275] =    150.00 %
f...........OFFSET           [333] =      0.00 %
f...........CALIBRATION      [331] =    100.00 %
f...........MODULUS          [336] = FALSE
f...........ANOUT 2          [355] =      0.00 %
f...........SOURCE TAG       [276] =         9
f.......DIGITAL INPUTS
f.........DIGIN 1 (E2)
f...........VALUE FOR TRUE   [279] =      0.01 %
f...........VALUE FOR FALSE  [280] =      0.00 %
f...........OUTPUT           [527] =      0.00 %
f...........DESTINATION TAG  [281] =        57
f.........DIGIN 2 (E3)
f...........VALUE FOR TRUE   [283] =      0.01 %
f...........VALUE FOR FALSE  [284] =      0.00 %
f...........OUTPUT           [528] =      0.00 %
f...........DESTINATION TAG  [285] =        92
f.........DIGIN 3 (E4)
f...........VALUE FOR TRUE   [287] =      0.01 %
f...........VALUE FOR FALSE  [288] =      0.00 %
f...........OUTPUT           [529] =      0.00 %
f...........DESTINATION TAG  [289] =        93
f.........DIGIN 4 (E5)
f...........VALUE FOR TRUE   [523] =      0.01 %
f...........VALUE FOR FALSE  [524] =      0.00 %
f...........OUTPUT           [508] =      0.00 %
f...........DESTINATION TAG  [525] =        94
f...........DIGIN 4 (E5)     [521] = FALSE
f.........DIGIN B6 DEST    [451] =        71
f.........DIGIN B7 DEST    [450] =        70
f.........DIGIN B8 DEST    [452] =        72
f.......DIGITAL OUTPUTS
f.........DIGOUT 1
f...........THRESHOLD (>)    [292] =      0.00 %
f...........INPUT            [324] =      0.00 %
f...........OFFSET           [321] =      0.00 %
f...........MODULUS          [293] = FALSE
f...........INVERT           [327] = FALSE
f...........SOURCE TAG       [294] =        17
f.........DIGOUT 2
f...........THRESHOLD (>)    [296] =      0.00 %
f...........INPUT            [325] =      0.00 %
f...........OFFSET           [322] =      0.00 %
f...........MODULUS          [297] = FALSE
f...........INVERT           [328] = FALSE
f...........SOURCE TAG       [298] =        12
f.........DIGOUT 3
f...........THRESHOLD (>)    [300] =      0.00 %
f...........INPUT            [326] =      0.00 %
f...........OFFSET           [323] =      0.00 %
f...........MODULUS          [301] = TRUE
f...........INVERT           [329] = FALSE
f...........SOURCE TAG       [302] =       559
f.......CONFIGURE 5703
f.........SOURCE TAG       [304] =       176
f.........DESTINATION TAG  [305] =       371
f.......BLOCK DIAGRAM
f.........RAISE/LOWER DEST [307] =         0
f.........RAMP O/P DEST    [308] =       372
f.........PRESET DEST      [111] =       373
f.........S-RAMP DEST      [103] =         0
f.........HOME DEST        [389] =         0
f.........SPT SUM1 OP DEST [345] =        58
f.........SPT SUM2 OP DEST [346] =       176
f.........SPT SUM3 OP DEST [347] =         0
f.........PID O/P DEST     [552] =         0
f.........PID ERROR DEST   [556] =       545
f.........POSITION DEST    [341] =         0
f.......INTERNAL LINKS
f.........LINK 1 SOURCE    [180] =         0
f.........LINK 1 DEST      [181] =         0
f.........LINK 2 SOURCE    [182] =         0
f.........LINK 2 DEST      [183] =         0
f.........LINK 3 SOURCE    [184] =         0
f.........LINK 3 DEST      [185] =         0
f.........LINK 4 SOURCE    [186] =         0
f.........LINK 4 DEST      [187] =         0
f.........LINK 5 SOURCE    [560] =         0
f.........LINK 5 DEST      [561] =         0
f.........LINK 6 SOURCE    [562] =         0
f.........LINK 6 DEST      [563] =         0
f.........LINK 7 SOURCE    [564] =         0
f.........LINK 7 DEST      [565] =         0
f.........LINK 8 SOURCE    [566] =         0
f.........LINK 8 DEST      [567] =         0
f.........LINK 9 SOURCE    [568] =         0
f.........LINK 9 DEST      [569] =         0
f.........LINK 10 SOURCE   [570] =         0
f.........LINK 10 DEST     [571] =         0
f.........LINK 11 SOURCE   [572] =         0
f.........LINK 11 DEST     [573] =         0
f.........LINK 12 SOURCE   [574] =         0
f.........LINK 12 DEST     [575] =         0
f.........LINK 13 SOURCE   [576] =         0
f.........LINK 13 DEST     [577] =         0
f.........LINK 14 SOURCE   [578] =         0
f.........LINK 14 DEST     [579] =         0
f.........LINK 15 SOURCE   [580] =         0
f.........LINK 15 DEST     [581] =         0
f.........LINK 16 SOURCE   [582] =         0
f.........LINK 16 DEST     [583] =         0
h.....RESERVED
h.......SSD USE ONLY
h.........DO NOT ALTER !!
h...........Id Iq LOOPS
h.............Id PROP GAIN     [401] =         2
h.............Id INT GAIN      [402] =       500
h.............MAX Id DEMAND    [403] =      7500
h.............MIN Id DEMAND    [404] =     -2000
h.............MAX Id INTEGRAL  [405] =      7500
h.............MIN Id INTEGRAL  [406] =     -2000
h.............Iq INT GAIN      [407] =     10000
h.............MAX Iq INTEGRAL  [408] =      4000
h.............MIN Iq INTEGRAL  [409] =     -4000
h.............MAX Id HI WORD   [415] =         0
h.............MIN Id HI WORD   [416] =        -1
h...........MISCELLANEOUS
h.............584S CHASSIS     [169] = TRUE
h.............BYPASS PASSWORD  [69 ] = FALSE
h.............SKIP CO-PRO INIT [154] = FALSE
h.............BRAKE THRESHOLD  [411] =       936
h.............MODN INDEX       [412] =      9000
h.............AD POS THRESHOLD [413] =         6
h.............AD NEG THRESHOLD [414] =         6
h.............DRIVE STATUS     [168] = FALSE
h.............DRIVE RATING RMS [133] =       9.4 AMPS
h.............MID VOLTS        [151] = TRUE
h.............CHASSIS TYPE     [152] =       584
h.............RESET VEC VARS   [167] = FALSE
h.............RESET EAT        [155] = FALSE
h.............MIN MMI CYCLE TM [313] =       200
h.............MAX MMI CYCLE TM [314] =      4000
h.............CYCLE TIME       [315] =      8000
h.............SYS TIME         [351] =  0x0AEF
h.............ENCODER COUNTER  [77 ] =         0
h.............SPD.FBK. TC      [319] =     0.010 SECS
h.............TORQUE.FBK.TC    [320] =     0.010 SECS
h.............P3 TAG LIST TC   [318] =     0.010 SECS
h.............IFB ADJUST       [495] =     115.0 %
h.............TOTAL TRIP COUNT [624] =  0x0000
h.............SYSTEM RESET     [64 ] = FALSE
h...........TEST FUNCTIONS
h.............SELECT FUNCTION  [418] =         0
h.............SPEED PERIOD     [419] =      1000
h.............SPEED AMPLITUDE  [420] =       500
h.............SPEED OFFSET     [421] =         0
h.............CURRENT PERIOD   [422] =        40
h.............CURR AMPLITUDE   [423] =       200
h.............CURRENT OFFSET   [424] =         0
h...........TRACE
h.............TRACE MODE       [426] =         1
h.............PRESET COUNT     [427] =         0
h.............NO OF PASSES     [428] =         1
h.............TRACE 16 ITEMS   [429] = FALSE
h.............TRACE ADDRESS 1  [430] =  0x00AC
h.............TRACE ADDRESS 2  [431] =  0x0068
h.............TRACE ADDRESS 3  [432] =  0x00A4
h.............TRACE ADDRESS 4  [433] =  0x0066
h.............TRACE ADDRESS 5  [434] =  0x00AA
h.............TRACE ADDRESS 6  [435] =  0x00B4
h.............TRACE ADDRESS 7  [436] =  0x00A6
h.............TRACE ADDRESS 8  [437] =  0x00B2
h.............TRACE ADDRESS 9  [438] =  0x00BE
h.............TRACE ADDRESS 10 [439] =  0xF450
h.............TRACE ADDRESS 11 [440] =  0x00B6
h.............TRACE ADDRESS 12 [441] =  0xF452
h.............TRACE ADDRESS 13 [442] =  0xF44E
h.............TRACE ADDRESS 14 [443] =  0x0086
h.............TRACE ADDRESS 15 [444] =  0xDD46
h.............TRACE ADDRESS 16 [445] =  0x00B0
h...........FIELD WK VARS
h.............MAG I SCALE 0    [454] =     100.0 %
h.............MAG I SCALE 1    [455] =      77.0 %
h.............MAG I SCALE 2    [456] =      63.0 %
h.............MAG I SCALE 3    [457] =      50.0 %
h.............MAG I SCALE 4    [586] =      40.0 %
h.............MAG I SCALE 5    [459] =      35.0 %
h.............MAG I SCALE 6    [460] =      30.0 %
h.............MAG I SCALE 7    [461] =      25.0 %
h.............MAG I SCALE 8    [462] =      20.0 %
h.............MAG I SCALE 9    [630] =      11.1 %
h.............TR SCALE 0       [587] =     100.0 %
h.............TR SCALE 1       [588] =     100.0 %
h.............TR SCALE 2       [589] =     100.0 %
h.............TR SCALE 3       [590] =     100.0 %
h.............TR SCALE 4       [591] =     100.0 %
```

```
h.............TR SCALE 5       [592] =     100.0 %
h.............TR SCALE 6       [593] =     100.0 %
h.............TR SCALE 7       [594] =     100.0 %
h.............TR SCALE 8       [595] =     100.0 %
h.............TR SCALE 9       [631] =     100.0 %
h...........AUTOTUNE MISC
h.............KIMR_INT         [487] =      1000
h.............AUTO RAMP INCRMT [488] =         2
h.............LINK V FILT GAIN [489] =       500
h.............TERM V FILT GAIN [490] =       500
h.............TERM V FLTGN DSP [491] =        50
h.............AUTOCAL MAX RPM  [492] =         0 RPM
h.............LOAD FACTOR @BS  [493] =      95.0 %
h.............LOAD FACTOR @2BS [494] =      90.0 %
h.............MIN LINK V RATIO [628] =     85.00 %
h...........TERM V CONTROL
h.............% LOAD @BASE SPD [614] =      5.00 %
h.............TVolts INT RANGE [615] =     50.00 %
h.............SPD @ TV INT =0  [616] =     50.00 %
h.............IQ @TV INTGN=MIN [617] =     100.0 %
h.............IQ @TV INTGN=MAX [618] =     200.0 %
h.............LOOP RESPNSE=nTr [619] =        20
h.............FAST RESPONSE %  [620] =    102.50 %
h...........DIAGNOSTICS RESD
h.............SLIP FREQUENCY   [625] =      0.00 Hz
h.............RUN SLIP F DIAG  [627] = FALSE
f.....PEEK
f.......PEEK DATA        [349] = [0xC000] = 0000
f.......PEEK SCALE       [350] =    100.00 %
......CO-PROCESSOR
........COPROTAG[0]      [463] =      0.00 %
........COPROTAG[1]      [464] =      0.00 %
........COPROTAG[2]      [465] =      0.00 %
........COPROTAG[3]      [466] =      0.00 %
........COPROTAG[4]      [467] =      0.00 %
........COPROTAG[5]      [468] =      0.00 %
........COPROTAG[6]      [469] =      0.00 %
........COPROTAG[7]      [470] =      0.00 %
........COPROTAG[8]      [471] =      0.00 %
........COPROTAG[9]      [472] =      0.00 %
........COPROTAG[10]     [473] = FALSE
........COPROTAG[11]     [474] = FALSE
........COPROTAG[12]     [475] = FALSE
........COPROTAG[13]     [476] = FALSE
........COPROTAG[14]     [477] = FALSE
........COPROTAG[15]     [478] = FALSE
....PARAMETER SAVE   [208] = UP TO ACTION
......SAVE (U/D)
....CONFIGURE DRIVE
......ENCODER LINES    [131] =      2048
......MAX SPEED RPM    [130] =      1500 RPM
......BASE FREQUENCY   [448] =      50.0 Hz
......MOTOR VOLTS      [486] =       415 VOLTS
......MOTOR RATING RMS [134] =       1.0 AMPS
......NO.OF POLES      [399] =         4
......NAMEPLATE RPM    [135] =      1440 RPM
......MAG CURRENT %    [453] =     30.00 %
......ROTOR TIME CONST [458] =     100.0 mSECS
......ENCODER SIGN     [164] = NEG
......MAIN TORQUE LIM. [159] =    100.00 %
......AUTOTUNE FLAG    [482] = FALSE
......SPD. PROP. GAIN  [161] =     10.00
......SPD. INT. TIME   [162] =       100 mSECS
```

NOTES:
* Parameter is not at factory default.
f Menu is only visible with FULL MENU = TRUE.
h Menu is hidden and is for engineering use only.

