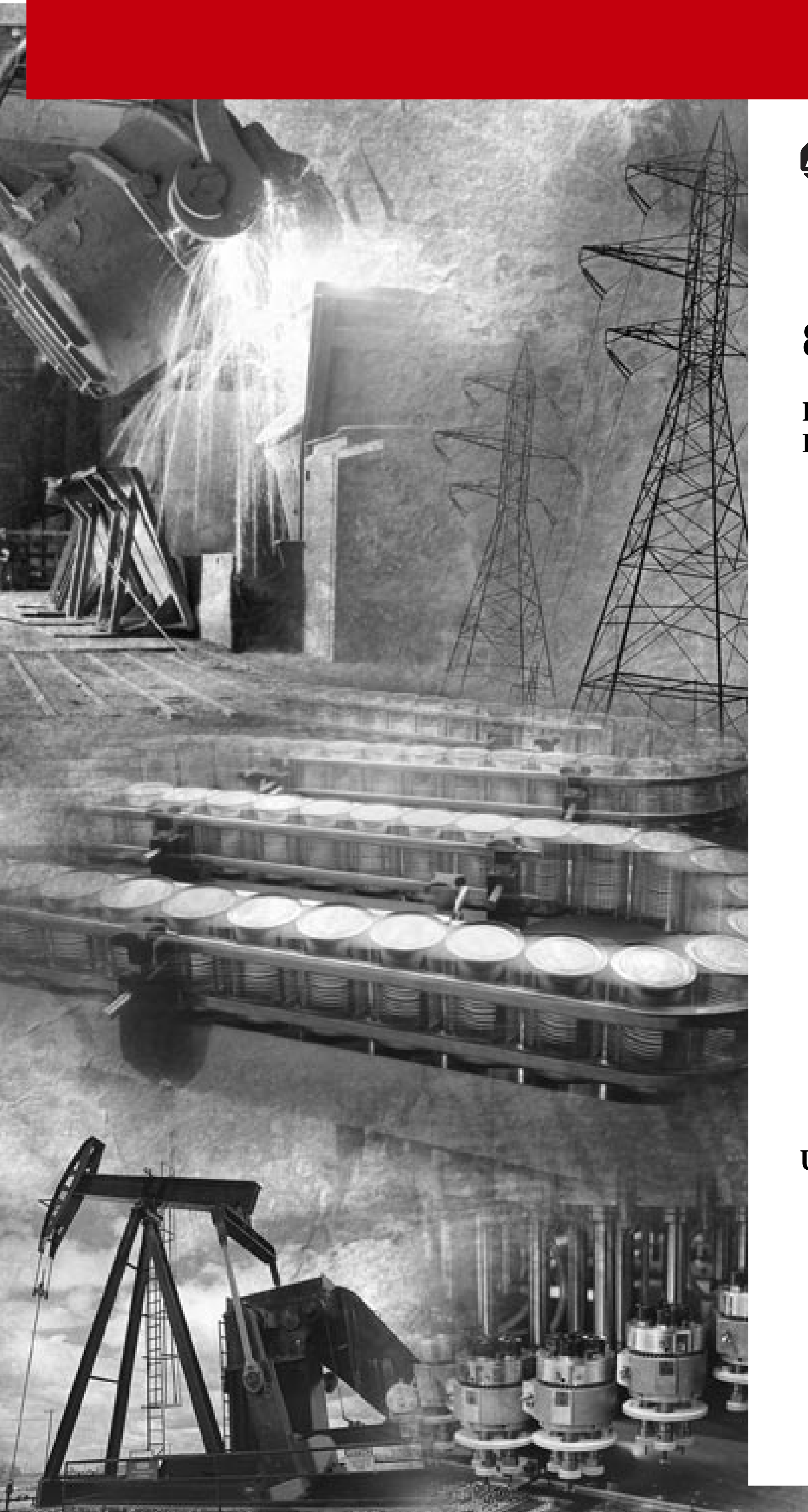


Allen-Bradley

8720MC

HIGH PERFORMANCE DRIVE

User Manual

Rockwell Automation

Important User Information

Because of the variety of uses for the products described in this publication, those responsible for the application and use of this control equipment must satisfy themselves that all necessary steps have been taken to assure that each application and use meets all performance and safety requirements, including any applicable laws, regulations, codes and standards.

The illustrations, charts, sample programs and layout examples shown in this guide are intended solely for purposes of example. Since there are many variables and requirements associated with any particular installation, Allen-Bradley does not assume responsibility or liability (to include intellectual property liability) for actual use based upon the examples shown in this publication.

Allen-Bradley publication SGI-1.1, *Safety Guidelines for the Application, Installation and Maintenance of Solid-State Control* (available from your local Allen-Bradley office), describes some important differences between solid-state equipment and electromechanical devices that should be taken into consideration when applying products such as those described in this publication.

European Communities (EC) Directive Compliance

If this product has the CE mark it is approved for installation within the European Union and EEA regions. It has been designed and tested to meet the following directives.

EMC Directive

This product is tested to meet the Council Directive 89/336/EC Electromagnetic Compatibility (EMC) by applying the following standards, in whole or in part, documented in a technical construction file:

- EN 50081-2 EMC — Generic Emission Standard, Part 2 — Industrial Environment
- EN 50082-2 EMC — Generic Immunity Standard, Part 2 — Industrial Environment

This product is intended for use in an industrial environment.

Low Voltage Directive

This product is tested to meet Council Directive 73/23/EEC Low Voltage, by applying the safety requirements of EN 61131-2 Programmable Controllers, Part 2 - Equipment Requirements and Tests. For specific information required by EN 61131-2, see the appropriate sections in this publication, as well as the Allen-Bradley publication Industrial Automation Wiring and Grounding Guidelines For Noise Immunity, publication 1770-4.1.

This equipment is classified as open equipment and must be mounted in an enclosure during operation to provide safety protection.

Preface

Chapter 1
Introduction

Chapter 2
Specifications

Chapter 3
Dimensions

Chapter 4
Drive Installation and Wiring

Chapter 5

Motor Installation and Wiring

Chapter 6
Interface Signal Description

Chapter 7
Using the Human Interface Module (HIM)

Chapter 8
Programming Parameters

Appendix B
Replacement Spare Parts

Preface

Read the preface to become familiar with the rest of the manual. This preface covers the following topics:

- who should use this manual
- purpose of this manual
- what is the 8720MC Drive?
- contents of this manual
- related documentation
- common techniques used in this manual
- terms and abbreviations
- Allen-Bradley support
- safety precautions

Who Should Use this Manual

Use this manual if you are responsible for setting up and servicing the 8720MC Drive. You must have previous experience with and a basic understanding of electrical terminology, programming procedures, required equipment, and safety precautions before attempting to service the 8720MC Drive.

Purpose of this Manual

This manual provides the necessary information to install, program, start up, and maintain the 8720MC Drive.

What is the 8720MC Drive?

The Allen-Bradley 8720MC Drive System is a family of products designed to satisfy a wide range of machine tool spindle and power servo applications. For applications which do not require line regeneration, Allen-Bradley offers five 380 to 460 VAC input high performance digital drives with current outputs ranging from 21 to 48 amperes. For applications requiring line regeneration, the same five drives plus an additional 14 amp drive can be connected to a regenerative power supply via a 750V DC common bus interface. The complete family includes a set of twelve drive amplifiers capable of controlling a family of motors ranging in power from 5.5 to 93 kW.

Contents of this Manual

This manual contains the information shown in the following table.

Chapter:	Title
	Preface
1	Introduction
2	Specifications
3	Dimensions

4	Drive Installation and Wiring
5	Motor Installation and Wiring
6	Interface Signal Description
7	Programming Terminals
8	Programming Parameters
9	Start-up
10	Troubleshooting
	Appendix A

Related Documentation

The following documents contain additional information about related Allen-Bradley products. To obtain a copy, contact your local Allen-Bradley office or distributor.

Catalog Number:	Document Title:	Publication Number:
N/A	8720MC Product Specification	8720-SR001A-US-P
N/A	8720MC Product Brochure	8720MC-BR001A-US-P
8720MC-PSU	8720MC Regenerative Power Supply User Manual	8720MC-RM001B-US-P
8520-ARM2	9/Series Adjustable Machine Parameters Manual	8520-4.3
1336R -VB	1336 REGEN 5.0 - 1336R Line Regenerative Package User Manual	1336REGEN-5.0
1336-WA, WB, WC	1336 5.65 – Series A Brake Chopper Module	1336 - 5.65
1394-50	1394-5.0 1394 Digital AC Multi-Axis Motion Control System	1394-5.0

The *IEC Specification 1491* provides a complete description of the standard for Serial Communications System or Sercos. You can obtain this specification from the International Electrotechnical Commission.

Common Techniques Used in this Manual

The following conventions are used throughout this manual:

- Bulleted lists provide information, not procedural steps.
- Numbered lists provide sequential steps or hierarchical information.
- *Italic* type is used for parameter and chapter names.

Identifies tips that have been added to call attention to useful information.

Important: Identifies information that is critical for successful application and understanding of the product.

ATTENTION: Identifies information about practices or circumstances that can lead to personal injury or death, property damage or economic loss.

Attention statements help you to:

- identify a hazard
- avoid a hazard
- recognize the consequences

Allen-Bradley Support

Allen-Bradley offers support services worldwide, with over 75 sales/support offices, 512 authorized distributors and 260 authorized systems integrators located throughout the United States alone, plus Allen-Bradley representatives in every major country in the world.

Local Product Support

Contact your local Allen-Bradley representative for:

- sales and order support
- product technical training
- warranty support
- support service agreements

Technical Product Assistance

If you need to contact Allen-Bradley for technical assistance, please review the *Troubleshooting* chapter first. If the problem persists, then call your local Allen-Bradley representative. For the quickest possible response, we recommend that you have the catalog numbers of your products available when you call.

Your Questions or Comments on this Manual

If you find a problem with this manual, please notify us of it on the enclosed Publication Problem Report.

Safety Precautions

The following general precautions apply to the 8720MC Drive.

ATTENTION: Only those familiar with the 8720MC Drive and associated machinery should plan or implement the installation, startup, and subsequent maintenance of the system. Failure to comply can result in personal injury and/or equipment damage.

ATTENTION: This product contains stored energy devices. To avoid hazard of electrical shock, verify that all voltage on the capacitors has been discharged before attempting to service, repair, or remove this unit. You should only attempt the procedures in this manual if you are qualified to do so and familiar with solid-state control equipment and the safety precautions in publication NFPA 70E.

ATTENTION: The system integrator is responsible for local safety and electrical codes.

ATTENTION: An incorrectly applied or installed drive can result in component damage or a reduction in product life. Wiring or application errors, such as under sizing the motor, incorrect or inadequate AC supply, or excessive ambient temperatures can result in malfunction of the drive.

ATTENTION: This drive contains ESD (Electrostatic Discharge) sensitive parts and assemblies. Static control precautions are required when installing, testing, servicing, or repairing this assembly. Component damage can result if ESD control procedures are not followed. If you are not familiar with static procedures, refer to the Allen-Bradley publication 8000-4.5.2, *Guarding Against Electrostatic Damage* or any other applicable ESD Protection Handbook.

Introduction

Chapter Objectives

This chapter provides an overview of the 8720MC High Performance Drive. It covers information on the three basic components of the drive, which include:

- 8720MC Drive Amplifier
- 8720MC Regenerative Power Supply (also called regenerative converter)
- 8720SM AC Induction Motor

8720MC Drive Overview

The Allen-Bradley 8720MC Drive System is a family of products designed to satisfy a wide range of machine tool spindle and power servo applications.

Drive Amplifiers for Non Line Regeneration

For lower power applications which do not require line regeneration, Allen-Bradley offers five 460 VAC input high performance digital drive amplifiers with current outputs ranging from 21 to 48 amperes. These amplifiers can support frequent high acceleration/deceleration cycles when used in conjunction with the A-B 1336WB Brake Chopper Module. There are five available 8720SM AC motors, ranging in power from 5.5 to 18.5 kW that are compatible with the 460 VAC input drive amplifiers. Four of these drive amplifier ratings can also be operated off 380 VAC directly when providing motor current for the 5.5, 7.5, 11, and 15 kW, 380 VAC input compatible, 8720SM motors

Drive Amplifiers for Line Regeneration

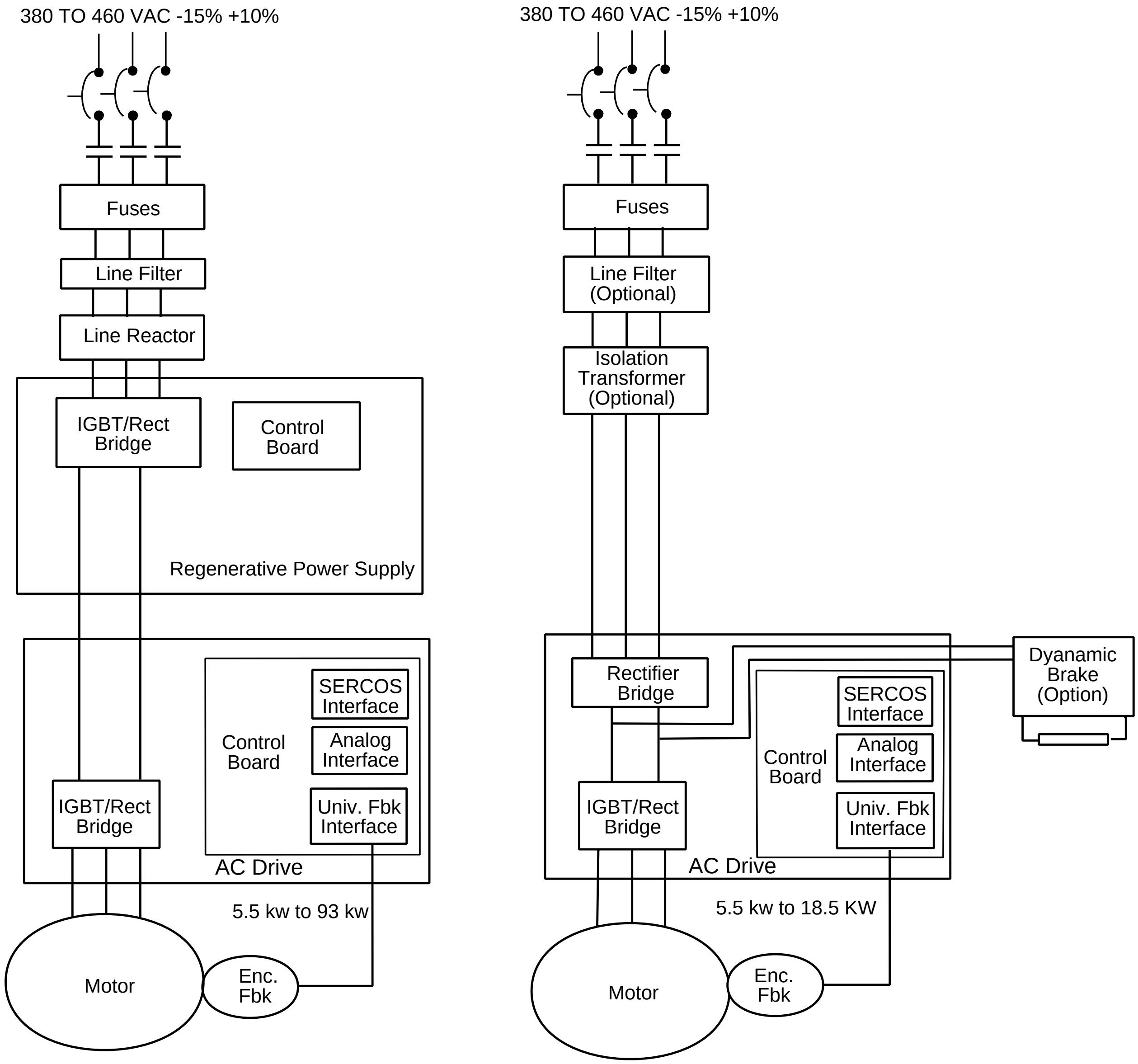
For applications requiring line regeneration, the six smaller drive ratings (14, 21, 27, 34, 42, and 48 amperes) can alternatively be connected to a regenerative power supply via a 750V DC common bus interface. These high performance digital drive amplifiers are complemented by another six, common bus only, drive amplifiers with output capacities of 65, 78, 97, 120, 149 and 180 amperes.

The complete family of common bus offerings includes a set of twelve drive amplifiers capable of controlling a family of motors ranging in power from 5.5 to 93 kW. For motors ranging from 5.5 to 37 kW, the 750V DC common bus drive amplifiers are powered by the 8720MC–RPS065 line regenerative power supply which provides up to 65 amperes at a controlled bus voltage of 750V DC. For motors ranging in power from 45 to 93 kW, the 8720MC RPS065 Regenerative Power Supply can be operated in master slave mode.

An 8720MC-RPS065 master can to provide up to 74 kw of continuous motor power when operating with one slave and 110 kw when operating with two slaves.

Figure 1.1 shows 8720MC drive configurations for line regenerative and non line regenerative applications.

Figure 1.1
8720MC Drive System Configurations



8720MC DRIVE SYSTEM CONFIGURATIONS

The CNC or GMC motion controller interfaces to the 8720MC can be either a Sercos digital command or a standard +/- 10V DC analog command. Both the Sercos and analog interfaces are available with all of the 8720MC drive amplifiers.

Key Features of the 8720MC Drive Amplifiers

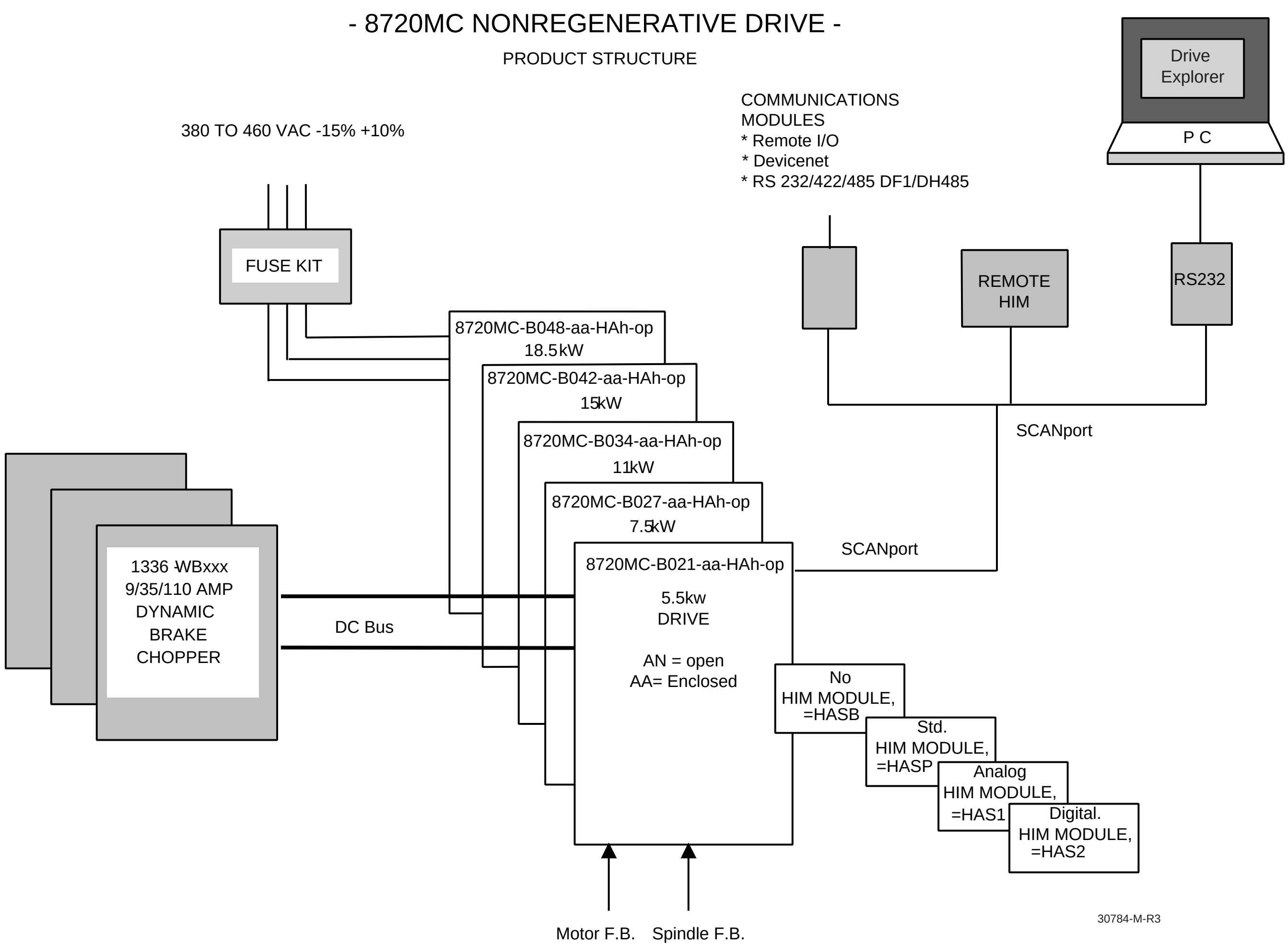
The following features apply to all 8720MC Drive amplifiers:

- High performance digital position, velocity and current loops permit high bandwidth servo operation
- +/- 500 Hz output frequency, 30,000 RPM 2 pole motor operation
- High resolution (4 million counts/rev) feedback capability provides superior velocity and position resolution; Feedback sampling every 125 micro seconds
- High resolution feedback port for motor mounted feedback device provides excellent motor smoothness of operation, even at very low speeds
- Additional feedback port for a high resolution spindle or axis mounted feedback device, available with SERCOS version only
- Option for resident or SCANport connected Human Interface Module (HIM)
- ScanPort interface for hand held terminals
- DeviceNet, ControlNet, Remote I/O, and DH 485 communications via ScanPort
- Simplified entry of configuration parameters in engineering units
- Two configurable +/- 10 V DC analog outputs (12 bits resolution)
- Ten 24V DC discrete sourcing inputs
- Four 24V DC isolated relay contact outputs
- Six additional 24V DC configurable, isolated, current limiting discrete outputs
- One 5V DC and one 24V DC registration input
- One 5 V DC TTL A quad B encoder output with marker provides a motion controller position interface, 1024 pulses per motor revolution
- Sercos Interface:
  - Sercos 2/4 mbaud fiber optic digital command interface
- Analog Interface:
  -Two +/- 10V DC analog inputs (14 bits resolution)
- UL and CUL listed
- CE marked to meet European requirements for low voltage and electromagnetic compatibility directives

Non Line Regenerative Applications

The smallest five 8720MC drive amplifiers can be configured for either non line regenerative or line regenerative applications. Figure 1.2 illustrates the AC input non line regenerative drive amplifier configurations that are available when used in conjunction with the Allen-Bradley 1336-WB dynamic braking modules.

Figure 1.2
8720MC Non Line Regenerative Drive Amplifier Configuration

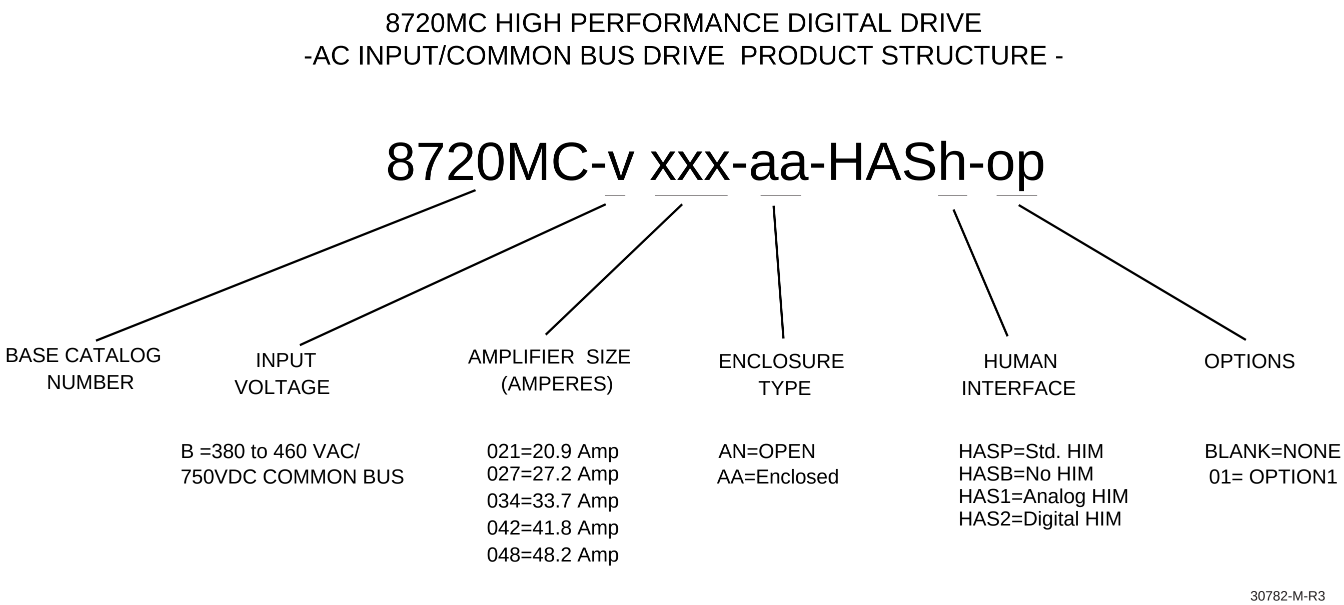


These five drive amplifiers range in output capacity from 21 to 48 amperes. They are equipped with 380 to 460V AC, 3 phase input capability in addition to the DC common bus input capability provided on all drive amplifiers.

In the non regenerative configuration, the DC bus terminals are brought out to interface to the A-B 1336 WB Dynamic Braking Module. In a situation where a high inertia drive load is decelerated rapidly, the motor returns energy to the 8720MC DC bus. To prevent unwanted DC bus over voltage trips, the 1336-WB Dynamic Braking Module senses the rising bus voltage and shunts the bus current through a shunt resistor connected to the 1336-WB. Under normal operation when the motor is under load, the 1336-WB essentially disconnects the shunt resistor. In this way the motor can be decelerated at its maximum allowable rate without causing a DC bus over voltage shut down.

The 8720MC drive amplifiers are equipped with either Sercos digital or standard analog command interfaces and can include an integrated human interface module (HIM). Drive configuration can be accomplished with the integrated HIM, a remote hand held HIM or a personal computer using Drive Explorer$_{TM}$; a Windows 95, NT or CE$_{TM}$ compatible drive configuration tool. Figure 1.3 shows the product structure of the 8720MC amplifiers for non line regenerative direct AC input applications.

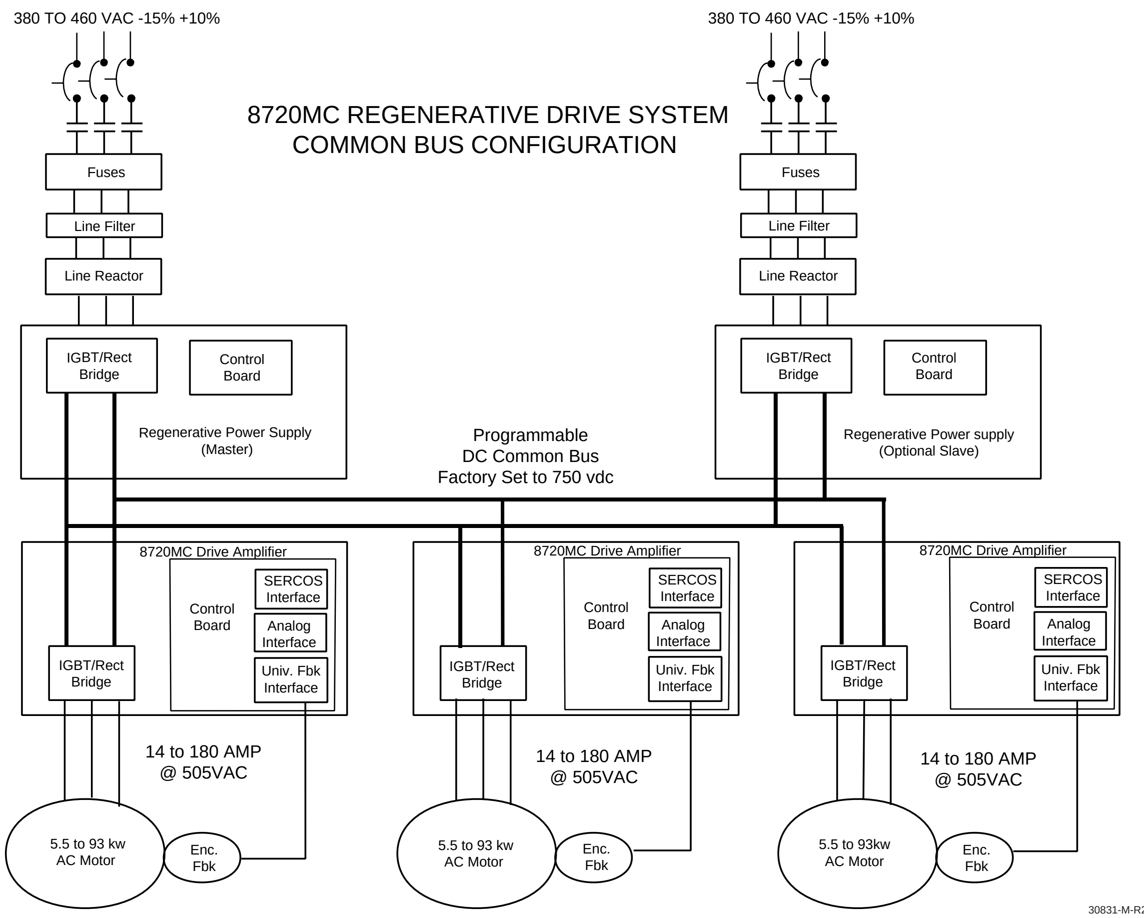
Figure 1.3
Product Structure of Non Line Regenerative Drives, Ratings 014 to 048



Common Bus Architecture and Product Structure

Applications involving multiple spindles or multiple power servos can benefit from the common bus architecture available with the 8720MC Drive. In this configuration, an 8720MC regenerative power supply (converter) produces a common 750 V DC bus, which can be used by multiple 8720MC drive amplifiers, as shown in Figure 1.4. This allows a single regenerative power supply to be used with multiple spindle or power servo drives, thereby enhancing the cost effectiveness of multiple drive applications.

Figure 1.4
8720MC Regenerative Drive System Common Bus Configuration



Key Features of the Common Bus Amplifiers

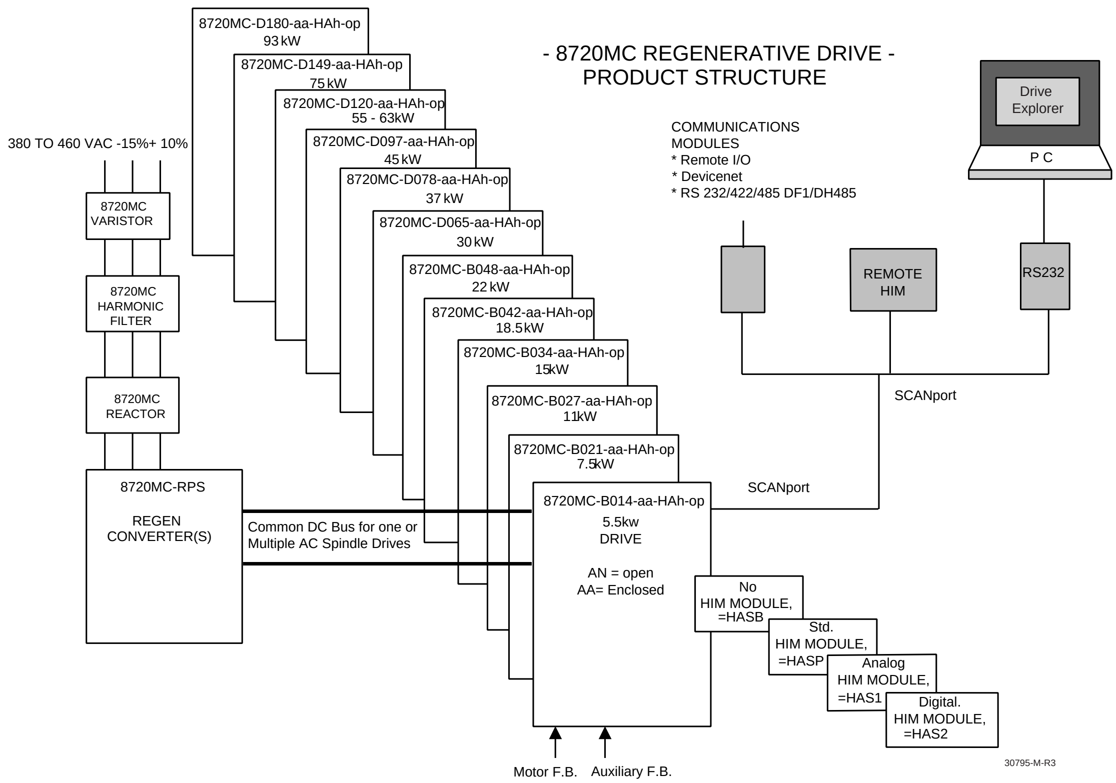
Key features of the twelve available common bus amplifiers include:

- Adjustable bus voltage, 750 V DC nominal
- 505V AC maximum RMS output voltage at maximum speed, 3 phase, +/- 500 Hz
- 12 sizes, 5.5 kW (7.5 hp), 13.9 amperes to 93 kW (125 hp), 180 amperes

Product Structure of the Line Regenerative Drive Amplifiers

The 8720MC Spindle Drive can be provided in an energy efficient line regenerative configuration. Figure 1.5, 1.6, and 1.7 illustrate the various regenerative amplifier configurations that are available when used in conjunction with the 8720MC Regenerative Power Supplies.