APPENDIX D - TAGS BY NUMBER

Tag	Name	Type	DP	RW	Range	Default	Cfg	Inhib
0	SYSTEM::SOFTWARE::RELEASE	Data	4	RW	2.1 to 2.1	2.1	1	0
1		Data	2	RW	0.00 % to 655.35 %	0.00%	0	0
2	VECTOR DRIVE	Menu						
3		Menu						
4	MENU LEVEL	Menu						
5	DIAGNOSTICS	Menu						
6	DIAGNOSTICS::TOTAL SPD.DMD.	Diagnostic						
7	DIAGNOSTICS::SPEED FB UNFIL	Diagnostic						
8	DIAGNOSTICS::SPEED ERROR	Diagnostic						
9	DIAGNOSTICS::TORQUE DEMAND	Diagnostic						
10	DIAGNOSTICS::TORQUE FEEDBACK	Diagnostic						
11	DIAGNOSTICS::SPEED FEEDBACK	Diagnostic						
12	DIAGNOSTICS::HEALTH OUTPUT	Diagnostic						
13	DIAGNOSTICS::ACTUAL POS I LIM	Diagnostic						
14	DIAGNOSTICS::ACTUAL NEG I LIM	Diagnostic						
15	DIAGNOSTICS::INVERSE TIME O/P	Diagnostic						
16	DIAGNOSTICS::AT CURRENT LIMIT	Diagnostic						
17	DIAGNOSTICS::AT ZERO SPEED	Diagnostic						
18	DIAGNOSTICS::AT ZERO SETPOINT	Diagnostic						
19	DIAGNOSTICS::AT STANDSTILL	Diagnostic						
20	DIAGNOSTICS::STALL TRIP	Diagnostic						
21	DIAGNOSTICS::RAMPING	Diagnostic						
22	DIAGNOSTICS::PROGRAM STOP	Diagnostic						
23	DIAGNOSTICS::DRIVE START	Diagnostic						
24	DIAGNOSTICS::DRIVE ENABLE	Diagnostic						
25	DIAGNOSTICS::OPERATING MODE	Diagnostic						
26	DIAGNOSTICS::COAST STOP	Diagnostic						
27	DIAGNOSTICS::HEALTHY	Diagnostic						
28	DIAGNOSTICS::RUN	Diagnostic						
29	DIAGNOSTICS::ANIN 1 (C3)	Diagnostic						
30	RESERVED	Diagnostic						
31	DIAGNOSTICS::ANIN 3 (F2)	Diagnostic						
32	DIAGNOSTICS::ANIN 4 (F3)	Diagnostic						
33	DIAGNOSTICS::ANIN 5 (F4)	Diagnostic						
34	DIAGNOSTICS::ANOUT 1 (C5)	Diagnostic						
35	DIAGNOSTICS::ANOUT 2 (F5)	Diagnostic						
36	DIAGNOSTICS::DIGIN B7 START	Diagnostic						
37	DIAGNOSTICS::DIGIN B6 JOG	Diagnostic						
38	DIAGNOSTICS::DIGIN B8 ENABLE	Diagnostic						
39	DIAGNOSTICS::DIGIN 1 (E2)	Diagnostic						
40	DIAGNOSTICS::DIGIN 2 (E3)	Diagnostic						
41	DIAGNOSTICS::DIGIN 3 (E4)	Diagnostic						
42	DIAGNOSTICS::DIGOUT 1 (E6)	Diagnostic						
43	DIAGNOSTICS::DIGOUT 2 (E7)	Diagnostic						
44	DIAGNOSTICS::DIGOUT 3 (E8)	Diagnostic						
45	DIAGNOSTICS::RAISE/LOWER O/P	Diagnostic						
46	DIAGNOSTICS::SPT SUM O/P 1	Diagnostic						
47	DIAGNOSTICS::RAMP OUTPUT	Diagnostic						
48	DIAGNOSTICS::SPEED SETPOINT	Diagnostic						

49	DIAGNOSTICS::SEQ RUN INPUT	Diagnostic						

Tag	Name	Type	DP	RW	Range	Default	Cfg	Inhib
50	DIAGNOSTICS::SEQ OUTPUT	Diagnostic						
51	DIAGNOSTICS::ENCODER	Diagnostic						
52	SETUP PARAMETERS	Menu						
53	SETUP PARAMETERS::RAMPS	Menu						
54	SETUP PARAMETERS::RAMPS::RAMP ACCEL TIME	Data	1	RW	0.0 SECS to 600.0 SECS	10.0 SECS	1	0
55	SETUP PARAMETERS::RAMPS::RAMP DECEL TIME	Data	1	RW	0.0 SECS to 600.0 SECS	10.0 SECS	1	0
56	SETUP PARAMETERS::RAMPS::RAMP QUENCH	Data	0	RW	FALSE / TRUE /	FALSE	1	0
57	SETUP PARAMETERS::RAMPS::RAMP HOLD	Data	0	RW	FALSE / TRUE /	FALSE	1	0
58	SETUP PARAMETERS::RAMPS::RAMP INPUT	Data	2	RW	-100.00 % to 100.00 %	0.00%	1	0
59	SETUP PARAMETERS::RAMPS::% S-RAMP	Data	2	RW	-100.00 % to 100.00 %	0.00%	1	0
60	SETUP PARAMETERS::RAMPS::RAMPING THRESH.	Data	2	RW	0.00 % to 100.00 %	1.00%	1	0
61	SETUP PARAMETERS::RAMPS::AUTO RESET	Data	0	RW	FALSE / TRUE /	TRUE	1	0
62	SETUP PARAMETERS::RAMPS::EXTERNAL RESET	Data	0	RW	FALSE / TRUE /	FALSE	1	0
63	SETUP PARAMETERS::RAMPS::RESET VALUE	Data	2	RW	-100.00 % to 100.00 %	0.00%	1	0
64	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::MISCELLANEOUS::SYSTEM RESET	Data	0	RO	FALSE / TRUE /	FALSE	1	0
65	SETUP PARAMETERS::AUX I/O	Menu						
66	SETUP PARAMETERS::AUX I/O::AUX START	Data	0	RW	FALSE / TRUE /	TRUE	1	0
67	SETUP PARAMETERS::AUX I/O::AUX JOG	Data	0	RW	FALSE / TRUE /	TRUE	1	0
68	SETUP PARAMETERS::AUX I/O::AUX ENABLE	Data	0	RW	FALSE / TRUE /	TRUE	1	0
69	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::MISCELLANEOUS::BYPASS PASSWORD	Data	0	RW	FALSE / TRUE /	FALSE	1	0
70	SETUP PARAMETERS::AUX I/O::START	Data	0	RW	FALSE / TRUE /	FALSE	1	0
71	SETUP PARAMETERS::AUX I/O::JOG INPUT	Data	0	RW	FALSE / TRUE /	FALSE	1	0
72	SETUP PARAMETERS::AUX I/O::ENABLE	Data	0	RW	FALSE / TRUE /	FALSE	1	0
73		Data	2	RW	0.01 SECS to 60.00 SECS	0.10 SECS	1	0
74	SETUP PARAMETERS::JOG	Menu						
75	SETUP PARAMETERS::JOG::JOG SPEED 1	Data	2	RW	-100.00 % to 100.00 %	10.00%	1	0
76	SETUP PARAMETERS::JOG::JOG SPEED 2	Data	2	RW	-100.00 % to 100.00 %	-10.00%	1	0
77	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::MISCELLANEOUS::ENCODER COUNTER	Data	0	RO	-10000 to 10000	0	1	0
78	DIAGNOSTICS::CURRENT FEEDBACK	Diagnostic						
79	JOG RAMP INPUT	Data	2	RW	-100.00 % to 100.00 %	0.00%	1	0
80	SETUP PARAMETERS::JOG::MODE	Data	0	RW	FALSE / TRUE /	FALSE	1	0
81	SETUP PARAMETERS::RAISE/LOWER	Menu						
82	SETUP PARAMETERS::RAISE/LOWER::RESET VALUE	Data	2	RW	-100.00 % to 100.00 %	0.00%	1	0
83	SETUP PARAMETERS::RAISE/LOWER::RAMP RATE	Data	1	RW	0.1 SECS to 600.0 SECS	60.0 SECS	1	0
84		Data	0	RW	FALSE / TRUE /	TRUE	0	0
85	SETUP PARAMETERS::RAISE/LOWER::RAISE INPUT	Data	0	RW	FALSE / TRUE /	FALSE	1	0
86	SETUP PARAMETERS::RAISE/LOWER::LOWER INPUT	Data	0	RW	FALSE / TRUE /	FALSE	1	0
87	SETUP PARAMETERS::RAISE/LOWER::MIN VALUE	Data	2	RW	-300.00 % to 300.00 %	-100.00%	1	0
88	SETUP PARAMETERS::RAISE/LOWER::MAX VALUE	Data	2	RW	-300.00 % to 300.00 %	100.00%	1	0
89	SETUP PARAMETERS::RAISE/LOWER::EXTERNAL RESET	Data	0	RW	FALSE / TRUE /	FALSE	1	0
90	CONFIGURE DRIVE	Menu						
91	SETUP PARAMETERS::PRESET	Menu						
92	SETUP PARAMETERS::PRESET::SELECT 1	Data	2	RW	FALSE / TRUE /	FALSE	1	0
93	SETUP PARAMETERS::PRESET::SELECT 2	Data	2	RW	FALSE / TRUE /	FALSE	1	0
94	SETUP PARAMETERS::PRESET::SELECT 3	Data	2	RW	FALSE / TRUE /	FALSE	1	0
95	SETUP PARAMETERS::PRESET::INPUT 1	Data	2	RW	-300.00 % to 300.00 %	0.00%	1	0
96	SETUP PARAMETERS::PRESET::INPUT 2	Data	2	RW	-300.00 % to 300.00 %	25.00%	1	0
97	SETUP PARAMETERS::PRESET::INPUT 3	Data	2	RW	-300.00 % to 300.00 %	50.00%	1	0
98	SETUP PARAMETERS::PRESET::INPUT 4	Data	2	RW	-300.00 % to 300.00 %	100.00%	1	0
99	SETUP PARAMETERS::PRESET::INPUT 5	Data	2	RW	-300.00 % to 300.00 %	0.00%	1	0

Tag	Name	Type	DP	RW	Range	Default	Cfg	Inhib
100	SETUP PARAMETERS::PRESET::INPUT 6	Data	2	RW	-300.00 % to 300.00 %	-25.00%	1	0
101	SETUP PARAMETERS::PRESET::INPUT 7	Data	2	RW	-300.00 % to 300.00 %	-50.00%	1	0
102	SETUP PARAMETERS::PRESET::INPUT 8	Data	2	RW	-300.00 % to 300.00 %	-100.00%	1	0
103	SYSTEM::CONFIGURE I/O::BLOCK DIAGRAM::S-RAMP DEST	Data	0	RW	0 to 700	0	1	1
104	SETUP PARAMETERS::S-RAMP::RESET	Data	2	RW	FALSE / TRUE /	FALSE	1	0
105	SETUP PARAMETERS::S-RAMP::RESET VALUE	Data	2	RW	-300.00 % to 300.00 %	0.00%	1	0
106	SETUP PARAMETERS::S-RAMP::ACCELERATION	Data	2	RW	0.00 to 100.00	10	1	0
107	SETUP PARAMETERS::S-RAMP::JERK	Data	2	RW	0.00 to 100.00	10	1	0
108	SETUP PARAMETERS::S-RAMP::QUENCH	Data	0	RW	FALSE / TRUE /	FALSE	1	0
109	SETUP PARAMETERS::PRESET::SIGN	Data	0	RW	NEG / POS /	NEG	1	0
110	DIAGNOSTICS::PRESET O/P	Diagnostic						
111	SYSTEM::CONFIGURE I/O::BLOCK DIAGRAM::PRESET DEST	Data	0	RW	0 to 700	373	1	1
112	SETUP PARAMETERS::STOP RATES::CONTACTOR DELAY	Data	1	RW	0.0 SECS to 1000.0 SECS	0.5 SECS	1	0
113	SETUP PARAMETERS::JOG::JOG ACCEL RATE	Data	1	RW	0.0 SECS to 100.0 SECS	10.0 SECS	1	0
114	SETUP PARAMETERS::JOG::JOG DECEL RATE	Data	1	RW	0.0 SECS to 100.0 SECS	10.0 SECS	1	0
115	SETUP PARAMETERS::INVERSE TIME	Menu						
116	SETUP PARAMETERS::INVERSE TIME::AIMING POINT	Data	2	RW	0.00 % to 150.00 %	105.00%	1	0
117	SETUP PARAMETERS::INVERSE TIME::DELAY	Data	1	RW	0.0 SECS to 1000.0 SECS	60.0 SECS	1	0
118	SETUP PARAMETERS::INVERSE TIME::DOWN RATE	Data	1	RW	0.0 SECS to 600.0 SECS	10.0 SECS	1	0
119	SETUP PARAMETERS::STOP RATES	Menu						
120	SETUP PARAMETERS::STOP RATES::RUN STOP TIME	Data	1	RW	0.0 SECS to 1000.0 SECS	10.0 SECS	1	0
121	SETUP PARAMETERS::STOP RATES::RUN STOP LIMIT	Data	1	RW	0.0 SECS to 1000.0 SECS	60.0 SECS	1	0
122	SETUP PARAMETERS::STOP RATES::PRE-START DELAY	Data	3	RW	0.000 SECS to 30.000 SECS	0.500 SECS	1	0
123	SETUP PARAMETERS::STOP RATES::FAST STOP TIME	Data	1	RW	0.0 SECS to 1000.0 SECS	1.0 SECS	1	0
124	SETUP PARAMETERS::STOP RATES::FAST STOP LIMIT	Data	1	RW	0.0 SECS to 1000.0 SECS	60.0 SECS	1	0
125	SETUP PARAMETERS::STOP RATES::USE SYSTEM RAMP	Data	0	RW	FALSE / TRUE /	TRUE	1	0
126	SETUP PARAMETERS::STOP RATES::STOP ZERO SPEED	Data	2	RW	0.00 % to 100.00 %	1.00%	1	0
127	SETUP PARAMETERS::CALIBRATION	Menu						
128	SETUP PARAMETERS::ALARMS::MOTOR TMP.TRIP	Data	2	RW	0.00 % to 200.00 %	75.00%	1	0
129	SETUP PARAMETERS::ALARMS::HEATSINK LEVEL	Data	2	RW	0.00 % to 200.00 %	17.00%	1	0
130	SETUP PARAMETERS::CALIBRATION::MAX SPEED RPM	Data	0	RW	0 RPM to 32000 RPM	1500 RPM	1	0
131	SETUP PARAMETERS::CALIBRATION::ENCODER LINES	Data	0	RW	0 to 8000	2048	0	1
132	SETUP PARAMETERS::SPEED LOOP::SPEED SETPOINTS::ZERO SPD HYST	Data	2	RW	0.00 % to 100.00 %	0.10%	1	0
133	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::MISCELLANEOUS::DRIVE RATING RMS	Data	1	RO	0.1 AMPS to 3000.0 AMPS	3000.0 AMPS	1	0
134	SETUP PARAMETERS::CALIBRATION::MOTOR RATING RMS	Data	1	RW	0.1 AMPS to 3000.0 AMPS	1.0 AMPS	1	1
135	SETUP PARAMETERS::CALIBRATION::NAMEPLATE RPM	Data	0	RW	0 RPM to 32000 RPM	1440 RPM	1	1
136	SETUP PARAMETERS::ALARMS::STALL TORQUE	Data	2	RW	0.00 % to 200.00 %	100.00%	1	0
137	SETUP PARAMETERS::ALARMS::STALL DELAY	Data	2	RW	0.00 to 300.00	100	1	0
138	SETUP PARAMETERS::ALARMS::STALL SPEED	Data	2	RW	0.00 % to 200.00 %	100.00%	1	0
139	SETUP PARAMETERS::ALARMS::OVER SPEED LEVEL	Data	2	RW	0.00 % to 200.00 %	120.00%	0	1
140	SETUP PARAMETERS::ALARMS	Menu						
141	SETUP PARAMETERS::ALARMS::MOTOR TEMP	Data	2	RO	-200.00 % to 200.00 %	0.00%	1	0
142	SETUP PARAMETERS::ALARMS::5703 RCV.INHIBIT	Data	0	RW	FALSE / TRUE /	FALSE	1	0
143	SETUP PARAMETERS::ALARMS::STALL INHIBIT	Data	0	RW	FALSE / TRUE /	FALSE	1	0
144	SETUP PARAMETERS::ALARMS::EXTERNAL TRIP	Data	0	RW	FALSE / TRUE /	FALSE	1	0
145	SETUP PARAMETERS::ALARMS::OVER SPD INHIBIT	Data	0	RW	FALSE / TRUE /	FALSE	1	0
146	SETUP PARAMETERS::ALARMS::MOTR.TMP.INHIBIT	Data	0	RW	FALSE / TRUE /	FALSE	1	0
147	SETUP PARAMETERS::TORQUE LOOP	Menu						
148	SETUP PARAMETERS::INVERSE TIME::UP RATE	Data	1	RW	0.0 SECS to 600.0 SECS	120.0 SECS	1	0
149	SETUP PARAMETERS::TORQUE LOOP::1 / GAIN	Data	0	RW	0 to 255	70	1	1

Tag	Name	Type	DP	RW	Range	Default	Cfg	Inhib
150	DIAGNOSTICS::CO-PRO PRESENT	Diagnostic						
151	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::MISCELLANEOUS::MID VOLTS	Data	0	RO	FALSE / TRUE /	TRUE	1	0
152	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::MISCELLANEOUS::CHASSIS TYPE	Data	0	RO	584 to 587	584	1	0
153	SETUP PARAMETERS::TORQUE LOOP::SYMETRIC TQ.LIM.	Data	0	RW	FALSE / TRUE /	TRUE	1	0
154	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::MISCELLANEOUS::SKIP CO-PRO INIT	Data	0	RW	FALSE / TRUE /	FALSE	0	0
155	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::MISCELLANEOUS::RESET EAT	Data	0	RW	FALSE / TRUE /	FALSE	0	1
156	SET DRIVE RATING	Data	0	RO	0.75 kW 380-460v / 1.1 kW 380-460v / 1.5 kW 380-460v / 2.2 kW 380-460v / 4.0 kW 380-460v / 5.5 kW 380-460v / 7.5 kW 380-460v / 11 kW 380-460v / 15 kW 380-460v / 18.5 kW 380-460v / 22 kW 380-460v / 30 kW 380-460v / 37 kW 380-460v / 45 kW 380-460v / 55 kW 3	0.75 kW 208-240v	0	1
157	SETUP PARAMETERS::TORQUE LOOP::POS TORQUE LIMIT	Data	2	RW	-150.00 % to 150.00 %	150.00%	1	0
158	SETUP PARAMETERS::TORQUE LOOP::NEG TORQUE LIMIT	Data	2	RW	-150.00 % to 150.00 %	-150.00%	1	0
159	SETUP PARAMETERS::TORQUE LOOP::MAIN TORQUE LIM.	Data	2	RW	0.00 % to 150.00 %	100.00%	1	0
160	SETUP PARAMETERS::SPEED LOOP	Menu						
161	SETUP PARAMETERS::SPEED LOOP::SPD. PROP. GAIN	Data	2	RW	0.00 to 250.00	10	1	0
162	SETUP PARAMETERS::SPEED LOOP::SPD. INT. TIME	Data	0	RW	1 mSECS to 30000 mSECS	100 mSECS	1	0
163	SETUP PARAMETERS::SPEED LOOP::INT. DEFEAT	Data	0	RW	FALSE / TRUE /	FALSE	1	0
164	SETUP PARAMETERS::SPEED LOOP::ENCODER SIGN	Data	0	RW	NEG / POS /	NEG	0	1
165	SETUP PARAMETERS::SPEED LOOP::SPEED FBK FILTER	Data	0	RW	FALSE / TRUE /	TRUE	0	1
166	SETUP PARAMETERS::ALARMS::ACK ALARM	Data	0	RW	FALSE / TRUE /	FALSE	0	0
167	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::MISCELLANEOUS::RESET VEC VARS	Data	0	RW	FALSE / TRUE /	TRUE	0	0
168	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::MISCELLANEOUS::DRIVE STATUS	Diagnostic						
169	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::MISCELLANEOUS::584S CHASSIS	Data	0	RW	FALSE / TRUE /	TRUE	0	1
170	SETUP PARAMETERS::SPEED LOOP::SPEED SETPOINTS	Menu						
171	SETUP PARAMETERS::SPEED LOOP::SPEED SETPOINTS::DIRECT SPT1	Data	2	RO	-110.00 % to 110.00 %	0.00%	0	0
172	SETUP PARAMETERS::SPEED LOOP::SPEED SETPOINTS::DIRECT RATIO	Data	4	RW	-1.0000 to 1.0000	0.1	1	0
173	SETUP PARAMETERS::SPEED LOOP::SPEED SETPOINTS::DIRECT SPT. MAX	Data	2	RW	0.00 % to 100.00 %	100.00%	1	0
174	SETUP PARAMETERS::SPEED LOOP::SPEED SETPOINTS::DIRECT SPT. MIN	Data	2	RW	-100.00 % to 0.00 %	-100.00%	1	0
175	SETUP PARAMETERS::SPEED LOOP::SPEED SETPOINTS::DIRECT ENABLE	Data	0	RW	FALSE / TRUE /	FALSE	1	0
176	SETUP PARAMETERS::SPEED LOOP::SPEED SETPOINTS::MAIN SPD.SPT.	Data	2	RW	-110.00 % to 110.00 %	0.00%	1	0
177	SETUP PARAMETERS::SPEED LOOP::SPEED SETPOINTS::MAX SPEED	Data	2	RW	0.00 % to 110.00 %	100.00%	1	0
178	SETUP PARAMETERS::SPEED LOOP::SPEED SETPOINTS::MIN SPEED	Data	2	RW	-110.00 % to 0.00 %	-100.00%	1	0
179	SYSTEM::CONFIGURE I/O::INTERNAL LINKS	Menu						
180	SYSTEM::CONFIGURE I/O::INTERNAL LINKS::LINK 1 SOURCE	Data	0	RW	0 to 700	0	1	1
181	SYSTEM::CONFIGURE I/O::INTERNAL LINKS::LINK 1 DEST	Data	0	RW	0 to 700	0	1	1
182	SYSTEM::CONFIGURE I/O::INTERNAL LINKS::LINK 2 SOURCE	Data	0	RW	0 to 700	0	1	1
183	SYSTEM::CONFIGURE I/O::INTERNAL LINKS::LINK 2 DEST	Data	0	RW	0 to 700	0	1	1
184	SYSTEM::CONFIGURE I/O::INTERNAL LINKS::LINK 3 SOURCE	Data	0	RW	0 to 700	0	1	1
185	SYSTEM::CONFIGURE I/O::INTERNAL LINKS::LINK 3 DEST	Data	0	RW	0 to 700	0	1	1
186	SYSTEM::CONFIGURE I/O::INTERNAL LINKS::LINK 4 SOURCE	Data	0	RW	0 to 700	0	1	1
187	SYSTEM::CONFIGURE I/O::INTERNAL LINKS::LINK 4 DEST	Data	0	RW	0 to 700	0	1	1
188	SETUP PARAMETERS::SETPOINT SUM 1	Menu						
189	SETUP PARAMETERS::SETPOINT SUM 1::RATIO 0	Data	4	RW	-3.0000 to 3.0000	1	1	0
190	SETUP PARAMETERS::SETPOINT SUM 1::RATIO 1	Data	4	RW	-3.0000 to 3.0000	1	1	0
191	SETUP PARAMETERS::SETPOINT SUM 1::SIGN 0	Data	0	RW	NEG / POS /	POS	1	0
192	SETUP PARAMETERS::SETPOINT SUM 1::SIGN 1	Data	0	RW	NEG / POS /	POS	1	0
193	SETUP PARAMETERS::SETPOINT SUM 1::DIVIDER 0	Data	4	RW	-3.0000 to 3.0000	1	1	0
194	SETUP PARAMETERS::SETPOINT SUM 1::DIVIDER 1	Data	4	RW	-3.0000 to 3.0000	1	1	0
195	SETUP PARAMETERS::SETPOINT SUM 1::LIMIT	Data	2	RW	-300.00 % to 300.00 %	100.00%	1	0
196	SETUP PARAMETERS::SETPOINT SUM 1::INPUT 0	Data	2	RW	-100.00 % to 100.00 %	0.00%	1	0
197	SETUP PARAMETERS::SETPOINT SUM 1::INPUT 1	Data	2	RW	-100.00 % to 100.00 %	0.00%	1	0

198	SETUP PARAMETERS::SETPOINT SUM 1::INPUT 2	Data	2	RW	-100.00 % to 100.00 %	0.00%	1	0
199	PASSWORD	Menu						

Tag	Name	Type	DP	RW	Range	Default	Cfg	Inhib
200	PASSWORD::ENTER PASSWORD	Data	0	RW	0x0000 to 0xFFFF	0x0000	1	0
201	PASSWORD::CHANGE PASSWORD	Data	0	RW	0x0000 to 0xFFFF	0x0000	1	0
202	ALARM STATUS	Menu						
203	ALARM STATUS::HEALTH STORE	Data	0	RO	0x0000 to 0xFFFF	0x0000	0	0
204	MENUS	Menu						
205	MENUS::FULL MENUS	Data	0	RW	FALSE / TRUE /	FALSE	0	0
206	MENUS::MENU DELAY	Data	0	RW	0 to 10000	0	0	0
207	MENUS::DATA DELAY	Data	0	RW	20 to 10000	50	0	0
208	PARAMETER SAVE	Data	2	RW	UP TO ACTION / WORKING /	UP TO ACTION	1	0
209	PARAMETER SAVE::SAVE (U/D)	Menu						
210	SERIAL LINKS	Menu						
211	SERIAL LINKS::P3 TAG LIST	Menu						
212	SERIAL LINKS::P3 TAG LIST::TAG 1	Data	0	RW	0 to 700	7	1	0