Figure 1.5
8720MC Line Regenerative Drive Amplifier Configuration



There are 6 DC input drives to 48 amps which are provided in the B chassis configuration. There are 2 DC input drives which are provided in the C chassis configuration. The remaining 4 DC input drives are provided in the D chassis configuration. Each drive is available in an open package or a Nema 1 enclosed package. There are four options for an integrally mounted human interface module called a HIM.

- The drives can be provided with a blank filler panel wherein a remote HIM module can be used for programming and manual operation.
- A integral programmer only HIM wherein only configuration and status monitoring can be performed.
- An analog HIM which includes a potentiometer and jog controls
- A digital HIM which has a digital speed control and jog controls

Figure 1.6
Product Structure of Line Regenerative Drives, Ratings 014 to 048 Amps i

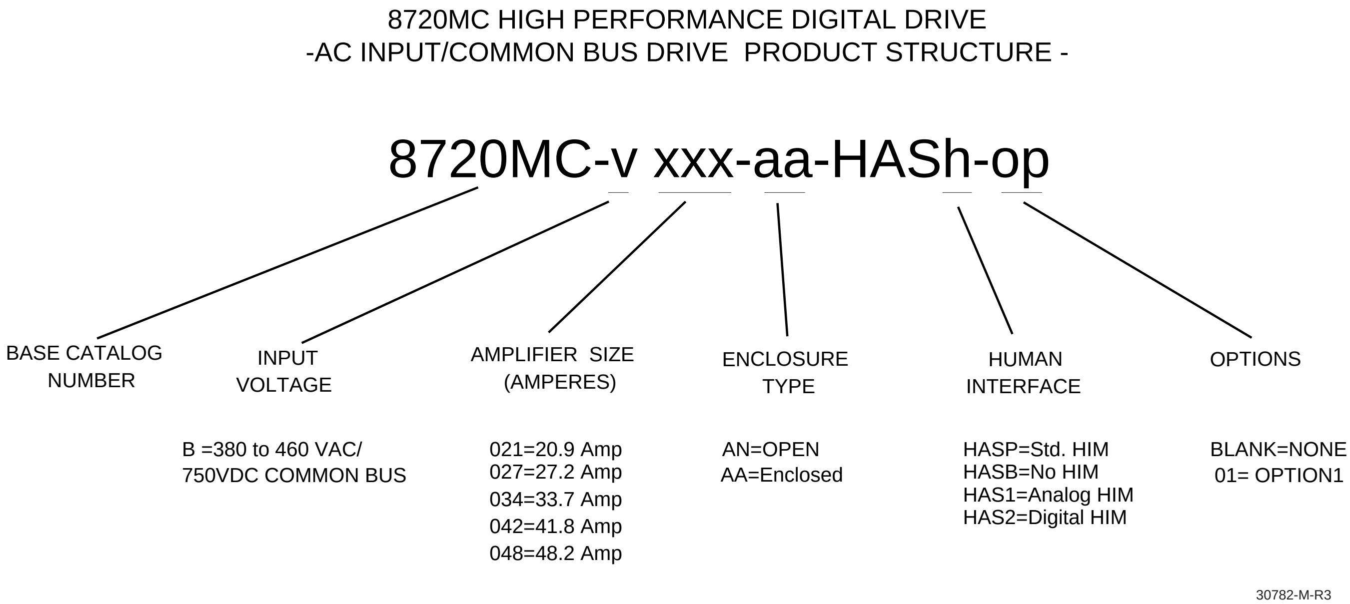
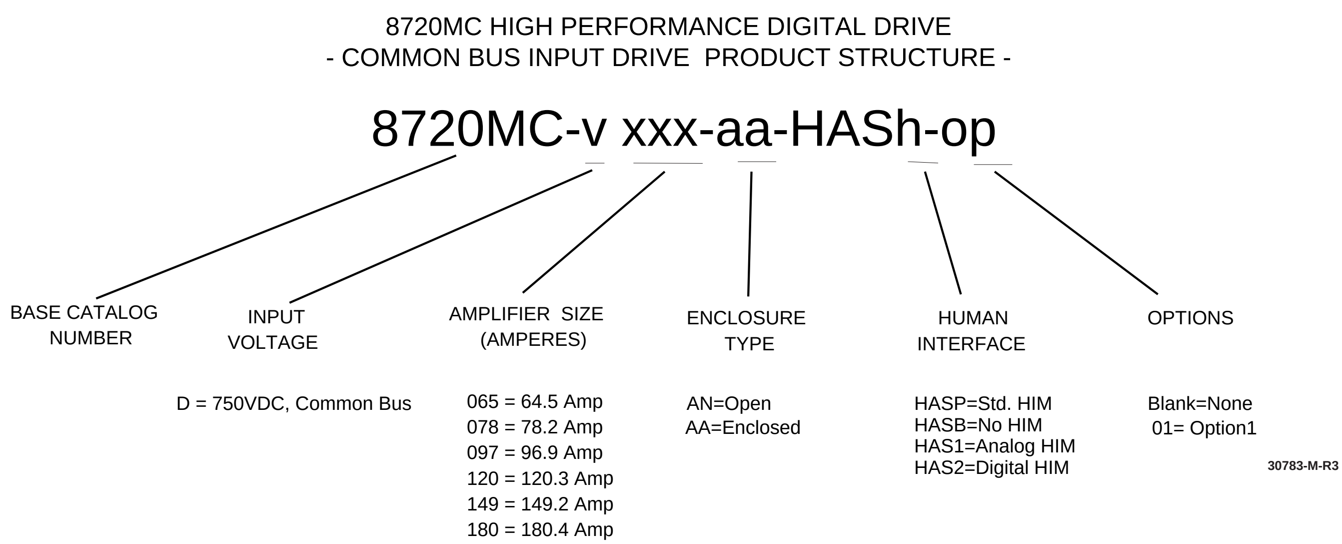


Figure 1.7
Product Structure of Line Regenerative Drives, Ratings 065 to 180 Amps

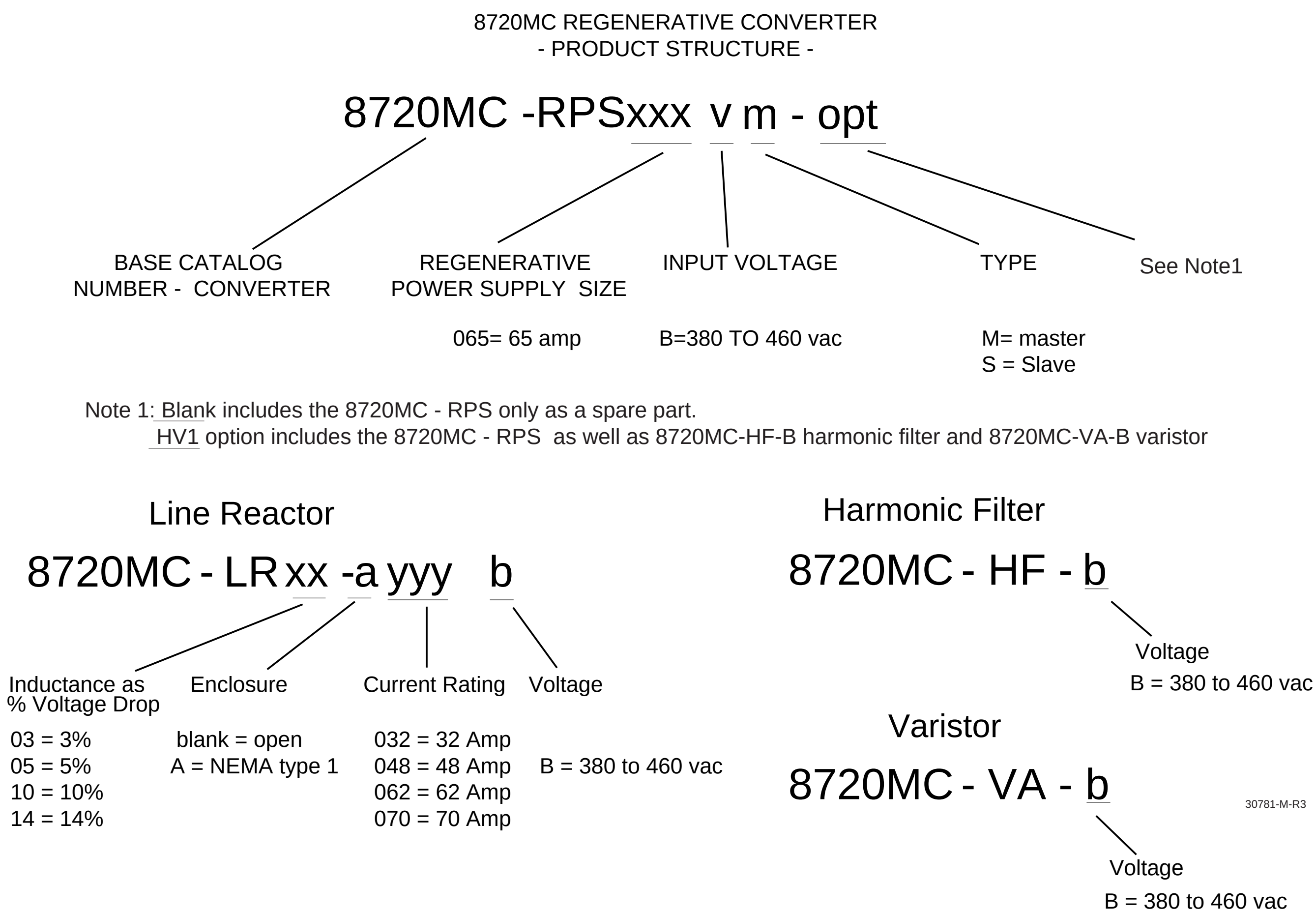


Regenerative Power Supplies

Product Structure of the 8720MC Regenerative Power Supply

For motors up to 37 kW (50 hp), the 8720MC – RPS065 is the standard choice for a regenerative power supply (also called regenerative converter). Designed for either 380 or 460V AC 3 phase input, this power supply provides a regulated and configurable DC bus voltage. When used with the 8720MC drive amplifiers, the bus voltage is factory set at 750V DC. The product structure of the 8720MC regenerative power supply is shown in Figure 1.8.

Figure 1.8
8720MC Regenerative Power Supply Product Structure



The HV1 Option for the 8720MC Regenerative Power Supply includes a harmonic filter and a varister. These are required separately mounted items. In addition a line reactor, sized to the load, must be placed in each incoming AC phase. The 8720MC-LR is an assembly consisting of 3 single phase line reactors on a common base. If CE compliance is a requirement for the application an additional filter is required. For details on this filter please see publication 8720MC-RM001B-US-P, Regenerative Power Supply User Manual.

Key Features of the 8720MC Regenerative Power Supply

Key features of the 8720MC Regenerative Power supplies are:

- 380 to 460V AC, +10%/-15%, 3 phase input voltage, 50/60 Hz, 45 kVA
- 64 amperes continuous output current, 96 amperes peak (1 min)
- Programmable bus voltage (nominal 750 V DC) with under and over voltage trip points
- Built in programmer allows display and adjustment of parameters, status monitoring of faults as well as reset of faults
- 4 segment display provides status monitoring of AC input current, AC input voltage, DC bus voltage, motor power, and % load
- Compact design provides small footprint
- Capable of supporting multiple common bus drive amplifiers
- -10 to 55 degrees C operating temperature, 5 to 95% humidity
- Diagnostic messages
- Run, fault, and fault reset discrete I/O
- Master/slave operation for parallel regenerative power supplies:
  - UL and CUL listed
  - CE marked to meet European requirements for low voltage and electromagnetic compatibility

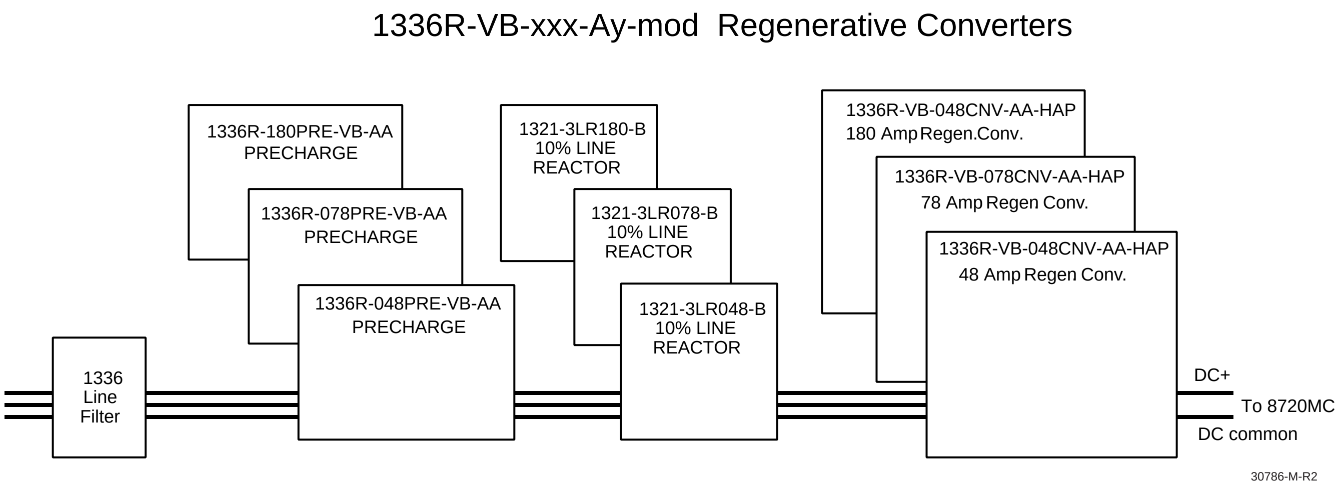
In addition to the 8720MC-RPS065 regenerative power supply, a line reactor is required for each incoming phase as well as a varistor, a harmonic filter, and a contactor.

The 8720MC-RPS is available in both master and slave configurations. You can double or triple the current capacity of the DC bus by interconnecting the master and slave control boards with ribbon cable and wiring their DC bus outputs in parallel. When the master unit is configured for master/slave operation, the master unit assures that the slave regenerative power supplies share the bus output so as to appear as a single x2 or x3 power supply. In this configuration, a master/slave 8720MC-RPS pair can control motors to 74 kw or 100 hp. In addition a single master and 2 slave units can provide up to 110 kw of continuous output power.

Product Structure of the 1336R Regenerative Power Supplies

As an alternative, the 1336R-VB048, -VB078, and -VB180 are available choices for regenerative power supplies. The product structure of the 1336R-VBxxx regenerative power supply (regenerative converter) is shown in Figure 1.9.

Figure 1.9
1336R Regenerative Power Supply Product Structure



Key Features of the 1336R Regenerative Power Supplies

Key features of the 1336R Regenerative Power supplies include:

- 380 to 460V AC, +10%/-15%, 3 phase input voltage, 48 to 62 Hz
- 52, 85 and 196 amperes continuous output current
- Programmable bus voltage (nominal 735 V DC) and overload trip points
- Built in programmer and display
- Separate pre-charge unit
- Capable of supporting multiple common bus drive amplifiers
- 0 to 55 degrees C operating temperature, 5 to 95% humidity

8720SM AC Spindle Motor Overview

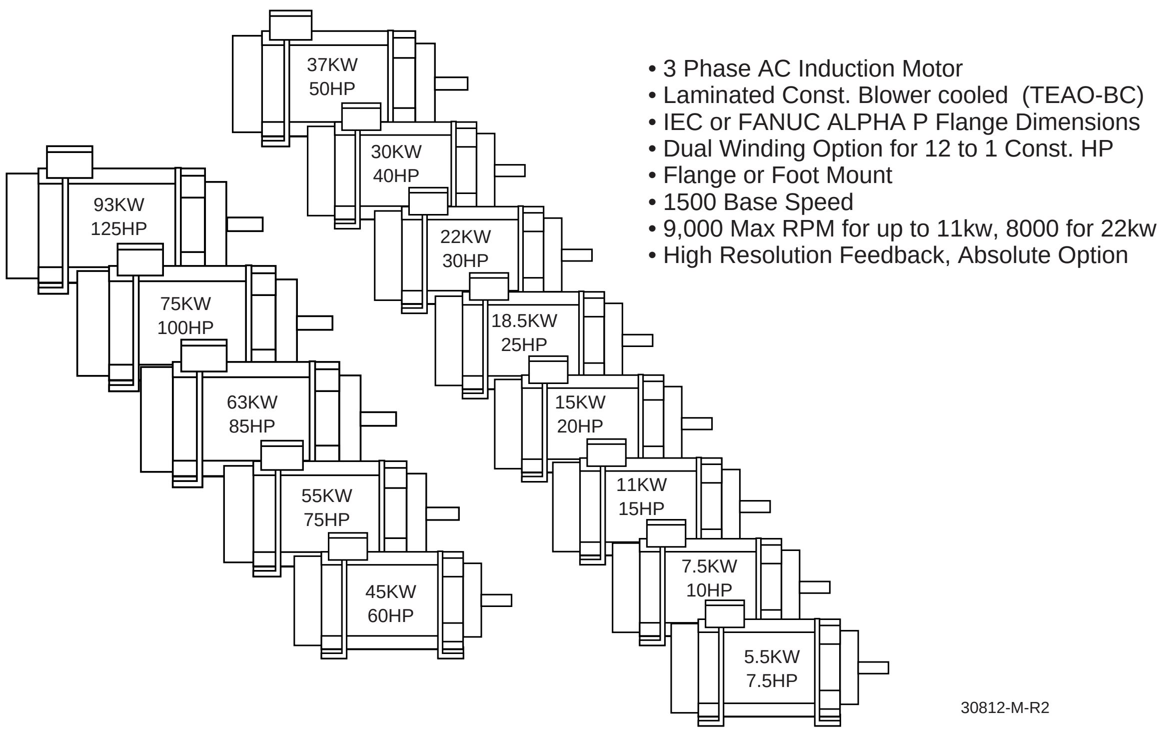
The 8720SM High Performance AC Motors have been specifically designed to meet the needs of modern high performance industrial machinery. To cover a wide variety of spindle motor requirements, both a standard single winding series of motors and a dual winding series are available. All standard motors are provided with precision steel bearings.

The standard motor includes an integrated high resolution single-turn, absolute feedback encoder. A multi-turn, absolute feedback encoder as well as a sinusoidal incremental encoder are available as options. The feedback devices assure precision servo performance for both spindle and power servo applications. Highly accurate position and velocity control is readily attainable.

Product Structure of the 8720SM High Performance AC Motors

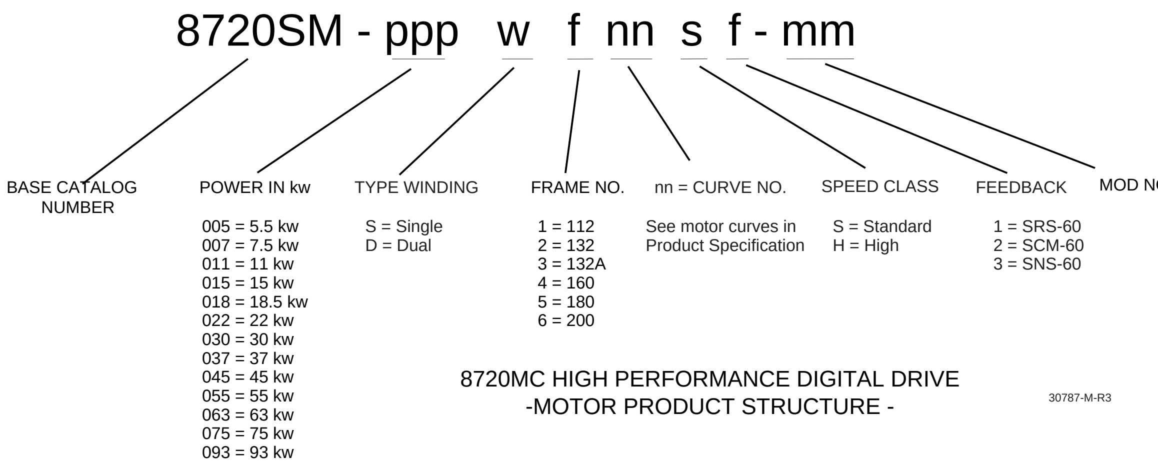
A family of thirteen standard AC induction motors ranging in power from 5.5 to 93 kW (7.5 to 125 hp) is available for operation with the 750 V DC bus provided by the 8720MC - RPS. Standard motor windings are also available for 460 V AC & 380 V AC input drive amplifiers. In addition several (wye/delta) dual wound motors are available for wide constant horsepower applications. See Publication 8720-SR001A-US-P, 8720MC Product Specification, for a complete listing of the available standard motors. Figures 1.10 and 1.11 show the product range and product structure of the AC spindle motors.

Figure 1.10
8720SM AC Spindle Motor Family



These high performance AC motors are available with one of three feedback device options. The standard offering is a single turn absolute high resolution encoder providing 4 million counts/rev of resolution. The other options are an incremental encoder, also with 4 million counts/rev of resolution. This option is used in applications where the 8720MC drive's A quad B encoder output is required. Also available is a multi-turn absolute encoder providing 4096 turns and 4 million counts/rev of resolution. Only the incremental "S3" option is available with the analog version.

Figure 1.11
8720SM AC Motor Product Structure



NOTE: The 132 frame has standard IEC dimensions for the mounting flange, 250 mm pilot diameter and 300 mm bolt circle. The 132A frame has A-B 1327AB compatible dimensions for the mounting flange with a 230 mm pilot diameter and a 265 mm bolt circle. All other dimensions are identical for these two offerings. Refer to Chapter 3 for detailed dimensions for all frames.

Key Features of the 8720SM AC Spindle Motors

Key features of the 8720SM AC spindle motors include:

- Compact design, laminated stack, enclosed construction, asynchronous, 4 pole AC induction motor
- Blower cooled with integral fan, air over design, IP55 protection
- Low rotor inertia for rapid acceleration and deceleration
- Integrally mounted 4 million count per revolution industrial single-turn absolute feedback encoder. Other options include an incremental 4 million count per revolution encoder or Multi-turn absolute 2 million count per revolution encoder
- High speeds – 9,000 RPM up to 11 kW, 8,000 RPM up to 22 kW with permanently greased steel bearings
- Precision balance
- Wide constant power range – single wound Y connected motors up to 6:1standard, 16 to 1 optional, dual wye/delta wound motors up to 12:1. Power range from 5.5 to 93 kW (5 to 125 hp)
- Five IEC standard frame sizes, 6 flange sizes, for flange or foot mount

- High Reliability – The 8720SM motors use field proven stator and rotor designs
- Windings for 460 vac input, 380 vac and 750 VDC input drives
- Custom windings – If the available standard windings do not provide the desired speed vs. kW or speed vs. torque performance curves, special requirements can be accommodated

Specifications

Chapter Objectives

Chapter 2 contains:

- specifications common to all 8720MC drive amplifiers and motors
- specifications for 5.5 to 37 kW motors with the 8720MC, 750V DC input, Drive Amplifier and 8720MC-RPS Regenerative Power Supply
- power and torque curves for 5.5 to 37 kW motors with the 8720MC, 750V DC Input, Drive Amplifier and 8720MC-RPS Regenerative Power Supply
- specifications for 45 to 93 kW motors with the 8720MC, 750V DC input, Drive Amplifier and the Master/Slave 8720MC-RPS Regenerative Power Supply
- power and torque curves for 45 to 93 kW motors with the 8720MC, 750V DC input, Drive Amplifier and the Master/Slave 8720MC-RPS Regenerative Power Supply
- specifications for 5.5 kW to 18.5 kW motors with the 8720MC, 460V AC input, Drive Amplifier.
- power and torque curves for 5.5 to 18.5 kW motors with the 8720MC, 460 VAC input, Drive Amplifier.
- specifications for 5.5 kW to 15 kW motors with the 8720MC, 380 V AC input, Drive Amplifier.
- power and torque curves for 5.5 to 15 kW motors with the 8720MC, 380V AC input, Drive Amplifier.
- specifications for 15 kW to 30 kW dual winding wide speed range motors with the 8720MC Drive Amplifier, 750V DC Input Drives, and 8720MC-RPS Regenerative Power Supply
- power and torque curves for 15 kW to 30 kW dual winding wide speed range motors with the 8720MC, 750V DC Input, Drive Amplifier and 8720MC-RPS Regenerative Power Supply

The following Conversion factors apply to the tables:

Torque: 1 newton meter = .7376 ft-lb = 8.85 in-lb

Inertia: 1 kg-meter^2 = 23.7 lb-ft^2 = 8.85 in-lb sec^2

Power: 1 horsepower = .746 kW

Weight 1 kg = 2.205 lbs

Common Specifications

Specifications Common to all 8720MC Drive Amplifiers and Motors

Some specifications are common to all the drive amplifiers and motors. Tables 2.1, 2.2., 2.3, and 2.4 provide a summary of these common specifications.

Table 2.1:
Common 8720MC 750 vdc Input Drive Amplifier Specifications

Specification Type	Units	Value
Frequency range	Hz	0 to +/- 500
2 pole AC motor speed range	RPM	0 to +/-30,000
Voltage at maximum speed	volts RMS	505
Max Velocity loop bandwidth (-3db)	Hz	100
Peak Current (1 minute)	% rated	150
Speed regulation	% max speed	.01% with 100% disturbance
Rated operating temp (Open)	deg C	0 to 50
Rated operating temp (enclosed)	deg C	0 to 40
Storage temperature	deg C	-40 to 70
Ambient humidity	%	5 to 95%
Altitude	meters (feet)	1000 (3300)
Vibration as displacement	in. @ 1G	.0006
Shock	G peak, 11ms	15
Agency Certification		UL/CUL/CE

Table 2.2:
Common Drive Amplifier I/O Specifications

Specification Type	Units	Value
24V DC input current - sourcing	mA	3.3 to 12
24V DC output current sourcing capability	mA	up to 75
Dry contact current capacity	amps	5 amps AC or DC
Dry contact voltage range	V DC (AC)	up to 30 V DC (250 AC)
24V DC registration input current	mA	5 to 15

Specification Type	Units	Value
24V DC registration input voltage range	V DC	17.5 to 38
5V DC registration input current	mA	5 to 15
5V DC registration input voltage	V DC	4 to 7.5
+/- 10V DC analog input resolution	Mv/LSB (bits)	1.25mv/LSB (14 bits)
+/- 10V DC analog output resolution	Mv/LSB (bits)	5mv/LSB (12 bits)
Available 22V DC +/-25% VDC output power	mA	120 mA continuous
Available 5V DC +/-10% VDC output power	mA	250 mA continuous
Sercos data rate	mbits/sec	2 or 4
ScanPort data rate	kbits/sec	125

Table 2.3:
Common 8720SM Motor Specifications

Specification Type	Units	Value
Rated ambient temperature	deg C	0 to 40
Storage temperature	deg C	-20 to 80
Environmental protection		IP 55
Agency certification		UL/CSA/CE
Available mounting methods		flange/foot

Table 2.4:
Motor Encoder Specifications - SNS-60 Sinusoidal, Incremental

Specification Type	Units	Value
Absolute accuracy	Arc seconds	20
number of sinusoidal periods per revolution	periods	1024
8720MC Drive position resolution	counts/rev	4 million
Input voltage range	V DC	7 to 12
Operating current without loads	mA	80
Available memory	bytes	128
Absolute turns counter (optional capability)	turns	N/A
Max recommended cable length	meters	90

Specifications for 5.5 to 37 kW - 8720SM Motors with 8720MC-RPS Regenerative Power Supply

Tables 2.5, 2.6, and 2.7 contain specifications for 5.5 to 37 kW motors with the 8720MC Drive Amplifier, 750V DC input, and 8720MC Regenerative Power Supply. Information is divided into three categories:

- Table 2.5 - motor specifications
- Table 2.6 - drive amplifier specifications
- Table 2.7 - line reactor specifications
- Table 2.8 - regenerative power supply specifications

Table 2.5:
Motor Specifications - 750vdc Input

8720MC Motor Specifications **when used with 750V DC Input Drives and 8720MC-RPS Regenerative Power Supply**

Motor Specifications	Units	Motor Data for Each Power Rating							
Motor catalog number	**8720SM-**	**005S1BA**	**007S1CA**	**011S1DA**	**015S2EA**	**018S2FA**	**022S2GA**	**030S4JA**	**037S4KA**
Motor frame number		DL1106	DL1108	DL1110	DL1307	DL1308	DL1310	DL1611	DL1613
Continuous power -	kW (hp)	5.5 (7.5)	7.5(10)	11(15)	15(20)	18.5(25)	22(30)	30(40)	37(50)
S6 - 50% duty - power	kW (hp)	7.5 (10)	10 (13.4)	15(20.1)	18(24.1)	22(29.5)	30(40.2)	37(49.6)	45(60.3)
1 minute peak power	kW (hp)	8.3 (11.1)	11.5(15.4)	16.5(22.1)	23(30.8)	28(37.5)	33(44.2)	45(60.3)	55(76.1)
Rated torque at base speed	N-M (lb-ft)	35(25.8)	48 (35.4)	70 (51.6)	96 (70.8)	118 (90)	140 (103.2	192 (141.5)	238 (175.4)
peak torque at base speed	N-M (lb-ft)	53 (39)	72 (53.1)	105 (77.4)	143 (105.5)	176 (129.8)	210 (154.9)	290 (213.4)	355 (261.8)
Base speed - rpm	rpm	1500	1500	1500	1500	1500	1500	1500	1500
Max speed - foot mount	rpm	9000	9000	9000	8000	8000	7400	6500	6500
Max speed - flange mount	rpm	9000	9000	9000	8000	8000	7400	6000	5800
Constant power speed range		4.1:1	5.5:1	4.4:1	4.1:1	4.3:1	4.2:1	4.0:1	3.9:1
Rotor inertia	kg-m^2 (lb-ft^2)	.0165 (.391)	.0222 (.527)	.0272 (.645)	.0809 (1.92)	.0977 (2.32)	.111 (2.63)	.176 (4.2)	.209 (4.9)
Rated continuous motor current at base speed	amps (RMS cont.)	13.5	20.3	26.8	33.4	41.4	48	63.1	76.1
S6 current at base speed	amps (RMS)	17.2	25.3	34.6	39.1	47.2	61.2	74.6	89.2
Peak current at base speed	amps (RMS)	18.7	27.9	37.6	46	57	66.5	88.5	107
Voltage at Base Speed	volts (RMS)	350	315	335	370	364	369	371	375
Voltage at max speed	volts (RMS)	505	505	505	505	505	505	505	505
Motor weight	kg (lbs)	75 (165)	91 (201)	102 (225)	131 (289)	150 (331)	163 (359)	226 (497)	272 (598)
Max radial bearing load	kg (lbs)	206 (455)	206(455)	206(455)	243 (535)	243 (535)	243 (535)	350 (770)	350 (770)