213	SERIAL LINKS::P3 TAG LIST::TAG 2	Data	0	RW	0 to 700	0	1	0
214	SERIAL LINKS::P3 TAG LIST::TAG 3	Data	0	RW	0 to 700	0	1	0
215	SERIAL LINKS::P3 TAG LIST::TAG 4	Data	0	RW	0 to 700	0	1	0
216	SERIAL LINKS::P3 TAG LIST::TAG 5	Data	0	RW	0 to 700	0	1	0
217	ALARM STATUS::HEALTH WORD	Data	0	RO	0x0000 to 0xFFFF	0x0000	0	0
218	ALARM STATUS::FIRST ALARM	Data	0	RW	0x0000 to 0xFFFF	0x0000	0	0
219	ALARM STATUS::HEALTH INHIBIT	Data	0	RW	0x0000 to 0xFFFF	0x0000	0	0
220	MENUS::CONTRAST	Data	0	RW	0 to 255	128	0	0
221	SERIAL LINKS::MEMORY DUMP	Data	0	RW	FALSE / TRUE /	FALSE	1	0
222	SRL LINK ENABLE	Data	2	RW	-100.00 % to 100.00 %	0.00%	1	0
223	GROUP ID (GID)	Data	2	RW	-100.00 % to 100.00 %	0.00%	1	0
224	UNIT ID (UID)	Data	2	RW	-100.00 % to 100.00 %	0.00%	1	0
225	ASCII / BINARY	Data	2	RW	-100.00 % to 100.00 %	0.00%	1	0
226	BAUD RATE	Data	2	RW	555.36 % to 100.00 %	0.00%	1	0
227	ESP SUP. (ASCII)	Data	2	RW	-100.00 % to 100.00 %	0.00%	1	0
228	CHANGEBAND (BIN)	Data	2	RW	-100.00 % to 100.00 %	0.00%	1	0
229	ERROR REPORT	Data	2	RW	-100.00 % to 100.00 %	0.00%	1	0
230	PND. 7	Data	2	RW	-100.00 % to 100.00 %	0.00%	1	0
231	SYSTEM PORT (P3)	Menu						
232	SERIAL LINKS::5703 SUPPORT	Menu						
233	SERIAL LINKS::5703 SUPPORT::SETPT. RATIO	Data	4	RW	-3.0000 to 3.0000	1	1	0
234	SERIAL LINKS::5703 SUPPORT::SETPT. SIGN	Data	2	RW	NEG / POS /	NEG	1	0
235	SERIAL LINKS::5703 SUPPORT::SCALED INPUT	Data	2	RW	-300.00 % to 300.00 %	0.00%	1	0
236	SERIAL LINKS::5703 SUPPORT::OUTPUT	Data	2	RW	-300.00 % to 300.00 %	0.00%	1	0
237	SERIAL LINKS::P3 MODE	Data	0	RW	OPTION BOARD / 5703 MASTER / 5703 SLAVE / TAG LIST VT100 / TAG LIST NEWPORT / REMOTE MMI /	OPTION BOARD	0	0
238	SERIAL LINKS::DUMP MMI (TX)	Data	0	RW	UP TO ACTION / WORKING /	UP TO ACTION	1	0
239	SERIAL LINKS::UDP XFER (RX)	Data	2	RW	UP TO ACTION / WORKING /	UP TO ACTION	1	0
240	SERIAL LINKS::UDP XFER (TX)	Data	2	RW	UP TO ACTION / WORKING /	UP TO ACTION	1	0
241	SERIAL LINKS::P3 BAUD RATE	Data	0	RW	300 to 19200	9600	0	0
242	SYSTEM	Menu						
243	SYSTEM::SOFTWARE	Menu						
244	SYSTEM::CONFIGURE I/O	Menu						
245	SYSTEM::CONFIGURE I/O::CONFIGURE ENABLE	Data	0	RW	FALSE / TRUE /	FALSE	1	1
246	SYSTEM::CONFIGURE I/O::ANALOG INPUTS	Menu						
247	SYSTEM::CONFIGURE I/O::ANALOG INPUTS::ANIN 1 (C3)	Menu						
248	SYSTEM::CONFIGURE I/O::ANALOG INPUTS::ANIN 1 (C3)::CALIBRATION	Data	2	RW	-300.00 % to 300.00 %	100.00%	1	0
249	SYSTEM::CONFIGURE I/O::ANALOG INPUTS::ANIN 1 (C3)::MAX VALUE	Data	2	RW	-300.00 % to 300.00 %	100.00%	1	0

Tag	Name	Type	DP	RW	Range	Default	Cfg	Inhib
250	SYSTEM::CONFIGURE I/O::ANALOG INPUTS::ANIN 1 (C3)::MIN VALUE	Data	2	RW	-300.00 % to 300.00 %	-100.00%	1	0
251	SYSTEM::CONFIGURE I/O::ANALOG INPUTS::ANIN 1 (C3)::DESTINATION TAG	Data	0	RW	0 to 700	196	1	1
252	SETUP PARAMETERS::SPEED LOOP::SPEED SETPOINTS::ZERO SPEED LEVEL	Data	2	RW	0.00 % to 100.00 %	0.50%	1	0
253	SETUP PARAMETERS::S-RAMP::ACCEL O/P	Data	2	RO	0.00 to 150.00	10	1	0
254	SETUP PARAMETERS::S-RAMP::OVERSHOOT THRESH	Data	2	RW	0.00 % to 100.00 %	5.00%	1	0
255	SYSTEM::CONFIGURE I/O::ANALOG INPUTS::ANIN 3 (F2)	Menu						
256	SYSTEM::CONFIGURE I/O::ANALOG INPUTS::ANIN 3 (F2)::CALIBRATION	Data	2	RW	-300.00 % to 300.00 %	100.00%	1	0
257	SYSTEM::CONFIGURE I/O::ANALOG INPUTS::ANIN 3 (F2)::MAX VALUE	Data	2	RW	-300.00 % to 300.00 %	100.00%	1	0
258	SYSTEM::CONFIGURE I/O::ANALOG INPUTS::ANIN 3 (F2)::MIN VALUE	Data	2	RW	-300.00 % to 300.00 %	-100.00%	1	0
259	SYSTEM::CONFIGURE I/O::ANALOG INPUTS::ANIN 3 (F2)::DESTINATION TAG	Data	0	RW	0 to 700	197	1	1
260	SYSTEM::CONFIGURE I/O::ANALOG INPUTS::ANIN 4 (F3)	Menu						
261	SYSTEM::CONFIGURE I/O::ANALOG INPUTS::ANIN 4 (F3)::CALIBRATION	Data	2	RW	-300.00 % to 300.00 %	100.00%	1	0
262	SYSTEM::CONFIGURE I/O::ANALOG INPUTS::ANIN 4 (F3)::MAX VALUE	Data	2	RW	-300.00 % to 300.00 %	100.00%	1	0
263	SYSTEM::CONFIGURE I/O::ANALOG INPUTS::ANIN 4 (F3)::MIN VALUE	Data	2	RW	-300.00 % to 300.00 %	-100.00%	1	0
264	SYSTEM::CONFIGURE I/O::ANALOG INPUTS::ANIN 4 (F3)::DESTINATION TAG	Data	0	RW	0 to 700	0	1	1
265	SYSTEM::CONFIGURE I/O::ANALOG INPUTS::ANIN 5 (F4)	Menu						
266	SYSTEM::CONFIGURE I/O::ANALOG INPUTS::ANIN 5 (F4)::CALIBRATION	Data	2	RW	-300.00 % to 300.00 %	100.00%	1	0
267	SYSTEM::CONFIGURE I/O::ANALOG INPUTS::ANIN 5 (F4)::MAX VALUE	Data	2	RW	-300.00 % to 300.00 %	100.00%	1	0
268	SYSTEM::CONFIGURE I/O::ANALOG INPUTS::ANIN 5 (F4)::MIN VALUE	Data	2	RW	-300.00 % to 300.00 %	-100.00%	1	0
269	SYSTEM::CONFIGURE I/O::ANALOG INPUTS::ANIN 5 (F4)::DESTINATION TAG	Data	0	RW	0 to 700	0	1	1
270	SYSTEM::CONFIGURE I/O::ANALOG OUTPUTS	Menu						
271	SYSTEM::CONFIGURE I/O::ANALOG OUTPUTS::ANOUT 1 (C5)	Menu						
272	SYSTEM::CONFIGURE I/O::ANALOG OUTPUTS::ANOUT 1 (C5)::% TO GET 10V	Data	2	RW	-300.00 % to 300.00 %	100.00%	1	0
273	SYSTEM::CONFIGURE I/O::ANALOG OUTPUTS::ANOUT 1 (C5)::SOURCE TAG	Data	0	RW	0 to 10000	7	1	0
274	SYSTEM::CONFIGURE I/O::ANALOG OUTPUTS::ANOUT 2 (F5)	Menu						
275	SYSTEM::CONFIGURE I/O::ANALOG OUTPUTS::ANOUT 2 (F5)::% TO GET 10V	Data	2	RW	-300.00 % to 300.00 %	150.00%	1	0
276	SYSTEM::CONFIGURE I/O::ANALOG OUTPUTS::ANOUT 2 (F5)::SOURCE TAG	Data	0	RW	0 to 10000	9	1	0
277	SYSTEM::CONFIGURE I/O::DIGITAL INPUTS	Menu						
278	SYSTEM::CONFIGURE I/O::DIGITAL INPUTS::DIGIN 1 (E2)	Menu						
279	SYSTEM::CONFIGURE I/O::DIGITAL INPUTS::DIGIN 1 (E2)::VALUE FOR TRUE	Data	2	RW	-300.00 % to 300.00 %	0.01%	1	0
280	SYSTEM::CONFIGURE I/O::DIGITAL INPUTS::DIGIN 1 (E2)::VALUE FOR FALSE	Data	2	RW	-300.00 % to 300.00 %	0.00%	1	0
281	SYSTEM::CONFIGURE I/O::DIGITAL INPUTS::DIGIN 1 (E2)::DESTINATION TAG	Data	0	RW	0 to 700	57	1	1
282	SYSTEM::CONFIGURE I/O::DIGITAL INPUTS::DIGIN 2 (E3)	Menu						
283	SYSTEM::CONFIGURE I/O::DIGITAL INPUTS::DIGIN 2 (E3)::VALUE FOR TRUE	Data	2	RW	-300.00 % to 300.00 %	0.01%	1	0
284	SYSTEM::CONFIGURE I/O::DIGITAL INPUTS::DIGIN 2 (E3)::VALUE FOR FALSE	Data	2	RW	-300.00 % to 300.00 %	0.00%	1	0
285	SYSTEM::CONFIGURE I/O::DIGITAL INPUTS::DIGIN 2 (E3)::DESTINATION TAG	Data	0	RW	0 to 700	92	1	1
286	SYSTEM::CONFIGURE I/O::DIGITAL INPUTS::DIGIN 3 (E4)	Menu						
287	SYSTEM::CONFIGURE I/O::DIGITAL INPUTS::DIGIN 3 (E4)::VALUE FOR TRUE	Data	2	RW	-300.00 % to 300.00 %	0.01%	1	0
288	SYSTEM::CONFIGURE I/O::DIGITAL INPUTS::DIGIN 3 (E4)::VALUE FOR FALSE	Data	2	RW	-300.00 % to 300.00 %	0.00%	1	0
289	SYSTEM::CONFIGURE I/O::DIGITAL INPUTS::DIGIN 3 (E4)::DESTINATION TAG	Data	0	RW	0 to 700	93	1	1
290	SYSTEM::CONFIGURE I/O::DIGITAL OUTPUTS	Menu						
291	SYSTEM::CONFIGURE I/O::DIGITAL OUTPUTS::DIGOUT 1	Menu						
292	SYSTEM::CONFIGURE I/O::DIGITAL OUTPUTS::DIGOUT 1::THRESHOLD (>)	Data	2	RW	-300.00 % to 300.00 %	0.00%	1	0
293	SYSTEM::CONFIGURE I/O::DIGITAL OUTPUTS::DIGOUT 1::MODULUS	Data	2	RW	FALSE / TRUE /	FALSE	1	0
294	SYSTEM::CONFIGURE I/O::DIGITAL OUTPUTS::DIGOUT 1::SOURCE TAG	Data	0	RW	0 to 700	17	1	0
295	SYSTEM::CONFIGURE I/O::DIGITAL OUTPUTS::DIGOUT 2	Menu						
296	SYSTEM::CONFIGURE I/O::DIGITAL OUTPUTS::DIGOUT 2::THRESHOLD (>)	Data	2	RW	-300.00 % to 300.00 %	0.00%	1	0
297	SYSTEM::CONFIGURE I/O::DIGITAL OUTPUTS::DIGOUT 2::MODULUS	Data	2	RW	FALSE / TRUE /	FALSE	1	0
298	SYSTEM::CONFIGURE I/O::DIGITAL OUTPUTS::DIGOUT 2::SOURCE TAG	Data	0	RW	0 to 700	12	1	0
299	SYSTEM::CONFIGURE I/O::DIGITAL OUTPUTS::DIGOUT 3	Menu						

Tag	Name	Type	DP	RW	Range	Default	Cfg	Inhib
300	SYSTEM::CONFIGURE I/O::DIGITAL OUTPUTS::DIGOUT 3::THRESHOLD (>)	Data	2	RW	-300.00 % to 300.00 %	0.00%	1	0
301	SYSTEM::CONFIGURE I/O::DIGITAL OUTPUTS::DIGOUT 3::MODULUS	Data	2	RW	FALSE / TRUE /	TRUE	1	0
302	SYSTEM::CONFIGURE I/O::DIGITAL OUTPUTS::DIGOUT 3::SOURCE TAG	Data	0	RW	0 to 700	559	1	0
303	SYSTEM::CONFIGURE I/O::CONFIGURE 5703	Menu						
304	SYSTEM::CONFIGURE I/O::CONFIGURE 5703::SOURCE TAG	Data	0	RW	0 to 700	176	1	0
305	SYSTEM::CONFIGURE I/O::CONFIGURE 5703::DESTINATION TAG	Data	0	RW	0 to 700	371	1	0