Table 2.6:
Drive Amplifier Specifications

***8720MC Drive Amplifier Specifications* for 750V DC Input 8720MC-RPS Regenerative Power Supply and 8720SM AC Motor**

Drive Amp. Specifications	**Units**	**Drive Amplifier Data for Each Power Rating**							
Motor catalog number	8720SM-	005S1BA	007S1CA	011S1DA	015S2EA	018S2FA	022S2GA	030S4JA	037S4KA
Rated continupous motor current at base speed	amps (RMS cont.)	13.5	20.3	26.8	33.4	41.4	48	63.1	76.1
Drive amplifier catalog no.	**8720MC-**	**B014**	**B021**	**B027**	**B034**	**B042**	**B048**	**D065**	**D078**
DC input current @750 Vdc	amps	8.9	12.1	16.9	23.3	28.4	33.4	44.1	53.8
Max cont. output power	kW (hp)	5.5 (7.5)	7.5 (10)	11 (15)	15 (20)	18.5 (25)	22 (30)	30 (40)	37 (50)
Max cont. output current	amps (RMS)	14	21	27	34	42	48	65	78
Drive amplifier frame		B	B	B	B	B	B	C	C
DC Bus Capacitance	micro farads	1350	1350	2150	2150	4300	4300	6450	6450
Rated operating temp. (open)	deg C	0 to 50	0 to 50	0 to 50	0 to 50	0 to 50	0 to 50	0 to 50	0 to 50
Weight	kg(lbs)	22.7 (50)	22.7 (50)	22.7 (50)	22.7 (50)	22.7 (50)	22.7 (50)	38.6 (85)	38.6 (85)

Table 2.7:
Line Reactor Specifications

***8720MC Line Reactor Specifications* for 750V DC Input Drives with 8720MC-RPS Regenerative Power Supply and 8720SM AC Motor**

Line Reactor Specifications	**Units**	**Line Reactor Data for Each Power Rating**							
Motor catalog number	8720SM-	005S1BA	007S1CA	011S1DA	015S2EA	018S2FA	022S2GA	030S4JA	037S4KA
Req. RPS continuous Input current	amps (RMS)	9	12	18	25	31	36	50	61
Drive amplifier catalog no.	8720MC-	B014	B021	B027	B034	B042	B048	D065	D078
Line Reactor Catalog No.	**8720MC-**	**LR03-032B**	**LR03-032B**	**LR03-032B**	**LR03-032B**	**LR05-048B**	**LR05-048B**	**LR10-062B**	**LR10-062B**
Max cont. current	amps (RMS)	32	32	32	32	48	48	62	62
Inductance	uH	850	850	850	850	800	800	1100	1100
Weight	kg(lbs)	17 (37.4)	17 (37.4)	17 (37.4)	17 (37.4)	21 (46.2)	21 (46.2)	27 (59.4)	27 (59.4)

Table 2.8:
8720MC-RPS Regenerative Power Supply Specifications

8720MC-RPS Regenerative Power Supply **Specifications when used with 750V DC Input Drives and 8720SM AC Motors**

8720MC-RPS Regen. P.S.	**Units**	**Power Supply Specifications**							
Motor catalog number	8720SM-	005S1BA	007S1CA	011S1DA	015-S2EA	018S2FA	022S2GA	030S4JA	037S4KA
Drive amplifier catalog number	8720MC-	B014	B021	B027	B034	B042	B048	D065	D078
Regen. P. S. catalog number	**8720MC-**	**RPS027BM**	**RPS027BM**	**RPS027BM**	**RPS027BM**	**RPS065BM**	**RPS065BM**	**RPS065BM**	**RPS065BM**
AC Input voltage +10/-15%	RMS Volts	380 to 460	380 to 460	380 to 460	380 to 460	380 to 460	380 to 460	380 to 460	380 to 460
Input frequency	Hz +/-3%	50/60	50/60	50/60	50/60	50/60	50/60	50/60	50/60
Input power factor		.98 or less	.98 or less	.98 or less	.98 or less	.98 or less	.98 or less	.98 or less	.98 or less
Required input KVA	kVA	7	10	14	20	24	29	39	49
Required input current	amps RMS	9	12	18	25	31	36	50	61
Required input 1 min current	amps RMS	14	19	27	37	46	55	74	92
Required output KVA	kVA	7	9	13	18	22	27	36	45
Required output current	amps DC	8.9	12.1	16.9	23.3	28.4	33.4	44.1	53.8
Required max current(1 min)	amps DC	13	18	27	36	45	53	73	90
Design Bus voltage	volts DC	750	750	750	750	750	750	750	750
Rated input KVA	kVA	20	20	20	20	50	50	50	50
Rated input current	amps RMS	28	28	28	28	65	65	65	65
rated input 1 min current	amps RMS	42	42	42	42	98	98	98	98
Rated output KVA	kVA	19	19	19	19	45	45	45	45
Rated output current	amps DC	27	27	27	27	64	64	64	64
Rated max output current (1 min)	amps DC	40.5	40.5	40.5	40.5	96	96	96	96
Operating Temperature	deg C	-10 to 55	-10 to 55	-10 to 55	-10 to 55	-10 to 55	-10 to 55	-10 to 55	-10 to 55
Storage temperature	deg C	-40 to 65	-40 to 65	-40 to 65	-40 to 65	-40 to 65	-40 to 65	-40 to 65	-40 to 65
Ambient humidity	%	5 to 95%	5 to 95%	5 to 95%	5 to 95%	5 to 95%	5 to 95%	5 to 95%	5 to 95%
Altitude	meters (feet)	1000 (3300)	1000 (3300)	1000 (3300)	1000 (3300)	1000 (3300)	1000 (3300)	1000 (3300)	1000 (3300)
Vibration	G	<1G @ 25Hz	<1G @ 25Hz	<1G @ 25Hz	<1G @ 25Hz	<1G @ 25Hz	<1G @ 25Hz	<1G @ 25Hz	<1G @ 25Hz
shock	G	<2G	<2G	<2G	<2G	<2G	<2G	<2G	<2G
weight	kg(lbs)	11 (24.3)	11 (24.3)	11 (24.3)	11 (24.3)	13.5 (29.8)	13.5 (29.8)	13.5 (29.8)	13.5 (29.8)

Curves for 5.5 to 37 kW - 8720SM Motors with 8720MC-RPS Regenerative Power Supply

Power and Torque Curves

The following power and torque curves contain data for 5.5 kW, 7.5kW, 11kW, 15kW, 18.5kW, 22kW, 30kW, and 37kW motors at 1500 RPM base speed.

Figure 2.1
5.5kW Motor

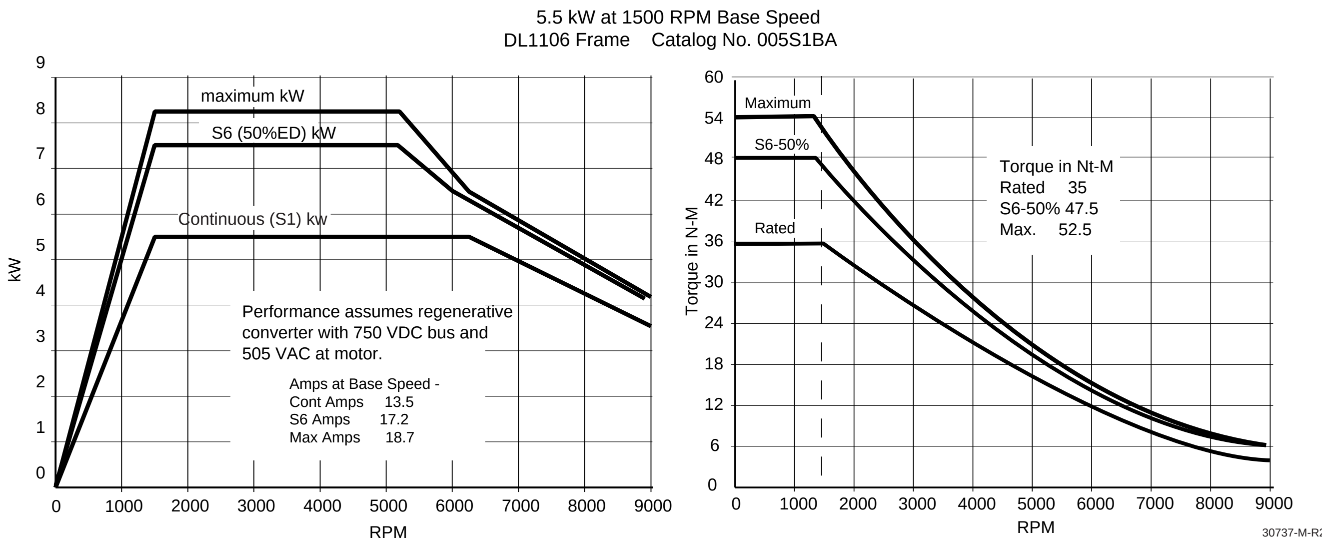


Figure 2.2
7.5kW Motor

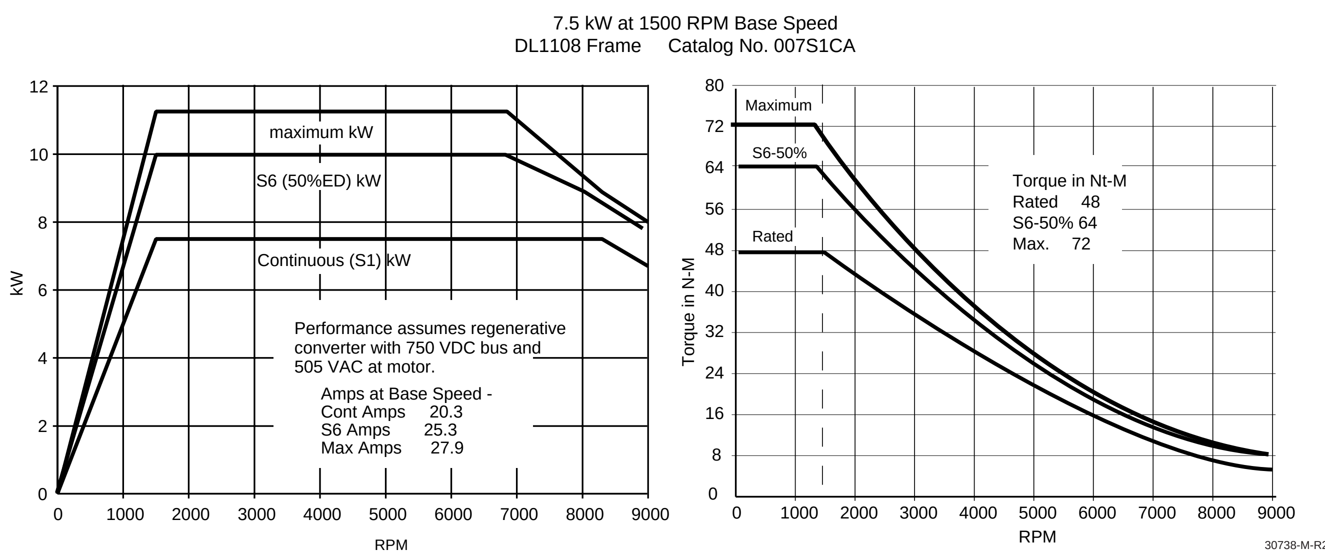


Figure 2.3 11Kw Motor

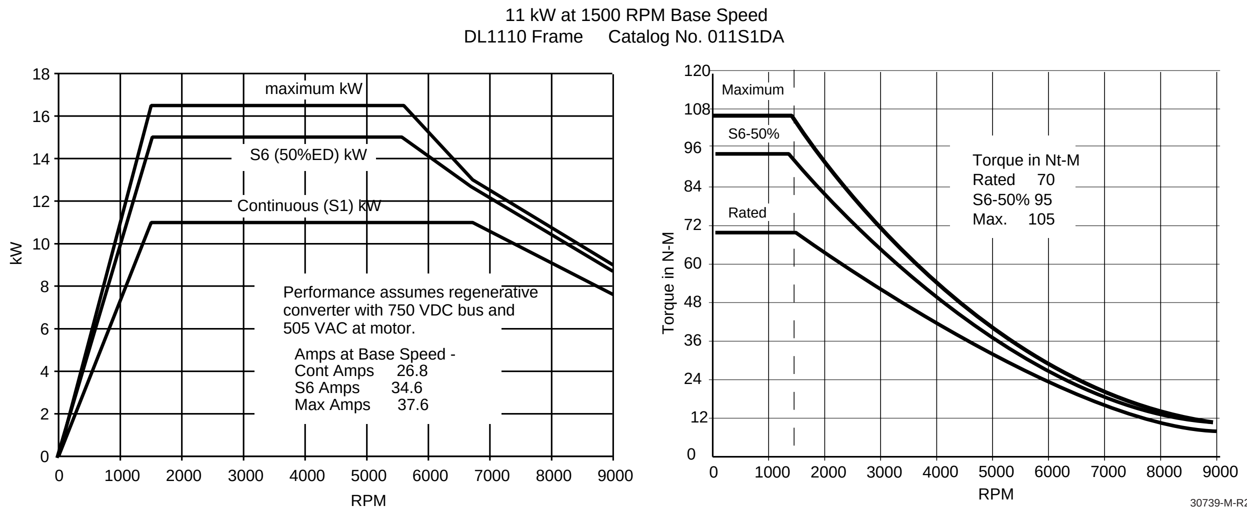


Figure 2.4 15kW Motor

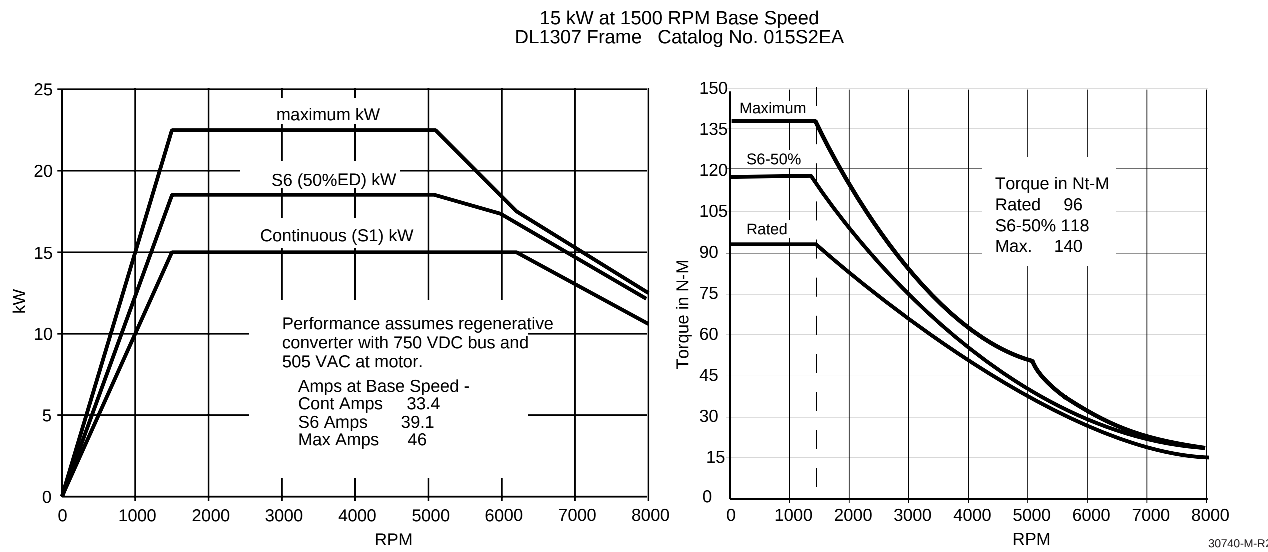


Figure 2.5 18.5kW Motor

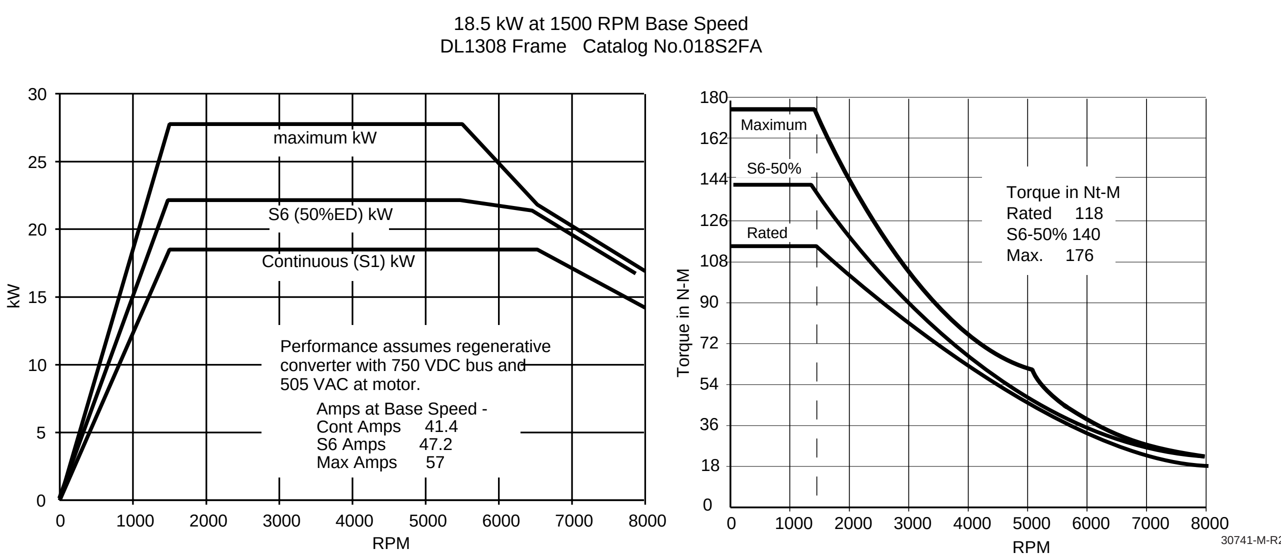


Figure 2.6 22.5kW Motor

22 kW at 1500 RPM Base Speed
DL1310 Frame Catalog No. 022S2GA

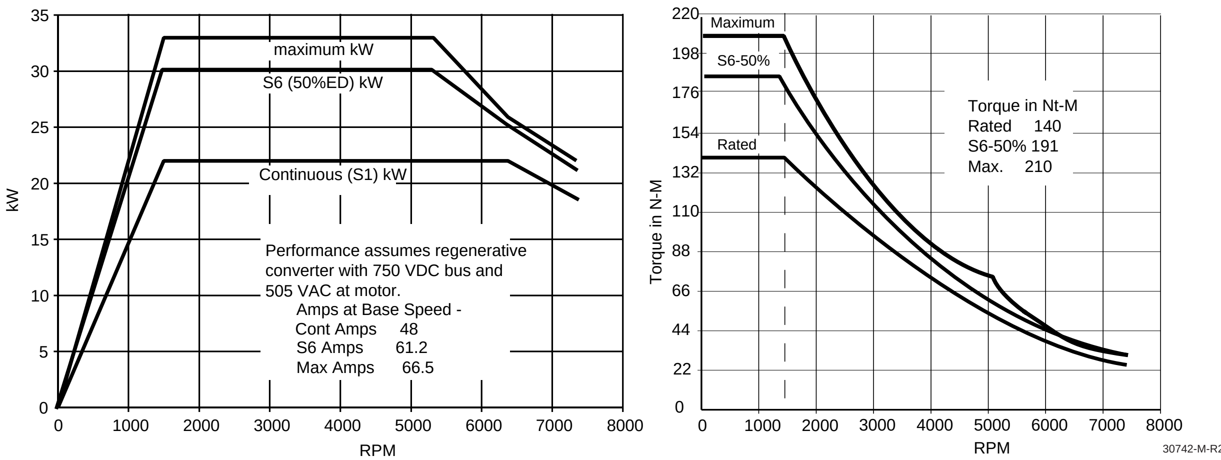


Figure 2.7 30kW Motor

30 kW at 1500 RPM Base Speed
DL1611 Frame Catalog No. 030S4JA

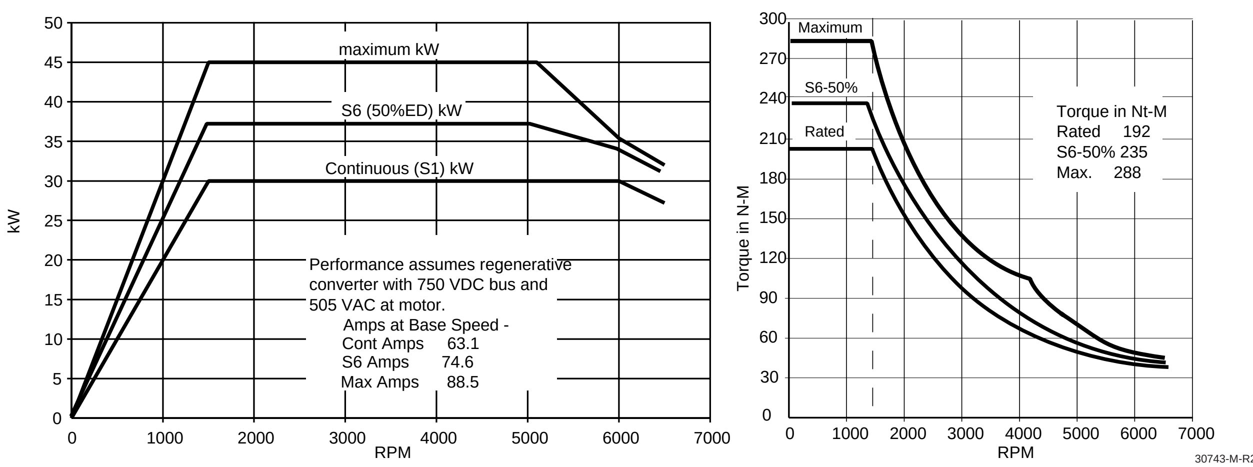
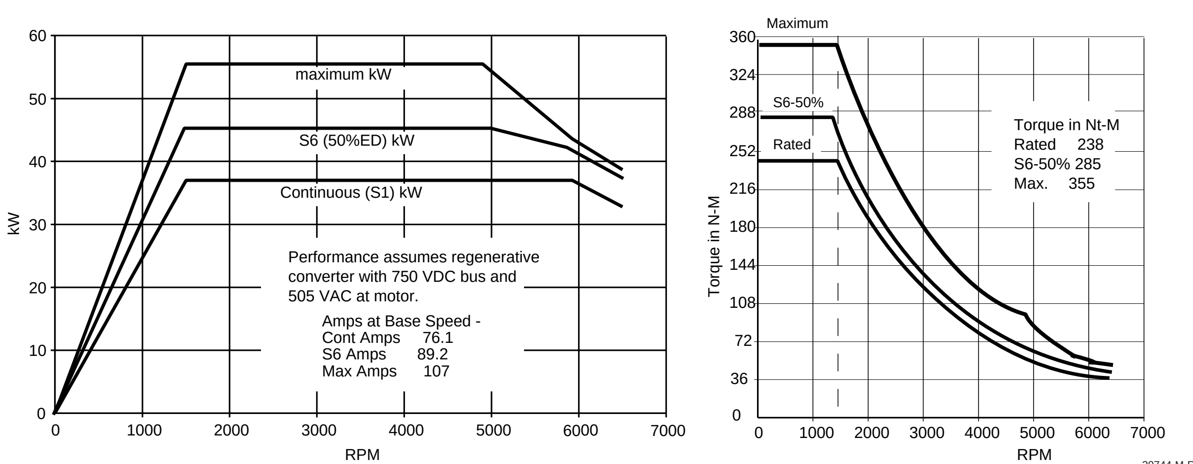


Figure 2.8 37kW Motor

37 kW at 1500 RPM Base Speed
DL1613 Frame Catalog No. 037S4KA



Specifications for 45 To 93 kW - 8720SM Motors with 8720MC-RPS Master and Slave Regenerative Power Supplies

Tables 2.8, 2.9, and 2.10 contain specifications for 45 to 93 kW motors with the 8720MC Drive Amplifier, 750V DC input, and 8720MC-RPS Regenerative Power Supplies. Information is divided into three categories:

- Table 2.9 - motor specifications
- Table 2.10 - drive amplifier specifications
- Table 2.11 - regenerative power supply specifications
- Table 2.12 - Line Reactor Specification

Table 2.9:
Motor Specifications

8720SM Motor Specifications - **for 750V DC Input Drives with Master/Slave Regenerative Power Supplies**

Motor Specifications	Units	Motor Data for Each Power Rating				
Motor catalog number	**8720SM-**	**045S5NA**	**055S5PA**	**063S5QA**	**075S6SA**	**093S6TA**
Motor frame number		DL1811	DL1813	DL1815	DL2010	DL2012
Continuous power -	kW (hp)	45 (60)	55 (73.7)	63 (84.4)	75(100.5)	93 (125)
S6 - 50% duty -	kW (hp)	55 (73.7)	63 (84.4)	76 (101.8)	92 (123.3)	110(147.4)
1 minute peak -	kW (hp)	68 (91.1)	82 (110)	95 (127.3)	112 (150)	140 (187.7)
Rated torque at base speed	N-m (lb-ft)	287 (211.5)	350 (258)	400 (294.8)	480 (353.8)	590 (434.8)
peak torque at base speed	N-M (lb-ft)	430 (317.2)	525 (387.24)	600 (442)	720 (531.1)	890 (656.5)
Base speed - rpm	rpm	1500	1500	1500	1500	1500
Max speed - foot mount	rpm	6500	5000	5000	5000	4500
Max speed - flange mount	rpm	6000	5000	5000	4500	4000
Constant power speed range		3.7:1	3.3:1	3.3:1	3.3:1	3.0:1
Rotor inertia	kg-m^2 (lb-ft^2)	.35 (8.3)	.409 (9.7)	.468 (11.1)	.885 (21.0)	1.01 (24.0)
Rated continuous motor current at base speed	amps (RMS cont.)	93	116	117.5	137	176
S6 current at base speed	amps (RMS)	110	129	135	161	200
Peak current at base speed	amps (RMS)	131	161	163	188	242
Voltage at Base Speed	volts (RMS)	375	370	418	430	410
Voltage at max speed	volts (RMS)	505	505	505	505	505
Motor weight	kg (lbs)	297 (655)	324 (714)	350 (772)	453 (999)	478 (1054)
Max radial bearing load	kg (lbs)	390 (860)	390 (860)	390 (860)	422 (930)	422 (930)

Table 2.10:
Drive Amplifier Specifications

***8720MC Drive Amplifier Specifications -* for 750V DC Input 8720MC-RPS Regenerative Power Supplies and 8720SM AC Motor**

Drive Amplifier Specifications	**Units**	**Drive Amplifier Data for Each Power Rating**				
Motor catalog number	8720SM-	045S5NA	055S5PA	063S5QA	075S6SA	093S6TA
Rated Continuous motor current at base speed	amps (RMS cont.)	93	116	117.5	137	176
Drive amplifier catalog number	**8720MC-**	**D097**	**D120**	**D120**	**D149**	**D180**
DC input current @ 750 V DC	amps	65.7	80.9	92.6	111.1	135.3
Max continuous output power	kW (hp)	45 (60.3)	63 (84.4)	63 (84.4)	75 (100.5)	93 (125)
Max continuous output current	amps	97	120	120	149	180
DC Bus Capacitance	Micro Farads	9000	9000	9000	9000	12000
Drive amplifier frame		D	D	D	D	D
Weight	kg(lbs)	108.9 (240)	108.9 (240)	108.9 (240)	108.9 (240)	108.9 (240)

Table 2.11:
8720MC Master/Slave Regenerative Power Supply Specifications

***Specifications for 8720MC-RPS Master and Slave(s) Regenerative Power Supplies* with 750 vdc Drives and 8720SM AC Motors**

8720MC-RPS065 Regen. P.S.	**Units**	**Power Supply Specifications**				
Motor catalog number	8720SM-	045S5NA	055S5PA	063S5QA	075S6SA	093S6TA
Drive amplifier catalog number	8720MC-	D097	D120	D120	D149	D180
Regen. Power supply catalog number	**8720MC-RPS065**	**BM and BS**	**BM and BS**	**BM and BS**	**BM and BS**	**BM & quan 2 BS**
AC input voltage AC+10/-15%	RMS volts	380 to 460	380 to 460	380 to 460	380 to 460	380 to 460
Input frequency	Hz +/-3%	50/60	50/60	50/60	50/60	50/60
Input power factor		.98	.98	.98	.98	.98
Required input KVA	kVA	56.5	72.4	83.6	99.5	122.5
Required input current	amps RMS	71	91	105	125	154
Required input 1 min current	amps RMS	106.5	136.5	157.5	187.5	231
Required output KVA	kVA	49.3	60.6	69.4	83.2	101.9
Required output current	amps DC	65.7	80.8	92.5	110.9	135.9
Required max current (1 min)	amps DC	98	121	139	166	204
Design Bus voltage	volts DC	750	750	750	750	750
Rated input KVA	kVA	100	100	100	100	150
Rated input current	amps RMS	130	130	130	130	195
rated input 1 min current	amps RMS	196	196	196	196	292

***Specifications for 8720MC-RPS Master and Slave(s) Regenerative Power Supplies* with 750 vdc Drives and 8720SM AC Motors**						
Rated output KVA	kVA	90	90	90	90	135
Rated output current	amps DC	128	128	128	128	192
Rated max output current (1 min)	amps DC	192	192	192	192	288
Operating Temperature (open)	deg C	0 to 50	0 to 50	0 to 50	0 to 50	0 to 50
Operating Temperature (Nema1)	deg C	0 to 40	0 to 40	0 to 40	0 to 40	0 to 40
Storage temperature	deg C	-40 to 85	-40 to 85	-40 to 85	-40 to 85	-40 to 85
Ambient humidity	%	5 to 95%	5 to 95%	5 to 95%	5 to 95%	5 to 95%
Altitude	meters (feet)	1000 (3300)	1000 (3300)	1000 (3300)	1000 (3300)	1000 (3300)
Shock	G peak for 11 ms	15	15	15	15	15
Vibration	mm (in) displacement at 1g	.152 (.0006)	.152 (.0006)	.152 (.0006)	.152 (.0006)	.152 (.0006)
Weight	kg(lbs)	38.6 (85)	108.9 (240)	108.9 (240)	108.9 (240)	108.9 (240)

Table 2.12: 8720MC Line Reactor Specifications

***8720MC Line Reactor Specifications* for 750V DC Input Drives with Multiple 8720MC-RPS Regen Power Supplies and 8720SM AC Motor**						
Line Reactor Specifications	**Units**	**Line Reactor Data for Each Power Rating**				
Motor catalog number	8720SM-	045S5NA	055S5PA	063S5QA	075S6SA	093S6TA
Req. RPS continuous Input current	amps RMS	71	91	105	125	154
Drive amplifier catalog no.	8720MC-	D097	D120	D120	D149	D180
Line Reactor Catalog No.	**8720MC-**	**LR05-048B**	**LR05-048B**	**LR10-062B**	**LR14-070B**	**LR10-062B**
Number of Reactor Assemblies Req	quantity	2	2	2	2	3
Max cont. current	amps RMS	48	48	62	70	62
Inductance	uH	800	800	1100	1200	1100
Weight	kg (lbs)	21 (46.2) each	21 (46.2) each	27 (59.4) each	38 (83.8) each	27 (59.4) each

Because of the larger current requirements for motors from 45 to 75 kw a master 37 kw regenerative power supply (RPS) and a slave 37 kw RPS are required . A master 37 kw RPS and two slave 37 kw RPS units are required for the 93 kw motor. Each master or slave RPS requires its own line reactor, harmonic filter and varister. The master and slave RPS units are designed to share the current loads equally so incoming AC fuses and wiring should be sized accordingly.

Curves for 45 to 93 kW 8720SM Motors with 8720MC Regenerative Power Supply 750 vdc Input

Power and Torque Curves

The following power and torque curves contain data for 45 kW, 55kW, 63kW, 75kW, and 93kW motors at 1500 RPM base speed.