306	SYSTEM::CONFIGURE I/O::BLOCK DIAGRAM	Menu						
307	SYSTEM::CONFIGURE I/O::BLOCK DIAGRAM::RAISE/LOWER DEST	Data	0	RW	0 to 700	0	1	1
308	SYSTEM::CONFIGURE I/O::BLOCK DIAGRAM::RAMP O/P DEST	Data	0	RW	0 to 700	372	1	1
309	SETUP PARAMETERS::ALARMS::MOTOR TMP.RST.	Data	2	RW	0.00 % to 200.00 %	50.00%	1	0
310	SYSTEM::RESERVED	Menu						
311	SYSTEM::RESERVED::SSD USE ONLY	Menu						
312	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!	Menu						
313	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::MISCELLANEOUS::MIN MMI CYCLE TM	Data	0	RW	0 to 30000	200	1	0
314	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::MISCELLANEOUS::MAX MMI CYCLE TM	Data	0	RW	0 to 30000	4000	1	0
315	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::MISCELLANEOUS::CYCLE TIME	Data	0	RO	0 to 10000	0	1	0
316	SETUP PARAMETERS::S-RAMP::AT SPEED	Data	0	RO	FALSE / TRUE /	FALSE	1	0
317	SETUP PARAMETERS::S-RAMP	Menu						
318	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::MISCELLANEOUS::P3 TAG LIST TC	Data	3	RW	0.000 SECS to 30.000 SECS	0.010 SECS	1	0
319	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::MISCELLANEOUS::SPD.FBK. TC	Data	3	RW	0.000 SECS to 30.000 SECS	0.010 SECS	1	0
320	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::MISCELLANEOUS::TORQUE.FBK.TC	Data	3	RW	0.000 SECS to 30.000 SECS	0.010 SECS	1	0
321	SYSTEM::CONFIGURE I/O::DIGITAL OUTPUTS::DIGOUT 1::OFFSET	Data	2	RW	-300.00 % to 300.00 %	0.00%	1	0
322	SYSTEM::CONFIGURE I/O::DIGITAL OUTPUTS::DIGOUT 2::OFFSET	Data	2	RW	-300.00 % to 300.00 %	0.00%	1	0
323	SYSTEM::CONFIGURE I/O::DIGITAL OUTPUTS::DIGOUT 3::OFFSET	Data	2	RW	-300.00 % to 300.00 %	0.00%	1	0
324	SYSTEM::CONFIGURE I/O::DIGITAL OUTPUTS::DIGOUT 1::INPUT	Data	2	RW	-300.00 % to 300.00 %	0.00%	1	0
325	SYSTEM::CONFIGURE I/O::DIGITAL OUTPUTS::DIGOUT 2::INPUT	Data	2	RW	-300.00 % to 300.00 %	0.00%	1	0
326	SYSTEM::CONFIGURE I/O::DIGITAL OUTPUTS::DIGOUT 3::INPUT	Data	2	RW	-300.00 % to 300.00 %	0.00%	1	0
327	SYSTEM::CONFIGURE I/O::DIGITAL OUTPUTS::DIGOUT 1::INVERT	Data	1	RW	FALSE / TRUE /	FALSE	1	0
328	SYSTEM::CONFIGURE I/O::DIGITAL OUTPUTS::DIGOUT 2::INVERT	Data	1	RW	FALSE / TRUE /	FALSE	1	0
329	SYSTEM::CONFIGURE I/O::DIGITAL OUTPUTS::DIGOUT 3::INVERT	Data	1	RW	FALSE / TRUE /	FALSE	1	0
330	SYSTEM::CONFIGURE I/O::ANALOG OUTPUTS::ANOUT 1 (C5)::CALIBRATION	Data	2	RW	-200.00 % to 200.00 %	100.00%	1	0
331	SYSTEM::CONFIGURE I/O::ANALOG OUTPUTS::ANOUT 2 (F5)::CALIBRATION	Data	2	RW	-200.00 % to 200.00 %	100.00%	1	0
332	SYSTEM::CONFIGURE I/O::ANALOG OUTPUTS::ANOUT 1 (C5)::OFFSET	Data	2	RW	-300.00 % to 300.00 %	0.00%	1	0
333	SYSTEM::CONFIGURE I/O::ANALOG OUTPUTS::ANOUT 2 (F5)::OFFSET	Data	2	RW	-300.00 % to 300.00 %	0.00%	1	0
334	SERIAL LINKS::P3 TAG LIST::FULL TAG LIST	Data	0	RW	FALSE / TRUE /	FALSE	1	0
335	SYSTEM::CONFIGURE I/O::ANALOG OUTPUTS::ANOUT 1 (C5)::MODULUS	Data	2	RW	FALSE / TRUE /	FALSE	1	0
336	SYSTEM::CONFIGURE I/O::ANALOG OUTPUTS::ANOUT 2 (F5)::MODULUS	Data	2	RW	FALSE / TRUE /	FALSE	1	0
337	SETUP PARAMETERS::REF ENCODER::PHASE::POS CALC ENABLE	Data	0	RW	FALSE / TRUE /	FALSE	1	0
338	SETUP PARAMETERS::REF ENCODER::PHASE::POSITION ERROR	Data	0	RW	-30000 to 30000	0	1	0
339	SETUP PARAMETERS::REF ENCODER	Menu						
340		Data	0	RW	FALSE / TRUE /	FALSE	1	0
341	SYSTEM::CONFIGURE I/O::BLOCK DIAGRAM::POSITION DEST	Data	0	RW	0 to 700	0	1	1
342	SETUP PARAMETERS::REF ENCODER::PHASE::MAX POSITION ERR	Data	2	RW	-300.00 to 300.00	100	1	0
343	SETUP PARAMETERS::REF ENCODER::PHASE::REF SCALE A	Data	0	RW	-30000 to 30000	100	1	0
344	SETUP PARAMETERS::REF ENCODER::PHASE::REF SCALE B	Data	0	RW	-30000 to 30000	100	1	0
345	SYSTEM::CONFIGURE I/O::BLOCK DIAGRAM::SPT SUM1 OP DEST	Data	0	RW	0 to 700	58	1	1
346	SYSTEM::CONFIGURE I/O::BLOCK DIAGRAM::SPT SUM2 OP DEST	Data	0	RW	0 to 700	176	1	1
347	SYSTEM::CONFIGURE I/O::BLOCK DIAGRAM::SPT SUM3 OP DEST	Data	0	RW	0 to 700	0	1	1
348	SYSTEM::PEEK	Menu						
349	SYSTEM::PEEK::PEEK DATA	Data	0	RW	[0x0020] = 0000 to [0xFFFF] = 0000	[0xC000] = 0000	1	0

Tag	Name	Type	DP	RW	Range	Default	Cfg	Inhib
350	SYSTEM::PEEK::PEEK SCALE	Data	2	RW	-300.00 % to 300.00 %	100.00%	1	0
351	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::MISCELLANEOUS::SYS TIME	Diagnostic						
352	SETUP PARAMETERS::STOP RATES::READY DELAY	Data	3	RW	0.000 SECS to 30.000 SECS	0.000 SECS	1	0
353	SETUP PARAMETERS::REF ENCODER::SPEED::MAX SPEED RPM	Data	0	RW	0 RPM to 6000 RPM	1500 RPM	1	0
354	SYSTEM::CONFIGURE I/O::ANALOG OUTPUTS::ANOUT 1 (C5)::ANOUT 1	Data	2	RW	-300.00 % to 300.00 %	0.00%	1	0
355	SYSTEM::CONFIGURE I/O::ANALOG OUTPUTS::ANOUT 2 (F5)::ANOUT 2	Data	2	RW	-300.00 % to 300.00 %	0.00%	1	0
356	SETUP PARAMETERS::REF ENCODER::SPEED::ENCODER LINES	Data	0	RW	0 to 8000	2048	1	0
357	SETUP PARAMETERS::REF ENCODER::SPEED::REFSPEED	Data	2	RW	-200.00 % to 200.00 %	0.00%	1	0
358	SYSTEM::CONFIGURE I/O::ANALOG INPUTS::ANIN 1 (C3)::OFFSET	Data	2	RW	-100.00 % to 100.00 %	0.00%	1	0
359	SETUP PARAMETERS::REF ENCODER::PHASE::REF ENCODER I/P	Data	0	RW	-30000 to 30000	0	1	0
360	SYSTEM::CONFIGURE I/O::ANALOG INPUTS::ANIN 3 (F2)::OFFSET	Data	2	RW	-100.00 % to 100.00 %	0.00%	1	0
361	SYSTEM::CONFIGURE I/O::ANALOG INPUTS::ANIN 4 (F3)::OFFSET	Data	2	RW	-100.00 % to 100.00 %	0.00%	1	0
362	SYSTEM::CONFIGURE I/O::ANALOG INPUTS::ANIN 5 (F4)::OFFSET	Data	2	RW	-100.00 % to 100.00 %	0.00%	1	0
363	SETUP PARAMETERS::SETPOINT SUM 2	Menu						
364	SETUP PARAMETERS::SETPOINT SUM 2::RATIO 0	Data	4	RW	-3.0000 to 3.0000	1	1	0
365	SETUP PARAMETERS::SETPOINT SUM 2::RATIO 1	Data	4	RW	-3.0000 to 3.0000	1	1	0
366	SETUP PARAMETERS::SETPOINT SUM 2::SIGN 0	Data	0	RW	NEG / POS /	POS	1	0
367	SETUP PARAMETERS::SETPOINT SUM 2::SIGN 1	Data	0	RW	NEG / POS /	POS	1	0
368	SETUP PARAMETERS::SETPOINT SUM 2::DIVIDER 0	Data	4	RW	-3.0000 to 3.0000	1	1	0
369	SETUP PARAMETERS::SETPOINT SUM 2::DIVIDER 1	Data	4	RW	-3.0000 to 3.0000	1	1	0
370	SETUP PARAMETERS::SETPOINT SUM 2::LIMIT	Data	2	RW	-300.00 % to 300.00 %	100.00%	1	0
371	SETUP PARAMETERS::SETPOINT SUM 2::INPUT 0	Data	2	RW	-100.00 % to 100.00 %	0.00%	1	0
372	SETUP PARAMETERS::SETPOINT SUM 2::INPUT 1	Data	2	RW	-100.00 % to 100.00 %	0.00%	1	0
373	SETUP PARAMETERS::SETPOINT SUM 2::INPUT 2	Data	2	RW	-100.00 % to 100.00 %	0.00%	1	0
374	SETUP PARAMETERS::SETPOINT SUM 3	Menu						
375	SETUP PARAMETERS::SETPOINT SUM 3::RATIO 0	Data	4	RW	-3.0000 to 3.0000	1	1	0
376	SETUP PARAMETERS::SETPOINT SUM 3::RATIO 1	Data	4	RW	-3.0000 to 3.0000	1	1	0
377	SETUP PARAMETERS::SETPOINT SUM 3::SIGN 0	Data	0	RW	NEG / POS /	POS	1	0
378	SETUP PARAMETERS::SETPOINT SUM 3::SIGN 1	Data	0	RW	NEG / POS /	POS	1	0
379	SETUP PARAMETERS::SETPOINT SUM 3::DIVIDER 0	Data	4	RW	-3.0000 to 3.0000	1	1	0
380	SETUP PARAMETERS::SETPOINT SUM 3::DIVIDER 1	Data	4	RW	-3.0000 to 3.0000	1	1	0
381	SETUP PARAMETERS::SETPOINT SUM 3::LIMIT	Data	2	RW	-300.00 % to 300.00 %	100.00%	1	0
382	SETUP PARAMETERS::SETPOINT SUM 3::INPUT 0	Data	2	RW	-100.00 % to 100.00 %	0.00%	1	0
383	SETUP PARAMETERS::SETPOINT SUM 3::INPUT 1	Data	2	RW	-100.00 % to 100.00 %	0.00%	1	0
384	SETUP PARAMETERS::SETPOINT SUM 3::INPUT 2	Data	2	RW	-100.00 % to 100.00 %	0.00%	1	0
385	DIAGNOSTICS::SPT SUM O/P 2	Diagnostic						
386	DIAGNOSTICS::SPT SUM O/P 3	Diagnostic						
387	SETUP PARAMETERS::HOME	Menu						
388	SETUP PARAMETERS::HOME::LINEAR O/P	Data	0	RW	FALSE / TRUE /	FALSE	1	0
389	SYSTEM::CONFIGURE I/O::BLOCK DIAGRAM::HOME DEST	Data	0	RW	0 to 700	0	1	1
390	SYSTEM::CONFIGURE I/O::ANALOG INPUTS::ANIN 1 (C3)::SCALED INPUT	Diagnostic						
391	SYSTEM::CONFIGURE I/O::ANALOG INPUTS::ANIN 3 (F2)::SCALED INPUT	Diagnostic						
392	SYSTEM::CONFIGURE I/O::ANALOG INPUTS::ANIN 4 (F3)::SCALED INPUT	Diagnostic						
393	SYSTEM::CONFIGURE I/O::ANALOG INPUTS::ANIN 5 (F4)::SCALED INPUT	Diagnostic						
394	SETUP PARAMETERS::HOME::HOME INPUT	Data	2	RW	-100.00 % to 100.00 %	0.00%	1	0