Figure 2.9
45kW Motor

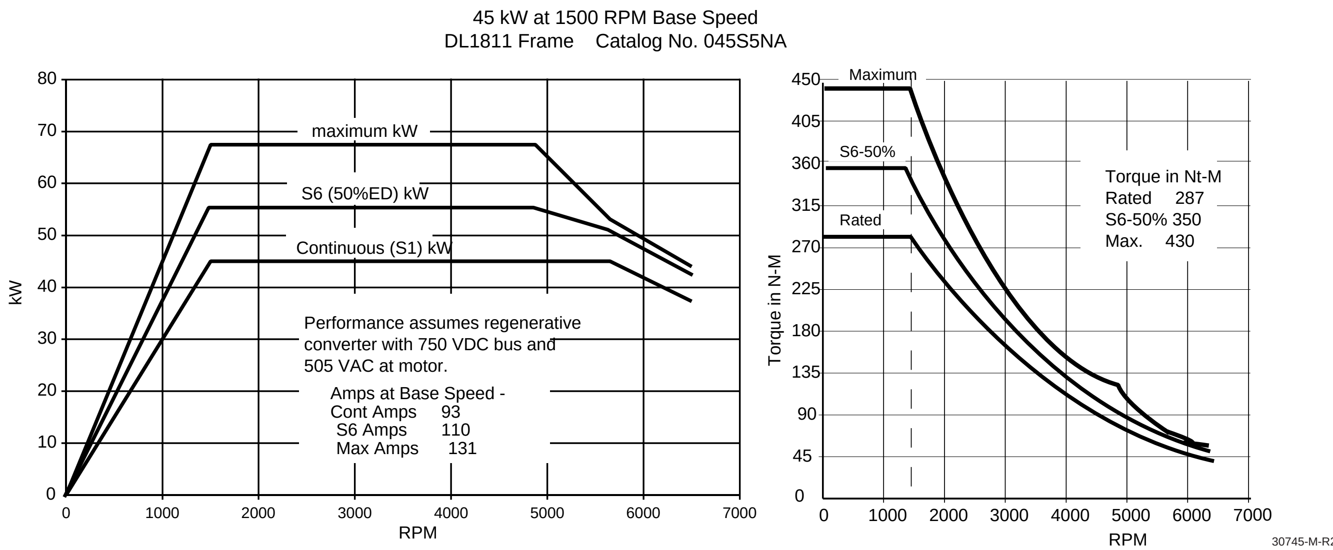


Figure 2.10
55kW Motor

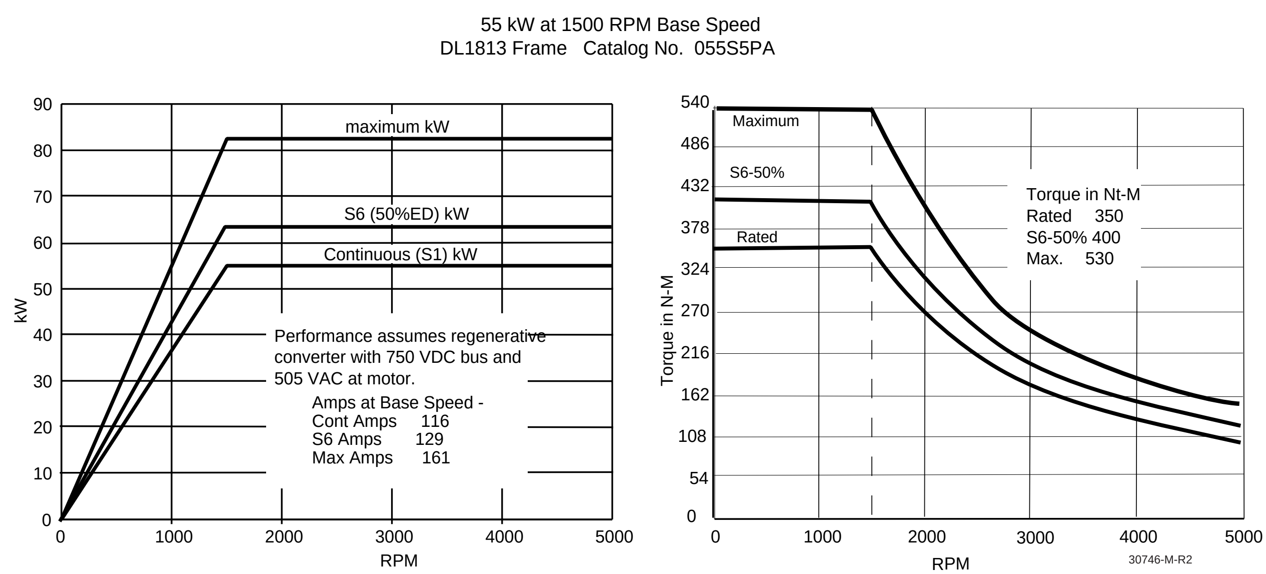


Figure 2.11 63kW Motor

63 kW at 1500 RPM Base Speed
DL1815 Frame Catalog No. 063S5QA

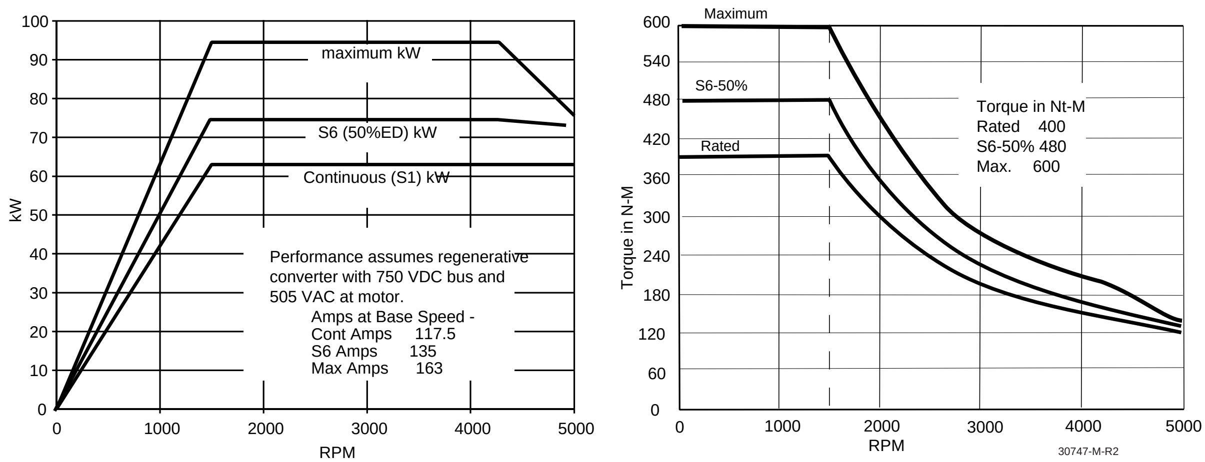


Figure 2.12 75kW Motor

75 kW at 1500 RPM Base Speed
DL2010 Frame Catalog No. 075S6SA

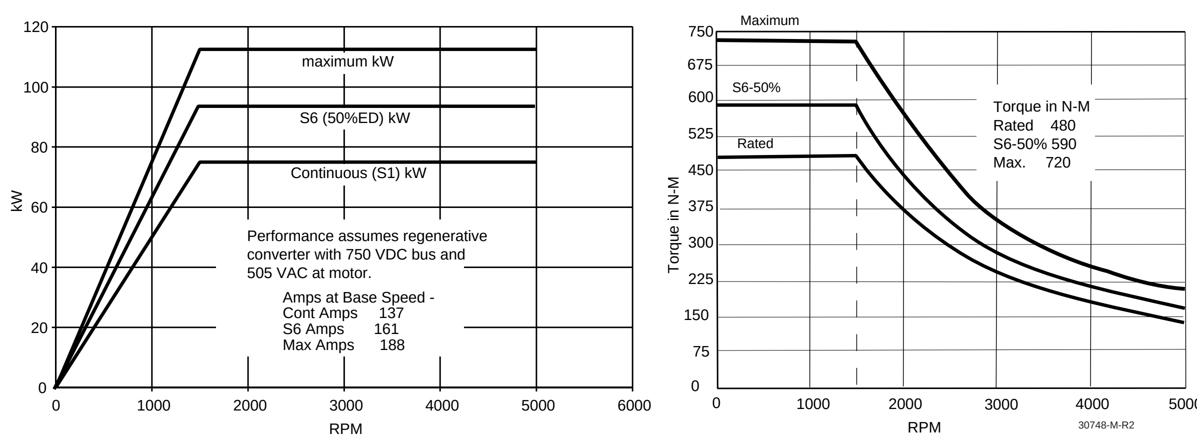
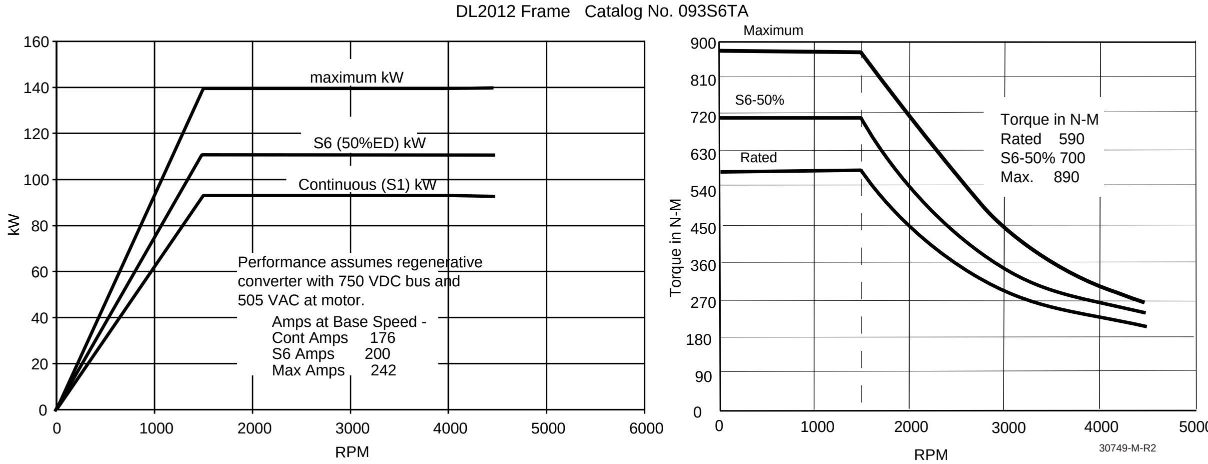


Figure 2.13 93kW Motor

93 kW at 1500 RPM Base Speed
DL2012 Frame Catalog No. 093S6TA



Specifications for 5.5 to 22 kW - 8720SM Motors with 460V AC Input

Tables 2.13 and 2.14 contain specifications for 5.5 to 18.5 kW motors with the 8720MC Drive Amplifier operating with 460V AC input drives. Information is divided into two categories:

- Table 2.13 - motor specifications
- Table 2.14 - drive amplifier specifications

Table 2.13:
Motor Specifications

8720SM Motor Specifications **for 460V AC Input Drives**

Motor Specifications	Units	Motor Data for Each Power Rating				
Motor catalog number	**8720SM-**	**005S1BB**	**007S1CB**	**011S1DB**	**015S2EB**	**018S2FB**
Motor frame number		DL1106	DL1108	DL1110	DL1307	DL1308
Continuous power -	kW (hp)	5.5 (7.5)	7.5(10)	11(15)	15(20)	18.5(25)
S6 - 50% duty -	kW (hp)	7.5 (10)	10 (13.4)	15(20.1)	18(24.1)	22(29.5)
1 minute peak -	kW (hp)	8.3 (11.1)	11.5 (15.4)	16.5(22.1)	23(30.8)	28(37.5)
Rated Torque at Base Speed	N-m (lb-ft)	35 (25.8)	48 (35.4)	70 (51.7)	96 (70.8)	118 (87)
Peak Torque at Base Speed	N-m (lb-ft)	53 (39.1)	72 (53.1)	105 (77.4)	143 (105.5)	177 (130.5)
Base speed - rpm	rpm	1500	1500	1500	1500	1500
Max speed S series	rpm	9000	9000	9000	8000	8000
Constant power speed range		5.8:1	6:1	4.5:1	4.3:1	3.9:1
Rotor inertia	$kg\text{-}m^2$ ($lb\text{-}ft^2$)	.0165 (.392)	.0222 (.528)	.0272 (.645)	.0809 (1.92)	.0977 (2.32)
Rated continuous motor current at base speed	amps (RMS cont.)	19.3	26.4	32.3	41.5	47.1
S6 current at base speed	amps (RMS)	25	33	42	49	54
Peak current at base speed	amps (RMS)	27.5	37	46	58	65
Voltage at Base Speed	volts (RMS)	245	243	278	297	320
Voltage at max speed	volts (RMS)	420	420	420	420	420
Motor weight	kg (lbs)	75 (165)	91 (201)	102 (225)	131 (289)	150 (331)
Max radial bearing load	kg (lbs)	206(455)	206(455)	206(455)	243 (535)	243 (535)

**Table 2.14:
Drive Amplifier Specifications**

***8720MC Drive Amplifier Specifications* for 460 V AC Input Drives**						
Drive Amplifier Specifications	**Units**	**Drive Amplifier Data for Each Power Rating**				
Motor catalog number	8720SM-	005S1BB	007S1CB	011S1DB	015S2EB	018S2FB
Rated motor current at base speed	amps (RMS cont.)	19.3	26.4	32.3	41.5	47.1
Drive amplifier catalog number	**8720MC-**	**B021**	**B027**	**B034**	**B042**	**B048**
AC input voltage	volts (RMS)	460	460	460	460	460
AC input current	amps (RMS)	22	28	35	43	49
Rated Input KVA	KVA	18	23	29	35	40
Max continuous output power	kW (hp)	5.5 (7.5)	7.5 (10)	11 (15)	15 (20)	18.5 (25)
Max continuous output current	amperes	21	27	34	42	48
Rated output KVA	KVA	15	20	35	43	49
DC Bus Capacitance	Micro Farads					
Drive amplifier frame		B	B	B	B	B
Weight	kg(lbs)	22.7 (50)	22.7 (50)	22.7 (50)	22.7 (50)	22.7 (50)

Curves for 5.5 to 22 kW - 8720SM Motors with 460V AC Input

Power and Torque Curves

The following power and torque curves contain data for 5.5 kW, 7.5kW, 11kW, 15kW, and 18.5kW motors, 1500 RPM base speed, motors wound for operation with 460 vac input drive amplifiers.

Figure 2.14 5.5 Kw Motor with 460 vac Input

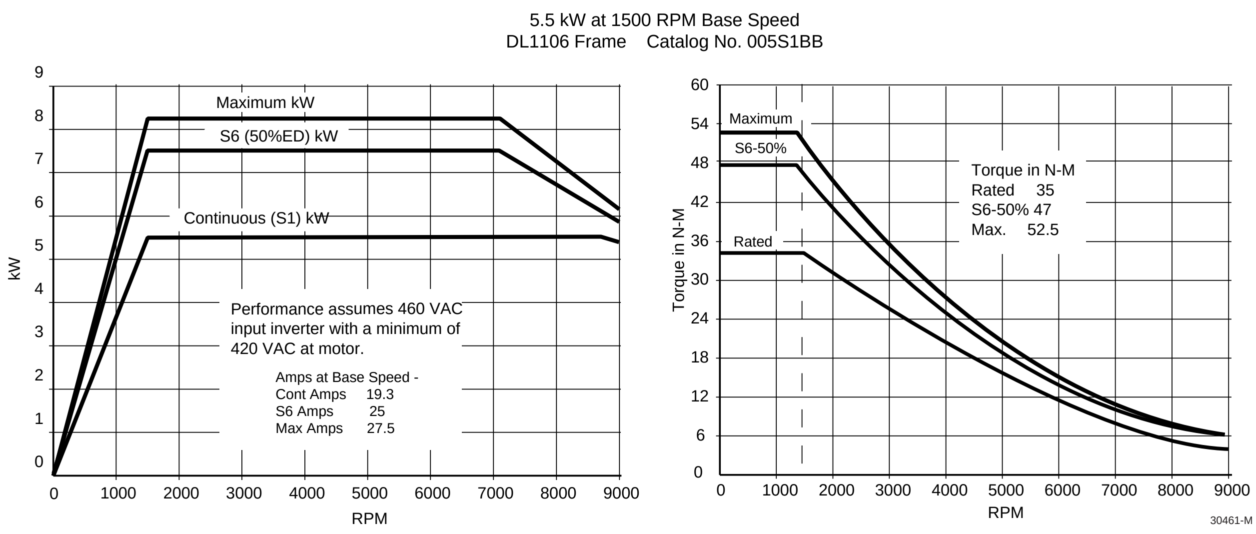


Figure 2.15 7.5 Kw Motor with 460 vac Input

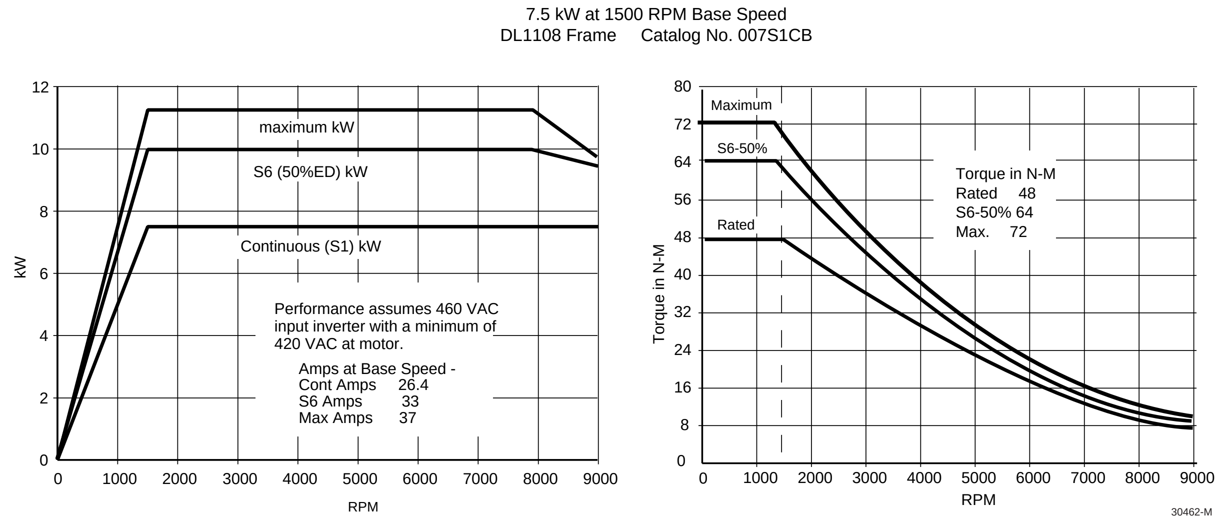


Figure 2.16 11Kw Motor with 460 vac Input

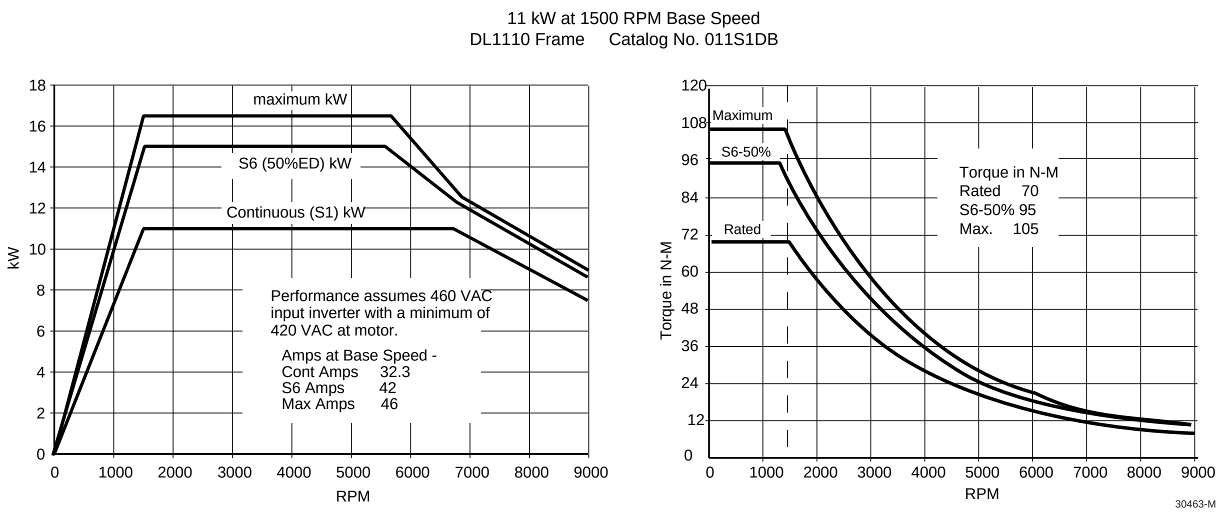


Figure 2.17 15 Kw Motor with 460 vac Input

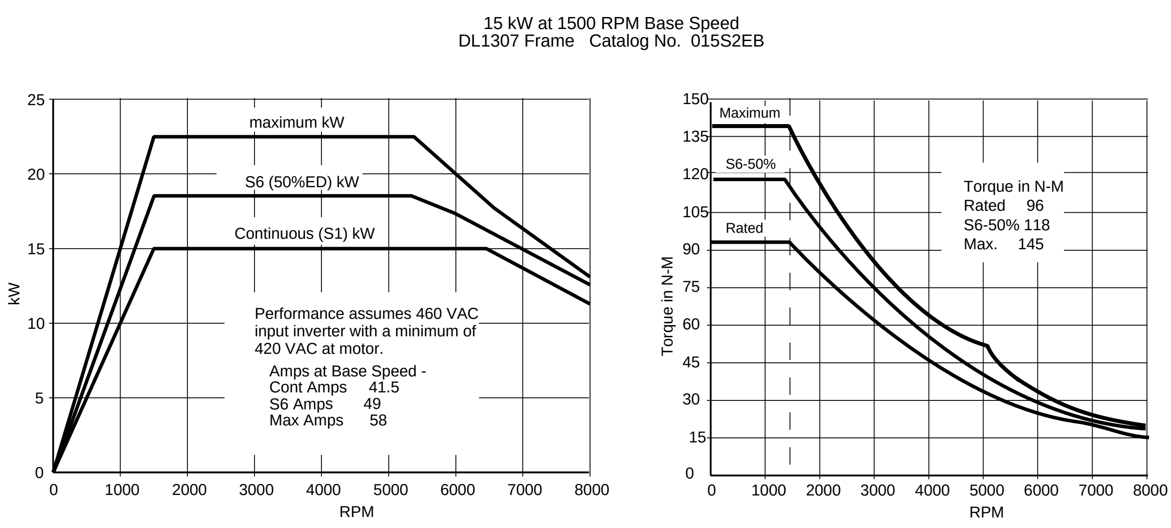
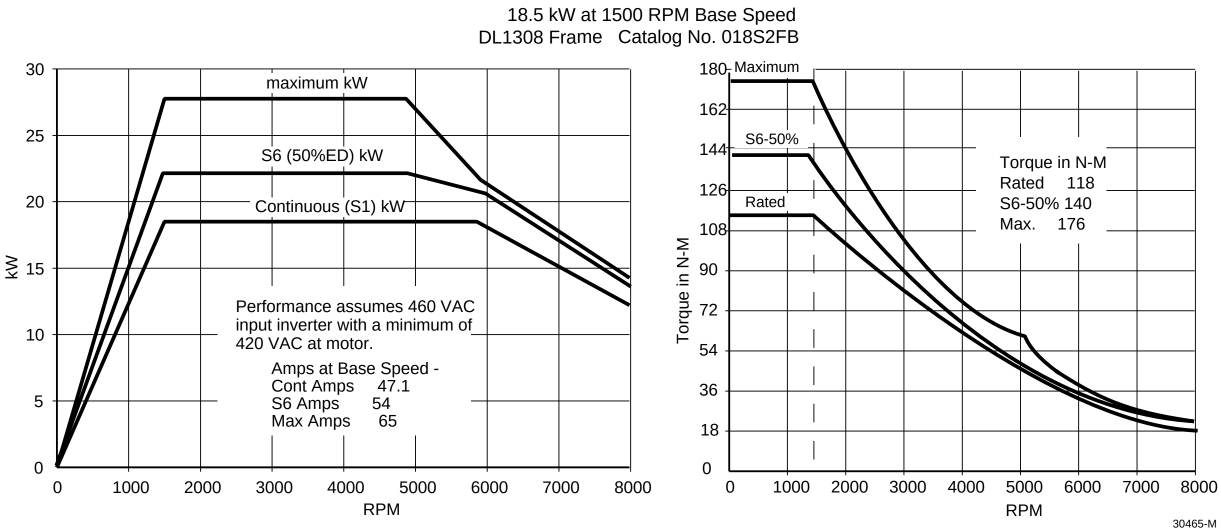


Figure 2.18 18.5 Kw Motor with 460 vac Input



Specifications for 380V AC Input Drives

Tables 2.15 and 2.16 contain specifications for 5.5 to 15 kW motors with the 8720MC Drive Amplifier and 380V AC input drives. Information is divided into two categories:

- Table 2.15 - motor specifications
- Table 2.16 - drive amplifier specifications

Table 2.15: Motor Specifications

***8720SM AC Motor Specifications* for 380 V AC Input Drives**

Motor Specifications	Units	Motor Data for Each Power Rating			
Motor catalog number	8720SM-	**005S1BC**	**007S1CC**	**011S1DC**	**015S2EC**
Motor frame number		DL1106	DL1108	DL1110	DL1307
Continuous power -	kW (hp)	5.5 (7.5)	7.5(10)	11(15)	15(20)
S6 - 50% duty -	kW (hp)	7.5 (10)	10 (13.4)	15(20.1)	18(24.1)
1 minute peak -	kW (hp)	8.3 (11.1)	11.5 (15.4)	16.5(22.1)	23(30.8)
Rated torque at base speed	N-m (ft-lb)	35 (25.8)	48 (35.4)	70 (51.7)	96 (70.8)
Peak Torque at Base Speed	N-m (lb-ft)	53 (39.17)	72 (53.1)	105 (77.4)	142 (104.7)
Base speed - rpm	rpm	1500	1500	1500	1500
Max speed S series	rpm	9000	9000	9000	8000
Constant power speed range		4.1:1	4.3:1	3:1	3.8:1
Rotor inertia	kg-m^2 (lb-ft^2)	.0165 (.392)	.0222 (.528)	.0272 (.645)	.0809 (1.92)
Rated continuous motor current at base speed	amps (RMS cont.)	20.2	26.4	32.3	48
S6 current at base speed	amps (RMS)	25.8	33	42	56

8720SM AC Motor Specifications for 380 V AC Input Drives					
Peak current at base speed	amps (RMS)	28	37	46	66
Voltage at max speed	volts (RMS)	345	345	345	345
Voltage at base speed	volts (RMS)	245	243	278	260
Motor weight	kg (lbs)	75 (165)	91 (201)	102 (225)	131 (289)
Max radial bearing load	kg (lbs)	206 (455)	206 (455)	206 (455)	243 (535)

Table 2.16:
Drive Amplifier Specifications

8720MC Drive Amplifier Specifications **for 380 V AC Input Drives with 8720SM AC Motors**

Drive Amplifier Specifications	Units	Drive Amplifier Data for Each Power Rating			
Motor catalog number	8720SM-	005S1BC	007S1CC	011S1DC	015S2EC
Rated continuous motor current at base speed	amps (RMS cont.)	20.2	26.4	32.3	48
Drive amplifier catalog number	**8720MC-**	**B021**	**B027**	**B034**	**B048**
AC input voltage	volts (RMS)	380	380	380	380
AC input current	amps (RMS)	22	28	35	49
Rated input KVA	KVA	14	18	23	32
Max continuous output power	kW (hp)	5.5 (7.5)	7.5 (10)	11 (15)	15 (20)
Max continuous output current	amperes	21	27	34	48
Rated output KVA	KVA	12.4	16.5	20.6	29.7
DC Bus Capacitance	Micro Farads				
Drive amplifier frame		B	B	B	B
Weight	kg(lbs)	22.7 (50)	22.7 (50)	22.7 (50)	22.7 (50)

Curves for 380V AC Input Drives

Power and Torque Curves

The following power and torque curves contain data for 5.5 kW, 7.5kW, 11kW, and 15kW motors, 1500 RPM base speed, motors wound for operation with 380 vac input drive amplifiers.

Figure 2.19 5.5 Kw Motor with 380 vac Input.

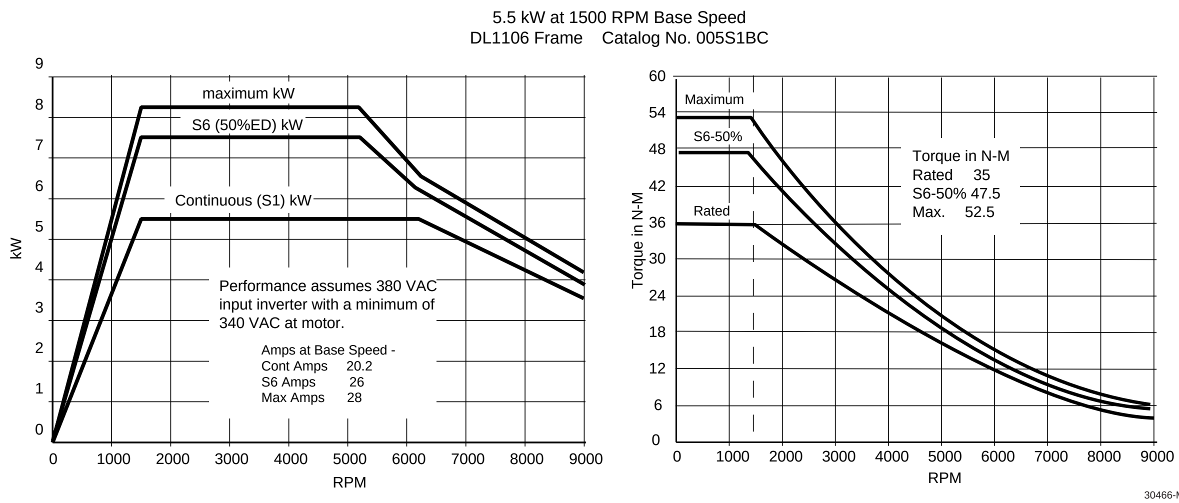


Figure 2.20 7.5 Kw Motor with 380 vac Input

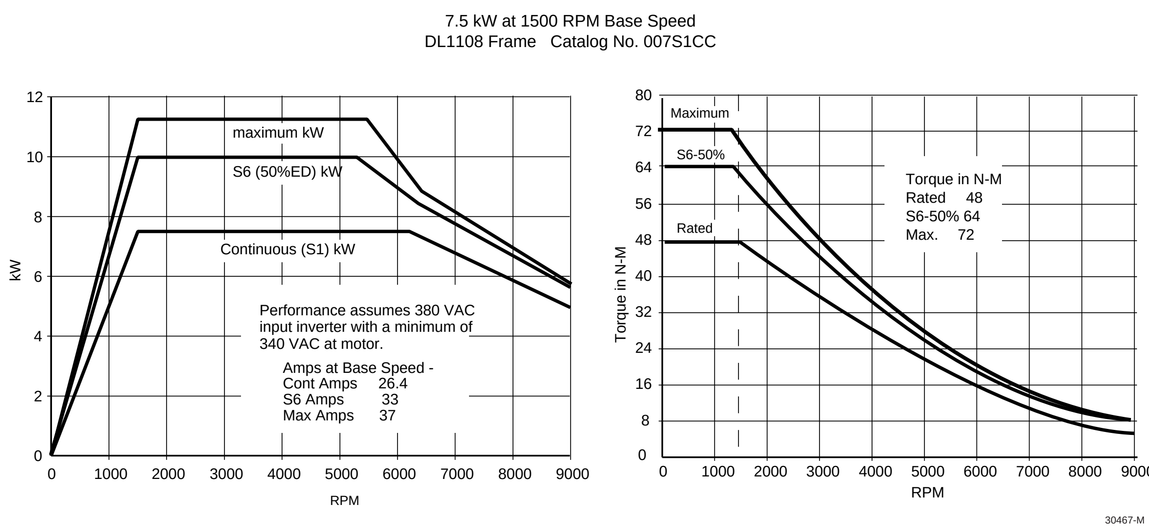


Figure 2.21 11 Kw Motor with 380 vac Input

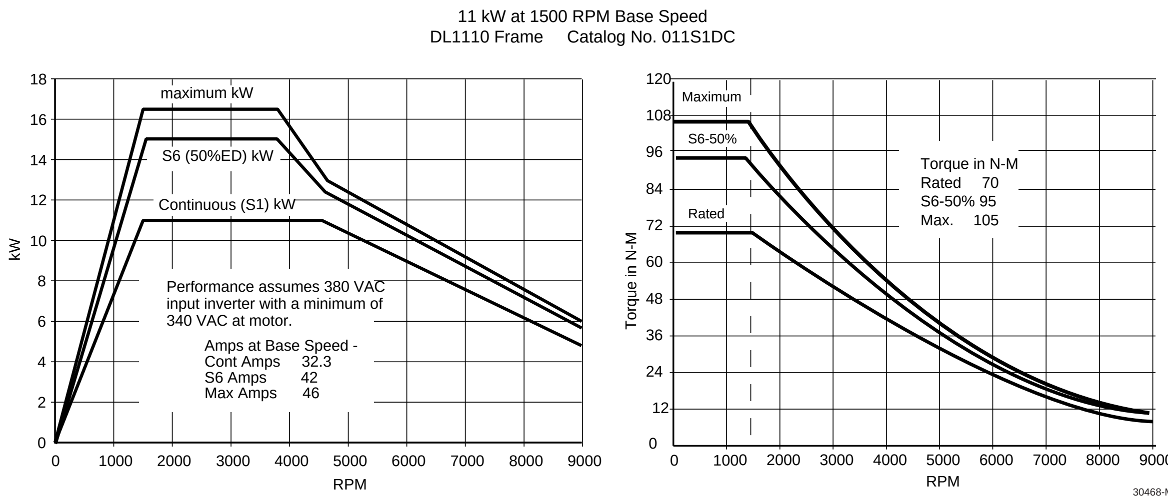
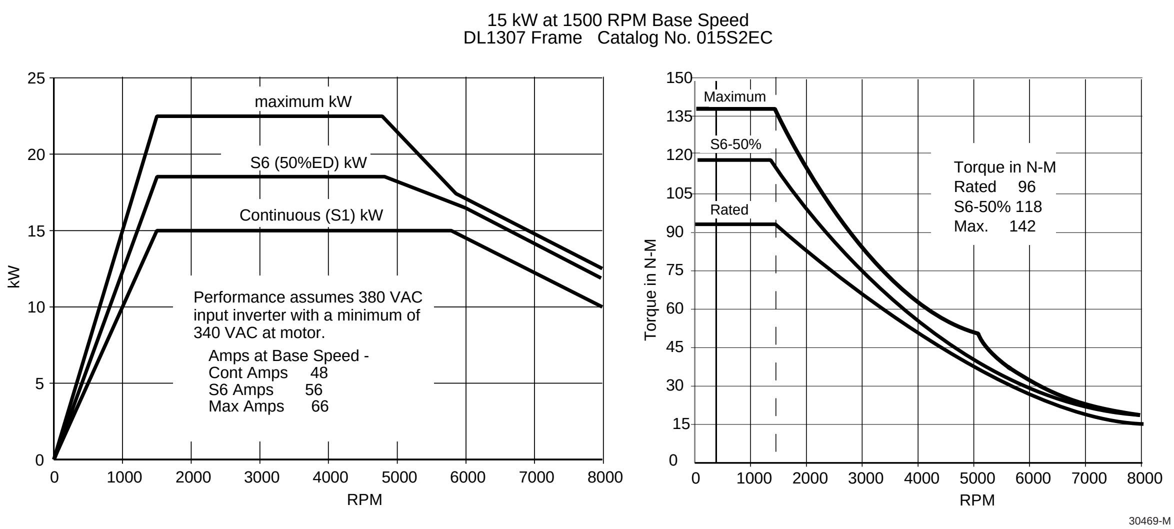