395	SETUP PARAMETERS::HOME::HOME OUTPUT	Data	2	RO	-100.00 % to 100.00 %	0.00%	0	0
396	SETUP PARAMETERS::HOME::HOMING DISTANCE	Data	0	RW	0 to 30000	2048	1	0
397	SETUP PARAMETERS::HOME::HOME	Data	0	RW	FALSE / TRUE /	FALSE	1	0
398	SETUP PARAMETERS::HOME::1/ENCODER SCALE	Data	2	RW	0.01 to 100.00	4	1	0
399	SETUP PARAMETERS::CALIBRATION::NO.OF POLES	Data	0	RW	2 to 50	4	0	1

Tag	Name	Type	DP	RW	Range	Default	Cfg	Inhib
400	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::Id Iq LOOPS	Menu						
401	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::Id Iq LOOPS::Id PROP GAIN	Data	0	RW	0 to 32767	2	0	0
402	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::Id Iq LOOPS::Id INT GAIN	Data	0	RW	0 to 32767	500	0	0
403	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::Id Iq LOOPS::MAX Id DEMAND	Data	0	RW	0 to 10000	7500	0	0
404	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::Id Iq LOOPS::MIN Id DEMAND	Data	0	RW	-5000 to -1	-2000	0	0
405	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::Id Iq LOOPS::MAX Id INTEGRAL	Data	0	RW	0 to 10000	7500	0	0
406	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::Id Iq LOOPS::MIN Id INTEGRAL	Data	0	RW	-5000 to 0	-2000	0	0
407	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::Id Iq LOOPS::Iq INT GAIN	Data	0	RW	0 to 32767	10000	0	0
408	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::Id Iq LOOPS::MAX Iq INTEGRAL	Data	0	RW	0 to 5000	4000	0	0
409	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::Id Iq LOOPS::MIN Iq INTEGRAL	Data	0	RW	-5000 to 0	-4000	0	0
410	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::MISCELLANEOUS	Menu						
411	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::MISCELLANEOUS::BRAKE THRESHOLD	Data	0	RW	0 to 1023	936	0	0
412	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::MISCELLANEOUS::MODN INDEX	Data	0	RW	0 to 12000	9000	0	0
413	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::MISCELLANEOUS::AD POS THRESHOLD	Data	0	RW	0 to 100	6	0	0
414	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::MISCELLANEOUS::AD NEG THRESHOLD	Data	0	RW	0 to 100	6	0	0
415	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::Id Iq LOOPS::MAX Id HI WORD	Data	0	RW	-1 to 0	0	0	0
416	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::Id Iq LOOPS::MIN Id HI WORD	Data	0	RW	-1 to 0	-1	0	0
417	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::TEST FUNCTIONS	Menu						
418	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::TEST FUNCTIONS::SELECT FUNCTION	Data	0	RW	0 to 9	0	0	1
419	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::TEST FUNCTIONS::SPEED PERIOD	Data	0	RW	2 to 65535	1000	1	0
420	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::TEST FUNCTIONS::SPEED AMPLITUDE	Data	0	RW	0 to 30000	500	1	0
421	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::TEST FUNCTIONS::SPEED OFFSET	Data	0	RW	-11000 to 11000	0	1	0
422	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::TEST FUNCTIONS::CURRENT PERIOD	Data	0	RW	2 to 10000	40	1	0
423	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::TEST FUNCTIONS::CURR AMPLITUDE	Data	0	RW	0 to 5000	200	1	0
424	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::TEST FUNCTIONS::CURRENT OFFSET	Data	0	RW	-5000 to 5000	0	1	0
425	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::TRACE	Menu						
426	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::TRACE::TRACE MODE	Data	0	RW	0 to 2	1	0	1
427	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::TRACE::PRESET COUNT	Data	0	RW	0 to 65535	0	0	1
428	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::TRACE::NO OF PASSES	Data	0	RW	1 to 254	1	0	1
429	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::TRACE::TRACE 16 ITEMS	Data	0	RW	FALSE / TRUE /	FALSE	0	1
430	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::TRACE::TRACE ADDRESS 1	Data	0	RW	0x0000 to 0xFFFF	0x0000	0	1
431	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::TRACE::TRACE ADDRESS 2	Data	0	RW	0x0000 to 0xFFFF	0x0000	0	1
432	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::TRACE::TRACE ADDRESS 3	Data	0	RW	0x0000 to 0xFFFF	0x0000	0	1
433	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::TRACE::TRACE ADDRESS 4	Data	0	RW	0x0000 to 0xFFFF	0x0000	0	1
434	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::TRACE::TRACE ADDRESS 5	Data	0	RW	0x0000 to 0xFFFF	0x0000	0	1
435	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::TRACE::TRACE ADDRESS 6	Data	0	RW	0x0000 to 0xFFFF	0x0000	0	1
436	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::TRACE::TRACE ADDRESS 7	Data	0	RW	0x0000 to 0xFFFF	0x0000	0	1
437	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::TRACE::TRACE ADDRESS 8	Data	0	RW	0x0000 to 0xFFFF	0x0000	0	1
438	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::TRACE::TRACE ADDRESS 9	Data	0	RW	0x0000 to 0xFFFF	0x0000	0	1
439	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::TRACE::TRACE ADDRESS 10	Data	0	RW	0x0000 to 0xFFFF	0x0000	0	1
440	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::TRACE::TRACE ADDRESS 11	Data	0	RW	0x0000 to 0xFFFF	0x0000	0	1
441	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::TRACE::TRACE ADDRESS 12	Data	0	RW	0x0000 to 0xFFFF	0x0000	0	1
442	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::TRACE::TRACE ADDRESS 13	Data	0	RW	0x0000 to 0xFFFF	0x0000	0	1
443	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::TRACE::TRACE ADDRESS 14	Data	0	RW	0x0000 to 0xFFFF	0x0000	0	1
444	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::TRACE::TRACE ADDRESS 15	Data	0	RW	0x0000 to 0xFFFF	0x0000	0	1
445	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::TRACE::TRACE ADDRESS 16	Data	0	RW	0x0000 to 0xFFFF	0x0000	0	1
446	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::FIELD WK VARS	Menu						
447	SETUP PARAMETERS::REF ENCODER::PHASE::OFFSET	Data	0	RW	-30000 to 30000	0	1	0
448	SETUP PARAMETERS::CALIBRATION::BASE FREQUENCY	Data	1	RW	0.1 Hz to 400.0 Hz	50.0 Hz	0	1
449		Data	2	RW	-150.00 % to 150.00 %	0.00%	1	0

Tag	Name	Type	DP	RW	Range	Default	Cfg	Inhib
450	SYSTEM::CONFIGURE I/O::DIGITAL INPUTS::DIGIN B7 DEST	Data	0	RW	0 to 700	70	1	1
451	SYSTEM::CONFIGURE I/O::DIGITAL INPUTS::DIGIN B6 DEST	Data	0	RW	0 to 700	71	1	1
452	SYSTEM::CONFIGURE I/O::DIGITAL INPUTS::DIGIN B8 DEST	Data	0	RW	0 to 700	72	1	1
453	SETUP PARAMETERS::TORQUE LOOP::MAG CURRENT %	Data	2	RW	0.00 % to 90.00 %	30.00%	0	1
454	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::FIELD WK VARS::MAG I SCALE 0	Data	1	RW	100.0 % to 100.0 %	100.00%	0	1
455	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::FIELD WK VARS::MAG I SCALE 1	Data	1	RW	0.0 % to 100.0 %	77.00%	0	1
456	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::FIELD WK VARS::MAG I SCALE 2	Data	1	RW	0.0 % to 100.0 %	63.00%	0	1
457	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::FIELD WK VARS::MAG I SCALE 3	Data	1	RW	0.0 % to 100.0 %	50.00%	0	1
458	SETUP PARAMETERS::TORQUE LOOP::ROTOR TIME CONST	Data	1	RW	12.8 mSECS to 3000.0 mSECS	100.0 mSECS	1	1
459	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::FIELD WK VARS::MAG I SCALE 5	Data	1	RW	0.0 % to 100.0 %	35.00%	0	1
460	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::FIELD WK VARS::MAG I SCALE 6	Data	1	RW	0.0 % to 100.0 %	30.00%	0	1
461	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::FIELD WK VARS::MAG I SCALE 7	Data	1	RW	0.0 % to 100.0 %	25.00%	0	1
462	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::FIELD WK VARS::MAG I SCALE 8	Data	1	RW	0.0 % to 100.0 %	20.00%	0	1
463	SYSTEM::CO-PROCESSOR::	Data	2	RW	-100.00 % to 100.00 %	0.00%	1	0
464	SYSTEM::CO-PROCESSOR::	Data	2	RW	-100.00 % to 100.00 %	0.00%	1	0
465	SYSTEM::CO-PROCESSOR::	Data	2	RW	-100.00 % to 100.00 %	0.00%	1	0
466	SYSTEM::CO-PROCESSOR::	Data	2	RW	-100.00 % to 100.00 %	0.00%	1	0