Figure 2.22 15 Kw Motor with 380 vac Input



Specifications for 750V DC Input Drives with Dual Wound 8720SM AC Motors

Table 2.17 contains motor specifications for wide constant power dual wound 8720SM Motors with 750V DC input 8720MC Drive Amplifier and 8720MC Regenerative Power Supply.
Dual Wound Motor Specifications

8720 SM Dual Wound Motors Specifications **for 750V DC Input Drives and 8720MC-RPS065 Regenerative Power Supply**

Motor Specifications	**Units**	**Motor Data for Each Power Rating**				
Motor catalog number	**8720SM-**	**015D5ND**	**018D5PD**	**020D5QD**	**025D6SD**	**030D6TD**
Motor frame number		DL1811	DL18113	DL1815	DL2010	DL2012
Continuous power -	kW (hp)	15 (20)	18 (24)	20 (27)	25 (33.5)	30 (40)
S6 - 50% duty -	kW (hp)	18 (24)	22 (29)	25 (33)	30 (40)	37 (50)
1 minute peak -	kW (hp)	23 (30)	27 (36)	30 (40)	38 (51)	45 (60)
Rated torque at base speed	N-m (lb-ft)	288 (212)	343 (253)	385 (284)	475 (350)	575 (424)
Peak torque at base speed	N-m (lb-ft)	430 (317)	518 (382)	575 (424)	720 (531)	860 (634)
Base speed - rpm	rpm	500	500	500	500	500
Max speed foot mount	rpm	6500	5000	5000	5000	4500
Max speed flange mount		6000	5000	5000	4500	4000
Constant power speed range		12:1	10:1	10:1	10:1	9:1
Rotor inertia	kG-m^2 (lb-ft^2)	.35 (8.305)	.409 (9.706)	.486 (11.533)	.885 (21.001)	1.01 (23.967)
Rated continuous motor current at base speed	amps (RMS cont.)	41	42.5	47	51	60.5
S6 current at base speed	amps (RMS)	47	50	56	58	70.4
Peak current at base speed	amps (RMS)	58	60	66	68	81.5
Min volts at max speed	volts (RMS)	505	505	505	505	505
Motor weight	kg (lbs)	297 (655)	324 (714)	350 (772)	453 (999)	478 (1054)
Max radial bearing load	kg (lbs)	860	860	860	930	930
Drive catalog number	8720MC-	B042	B042	B048	D065	D078
Regen Power Supply Cat No.	8720MC-	RPS065	RPS065	RPS065	RPS065	RPS065
Line Reactor Cat No.	8720MC-	LR05-048B	LR05-048B	LR05-048B	LR10-062B	LR10-062B

Curves for 750V DC Input Drives with Dual Wound 8720SM AC Motors

Power and Torque Curves

The following curves contain power and torque data for 15kW, 20 Kw, 25kW and 30 Kw dual wound motors with 500 RPM base speed and 13:1 constant power speed range. The wide speed range is achieved by switching from a “low winding” (wye connection configuration) to a “high winding” (delta connection configuration). There are power and torque curves shown for both the Low and the high windings. Switching between the wye and the delta connections is accomplished with high and low winding contactors. Chapter 4 illustrates the I/O and power wiring necessary to properly connect the 8720 high and low contactors to the motor. Looking at the curves in figures 2.23 and 2.24 it can be seen that a constant 15 Kw continuous power can be achieved from 500 to 6500 Rpm which represents a 13:1 speed range.

Figure 2.23
15kW Dual Wound Motor - Low Winding

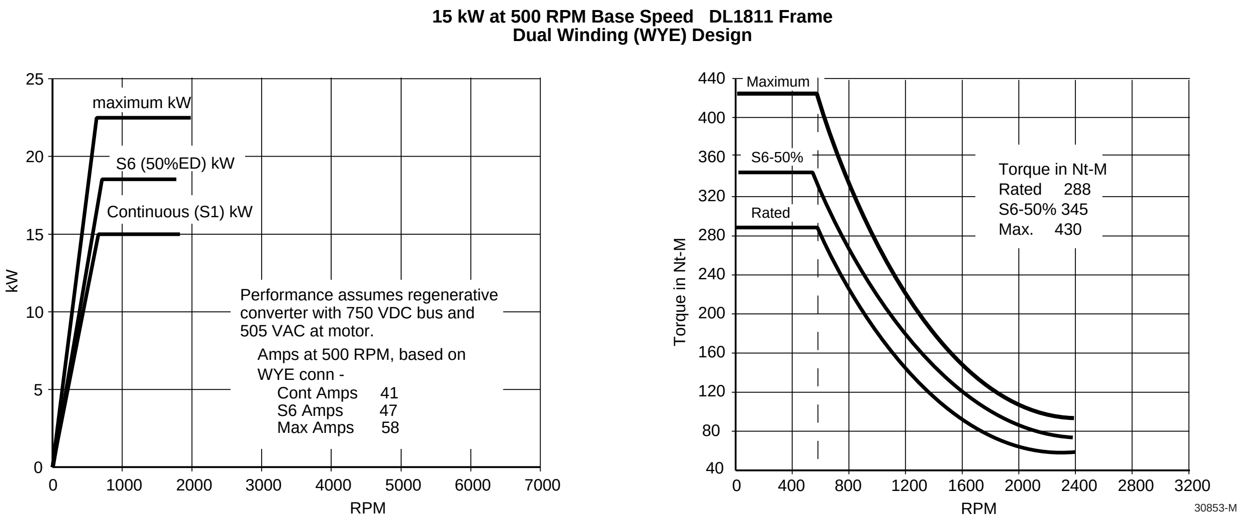


Figure 2.24 15kW Dual Wound Motor - High Winding

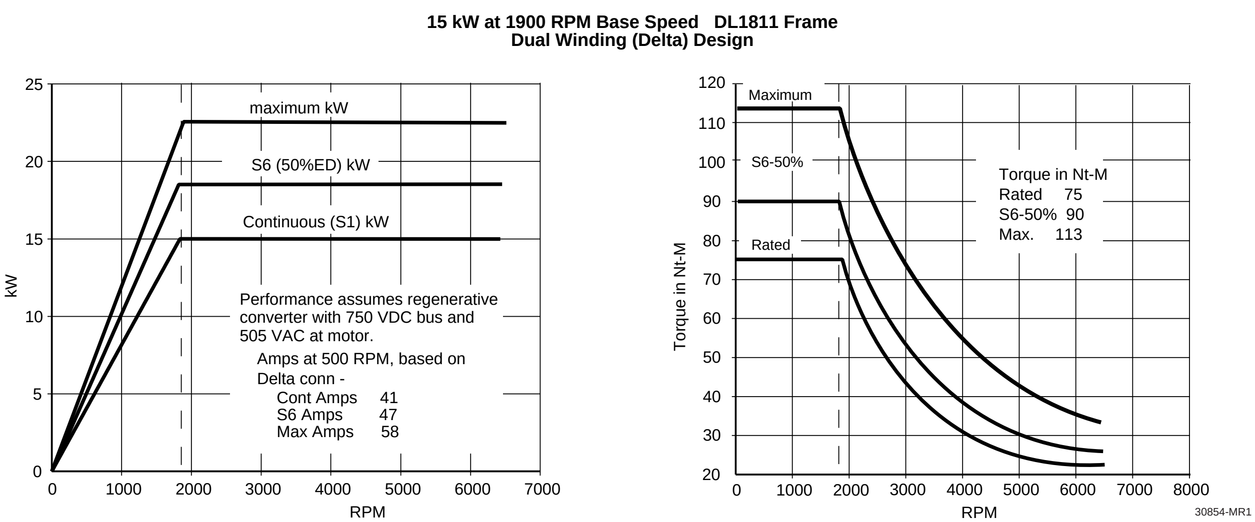


Figure 2.25 18 KW Dual Wound Motor - Low Winding

18 kW at 500 RPM Base Speed DL1813 Frame
Dual Winding (WYE) Design

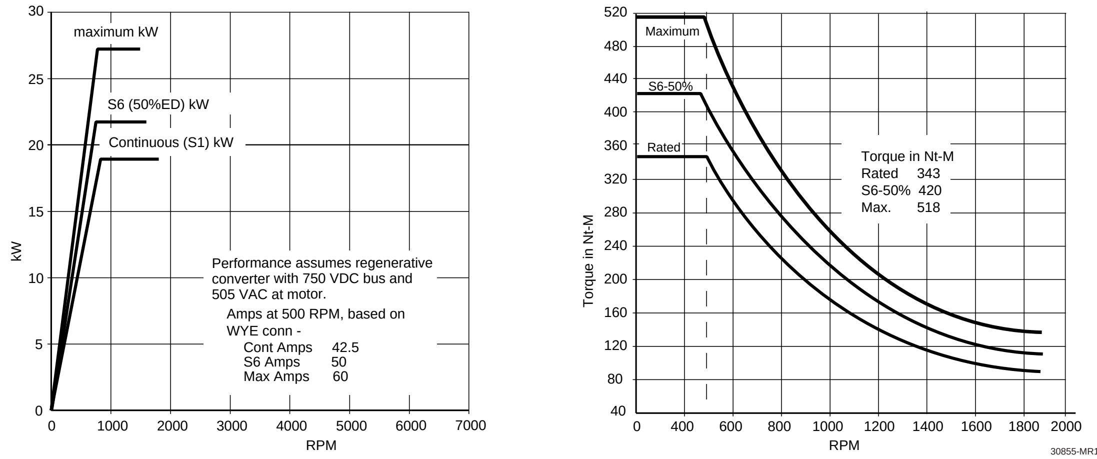


Figure 2.26 18 kW Dual Wound Motor - High Winding

18 kW at 500 RPM Base Speed DL1813 Frame
Dual Winding (Delta) Design

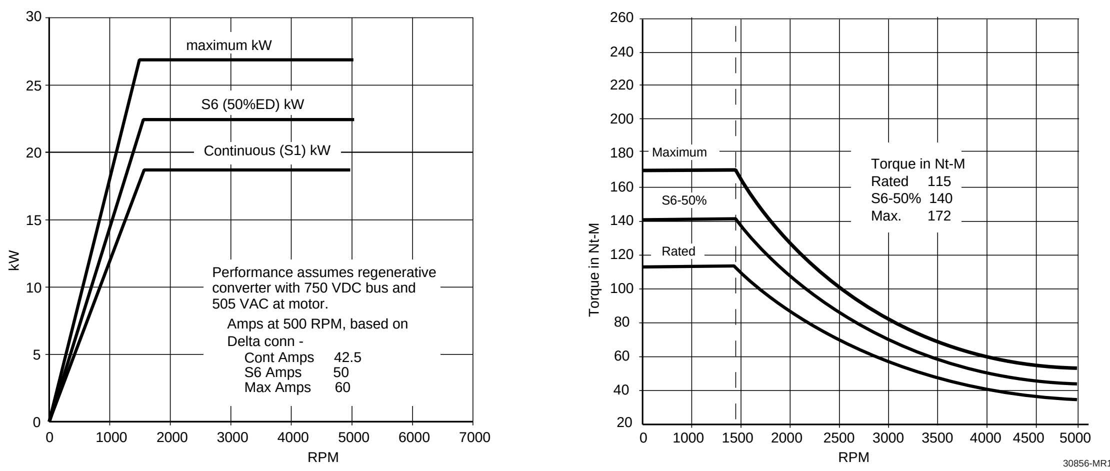


Figure 2.27 20kW Dual Wound Motor - Low Winding

20 kW at 500 RPM Base Speed DL1815 Frame
Dual Winding (WYE) Design

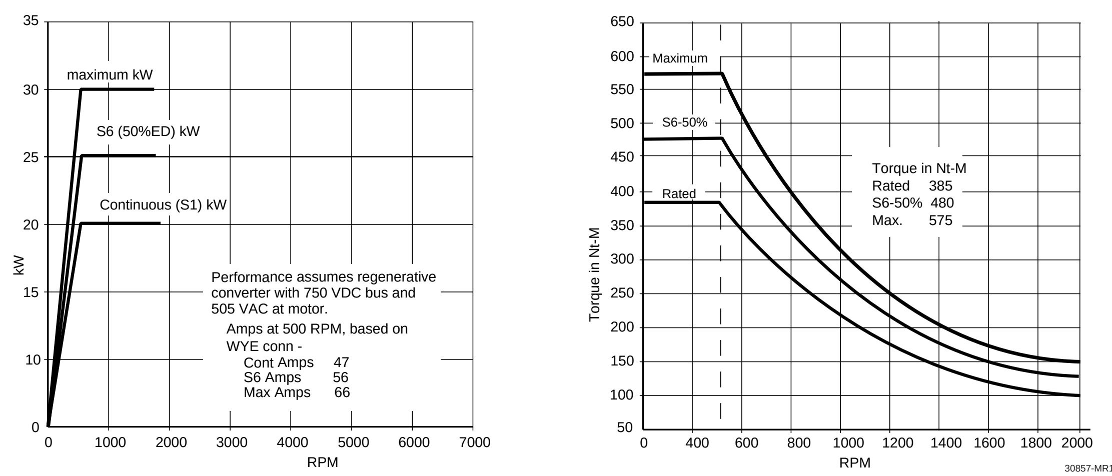


Figure 2.28 20 kW Dual Wound Motor - High Winding

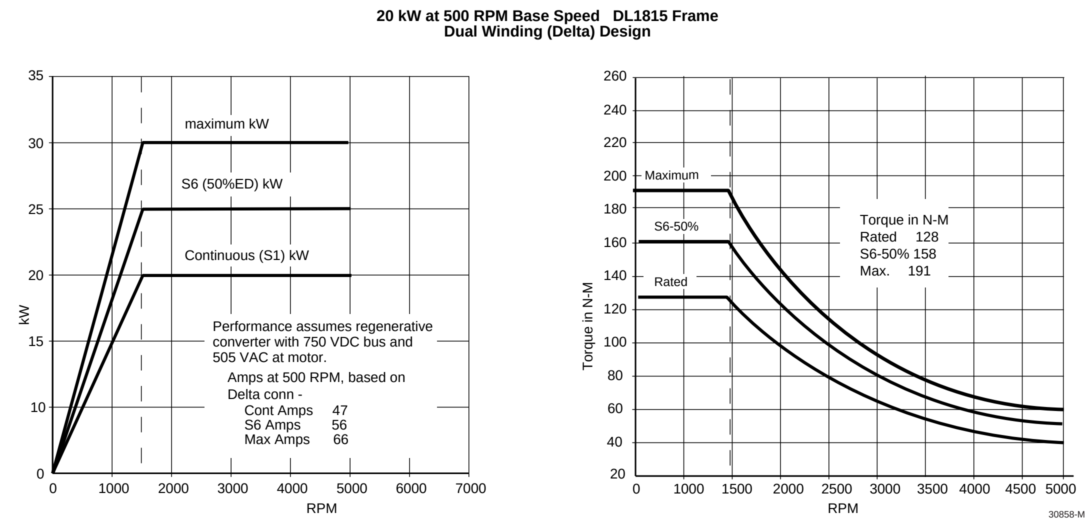


Figure 2.29 25 kW Dual Wound Motor - Low Winding

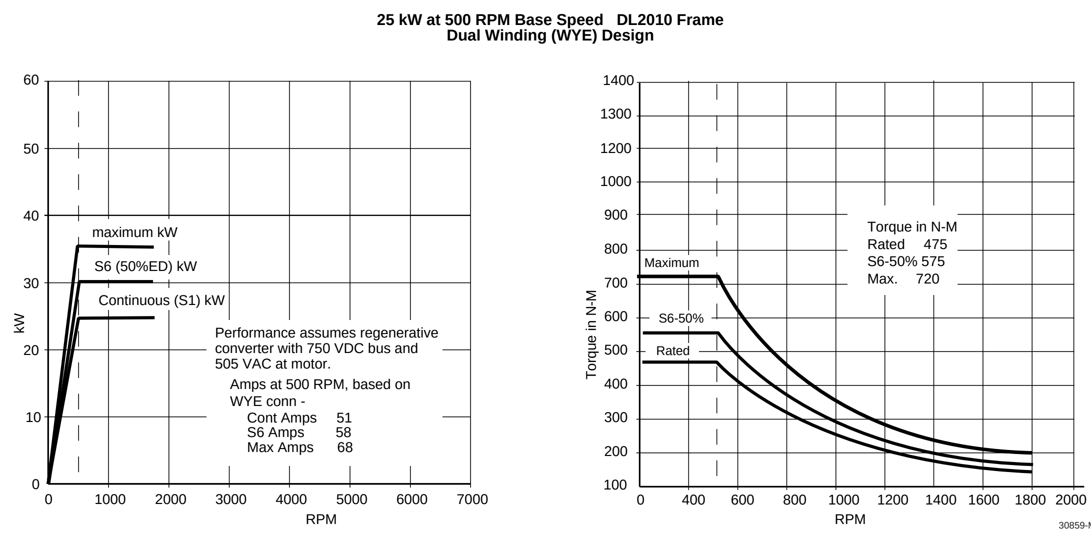


Figure 2.30 25 kW Dual Wound Motor - High Winding

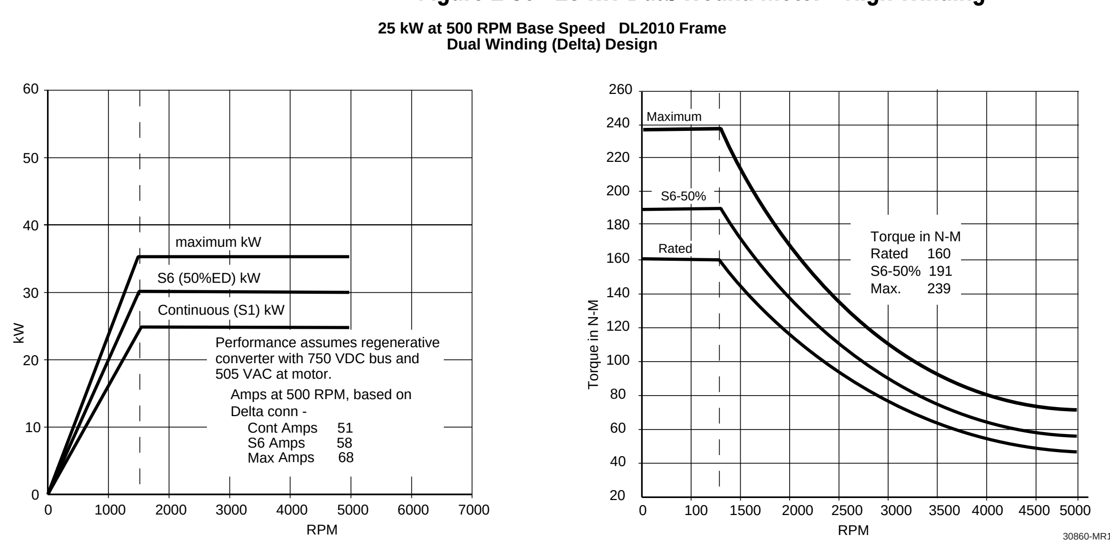


Figure 2.31 30 kW Dual Wound Motor - Low Winding

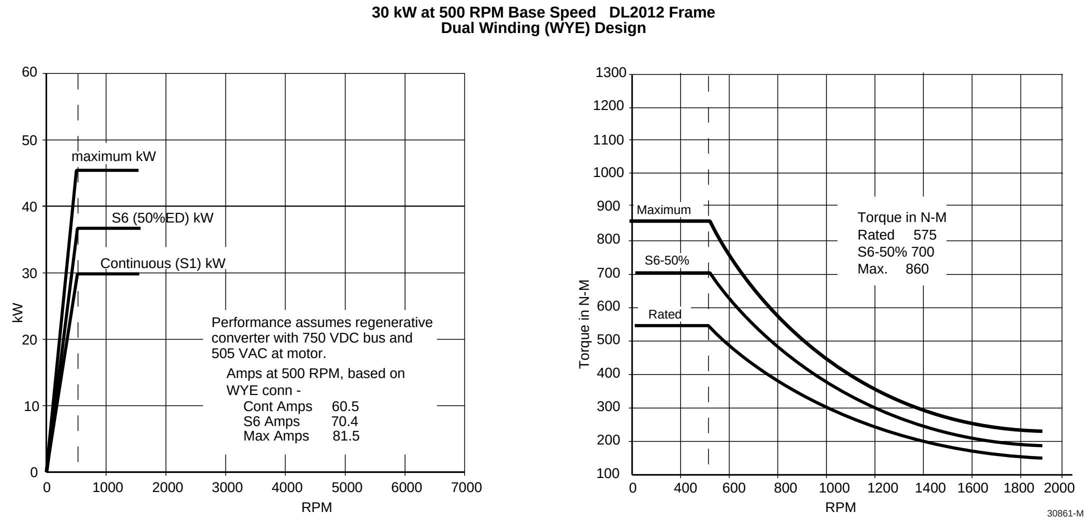
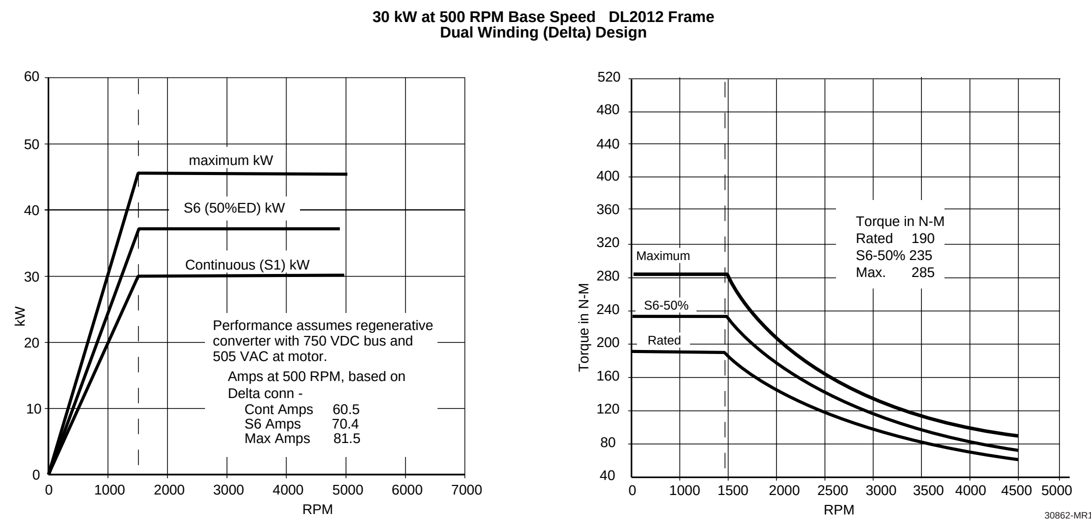


Figure 2.32 30 kW Dual Wound Motor - High Winding



Dimensions

Chapter Objectives

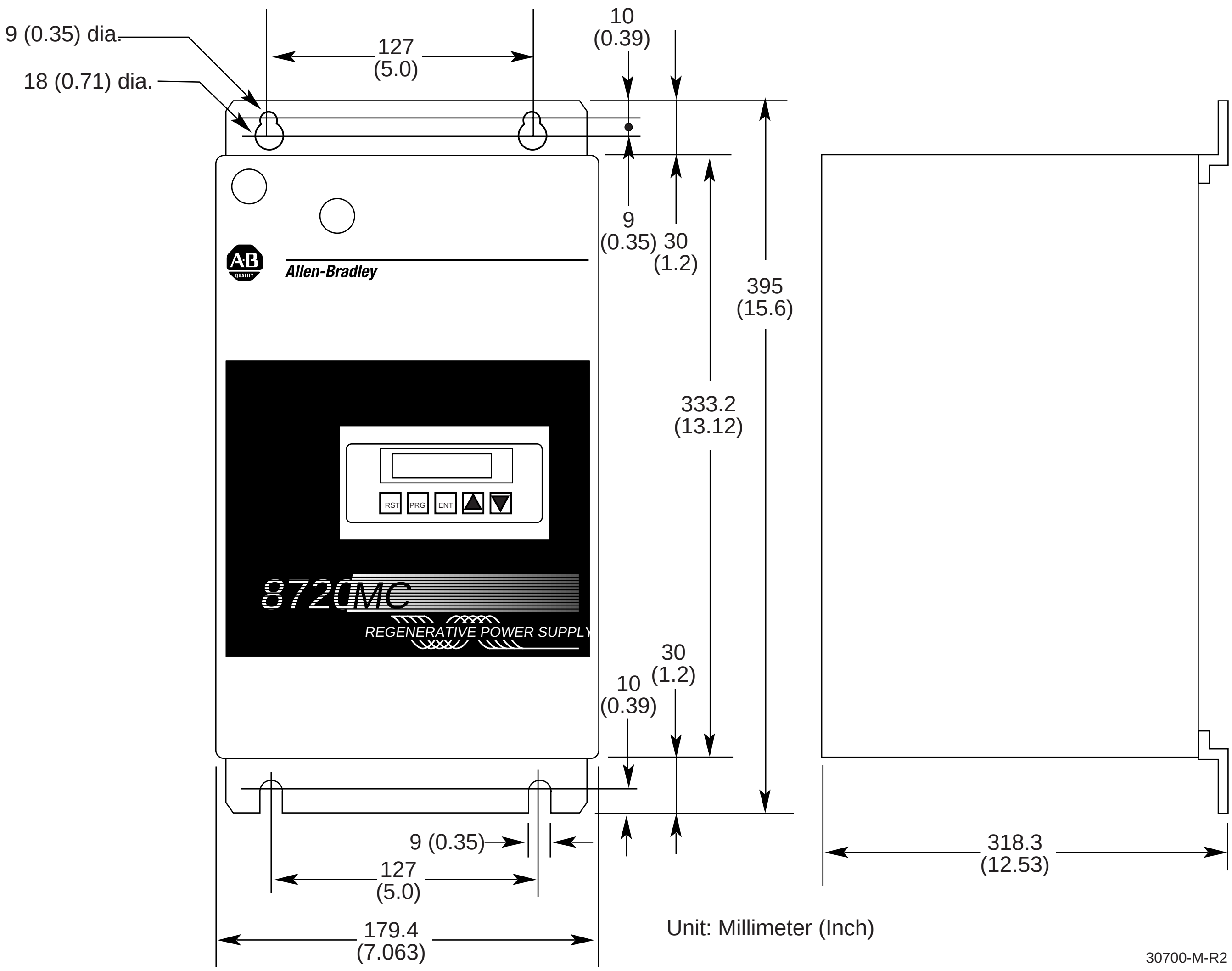
This chapter contains dimensions that pertain to the 8720MC Drive, the Regenerative Power Supply, and the 8720SM spindle motor. Information includes:

- dimensions for the 8720MC-RPS Regenerative Power Supply
- dimensions for the B and C frames, which apply to all the 8720MC-Bxxx Drive Amplifiers as well as the 8720MC-D065, and the 8720MC-D078 Drive Amplifiers
- dimensions for frame D, which is used with the 8720MC-D097, 8720MC-D120, 8720MC-D149, and 8720MC-D180 Drive Amplifiers
- mounting dimensions which assure proper heat dissipation around the drive
- dimensions and radial bearing capacities for various 8720SM motors, including frames DL1106 through DL2012
- dimensions for the 3-phase 380 to 460V AC 8720MC line reactor assemblies

8720MC Regenerative Power Supply Dimensions

The following dimensions are for the 8720MC-RPS Regenerative Power Supply, sometimes referred to as the Regenerative Converter.

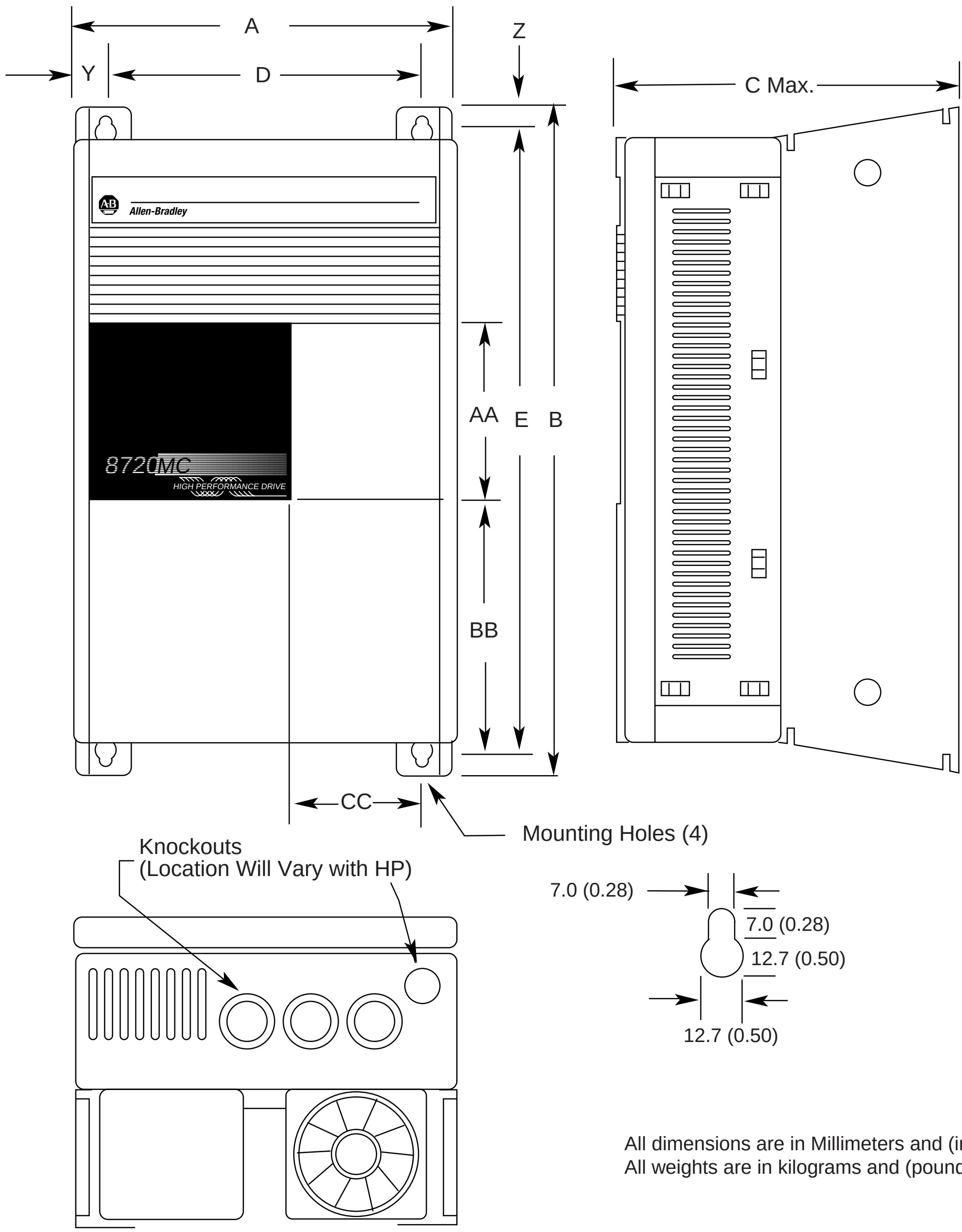
Figure 3.1
8720MC-RPS Regenerative Power Supply Dimensions



Dimensions for Frames B and C

The following dimensions are for the B and C frames, which are used with the 8720MC-Bxxx Drive Amplifier and the 8720MC-D065 and D078 Drive Amplifiers.

Figure 3.2
Dimensions for Frames B and C



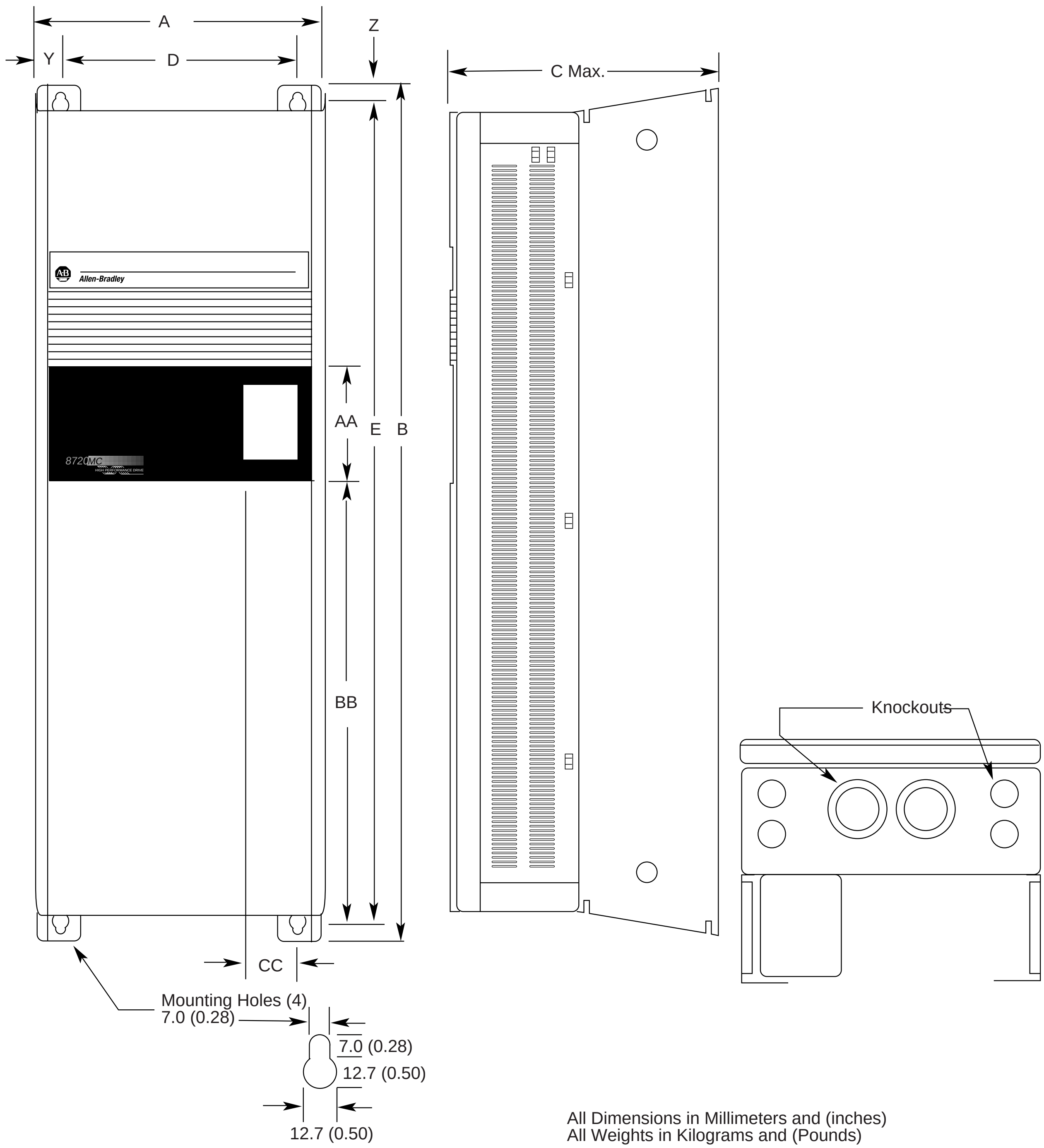
All dimensions are in Millimeters and (inches)
All weights are in kilograms and (pounds)

Frame 1 Reference	A	B	C Max	D	E	Y	Z	AA	BB	CC	Knockouts 3-Dual Size, 1-Fixed	Shipping Weight
B1, B2	276.4 (10.88)	476.3 (18.75)	231.0 (9.12)	212.6 (8.37)	461.0 (18.15)	32.00 (1.26)	7.6 (0.30)	131.1 (5.16)	180.8 (7.12)	71.9 (2.83)	28.6/34.9, 22.2 (1.125/1.375, 0.975)	22.7kg (50 lbs.)
C	301.8 (11.88)	701.0 (27.60)	231.0 (9.12)	238.0 (9.37)	685.8 (27.00)	32.00 (1.26)	7.6 (0.30)	131.1 (5.16)	374.7 (14.75)	71.9 (2.83)	28.6/34.9, 22.2 (1.125/1.375, 0.875)	38.6kg (85 lbs.)

Dimensions for Frame D

The following dimensions are for frame D, which is used with the 8720MC-Dxxx Drive Amplifier.

Figure 3.3
Dimensions for Frame D



All Dimensions in Millimeters and (inches)
All Weights in Kilograms and (Pounds)

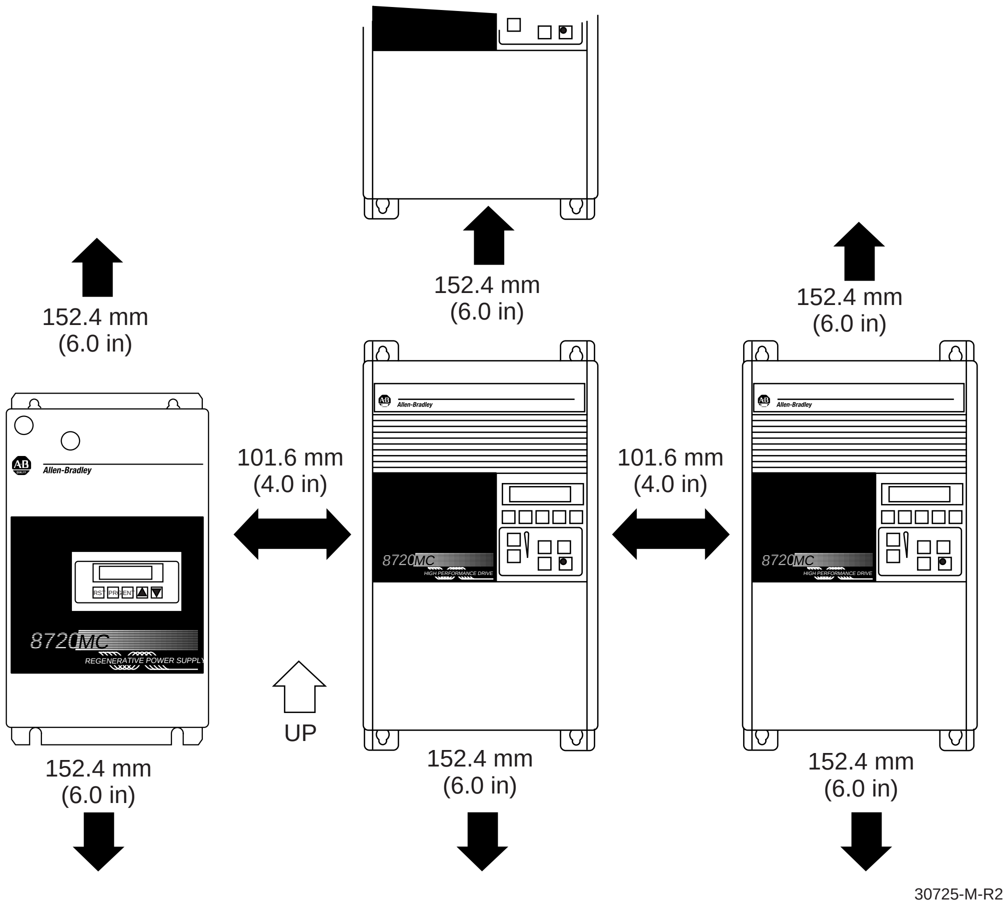
Frame 1 Reference	A	B	C Max	D	E	Y	Z	AA	BB	CC	Knockouts 3-Dual Size, 3-Fixed	Shipping Weight
D	381.5 (15.02)	1240.0 (48.82)	277.37 (10.92)	325.9 (12.83)	1216.2 (47.88)	27.94 (1.10)	111.94 (0.47)	131.1 (5.16)	688.6 (27.11)	71.9 (2.83)	62.7/6.2, 34.9/50.0 34.9 (2.47/3.00, 1.38/1.97, 1.38)	108.9 kg (240 lbs.)

30699-M-R2

Dimensions Allowing for Heat Dissipation

You need to mount the drive so that there is sufficient space at the top, sides, and front of the cabinet to let the heat dissipate.

Figure 3.4
Dimensions that Assure Heat Dissipation



Motor Dimensions

Notes to Motor Drawings

The following notes apply to all motor dimensional drawings:

NOTE (1) "h" Dimension will not be exceeded. Shims up to .5mm thickness are usually required for coupled or geared machines.

NOTE (2) Shaft extensions are according to Din 748. Tolerances are based on the ISO fitting system using K6 for diameters up to 50mm and m6 for diameters above.

NOTE (3) "t" varies +.018/-.290mm.

NOTE (4) Walls or obstructions must not encroach on air inlet space "XL" for blower or fan cooling.

NOTE (5) Tolerances for flange according to DIN42948.

NOTE (6) For the DL1106, DL1108 and DL1110 frames conduit entry is available on both sides of the terminal box. The plugged hole has a PG 29 metric pipe tap, 1.41 in. I.D.,suitable for 1 in. conduit.

NOTE (7) For all other frames:

- Terminal box can be rotated in 90 degree increments.
- Terminal box is mounted on top as standard
- Terminal box can be located on side in F1 or F2 position when specified.

NOTE (8) The 132 mm (DL1307, DL1308 and DL1310) frames are available with two different mounting flanges. The standard 132 flange has a 250 mm pilot diameter and a 300 mm bolt circle. The 132A flange has dimensions to match previous A-B 1327 motor designs. The 132A flange has a 230 mm pilot diameter and a 265 mm bolt circle. All other dimensions for the 132 and 132A offerings are identical. See Chapter 1, Figure 1.11 for Catalog Numbers.

Frame DL1106 through DL1110 Dimensions Before March 01

The following motor dimensions are for frames DL1106 through DL1110, 180 mm flange and 215 mm bolt circle manufactured before March, 2001.

Figure 3.5
Motor Dimensions for Frames DL1106 - DL1110

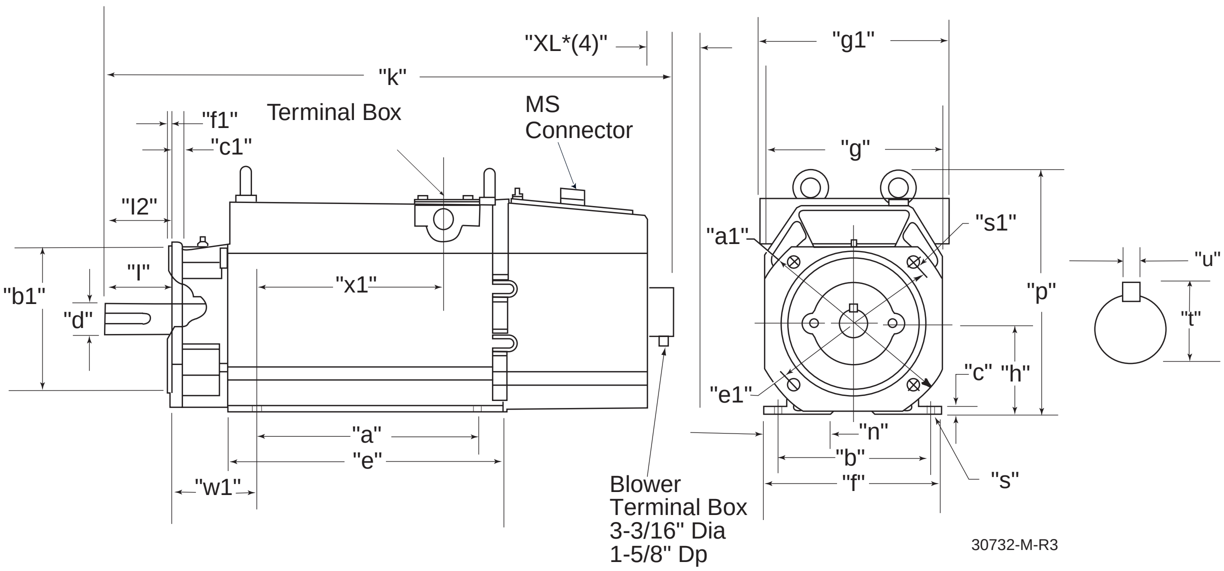


Table 3.1:
Common Dimensions for DL1106 - DL1110 (in millimeters)

Type DIN IEC	f AB	h(1) H	b A	c HA	s K	n AA	g AC	g1	w1 C	a1 P	b1 N	c1 LA	e1 M	f1 T	s1 S	p HD	XL(4) Xl(4)
DL1106 - DL1110	233	112	190	9	12	83.5	240	242	106	250	180	13	215	4	14	305	38

Table 3.2:
Specific Dimensions for DL1106 - DL1110 (in millimeters)

Type DIN IEC	k L	e	x1	a	Drive End Shaft and Key d(2) D	l E	l2	t(3) GA	u F	WT. kg	Radial Load @1500 rpm in lbs	Radial Load @9000 rpm in lbs
DL1106	642	269	134	203	38	80	80	41	10	65	455	240
DL1108	687	313	178	248	38	80	80	41	10	78	455	240
DL1110	725	352	216	286	38	80	80	41	10	89	455	240

Frame DL1106 through DL1110 Dimensions After March 01

The following motor dimensions are for frames DL1106 through DL1110, 180 mm flange and 215 mm bolt circle manufactured after March, 2001.

Figure 3.6
Motor Dimensions for Frames DL1106 - DL1110

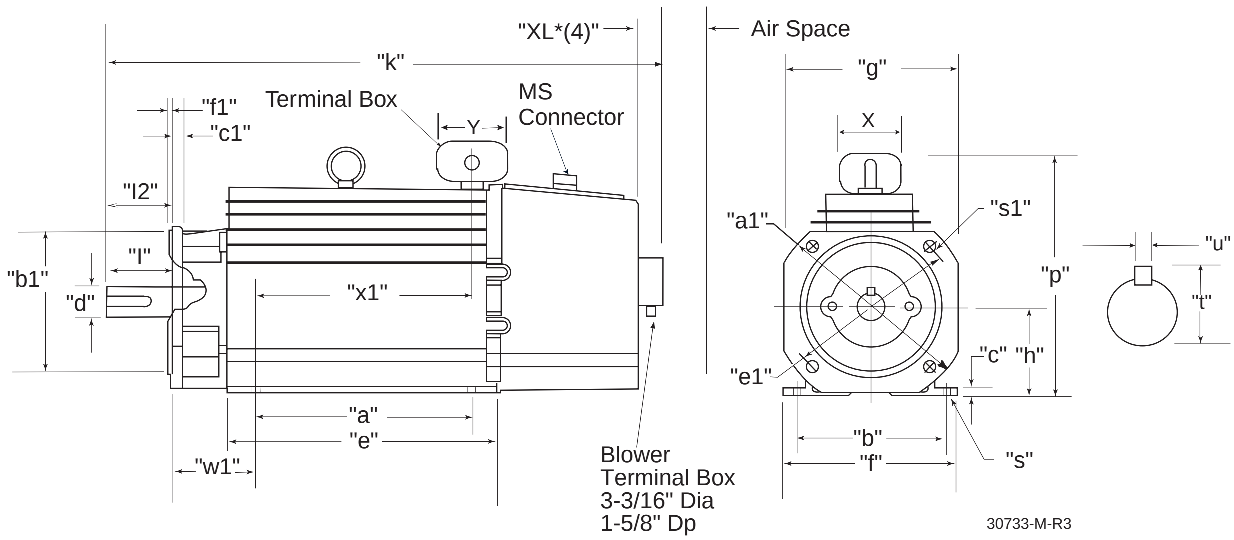


Table 3.3:
Common Dimensions for DL1106 - DL1110 (DIN Symbols in millimeters)

Type DIN / IEC	f AB	h(1) H	b A	c HA	s K	g AC	g1	w1 C	a1 P	b1 N	c1 LA	e1 M	f1 T	s1 S	p HD	XL(4) Xl(4)
DL1106 - DL1110	223	112	190	11	12	240	242	106	250	180	13	215	4	14	353	38

Table 3.4:
Specific Dimensions for DL1106 - DL1110 (DIN Symbols in millimeters)

Type DIN / IEC	k L	e	x1	a	Drive End Shaft and Key d(2) D	l E	l2	t(3) GA	u F	WT. kg	Radial Load @1500 rpm in lbs	Radial Load @9000 rpm in lbs
DL1106	642	269	134	203	38	80	80	41	10	65	455	240
DL1108	687	313	178	248	38	80	80	41	10	78	455	240
DL1110	725	352	216	286	38	80	80	41	10	89	455	240
DL1112	776	403	267	337	38	80	80	41	10	104	455	240

Frame DL1307 through DL1310 Dimensions, 250mm Flange

The following motor dimensions are for frames DL1307, 1308 and DL1310, the standard “132” with 250 mm flange and 300 mm bolt circle. Catalog number 8720SM-0ppS2.

Figure 3.7
Motor Dimensions for Frames DL1307 - DL1310, 250mm Flange,

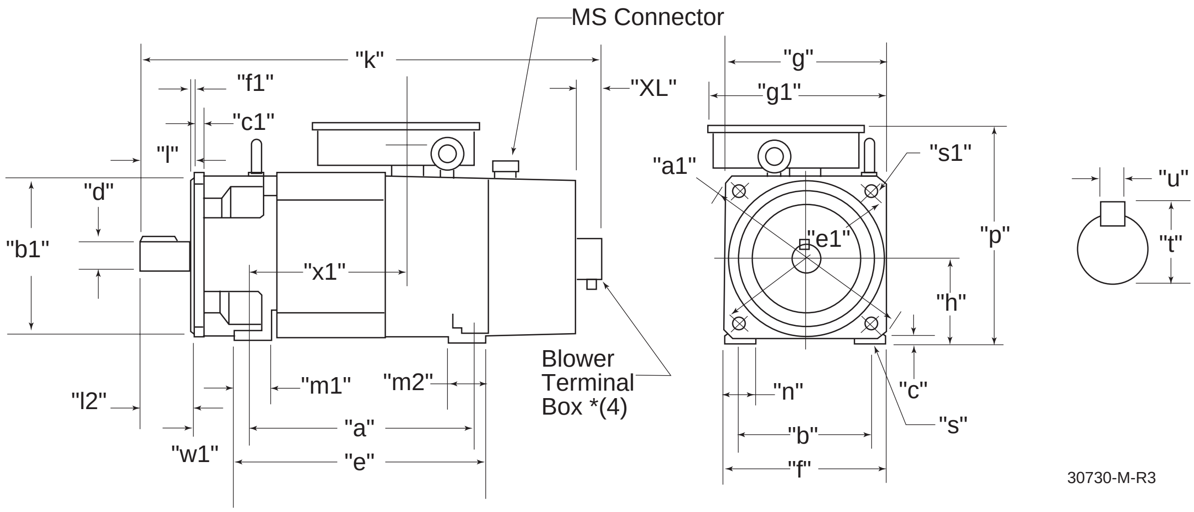


Table 3.5:
Common Dimensions for DL1307 - DL1310, 250mm Flange (in millimeters)

TYPE DIN IEC	f AB	h(1) H	b A	c HA	s K	n AA	g AC	w1 C	m1 BA	m2	a1 P	b1 N	c1 LA	e1 M	f1 T	s1 S	XL(4) XI(4)
DL1307 - DL1310	261	132	216	13	12	51	267	89	61	139	350	250	17	300	5	18	43

Table 3.6:
Frame Specific Dimensions for DL1307 - DL1310, 250mm Flange in mm

Type DIN IEC	k L	e	x1	a	Drive End Shaft and Key d(2) D	l E	l2	t(3) GA)	u F	WT. kg	Radial Load @1500 rpm in lbs	Radial Load @8000 rpm in lbs
DL1307	800	431	298	389	48	110	110	51.5	14	131	535	290
DL1308	838	469	336	427	48	110	110	51.5	14	150	535	290
DL1310	870	501	368	459	48	110	110	51.5	14	163	535	290

Table 3.7:
Junction Box for DL1307 - DL1310, 250 mm Flange

Type DIN IEC	Amps	g1	p HD
DL 1307 - DL1310	100	272	385

Frame DL1307 through DL1310 Dimensions, 230mm Flange

The following motor dimensions are for frames DL1307, 1308 and DL1310, the A-B 1327AB compatible “132A” with 230 mm flange and 265 mm bolt circle. Catalog number 8720SM-0ppS3.

Figure 3.8
Motor Dimensions for Frames DL1307 - Dl1310, 230mm Flange

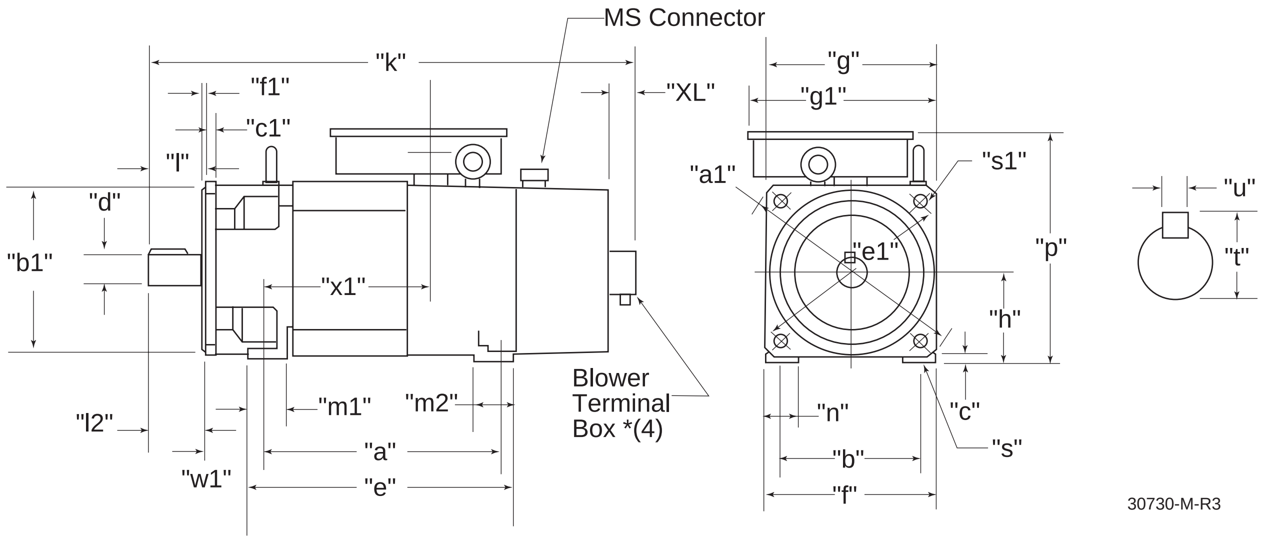


Table 3.8:
Common Dimensions for DL1307 - Dl1310, 230mm Flange (in millimeters)

Type DIN IEC	f AB	h(1) H	b A	c HA	s K	n AA	g AC	w1 C	m1 BA	m2	a1 P	b1 N	c1 LA	e1 M	f1 T	s1 S	XL(4) Xl(4)
DL1307 -DL1310	261	132	216	13	12	51	267	89	61	139	300	230	17	265	5	14	43

Table 3.9:
Frame Specific Dimensions for DL1307 - Dl1310, 230mm Flange in mm

Type DIN IEC	k L	e	x1	a	Drive End Shaft and Key d(2) D	 l E	 l2	 t(3) GA	 u F	WT. kg	Radial Load @1500 rpm in lbs	Radial Load @8000 rpm in lbs
DL1307	800	431	298	389	48	110	110	51.5	14	131	535	290
DL1308	838	469	336	427	48	110	110	51.5	14	150	535	290
DL1310	870	501	368	459	48	110	110	51.5	14	163	535	290

Table 3.10:
Junction Box for DL1307 - Dl1310, 230mm Flange

Type DIN IEC	Amps	g1	p HD
DL 1307 - DL1310	100	272	385

Frame DL1611 through DL1613 Dimensions

The following motor dimensions are for frames DL1611 through DL1613, 300 mm flange and 350 mm bolt circle.

Figure 3.9
Motor Dimensions for Frames DL1611 - DL1613

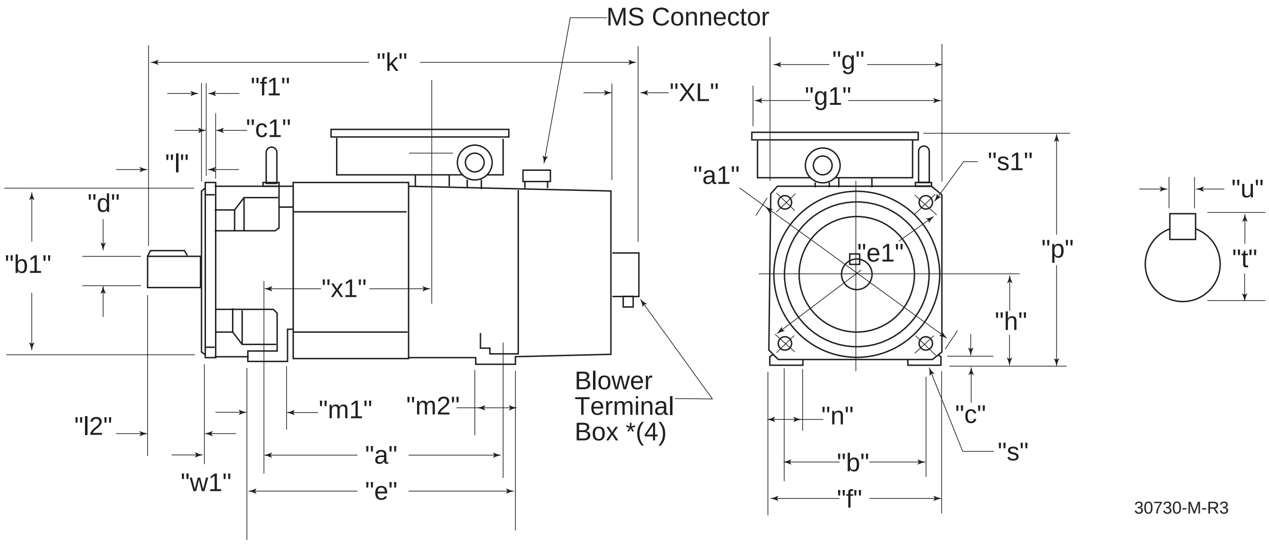


Table 3.11:
Common Dimensions for DL1611 - DL1613 (in millimeters)

Type DIN IEC	f AB	h(1) H	b A	c HA	s K	n AA	g AC	w1 C	m1 BA	m2	a1 P	b1 N	c1 LA	e1 M	f1 T	s1 S	XL(4) Xl(4)
DL1611 and DL1613	313	160	254	14	14	60	319	108	65	153	400	300	21	350	5	18	43

Table 3.12:
Frame Specific Dimensions for DL1611 - DL1613 (in millimeters)

Type DIN IEC	k L	e	x1	a	Drive End Shaft and Key d(2) D	1 E	12	t(3) GA	u F	WT. kg	Radial Load @1500 rpm in lbs	Radial Load @6500 rpm in lbs
DL1611	923	539	408	497	55	110	110	59	16	226	770	450
DL1613	974	589	458	548	55	110	110	59	16	272	770	450

Table 3.13:
Junction box for DL1611 - DL1613

Type DIN IEC	Amps	g1	p HD
DL1611 and DL1613	100	299	436

Frame DL1811 through DL1815 Dimensions

The following motor dimensions are for frames DL1811 through DL1815, 300 mm flange and 350 mm bolt circle.

Figure 3.10
Motor Dimensions for Frames DL1811 - DL1815

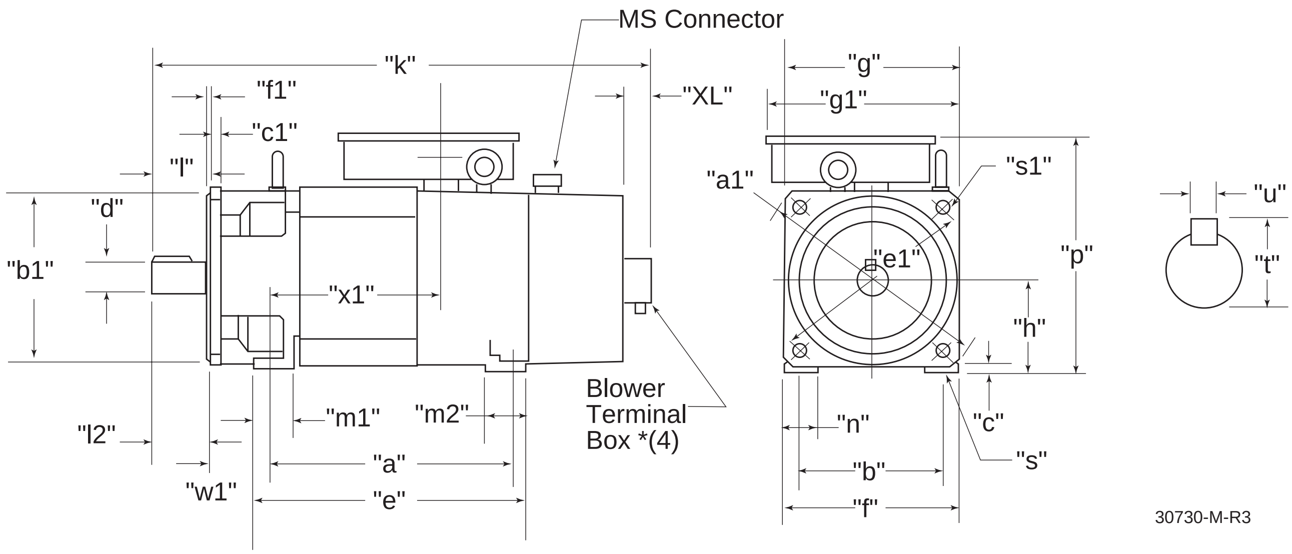


Table 3.14:
Common Dimensions for DL1811 - DL1815 (in millimeters)

Type DIN IEC	f AB	h(1) H	b A	c HA	s K	n AA	g AC	w1 C	m1 BA	m2	a1 P	b1 N	c1 LA	e1 M	f1 T	s1 S	XL(4) XI(4)
DL1811 - DL1815	350	180	279	15	15	70	355	121	65	175	400	300	21	350	5	18	43

Table 3.15:
Frame Specific Dimensions for DL1811 - DL1815 (in millimeters)

Type DIN IEC	k L	e	x1	a	Drive End Shaft and Key d(2) D	l E	l2	t(3) GA	u F	WT. kg	Radial Load @1500 rpm in lbs	Radial Load @6500 rpm in lbs
DL1811	997	571	421	520	60	140	140	64	18	297	860	500
DL1813	1048	622	472	571	60	140	140	64	18	324	860	500
DL1815	1099	673	523	622	60	140	140	64	18	350	860	500

Table 3.16:
Junction Box DL1811 - DL1815

Type DIN IEC	Amps	g1	p HD
DL 1811 - DL1815	160	319	491

Frame DL2010 through DL2012 Dimensions

The following motor dimensions are for frames DL2010 through DL2012.