467	SYSTEM::CO-PROCESSOR::	Data	2	RW	-100.00 % to 100.00 %	0.00%	1	0
468	SYSTEM::CO-PROCESSOR::	Data	2	RW	-100.00 % to 100.00 %	0.00%	1	0
469	SYSTEM::CO-PROCESSOR::	Data	2	RW	-100.00 % to 100.00 %	0.00%	1	0
470	SYSTEM::CO-PROCESSOR::	Data	2	RW	-100.00 % to 100.00 %	0.00%	1	0
471	SYSTEM::CO-PROCESSOR::	Data	2	RW	-100.00 % to 100.00 %	0.00%	1	0
472	SYSTEM::CO-PROCESSOR::	Data	2	RW	-100.00 % to 100.00 %	0.00%	1	0
473	SYSTEM::CO-PROCESSOR::	Data	2	RW	FALSE / TRUE /	FALSE	1	0
474	SYSTEM::CO-PROCESSOR::	Data	2	RW	FALSE / TRUE /	FALSE	1	0
475	SYSTEM::CO-PROCESSOR::	Data	2	RW	FALSE / TRUE /	FALSE	1	0
476	SYSTEM::CO-PROCESSOR::	Data	2	RW	FALSE / TRUE /	FALSE	1	0
477	SYSTEM::CO-PROCESSOR::	Data	2	RW	FALSE / TRUE /	FALSE	1	0
478	SYSTEM::CO-PROCESSOR::	Data	2	RW	FALSE / TRUE /	FALSE	1	0
479	SYSTEM::CO-PROCESSOR	Menu						
480	DIAGNOSTICS::TERMINAL VOLTS	Diagnostic						
481	SETUP PARAMETERS::AUTOTUNE	Menu						
482	SETUP PARAMETERS::AUTOTUNE::AUTOTUNE FLAG	Data	0	RW	FALSE / TRUE /	FALSE	1	0
483	SETUP PARAMETERS::AUTOTUNE::MAG I AUTOTUNE	Data	0	RW	FALSE / TRUE /	TRUE	1	0
484	SETUP PARAMETERS::AUTOTUNE::SET Tr < RTD SPD	Data	0	RW	FALSE / TRUE /	TRUE	1	0
485	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::AUTOTUNE MISC	Menu						
486	SETUP PARAMETERS::CALIBRATION::MOTOR VOLTS	Data	0	RW	0 VOLTS to 1000 VOLTS	415 VOLTS	1	0
487	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::AUTOTUNE MISC::KIMR_INT	Data	0	RW	0 to 32000	1000	1	0
488	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::AUTOTUNE MISC::AUTO RAMP INCRMT	Data	0	RW	1 to 50	2	1	0
489	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::AUTOTUNE MISC::LINK V FILT GAIN	Data	0	RW	0 to 32000	500	1	0
490	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::AUTOTUNE MISC::TERM V FILT GAIN	Data	0	RW	0 to 32000	500	1	0
491	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::AUTOTUNE MISC::TERM V FLTGN DSP	Data	0	RW	0 to 32000	50	1	0
492	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::AUTOTUNE MISC::AUTOCAL MAX RPM	Diagnostic						
493	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::AUTOTUNE MISC::LOAD FACTOR @BS	Data	1	RW	50.0 % to 100.0 %	95.00%	1	0
494	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::AUTOTUNE MISC::LOAD FACTOR @2BS	Data	1	RW	50.0 % to 100.0 %	90.00%	1	0
495	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::MISCELLANEOUS::IFB ADJUST	Data	1	RW	50.0 % to 150.0 %	115.00%	1	1
496		Data	2	RW	0.00 % to 100.00 %	0.00%	1	0
497		Data	2	RW	0.00 % to 100.00 %	0.00%	1	0
498		Data	0	RW	FALSE / TRUE /	FALSE	1	0
499		Data	0	RW	FALSE / TRUE /	FALSE	1	0

Tag	Name	Type	DP	RW	Range	Default	Cfg	Inhib
500	SETUP PARAMETERS::PID::ERROR CALC::ERROR O/P	Data	2	RO	-300.00 % to 300.00 %	0.00%	0	0
501	SETUP PARAMETERS::OP-STATION	Menu						
502	SETUP PARAMETERS::OP-STATION::START UP VALUES	Menu						
503	SETUP PARAMETERS::OP-STATION::START UP VALUES::SETPOINT	Data	1	RW	0.0 % to 100.0 %	0.00%	1	0
504	SETUP PARAMETERS::OP-STATION::START UP VALUES::REV DIRECTION	Data	0	RW	FALSE / TRUE /	FALSE	1	0
505	SETUP PARAMETERS::OP-STATION::START UP VALUES::PROGRAM	Data	0	RW	FALSE / TRUE /	FALSE	1	0
506	SETUP PARAMETERS::OP-STATION::START UP VALUES::LOCAL	Data	0	RW	FALSE / TRUE /	FALSE	1	0
507	SETUP PARAMETERS::OP-STATION::SET UP::SETPOINT	Data	1	RW	0.0 % to 100.0 %	0.00%	1	0
508	SYSTEM::CONFIGURE I/O::DIGITAL INPUTS::DIGIN 4 (E5)::OUTPUT	Data	2	RW	-300.00 % to 300.00 %	0.00%	1	0
509	SETUP PARAMETERS::OP-STATION::LOCAL RAMP::RAMP OUTPUT	Diagnostic						
510	SETUP PARAMETERS::OP-STATION::LOCAL RAMP	Menu						
511	SETUP PARAMETERS::OP-STATION::LOCAL RAMP::RAMP ACCEL TIME	Data	1	RW	0.0 SECS to 600.0 SECS	10.0 SECS	1	0
512	SETUP PARAMETERS::OP-STATION::LOCAL RAMP::RAMP DECEL TIME	Data	1	RW	0.0 SECS to 600.0 SECS	10.0 SECS	1	0
513	SETUP PARAMETERS::OP-STATION::LOCAL RAMP::RAMP QUENCH	Data	0	RW	FALSE / TRUE /	FALSE	1	0
514	SETUP PARAMETERS::OP-STATION::LOCAL RAMP::RAMP HOLD	Data	0	RW	FALSE / TRUE /	FALSE	1	0
515	SETUP PARAMETERS::OP-STATION::LOCAL RAMP::RAMP INPUT	Data	2	RW	-100.00 % to 100.00 %	0.00%	1	0
516	SETUP PARAMETERS::OP-STATION::LOCAL RAMP::% S-RAMP	Data	2	RW	-100.00 % to 100.00 %	0.00%	1	0
517	SETUP PARAMETERS::OP-STATION::LOCAL RAMP::RAMPING THRESH.	Data	2	RW	-100.00 % to 100.00 %	1.00%	1	0
518	SETUP PARAMETERS::OP-STATION::LOCAL RAMP::AUTO RESET	Data	0	RW	FALSE / TRUE /	TRUE	1	0
519	SETUP PARAMETERS::OP-STATION::LOCAL RAMP::EXTERNAL RESET	Data	0	RW	FALSE / TRUE /	FALSE	1	0
520	SETUP PARAMETERS::OP-STATION::LOCAL RAMP::RESET VALUE	Data	2	RW	-100.00 % to 100.00 %	0.00%	1	0
521	DIAGNOSTICS::DIGIN 4 (E5)	Diagnostic						
522	SYSTEM::CONFIGURE I/O::DIGITAL INPUTS::DIGIN 4 (E5)	Menu						
523	SYSTEM::CONFIGURE I/O::DIGITAL INPUTS::DIGIN 4 (E5)::VALUE FOR TRUE	Data	2	RW	-300.00 % to 300.00 %	0.01%	1	0
524	SYSTEM::CONFIGURE I/O::DIGITAL INPUTS::DIGIN 4 (E5)::VALUE FOR FALSE	Data	2	RW	-300.00 % to 300.00 %	0.00%	1	0
525	SYSTEM::CONFIGURE I/O::DIGITAL INPUTS::DIGIN 4 (E5)::DESTINATION TAG	Data	0	RW	0 to 700	94	1	1
526		Data	2	RW	0.01 SECS to 60.00 SECS	0.10 SECS	1	0
527	SYSTEM::CONFIGURE I/O::DIGITAL INPUTS::DIGIN 1 (E2)::OUTPUT	Data	2	RW	-300.00 % to 300.00 %	0.00%	1	0
528	SYSTEM::CONFIGURE I/O::DIGITAL INPUTS::DIGIN 2 (E3)::OUTPUT	Data	2	RW	-300.00 % to 300.00 %	0.00%	1	0
529	SYSTEM::CONFIGURE I/O::DIGITAL INPUTS::DIGIN 3 (E4)::OUTPUT	Data	2	RW	-300.00 % to 300.00 %	0.00%	1	0
530	SETUP PARAMETERS::PID	Menu						
531	SETUP PARAMETERS::PID::DERIVATIVE TC	Data	3	RW	0.000 SECS to 10.000 SECS	0.000 SECS	1	0
532	SETUP PARAMETERS::PID::ERROR CALC::DIVIDER 1	Data	4	RW	-3.0000 to 3.0000	1	1	0
533	SETUP PARAMETERS::PID::ERROR CALC::DIVIDER 2	Data	4	RW	-3.0000 to 3.0000	1	1	0
534	SETUP PARAMETERS::PID::ENABLE	Data	0	RW	FALSE / TRUE /	TRUE	1	0
535	SETUP PARAMETERS::PID::FILTER TC	Data	3	RW	0.000 SECS to 10.000 SECS	0.100 SECS	1	0
536	SETUP PARAMETERS::PID::ERROR CALC::INPUT 1	Data	2	RW	-300.00 % to 300.00 %	0.00%	1	0
537	SETUP PARAMETERS::PID::ERROR CALC::INPUT 2	Data	2	RW	-300.00 % to 300.00 %	0.00%	1	0
538	SETUP PARAMETERS::PID::INT.DEFEAT	Data	0	RW	FALSE / TRUE /	FALSE	1	0
539	SETUP PARAMETERS::PID::INT.TIME CONST.	Data	2	RW	0.00 SECS to 100.00 SECS	5.00 SECS	1	0
540	SETUP PARAMETERS::PID::PROFILER::MIN PROFILE GAIN	Data	2	RW	0.00 % to 100.00 %	20.00%	1	0
541	SETUP PARAMETERS::PID::PROFILER::MODE	Data	0	RW	0 to 4	0	1	0
542	SETUP PARAMETERS::PID::NEGATIVE LIMIT	Data	2	RW	-100.00 % to 0.00 %	-100.00%	1	0
543	SETUP PARAMETERS::PID::O/P SCALER(TRIM)	Data	4	RW	-3.0000 to 3.0000	1	1	0
544	SETUP PARAMETERS::PID::CLAMPED	Data	0	RW	FALSE / TRUE /	TRUE	1	0
545	SETUP PARAMETERS::PID::INPUT	Data	2	RW	-300.00 % to 300.00 %	0.00%	1	0
546	SETUP PARAMETERS::PID::OUTPUT	Data	2	RO	-300.00 % to 300.00 %	0.00%	1	0
547	SETUP PARAMETERS::PID::POSITIVE LIMIT	Data	2	RW	0.00 % to 100.00 %	100.00%	1	0
548	SETUP PARAMETERS::PID::PROFILER::PROFILED GAIN	Data	1	RW	0.0 to 100.0	0	1	0
549	SETUP PARAMETERS::PID::PROP.GAIN	Data	1	RW	0.0 to 100.0	1	1	0

Tag	Name	Type	DP	RW	Range	Default	Cfg	Inhib
550	SETUP PARAMETERS::PID::ERROR CALC::RATIO 1	Data	4	RW	-3.0000 to 3.0000	1	1	0
551	SETUP PARAMETERS::PID::ERROR CALC::RATIO 2	Data	4	RW	-3.0000 to 3.0000	1	1	0
552	SYSTEM::CONFIGURE I/O::BLOCK DIAGRAM::PID O/P DEST	Data	0	RW	0 to 700	0	1	0
553	SETUP PARAMETERS::PID::ERROR CALC::LIMIT	Data	2	RW	-300.00 % to 300.00 %	100.00%	1	0
554	SETUP PARAMETERS::PID::PROFILER::PROFILE INPUT	Data	2	RW	0.00 % to 100.00 %	0.00%	1	0
555	SETUP PARAMETERS::PID::PROFILER::PROFILE MININPUT	Data	2	RW	0.00 % to 100.00 %	0.00%	1	0
556	SYSTEM::CONFIGURE I/O::BLOCK DIAGRAM::PID ERROR DEST	Data	0	RW	0 to 700	545	1	0
557	SETUP PARAMETERS::PID::ERROR CALC	Menu						
558	SETUP PARAMETERS::PID::PROFILER	Menu						
559	DIAGNOSTICS::READY	Diagnostic						