Figure 3.11
Motor Dimensions for Frames DL2010 - DL2012

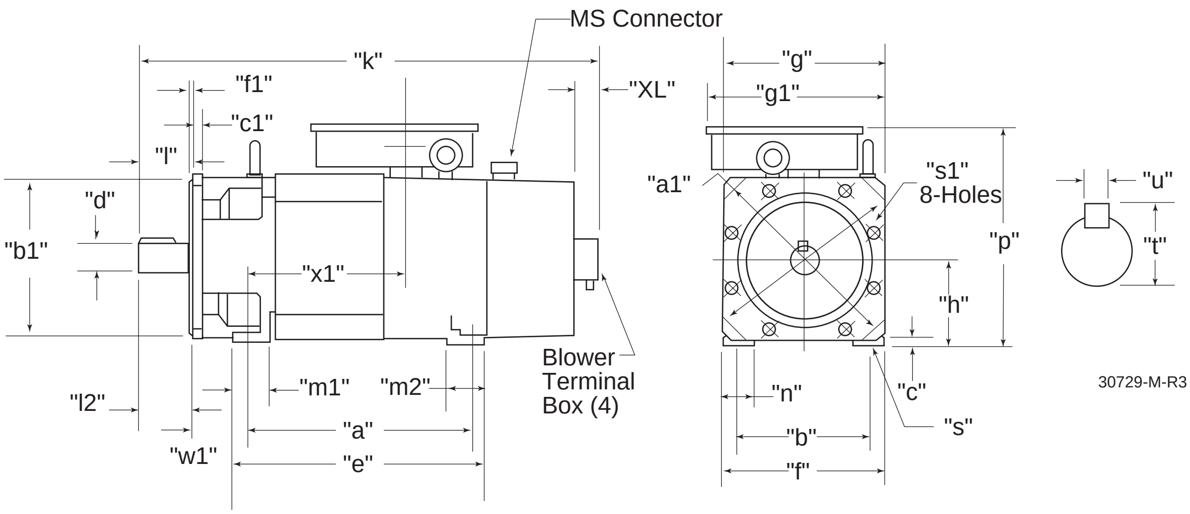


Table 3.17:
Common Dimensions for DL2010 - DL2012 (in millimeters)

Type DIN IEC	f AB	h(1) H	b A	c HA	s K	n AA	g AC	w1 C	m1 BA	m2	a1 P	b1 N	c1 LA	e1 M	f1 T	s1 S	XL(4) Xl(4)
DL2010 and DL2012	396	200	318	18	19	80	418	133	82	203	450	350	22	400	5	18	43

Table 3.18:
Frame Specific Dimensions for DL2010 - DL2012 (in millimeters)

Type DIN IEC	k L	e	x1	a	Drive End Shaft and Key d(2) D	l E	l2	t(3) GA	u F	WT. kg	Radial Load @1500 rpm in lbs	Radial Load @5000 rpm in lbs
DL2010	1155	705	499	654	65	140	140	69	18	453	930	575
DL2012	1219	769	563	718	65	140	140	69	18	478	930	575

Table 3.19:
Junction Box DL2010 - DL2012

Type DIN IEC	Amps	g1	p HD
DL 2010, DL2012	160	351	534

8720MC Line Reactor Dimensions

The following dimensions are for a 3% 3-phase 380 to 460V AC 8720MC Line Reactor.

Figure 3.12
3-Phase 380 - 460V AC 8720MC Line Reactor

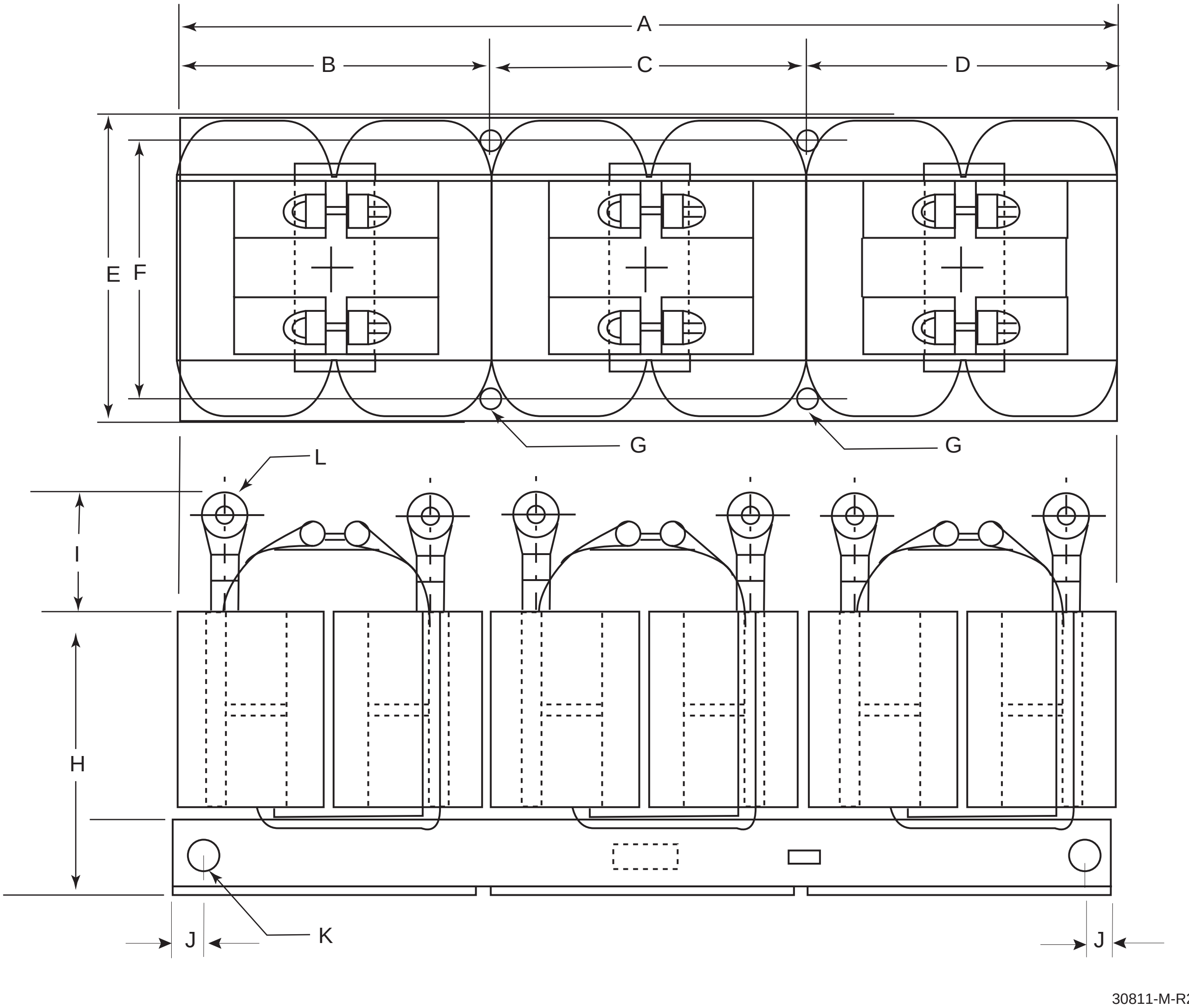


Table 3.20:
A through I Line Reactor Dimensions (in millimeters)m

A-B Catalog Number	A	B	C	D	E	F	G	H	I
8720MC-LR03-032B 32 amps @ 460V AC	345 +/-2	112.5	120 +/-1	112.5	140 max	100 +1/-.5	4-7	127 +/- 5	80 +/- 10
8720MC-LR05-048B 48 amps @ 460V AC	400 +/-2	132.5	135 +/-1	132.5	155 max	105 +1/-.5	4-7	125 +/- 5	80 +/- 10
8720MC-LR10-062B 62 amps @ 460V AC	440 +/-2	145	150 +/-1	145	160 max	110 +1/-.5	4-9.5	125 +/- 5	80 +/- 10
8720MC-LR14-070B 75 amps @ 460V AC	460 +/-2	155	150 +/-1	155	180 max	125 +1/-.5	4-9.5	140 +/- 5	80 +/- 10

**Table 3.21:
J through L Line Reactor Dimensions (in millimeters)**

A-B Catalog Number	J	K	L	Amps Cont.	Inductance
8720MC-LR03-032B	15	4-15	6- (R22-6)	32	850 uH
8720MC-LR05-048B	15	4-15	6- (R22-6)	48	800 uH
8720MC-LR10-062B	15	4-15	6- (R22-6)	62	1100 uH
8720MC-LR14-070B	15	4-15	6- (R38-6)	70	1200 uH

Drive Installation and Wiring

Chapter Objectives

Chapter 4 provides the following information so that you can mount and wire your 8720MC Drive:

- before mounting your drive
- mounting your drive
- grounding your drive
- AC supply source information for AC input drives
- connecting power to your drive
- selecting your motor cables
- connecting power to the 8720MC-RPS and 1336-R Regenerative Power Supplies
- control interface wiring
- disconnecting the drive output
- starting and stopping the motor
- electrical interference - EMI/RFI
- RFI filters

Important: Some of the mounting and wiring information is specific to the individual frame sizes. If you do not know what your frame size is, refer to *Chapter 3: Dimensions*.

ATTENTION: The following information is merely a guide for proper installation. The National Electric Code (NEC) and any other governing national, regional, or local code will overrule this information. Allen-Bradley cannot assume responsibility for the compliance or noncompliance to any code, national, local, or otherwise, for the proper installation of this drive or associated equipment. A hazard of personal injury and/or equipment damage exists if codes are ignored during installation.

Before Mounting Your Drive

Before mounting your drive, consider the following:

- what tools and equipment you need to mount your drive

- the distance between the motor and the drive
- the distance between the drive and other surfaces

Important: Before you mount your drive, you need to thoroughly read and understand the information presented in this chapter. You should take every precaution to complete the wiring as instructed.

Required Tools and Equipment

At a minimum, you will need the following tools and equipment to mount your drive:

- a small regular screw driver
- a medium phillips screw driver
- a box end wrench or socket set
- wire strippers

Distance Between the Motor and the Drive

Make sure there are no more than 90 meters of cable distance between the motor and the drive.

Allowing for Heat Dissipation

You need to mount the drive so that there is sufficient space at the top, sides, and front of the cabinet to let the heat dissipate. For further information, see "Dimensions Allowing for Heat Dissipation" in *Chapter 3:Dimensions.*

Mounting Your Drive

Read the following attention text before mounting your drive:

ATTENTION: You must be careful to prevent debris (such as metal shavings and conduit knockouts) from falling into the drive while performing any installation work around the drive. A hazard of personal injury and/or equipment damage exists if foreign material lodges inside the drive.

To mount your drive, you need to

1. Get the dimensions for your drive from *Chapter 3: Dimensions*.
2. Drill the holes at the appropriate spot (as determined from the drive dimensions).
3. Bolt the drive to the mounting surface.

User-Supplied Enclosures

If you are supplying your own enclosure for the 8720MC Drive, you can mount your drive within an enclosure or you can mount the drive to let the heat sink extend outside the enclosure.

Use the information in Table 4.1 along with the enclosure manufacturer's guidelines for sizing. This table contains numbers in parenthesis. These indicate notes at the end of the table. Figure references are for illustrations contained in Appendix A.

Table 4.1:
Information for User-supplied Enclosures

Catalog Number	Base Derate Amps(2)	Drive Frame Size	Derate Curve(1)(2)	Heat Dissipation Drive Watts(1)(2)	Heat sink Watts(1)(2)	Total Watts(1)(2)
380 - 480V AC Input Drives						
BO14	14	B	Not required	91	270	361
BO21	21	B	Not required	103	394	497
BO27	27	B	Figure A.1	117	486	603
BO34	34	B	Figure A.2	140	628	768
BO42	42	B	Figure A.3	141	720	861
BO48	48	B	Figure A.4	141	820	961
DO65	65	C	Figure A.5	175	933	1108
DO78	78	C	Figure A.6	193	1110	1303
DO97	97	D	Note (3)	361	1708	2069
D120	120	D	Figure A.7	361	1708	2069
D149	149	D	Figure A.8	426	1944	2307
D180	180	D	Figure A.9	522	2664	3186

NOTE (1) The open packaged drive ambient operating temperature is 50°C. The cabinet enclosure should be designed to provide an operating temperature that does not exceed 50°C in worst case ambient conditions. If the enclosed version is operating between 41 and 50°C and the drive PWM switching frequency is above the threshold shown in the derating curves in Appendix A the continuous current must be derated.

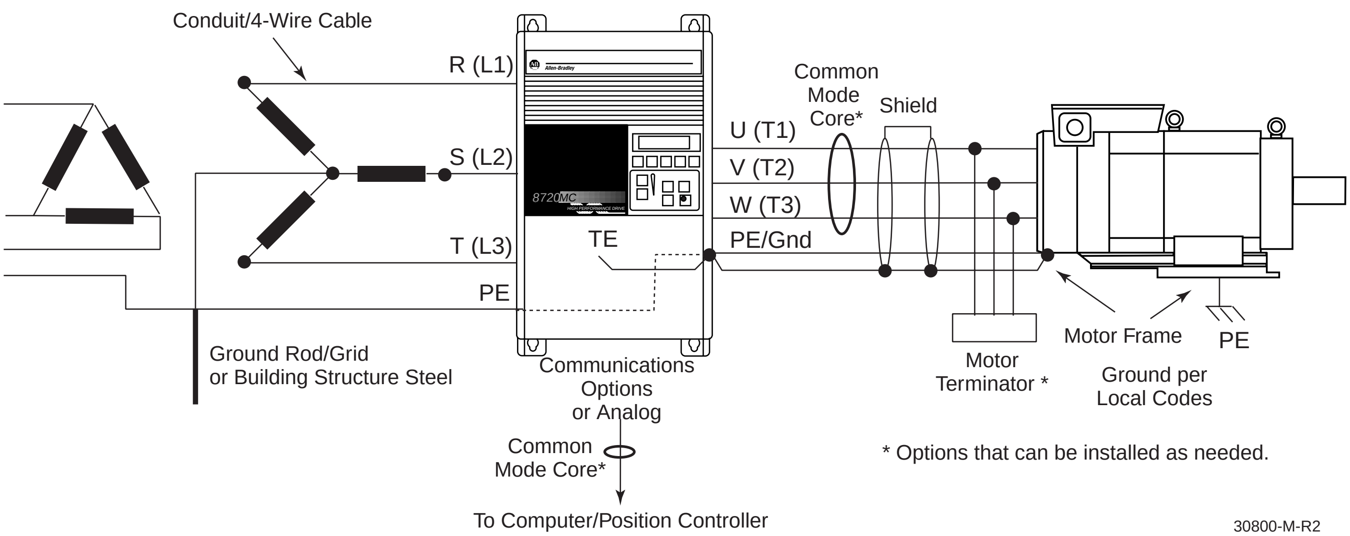
NOTE (2) Drive rating is based on altitudes of 1000 meters (3000 feet) or less. If installed at a higher altitude, derate the drive. Refer to Figure A.10 in Appendix A.

NOTE (3) Not available at time of publication.

Grounding Your Drive

Great care must be taken to assure that the 8720MC Drive is properly grounded. Spurious electrical noise must be minimized by using proper grounding, wire routing and shielding practices. Control circuits will not perform properly unless the appropriate preventative measures are taken. Figure 4.1 shows the grounding recommendations for the drive

Figure 4.1
Recommended 8720MC Grounding



To ground your 8720MC Drive:

1. Identify a good source of earth ground such as a ground rod or a clean low resistance connection to a steel building structure. Connect the PE terminal provided on TB1 to earth ground.
2. Define the paths through which the high frequency ground currents flow. Isolate the wires carrying these currents.
3. Connect the ground conductor of the motor cable (drive end) directly to the drive ground PE terminal, not to the enclosure ground bus bar.
4. Connect the enclosure ground bus bar to adjacent building steel or a floor ground rod.
5. Solidly ground the RFI filter, if you need to use one.
6. The D-frame amplifiers (097, 120, 149, and 180) have a TE terminal. The TE block is used for all control signal shields internal to the drive. It must be connected to an earth ground by a separate continuous lead.

These steps are explained in greater detail in the following sections.

Connecting the Drive to the System Ground

Connect the drive to earth ground via the power ground (PE) terminal provided on the power terminal block (TB1). Ground impedance must conform to the requirements of national and local industrial safety regulations (such as NEC, VDE 0160, and BSI). You should inspect and test the ground impedance at appropriate and regular intervals.

► Even if you have a floating secondary, the building must have a safety (earth) ground.

In any cabinet, you should use a single, low-impedance ground point or ground bus bar. You should:

- Ground all circuits independently and directly to this ground point or bus bar.
- Directly connect the AC supply ground conductor to this ground point or bus bar.

Defining the High Frequency Ground Current Paths

High frequency currents flow through the motor cable shield, the motor case ground wire and the feedback cable shield. Special care is required in terminating these connections. Defining the high frequency current paths helps to assure that noise-sensitive circuits do not share a path with high-frequency ground currents. You must separate current carrying ground conductors. Control and signal ground conductors should not run near or parallel to a power ground conductor.

Connecting the Ground Conductor of the Motor Cable

Connect the ground conductor of the motor cable (drive end) directly to the drive ground (PE) terminal, not to the enclosure bus bar. Grounding directly to the drive (and filter, if installed) provides a direct route for high-frequency current returning from the motor frame and ground conductor. At the motor end, you should also connect the ground conductor to the motor case ground stud. Shielded or armored four-wire cable is required. See “Selecting Your Motor Cables” later in this chapter.

Grounding the Safety Ground (PE)

Most codes require a safety ground. You can connect the ground bus to adjacent building steel (such as a girder or joist) or a floor ground loop, provided that the grounding points comply with your national (such as NEC), regional, or local regulations. Figure 4.1 shows TE ground. The TE ground is used to ground internal control circuits in the D frame drives.

Grounding the Optional RFI Filter

If you are using an RFI filter, you must solidly ground the RFI filter.

► Additional information about the optional RFI filter is located in Appendix B, *CE Conformity, Publication 1336 Impact-5.0*

AC Supply Source Information for AC Input Drives

The five 8720MC AC input drives are suitable for use in circuits that can deliver up to a maximum of 70 rms symmetrical amperes when used with the AC input line fuses specified in the tables in this section.

The 8720MC AC input drives do not contain input power short circuit fusing. Specifications for the recommended size and type of fuses necessary to protect against short circuits are shown in Table 4.2. The table is based on approximately 150% peak motor demand.

Table 4.2:
Max Recommended AC Input Line Fuse Ratings (380 to 460 vac Input)

Motor Cat. No. 8720SM-460VAC/380VAC	Drive Cat. No 8720MC-	Max RMS AC Input Fuse Current 380 to 460V AC	Bussman Fuse	Gould Shawmut Fuse	Input Wire Size AWG/mm^2
005S1BB/ 005S1BC	B021	35 amps	JKS-35	A4J35	AWG 10 / 5.3 mm^2
007S1CB/ 007S1CC	B027	40 amps	JKS-40	A4J40	AWG 10 / 5.3 mm^2
011S1DB 011S1DC	B034	50 amps	JKS-50	A4J50	AWG 8 / 8.4 mm^2
015S1EB	B042	70 amps	JKS-70	A4J70	AWG 6 / 13.3 mm^2
018S1FB/ 018S1FC	B048	80 amps	JKS-80	A4J80	AWG 6 / 13.3 mm^2

ATTENTION: To guard against personal injury and/or equipment damage caused by improper fusing, use only the recommended line fuses specified in the tables in this chapter. Branch circuit breakers or disconnect switches cannot provide this level of protection for drive components.

Unbalanced Distribution Systems

The AC input drives are designed for use with conventional three-phase supplies that are symmetrical with respect to ground. Surge suppression devices are included to protect the drive from lightning-induced over voltage between line and ground. For this reason, we recommend a neutral grounded system. The drive works with a grounded phase, but you may want to use an isolation transformer to provide a supply balanced with respect to ground.

Ungrounded Distribution Systems

All 8720MC AC input drives are equipped with a metal oxide varistor (MOV). The MOV provides voltage surge protection, phase-to-phase as well as phase-to-ground, which is designed to meet IEEE 587. The MOV circuit is designed for surge suppression only (transient line protection), not continuous operation.

With ungrounded distribution systems, the phase-to-ground MOV connection could become a continuous current path to ground. MOV line-to-line and line-to-ground voltages should not exceed the input voltage rating shown in *Chapter 2: Specifications*. Exceeding these values may cause physical damage to the MOV.

Is a Line Reactor or Isolation-Type Transformer Required?

When using the 8720MC-RPS Regenerative Power Supply you always need Line reactors. Refer to publication 8720-1.4, the 8720MC-RPS User Manual for details on the input wiring for this unit. When using the AC input amplifiers for 5.5 to 18.5 kW non regenerative applications, typically, you can connect the 8720MC AC input drive directly to a three-phase AC power line. However, certain power line conditions, as discussed in table 4.3, may introduce the possibility of drive input power component malfunction. To reduce the possibility of these malfunctions, a line reactor or isolation-type transformer may be required.

Use the following table to determine if a line reactor or isolation-type transformer is required for your AC input system.

Table 4.3:
Determining if a Line Reactor or Isolation Type Transformer is Needed

If the AC line supplying the drive:	Then an AC line reactor or isolation-type transformer:
Has power factor correction capacitor connected and switched	Is recommended between the capacitor bank and the input to the drive.
Frequently experiences transient power interruptions or significant voltage spikes	May be required
Is run off the same line as a line commutated DC drive	May be required.

Connecting Power to Your Drive

Read the following attention text before wiring power to your 8720MC Drive.

ATTENTION: The national codes and standards (such as NEC, VDE, and BSI) and local codes outline provisions for safely installing electrical equipment. Installation must comply with specifications regarding wire type, conductor sizes, branch circuit protection, and disconnect devices. Failure to do so may result in personal injury and/or equipment damage.

Important: For maintenance and set up procedures, you may operate the drive without having a motor connected.

8720MC Drive Connector Layout

Figure 4.2 shows the connector layout for the B frame chassis of the 8720MC Drive.

Figure 4.2
Drive Connector Layout for the B Frame Chassis

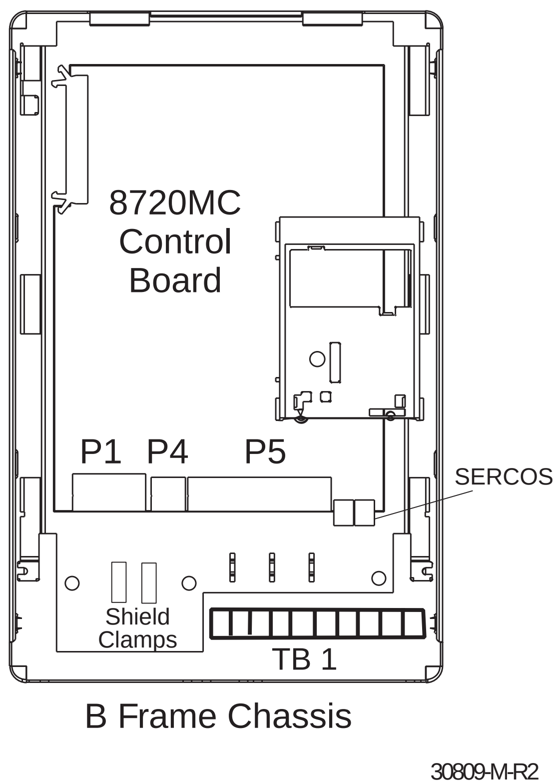
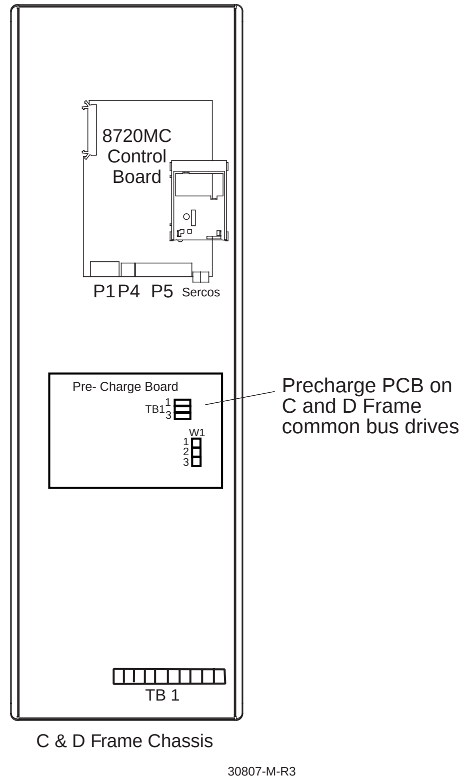


Figure 4.3 shows the connector layout for the C and D frame chassis of the 8720MC Drive.

Figure 4.3
Drive Connector Layout for the C and D Frame Chassis



For Figures 4.2 and 4.3 Terminal Strip TB1 is always the power terminal connection point and has terminals for both AC input power and DC input power. If in your application you will be using a regenerative power supply input use the DC input terminals only. If you have a direct AC input application use the 3 AC input terminals for 3 phase 380 to 460 vac incoming power. Use the 2 DC terminals for connection to a 1336 WB Brake Chopper Module. Always connect the PE terminal to an earth ground such as a ground rod or a steel building ground. Connect the U,V,W motor leads to the U,V,W connections at the drive and the motor. Always use 4 wire shielded cable. The ground wire should be firmly bonded to the motor ground terminal and the drive Chassis ground. The shield should also be firmly bonded to the motor ground terminal and the drive PE terminal.

For the C and D chassis +24vdc must be connected to terminal TB1-T1 and +24 vdc return must be connected to TB1-T3 on the precharge PCB shown in figure 4.3 and 4.15. Either +24vdc and +24 vdc return from P5-22 and P5-23 on the 8720MC control module or external +24vdc may be used. Also pins 1 and 2 must be jumpered on the W1 shorting plug. See figure 4.15.

TB1 Terminal Block Drive Connections

Figures 4.4 and 4.5 show the TB1 drive connections for the B frame.

Figure 4.4
TB1 Drive Connections for B Frame (5.5 to 11 kW)

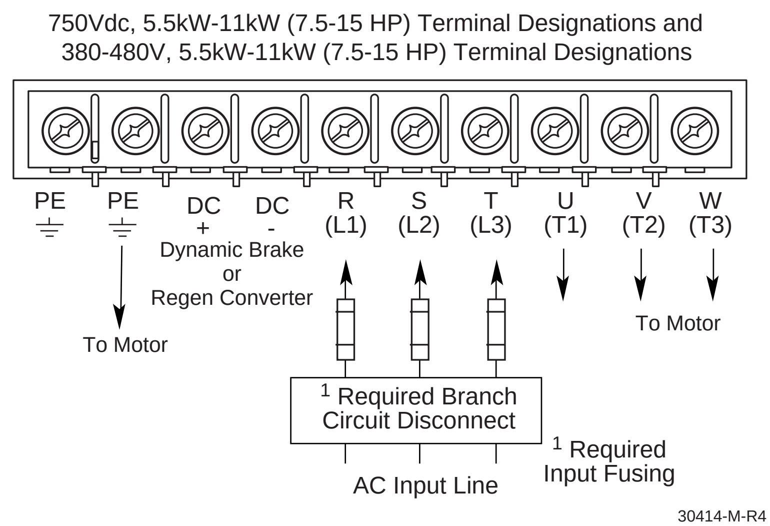


Figure 4.5
TB1 Drive Connections for B Frame (15 to 22 kW)

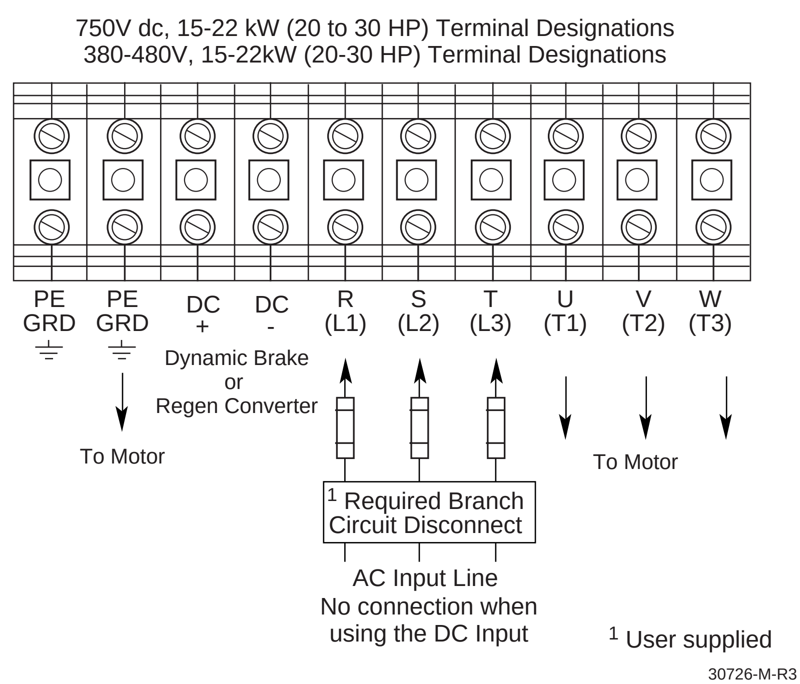


Figure 4.6 shows the TB1 drive connections for the C frame.

Figure 4.6
TB1 Drive Connections for C Frame

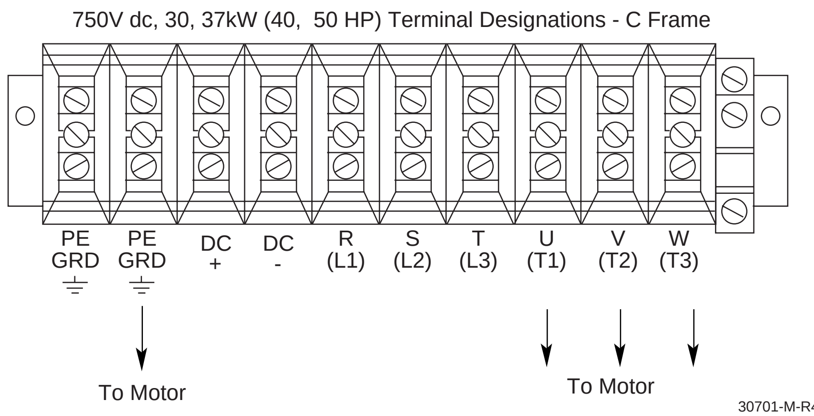
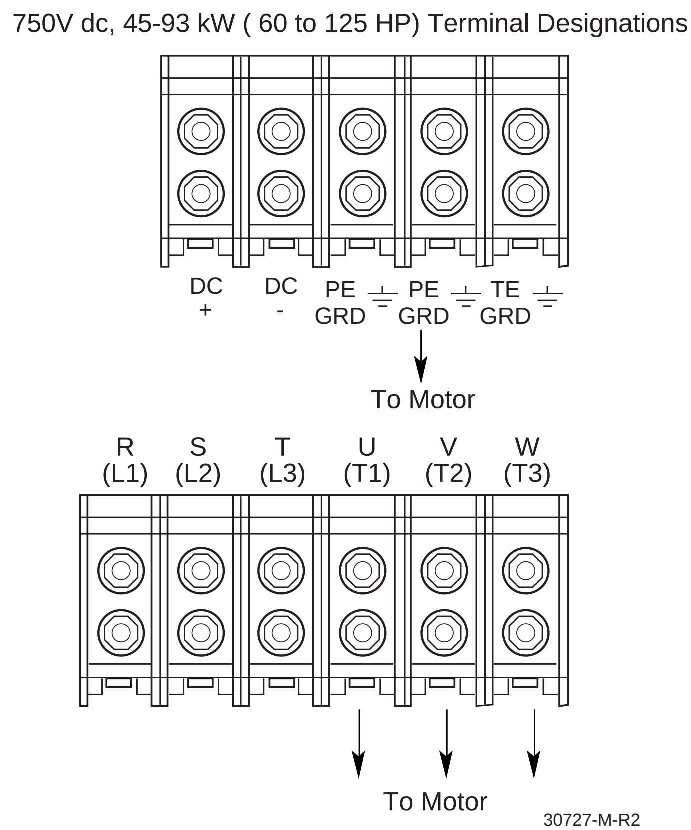


Figure 4.7 shows the TB1 drive connections for the D frame.