560	SYSTEM::CONFIGURE I/O::INTERNAL LINKS::LINK 5 SOURCE	Data	0	RW	0 to 700	0	1	1
561	SYSTEM::CONFIGURE I/O::INTERNAL LINKS::LINK 5 DEST	Data	0	RW	0 to 700	0	1	1
562	SYSTEM::CONFIGURE I/O::INTERNAL LINKS::LINK 6 SOURCE	Data	0	RW	0 to 700	0	1	1
563	SYSTEM::CONFIGURE I/O::INTERNAL LINKS::LINK 6 DEST	Data	0	RW	0 to 700	0	1	1
564	SYSTEM::CONFIGURE I/O::INTERNAL LINKS::LINK 7 SOURCE	Data	0	RW	0 to 700	0	1	1
565	SYSTEM::CONFIGURE I/O::INTERNAL LINKS::LINK 7 DEST	Data	0	RW	0 to 700	0	1	1
566	SYSTEM::CONFIGURE I/O::INTERNAL LINKS::LINK 8 SOURCE	Data	0	RW	0 to 700	0	1	1
567	SYSTEM::CONFIGURE I/O::INTERNAL LINKS::LINK 8 DEST	Data	0	RW	0 to 700	0	1	1
568	SYSTEM::CONFIGURE I/O::INTERNAL LINKS::LINK 9 SOURCE	Data	0	RW	0 to 700	0	1	1
569	SYSTEM::CONFIGURE I/O::INTERNAL LINKS::LINK 9 DEST	Data	0	RW	0 to 700	0	1	1
570	SYSTEM::CONFIGURE I/O::INTERNAL LINKS::LINK 10 SOURCE	Data	0	RW	0 to 700	0	1	1
571	SYSTEM::CONFIGURE I/O::INTERNAL LINKS::LINK 10 DEST	Data	0	RW	0 to 700	0	1	1
572	SYSTEM::CONFIGURE I/O::INTERNAL LINKS::LINK 11 SOURCE	Data	0	RW	0 to 700	0	1	1
573	SYSTEM::CONFIGURE I/O::INTERNAL LINKS::LINK 11 DEST	Data	0	RW	0 to 700	0	1	1
574	SYSTEM::CONFIGURE I/O::INTERNAL LINKS::LINK 12 SOURCE	Data	0	RW	0 to 700	0	1	1
575	SYSTEM::CONFIGURE I/O::INTERNAL LINKS::LINK 12 DEST	Data	0	RW	0 to 700	0	1	1
576	SYSTEM::CONFIGURE I/O::INTERNAL LINKS::LINK 13 SOURCE	Data	0	RW	0 to 700	0	1	1
577	SYSTEM::CONFIGURE I/O::INTERNAL LINKS::LINK 13 DEST	Data	0	RW	0 to 700	0	1	1
578	SYSTEM::CONFIGURE I/O::INTERNAL LINKS::LINK 14 SOURCE	Data	0	RW	0 to 700	0	1	1
579	SYSTEM::CONFIGURE I/O::INTERNAL LINKS::LINK 14 DEST	Data	0	RW	0 to 700	0	1	1
580	SYSTEM::CONFIGURE I/O::INTERNAL LINKS::LINK 15 SOURCE	Data	0	RW	0 to 700	0	1	1
581	SYSTEM::CONFIGURE I/O::INTERNAL LINKS::LINK 15 DEST	Data	0	RW	0 to 700	0	1	1
582	SYSTEM::CONFIGURE I/O::INTERNAL LINKS::LINK 16 SOURCE	Data	0	RW	0 to 700	0	1	1
583	SYSTEM::CONFIGURE I/O::INTERNAL LINKS::LINK 16 DEST	Data	0	RW	0 to 700	0	1	1
584	SERIAL LINKS::5703 SUPPORT::RAW INPUT	Data	2	RW	-300.00 % to 300.00 %	0.00%	1	0
585	SETUP PARAMETERS::TORQUE LOOP::CURRENT LIMIT	Data	2	RW	50.00 % to 150.00 %	150.00%	1	0
586	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::FIELD WK VARS::MAG I SCALE 4	Data	1	RW	0.0 % to 100.0 %	40.00%	0	1
587	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::FIELD WK VARS::TR SCALE 0	Data	1	RW	100.0 % to 100.0 %	100.00%	0	1
588	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::FIELD WK VARS::TR SCALE 1	Data	1	RW	20.0 % to 300.0 %	100.00%	0	1
589	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::FIELD WK VARS::TR SCALE 2	Data	1	RW	20.0 % to 300.0 %	100.00%	0	1
590	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::FIELD WK VARS::TR SCALE 3	Data	1	RW	20.0 % to 300.0 %	100.00%	0	1
591	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::FIELD WK VARS::TR SCALE 4	Data	1	RW	20.0 % to 300.0 %	100.00%	0	1
592	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::FIELD WK VARS::TR SCALE 5	Data	1	RW	20.0 % to 300.0 %	100.00%	0	1
593	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::FIELD WK VARS::TR SCALE 6	Data	1	RW	20.0 % to 300.0 %	100.00%	0	1
594	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::FIELD WK VARS::TR SCALE 7	Data	1	RW	20.0 % to 300.0 %	100.00%	0	1
595	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::FIELD WK VARS::TR SCALE 8	Data	1	RW	20.0 % to 300.0 %	100.00%	0	1
596	SETUP PARAMETERS::TORQUE LOOP::TORQ.DMD.ISOLATE	Data	0	RW	FALSE / TRUE /	FALSE	1	0
597	SETUP PARAMETERS::S-RAMP::INPUT	Data	2	RW	-100.00 % to 100.00 %	0.00%	1	0
598	SETUP PARAMETERS::S-RAMP::OUTPUT	Data	2	RO	-100.00 % to 100.00 %	0.00%	0	0
599	SETUP PARAMETERS::TORQUE LOOP::AUX TORQUE DMD	Data	2	RW	-150.00 % to 150.00 %	0.00%	1	0

Tag	Name	Type	DP	RW	Range	Default	Cfg	Inhib
600	SETUP PARAMETERS::REF ENCODER::PHASE::RESET	Data	0	RW	FALSE / TRUE /	FALSE	1	0
601	SETUP PARAMETERS::PID::ERROR CALC::SIGN 1	Data	0	RW	NEG / POS /	POS	1	0
602	SETUP PARAMETERS::PID::ERROR CALC::SIGN 2	Data	0	RW	NEG / POS /	POS	1	0
603	SETUP PARAMETERS::REF ENCODER::INCH	Menu						
604	SETUP PARAMETERS::REF ENCODER::INCH::INCH ADVANCE	Data	0	RW	FALSE / TRUE /	FALSE	1	0
605	SETUP PARAMETERS::REF ENCODER::INCH::INCH RETARD	Data	0	RW	FALSE / TRUE /	FALSE	1	0
606	SETUP PARAMETERS::REF ENCODER::INCH::INCH RATE	Data	1	RW	0.0 to 1000.0	10	1	0
607	SETUP PARAMETERS::REF ENCODER::SPEED	Menu						
608	SETUP PARAMETERS::REF ENCODER::PHASE	Menu						
609	SETUP PARAMETERS::REF ENCODER::PHASE::OFFSET SCALE	Data	0	RW	0 to 1000	1	1	0
610	SETUP PARAMETERS::REF ENCODER::PHASE::SATURATED	Data	0	RO	FALSE / TRUE /	FALSE	1	0
611	SETUP PARAMETERS::REF ENCODER::PHASE::OVERFLOW	Data	0	RO	FALSE / TRUE /	FALSE	1	0
612	SETUP PARAMETERS::S-RAMP::AT SPEED LEVEL	Data	2	RW	0.00 % to 100.00 %	1.00%	1	0
613	DIAGNOSTICS::DC LINK VOLTS	Diagnostic						
614	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::TERM V CONTROL::% LOAD @BASE SPD	Data	2	RW	0.00 % to 10.00 %	5.00%	1	0
615	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::TERM V CONTROL::TVolts INT RANGE	Data	2	RW	0.00 % to 80.00 %	50.00%	1	0
616	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::TERM V CONTROL::SPD @ TV INT =0	Data	2	RW	10.00 % to 100.00 %	50.00%	1	0
617	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::TERM V CONTROL::IQ @TV INTGN=MIN	Data	1	RW	10.0 % to 150.0 %	100.00%	1	0
618	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::TERM V CONTROL::IQ @TV INTGN=MAX	Data	1	RW	150.0 % to 300.0 %	200.00%	1	0
619	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::TERM V CONTROL::LOOP RESPNSE=nTr	Data	0	RW	4 to 30000	20	1	0
620	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::TERM V CONTROL::FAST RESPONSE %	Data	2	RW	100.00 % to 115.00 %	102.50%	1	0
621	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::TERM V CONTROL	Menu						
622	SETUP PARAMETERS::STOP RATES::PROG STOP I-LIM	Data	2	RW	0.00 % to 150.00 %	150.00%	1	0
623	DIAGNOSTICS::TERM V INTEGRAL	Diagnostic						
624	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::MISCELLANEOUS::TOTAL TRIP COUNT	Data	0	RW	0x0000 to 0xFFFF	0x0000	0	0
625	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::DIAGNOSTICS RESD::SLIP FREQUENCY	Diagnostic						
626	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::DIAGNOSTICS RESD	Menu						
627	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::DIAGNOSTICS RESD::RUN SLIP F DIAG	Data	0	RW	FALSE / TRUE /	FALSE	0	0
628	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::AUTOTUNE MISC::MIN LINK V RATIO	Data	2	RW	50.00 % to 100.00 %	85.00%	1	0
629	SETUP PARAMETERS::AUTOTUNE::AUTOCAL MAX RPM	Data	0	RW	0 RPM to 30000 RPM	30000 RPM	1	0
630	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::FIELD WK VARS::MAG I SCALE 9	Data	1	RW	0.0 % to 100.0 %	11.10%	0	1
631	SYSTEM::RESERVED::SSD USE ONLY::DO NOT ALTER !!::FIELD WK VARS::TR SCALE 9	Data	1	RW	20.0 % to 300.0 %	100.00%	0	1
632	SETUP PARAMETERS::OP-STATION::SET UP::LOCAL KEY ENABLE	Data	0	RW	FALSE / TRUE /	TRUE	0	1
633	SETUP PARAMETERS::OP-STATION::SET UP	Menu						
634		Data	2	RW	-150.00 % to 150.00 %	0.00%	1	0
635		Data	2	RW	-150.00 % to 150.00 %	0.00%	1	0
636		Data	2	RW	-150.00 % to 150.00 %	0.00%	1	0
637		Data	2	RW	-150.00 % to 150.00 %	0.00%	1	0
638		Data	2	RW	-150.00 % to 150.00 %	0.00%	1	0
639		Data	2	RW	-150.00 % to 150.00 %	0.00%	1	0
640		Data	2	RW	-150.00 % to 150.00 %	0.00%	1	0
641		Data	2	RW	-150.00 % to 150.00 %	0.00%	1	0
642		Data	2	RW	-150.00 % to 150.00 %	0.00%	1	0
643		Data	2	RW	-150.00 % to 150.00 %	0.00%	1	0
644		Data	2	RW	-150.00 % to 150.00 %	0.00%	1	0
645		Data	2	RW	-150.00 % to 150.00 %	0.00%	1	0
646		Data	2	RW	-150.00 % to 150.00 %	0.00%	1	0
647		Data	2	RW	-150.00 % to 150.00 %	0.00%	1	0
648		Data	2	RW	-150.00 % to 150.00 %	0.00%	1	0