Figure 4.7
TB1 Drive Connections for D Frame



General Terminal Specifications

Table 4.4 provides general terminal information for the power terminations on TB1.

**Table 4.4:
General Terminal Specifications**

Terminal	Description
PE	Power earth ground
R (LI), S (L2), T (L3)	AC line input terminals
+DC, -DC	DC bus terminals
U (TI), V (T2), W (T3)	Motor connection

Wire and Torque Specifications

Table 4.5 provides information about the maximum/minimum wire size and maximum torque used for the various frame sizes.

**Table 4.5:
Wire and Torque Specifications by Frame Size**

If you have this frame size:	The maximum/minimum wire size(1) in mm^2 (AWG) is:	The maximum torque in N-m (lb.-in.) is:
B	13.3/0.5 (6/20)	1.70 (15)
C	26.7/0.8 (3/18)	5.65 (50)
D(3)	127.0/2.1 (250 MCM114) 67.4/2.1 (00/14)(2)	6.00 (52) 6.00 (52)

NOTE (1) Wire sizes given are the maximum/minimum sizes that TB1 will accept. These are not recommendations.

NOTE (2) Applies to 45 and 56 kW (60 and 75 hp) 750V DC drives only.

NOTE (3) These configurations of TB1 are stud type terminations and require the use of lug type connectors to terminate field installed conductors. Lug kits are available for use with these configurations.Wire size used is determined by selecting the proper lug kit based on the drive catalog number, as explained below.

Selecting the Proper Lug Kit for Your System

The D frame has stud type terminals, which require using lug connectors for cable terminations. Additional cable information is explained in “Selecting Your Motor Cables” below. Table 4.6 shows the lug selection for each possible cable choice. Choose connectors for each installation based on the desired cable sizes, the application requirements, and all applicable national, state, and local codes.

Table 4.6:
Lug Selection

Drive Catalog Number	Output U, V, W and PE		DC+ DC-		TE	
	Cable (per Phase) mm² (AWG)	T & B Part No. (8 required)	Cable (per Phase) mm² (AWG)	T & B Part No. (2 required)	Cable (per Phase) mm² (AWG)	T & B Part No. Number
8720MC-D097	33.6 (2)	54147 (1)	21.2 (4)	54139 (1)	13.3 (6)	54135 (1)
8720MC-D120	53.5 (1/0)	54153 (1)	33.6 (3), (2)	54142 (1)	13.3 (6)	54135 (1)
8720MC-D149	85.0 (3/0)	54163 (1)	53.5 (1/0)	54153 (1)	13.3 (6)	54135 (1)
8720MC-D180	107.2 (4/0)	54168 (1)	67.4 (2/0)	54110 (1)	21.2 (4)	54139 (1)

NOTE (1) 5/16 inch stud. All other studs are 3/8 inch

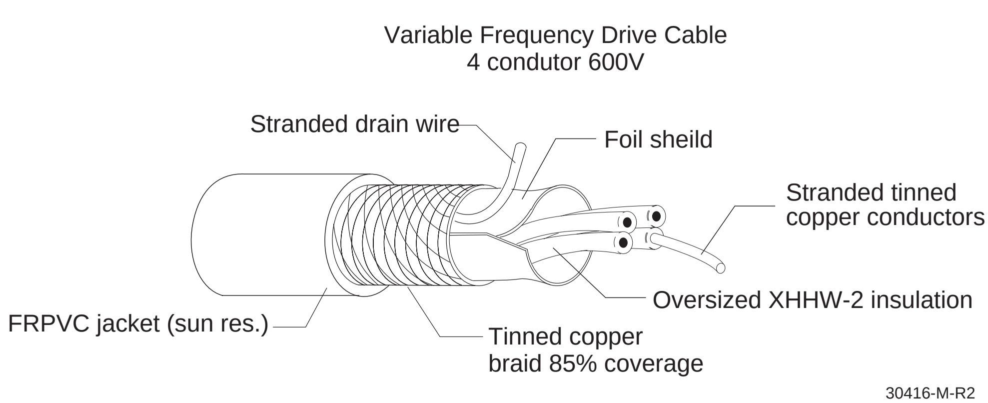
Selecting Motor Cables

The selection of motor cable is critical to assuring that the electromagnetic field, naturally produced when large amounts of electrical energy are switched at high frequency, don't cause unwanted electromagnetic interference to control equipment.

Shielded Motor Cable

The use of a four-wire type VFD, 600 volt, UL listed cable is strongly recommended for all motor currents at or below 130 amperes. Figure 4.8 illustrates the type of cable required. Use of shielded conductors is mandatory for preventing radiated EMI from migrating to noise sensitive microprocessor hardware. The combination of thick wire insulation, 85% braided shield coverage and 100% foil shield coverage works to minimize the electrical EMI generated by the motor leads, particularly if long distances are involved. Four-wire VFD cable is available in wire sizes from #16AWG to #2AWG. Recommended sources are Belden Wire and Cable Co. and Olflex Wire and Cable, Inc. In sizing the wire for the application, use 150 % of the rated motor continuous current, assuming no greater than 25 °C ambient temperature.

Figure 4.8
Required Cable Type



You should always use shielded motor cable. You must connect the shield to the drive chassis (PE) connection and the motor frame. Make the connection at both ends to minimize the external magnetic field.

If you use cable trays or large conduits to distribute the motor leads for multiple drives, use shielded cable to reduce or capture the noise from the motor leads and to minimize cross coupling of noise between the leads of different drives. Connect to the ground (PE) connections at both the motor and the drive end.

Armored Cable

Armored cable also provides effective shielding. Ideally, you should ground armored cable only at the drive (PE) and motor frame. Some armored cable has a PVC coating over the armor to prevent incidental contact with grounded structure. If, due to the type of connector, you must ground the armor at the cabinet entrance, use shielded cable within the cabinet to continue as far as possible with the coaxial arrangement of power cable and ground.

In some hazardous environments, you cannot ground both ends of the armored cable. When cable armor is grounded at both ends a ground loop is formed. If the ground loop is cut by a strong magnetic field induced from proximity to powerful electric machines there is a possibility for high circulating current operating at low frequency. In this case, make a ground connection at one end through a capacitance that blocks the low, line frequency current but presents a low impedance to RF. Due to the highly pulsed nature of the circulating current, the capacitor type used must be rated for AC-to-ground voltage. Consult the factory for specific guidelines.

Conduit

For applications above 130 amperes, metal conduit is required for cable distribution. Follow these guidelines:

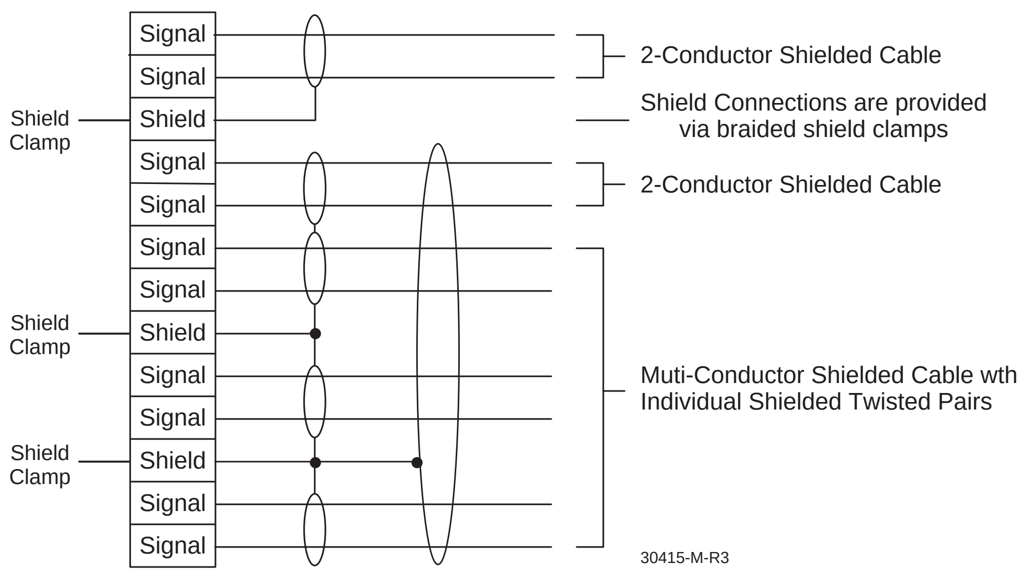
- Drives are normally mounted in cabinets, and ground connections are made at a common ground point in the cabinet. If the conduit is connected to the motor junction box and the drive end is connected to the ground panel in the cabinet, you do not need any additional conduit connections.
- Route no more than three sets of motor leads and a ground wire through a single conduit. This minimizes cross talk that could reduce the effectiveness of the noise reduction methods described. If more than three drive/motor connections per conduit are required, use shielded cable. If practical, each conduit should contain only one set of motor leads.
- It is recommended that you use a thick insulation lead wire, such as type RHW-2 or equal.

ATTENTION: To avoid a possible shock hazard caused by induced voltages, ground unused wires in the conduit at both ends. For the same reason, if a drive sharing a conduit is being serviced or installed, disable all drives using this conduit. This eliminates the possible shock hazard from cross coupled drive motor leads.

General Wire Guidelines

You should observe all applicable safety and national and local regulations when selecting the appropriate wire size for your system. Due to the drive overload capacity of 150% of the continuous current rating for one minute, the conductors for the transformer primary and secondary must be sized (at a minimum) for 125% to 160% of the maximum continuous input current for the motor selected. See the specification tables in Chapter 2 for input currents. The motor conductors must also be rated for a minimum of 125% to 160% of the full load motor continuous current. If less than 150% overload is required the torque limit parameters must be set in the drive accordingly. The distance between the drive and motor may affect the size of the conductors used. To protect against interference, use shielded wire in motor and control circuits. A shielded cable is required for all feedback signal wires.

Figure 4.9
Recommended Shielded Cable Practices



Specific requirements for wiring the feedback and analog I/O shielded cables are found in Figures 4.19 and 4.21 in this chapter

By-pass Contactors

Please read the following Attention regarding by-pass contactors.

ATTENTION: An incorrectly applied or installed system can result in component damage or reduction in product life. The most common causes are:

- Wiring AC line to drive output or control terminals.
- Improper by-pass or output circuits not approved by Allen-Bradley.
- Output circuits which do not connect directly to the motor.
- Incorrect or inadequate AC supply.
- Excessive ambient temperature.

Contact Allen-Bradley for assistance with application or wiring.

Connecting Power to the 8720MC-RPS and 1336R Regenerative Power Supplies

AC Supply Source

The 14 amp through 180 amp 8720MC DC input drives are suitable for use in circuits that can deliver up to a maximum of 250 rms symmetrical motor amperes when used with the 8720MC-RPS or 1336R Regenerative Power Supplies and the AC input line fuses specified in the tables in this section.

For detailed installation information on the 8720MC-RPS Regenerative Power Supply, refer to publication number 8720MC-RM001B-US, titled *8720MC Regenerative Power Supply User's Manual*. For detailed installation information about the 1336R Regenerative Converter, refer to publication number 1336 REGEN-5.0, titled *1336R Line Regenerative Package User Manual*. The following tables are provided to assist in selecting the appropriate fuses and wire for the regenerative power supplies. The data in the tables are based on 25 °C operating temperature and 70 °C insulation.

Always plan to use a cabinet disconnect switch as well as an AC line contactor in conjunction with the AC line input fuses or circuit breakers. To protect the AC input, install a circuit breaker or fuse in each incoming phase.In some locations local codes require fuses instead of circuit breakers. When using 8720MC-RPS in master slave operation both the master and slave units must have incoming AC circuit protection. See the *8720MC Regenerative Power supply User's Manual*, Chapter 4 for details.

Table 4.7: .
600V AC Input Fuse Specifications for Regenerative Power Supplies I

Motor Cat. No. 8720SM-	Drive Cat. No 8720MC-	Max Input Fuse Current 380 to 460V AC	Bussman Fuse	Gould Shawmut Fuse	Wire Size AWG /mm^2
005S1BA	B014	16 amps	JKS-20	A4J20	AWG 14 / 2.1 mm^2
007S1CA	B021	21 amps	JKS-25	A4J25	AWG 12 / 3.3 mm^2
011S1DA	B027	32 amps	JKS-35	A4J35	AWG 10 / 5.3 mm^2
015S2EA	B034	44 amps	JKS-45	A4J45	AWG 8/ 8.4 mm^2
018S2FA	B042	54 amps	JKS-60	A4J60	AWG 6/ 13.3 mm^2
022S2GA	B048	63 amps	JKS-70	A4J70	AWG 6/ 13.3 mm^2
030S4JA	D065	88 amps	JKS-90	A4J90	AWG 4/ 21.2 mm^2
037S4KA	D078	107amps	JKS-110	A4J110	AWG 4/ 21.2 mm^2
045S5NA	D097	63 amp master 63 amp slave	JKS-70	A4J60	AWG 6/ 13.3 mm^2
055S5PA	D120	73 amp master 73 amp slaver	JKS-80	A4J80	AAWG 6/ 13.3 mm^2
063S5QA	D120	92 amp master 92 amp slaver	JKS-100	A4J100	AWG 4/ 21.2 mm^2
075S6SA	D149	110 amp master 110 amp slaver	JKS-110	A4J110	AWG 4/ 21.2 mm^2
093S6TA	D180	90 amp master 2-90amp slaves	JKS-90	A4J90	AWG 4/ 21.2 mm^2

Table 4.7 demonstrates that any 8720SM motor application above 37kw requires a master and at least one or two slave RPS units. When two or three 8720MC-RPS065 Regenerative Power Supplies are operating in a master/slave mode, the output load is shared equally between the power supplies. When a master and one slave is required input fuses and wire should be sized to 1/2 of the total required maximum continuous input current for the total required drive load, multiplied by 1.75. When a master and two slaves are required input fuses and wire should be sized to 1/3 of the total required maximum continuous input current for the total required drive load, multiplied by 1.75. Table 4.7 uses this relationship.

Bus Bar and DC Drive Input Fuses

When multiple drives and/or master/slave RPS units are needed to meet the load requirements a common bus architecture is preferred. For common bus applications Allen-Bradley’s Bulletin 140 bus bar and panel mounting components is recommended. Size the bus bar capacity to at least 175% of total RPS continuous output current. The DC input wire and fuses to each drive should be sized to 175% of each drives maximum continuous input current requirements.

All fuses on the DC bus must be rated for 1,000 VDC operation. For DC bus fuses use Gould A1-100P, Gould A100C (80 amps and higher) or equal. Publication 8720MC-RM001C-US provides wiring diagrams for master slave RPS configurations.

When a single RPS is matched to a single drive, DC drive input fuses are not required. Table 4.8 is used to select DC drive input fuses and assumes more than one drive is connected to the RPS common bus, otherwise DC drive input fuses are not required. Suggested wire sizes assume single conductor connections. It is perfectly acceptable to use 2 or 3 conductors in parallel as long as the total amperage requirements are met. For example 2 parallel #12 conductors could be used in place of a single # 10 conductor.

Table 4.8:
1000 vdc Input Fuse Specifications for use with multiple Drives & RPS unit(s)

Motor Cat. No. 8720SM-	Drive Cat. No 8720MC-	Drive input Fuse Current @ 750V DC	Bussman Fuse	Gould Shawmut Fuse	Wire Size AWG /mm^2
005S1BA	B014	15 amps		A100P15-1	AWG 14 / 2.1 mm^2
007S1CA	B021	20 amps		A100P20-1	AWG 14/ 2.1 mm^2
011S1DA	B027	30 amps		A100P-30-1	AWG 12 / 3.3 mm^2
015S2EA	B034	40 amps	FWJ-40	A100P-40-1	AWG 12 / 3.3 mm^2
018S2FA	B042	50 amp	FWJ-50	A100P-50-4	AWG 10 / 5.3 mm^2
022S2GA	B048	60 amps	FWJ-60	A100P-60-4	AWG 8 / 8.4 mm^2
030S4JA	D065	77 amps	FWJ-80	A100P-80-4	AWG 6 / 13.3 mm^2
037S4KA	D078	94 amps	FWJ-100	A100P-100-4	AWG 4 / 21.2 mm^2
045S5NA	D097	115 amps	FWJ-125	A100P-125-4	AWG 2 / 33.6 mm^2
055S5PA	D120	141.5 amps	FWJ-150	A100P-150-4	AWG 1/0 / 53.3 mm^2
063S5QA	D120	162 amps	FWJ-175	A100P-175	AWG 2/0 / 67.4 mm^2
075S6SA	D149	194 amps	FWJ-200A	A100P-200-4	AWG 3/0 / 83.2 mm^2
093S6TA	D180	236 amps	FWJ-250	A100P-250-4	AWG 4/0 / 107.3 mm^2

Control Interface Wiring

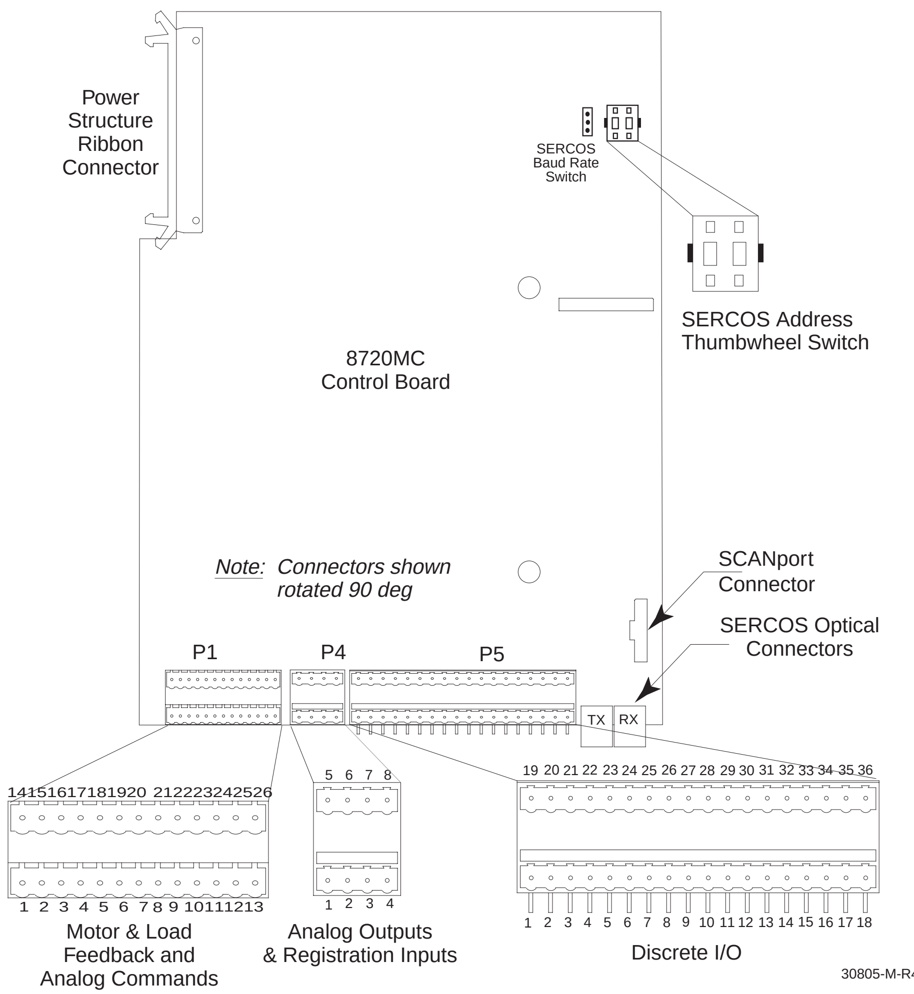
Before you can transfer data to or from the drive, you need to wire the analog inputs, the analog outputs, the digital inputs, the digital outputs, the output relays, the registration sensor, feedback devices and the SERCOS connections. The following sections will focus on the control wiring.

Control and Logic Connections

Figure 4.10 shows the control and logic connections for the 8720MC Drive. A total of 6 Weidmueller connectors (3 double row pairs) are used to connect the motor feedback, the auxiliary feedback, the analog I/O, the registration inputs, the digital I/O and the relay outputs. The front and back connectors are identical and consequently care must be taken to label and dress the cables so that they can not be inadvertently switched. Three tables follow the illustration. The tables contain:

- Table 4.5 - pinout information for the P1 connector
- Table 4.6 - pinout information for the P4 connector
- Table 4.7 - pinout information for the P5 connector

Figure 4.10
Control and Logic Connections for the 8720MC Drive



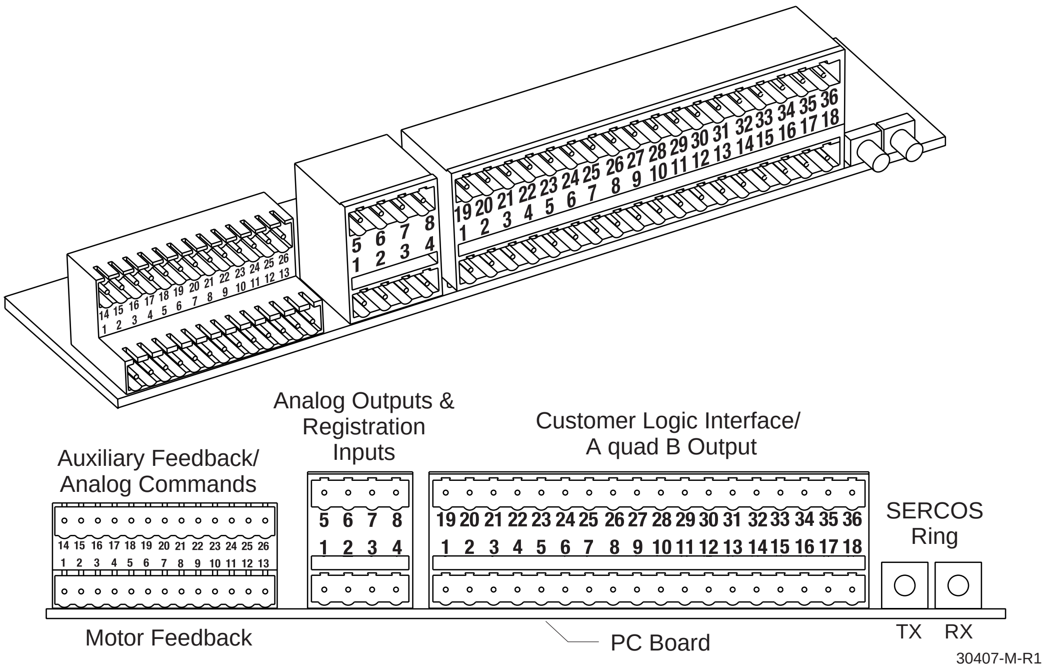


Table 4.9: P1 Connector Pinout Information

P1 Connector - Motor and Load Feedback and Analog Inputs Weidmueller Double Row 5.00mm Terminals			
Row1	**Description**	**Row2**	**Description**
1	Ch1: Sine or A Channel Data (motor)	14	Ch2 Sine or A Channel Data or Analog In 1
2	Ch1: Sine Return or not A Channel Data	15	Ch2 Sine Return or not Channel A Data or Analog In 1 return
3	Ch1: Cosine or B Channel Data (motor)	16	Ch2 Cosine or B Channel Data or Analog In 2
4	Ch1: Cosine Return or not B Channel Data	17	Ch2 Cosine Return or not Channel B Data or Analog In 2 return
5	Ch1: Encoder Power Common	18	Ch2: Encoder Power Common
6	Ch1 +9vdc Encoder Power (motor)	19	Ch2: +9vdc Encoder Power (auxiliary)
7	Ch1 +5vdc Encoder Power	20	Ch2: +5vdc Encoder Power
8	Ch1: Index/Communication Non-Inverted Data	21	Ch2: Index/Communication Non-Inverted Data
9	Ch1: Index/Communication Inverted Data	22	Ch2: Index/Communication Inverted Data
10	Ch1: SSI Clock Non Inverted	23	Ch2: SSI Clock Non Inverted
11	Ch1 SSI Clock Inverted	24	Ch2: SSI Clock Inverted
12	Ch1: Motor Thermal Switch Input	25	Not Used
13	Ch1: Motor Thermal Switch Input	26	Not Used

Table 4.10:
P4 Connector Pinout Information

P4 Connector - Analog Outputs and Registration Inputs Weidmueller Double Row 5.00mm Terminals			
Row1	**Description**	**Row2**	**Description**
1	Analog Output 1	5	Analog Output 2
2	+5vdc Registration Input	6	Analog Output Common
3	+24vdc Registration Input	7	Registration Common
4	+5vdc Power for Registration Input	8	+5vdc Registration Power Return

Figure 4.2 and 4.3 (shown earlier in this chapter) illustrate the location of the P1, P4 and P5 connectors on the 8720MC main control board. The P4 and P5 connectors have two mating connectors each. One is for the front row and one is for the back row when looking directly at the main control PC board. P4 connections 1-4, back row, are made through the lower mating connector and connections 5-8 are made through the front mating connector. The same is true for P5, but the lower terminations are 1-18 and the upper terminations are 19-36. The wire terminations for P4 and P5 are designed for stripped AWG 22 to AWG 14 wire. The wire insulation should be stripped back 1/2 inch to assure that the connector grips the wire and not the insulation.

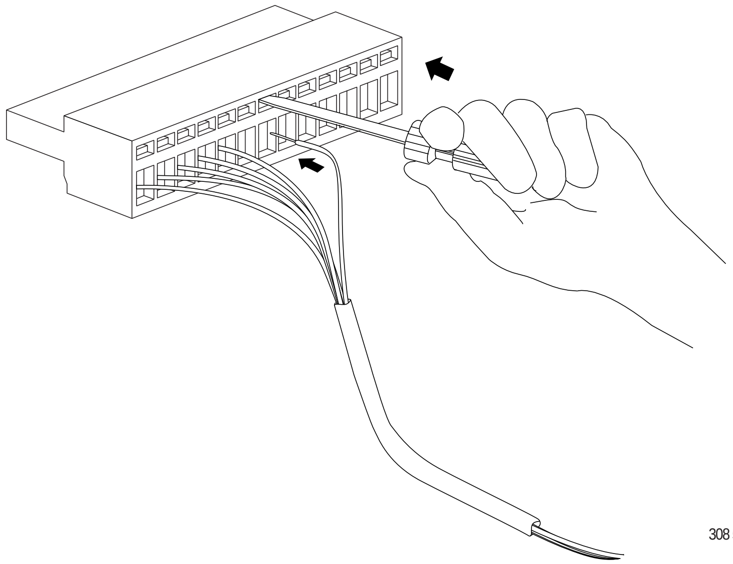
Each terminal has a spring type clamping mechanism which firmly grips the stripped wire. You can release the wire clamp by depressing the release spring located at each termination with a small instrument screw driver, as shown in Figure 4.11. The mating connectors are mechanically keyed and, therefore, it is not possible to put the connectors in backward. It is possible to switch the front and back connectors therefore care must be taken to prevent reversing the upper and lower connectors. You can accomplish this by using connector labels or you can tie wrap the cables to the chassis.

Table 4.11:
P5 Connector Pinout Information

P5 Connector - Discrete I/O - Weidmueller Double Row 5.00mm Terminals			
Row1	**Description**	**Row2**	**Description**
1	A quad B: A + channel output	19	A quad B: A - channel output
2	A quad B: B + channel output	20	A quad B: B - channel output
3	A quad B: Z + channel output	21	A quad B: Z - channel output
4	A quad B common	22	8720MC +24vdc power for inputs
5	Not used	23	8720MC +24vdc input power return
6	Relay output 1, Terminal 1	24	Relay output 3, Terminal 1
7	Relay output 1, Terminal 2	25	Relay output 3, Terminal 2
8	Relay output 2, Terminal 1	26	Relay output 4, Terminal 1
9	Relay output 2, Terminal 2	27	Relay output 4, Terminal 2
10	+ 24vdc Digital Output 5	28	+ 24vdc Digital Output 6
11	+ 24vdc Digital Output 7	29	+ 24vdc Digital Output 8
12	+ 24vdc Digital Output 9	30	+ 24vdc Digital Output 10
13	+24vdc Digital Input common	31	External +24vdc for Digital Outputs
14	+24vdc Digital Input 1	32	+24vdc Digital Input 2
15	+24vdc Digital Input 3	33	+24vdc Digital Input 4
16	+24vdc Digital Input 5	34	+24vdc Digital Input 6
17	+24vdc Digital Input 7	35	+24vdc Digital Input 8
18	+24vdc Digital Input 9	36	+24vdc Digital Input 10

The digital I/O and analog I/O have default functional assignments. Refer to chapter 6, tables 6.1 thru 6.7 for these functional definitions.

Figure 4.11
Releasing the Wire Clamp with an Instrument



Analog I/O Signal Wire Specifications

Table 4.12 contains recommended control signal wire specifications. The analog input connections are terminated to connector P1 per figure 4.10 and Table 4.9 The analog output connections are terminated to P4 per table 4.10

Table 4.12:
Control Signal Wire Specifications

This Belden wire or equivalent:	Should have these specifications:
8760	0.750 mm^2 (18 AWG), twisted pair, braided shield
8770	0.750 mm^2 (18 AWG) 3 conductor, braided shield
9460	0.750 mm^2 (18AWG) twisted pair, braided shield

The location of the terminal blocks is frame specific, as shown in figures 4.2 and 4.3

SERCOS Wiring

SERCOS stands for **S**erial **R**eal-time **CO**mmunications **S**ystem. SERCOS is a high speed (up to 4 Mbaud) serial interface, which was developed for communications between motion controllers and drives.

Since SERCOS uses a ring topology two fiber optic cables are required for each SERCOS node. One cable is for transmitting and the other is for receiving. Both cables are fiber optic, 1000 µm in diameter. The transmit cable is connected to the TX optical connector on the 8720MC control board. The receive cable is connected to the RX optical connector on the control board or another node. Figure 4.10 (shown earlier in this chapter) indicates where the fiber optic cables are connected to the control board.

Two types of pre-made fiber optic cables are available for the SERCOS ring connections. Cables for internal cabinet connections are 2.2 mm in diameter and have a PVC jacket. Cables for use in external raceways and open external connections are 5.3 mm in diameter and have a thick PVC jacket.

Figure 4.12 shows the SERCOS fiber optic cable assembly for internal cabinet use.

Figure 4.12
1000 µm SERCOS Fiber Optic Cable

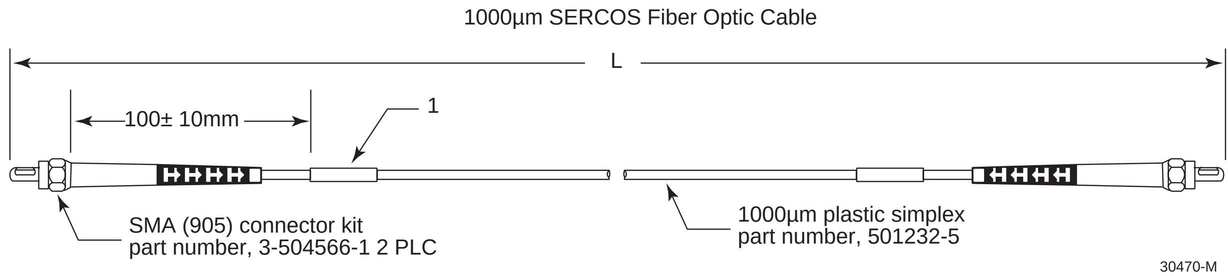


Table 4.13 contains catalog numbers for SERCOS fiber optic cables used within cabinets.

Table 4.13:
Catalog Numbers for Fiber Optic Cables Used Inside Cabinets

Cable Catalog Number	Amp Part Number	Length in meters (and inches)
8720MC-SC01	1278140-1	1.0 ± 0.05 (39.0 ± 2.0)
8720MC-SC02	1278140-2	2.0 ± 0.05 (79.0 ± 2.0)
8720MC-SC03	1278140-3	3.0 ± 0.05 (118.0 ± 2.0)
8720MC-SC05	1278140-5	5.0 ± 0.08 (197.0 ± 3.0)
8720MC-SC10	1-1278140-0	10.0 ± 0.15 (394.0 ± 6.0)

Table 4.14 contains catalog numbers for SERCOS fiber optic cables used outside cabinets.

Table 4.14:
Catalog Numbers for Fiber Optic Cables Used Outside Cabinets

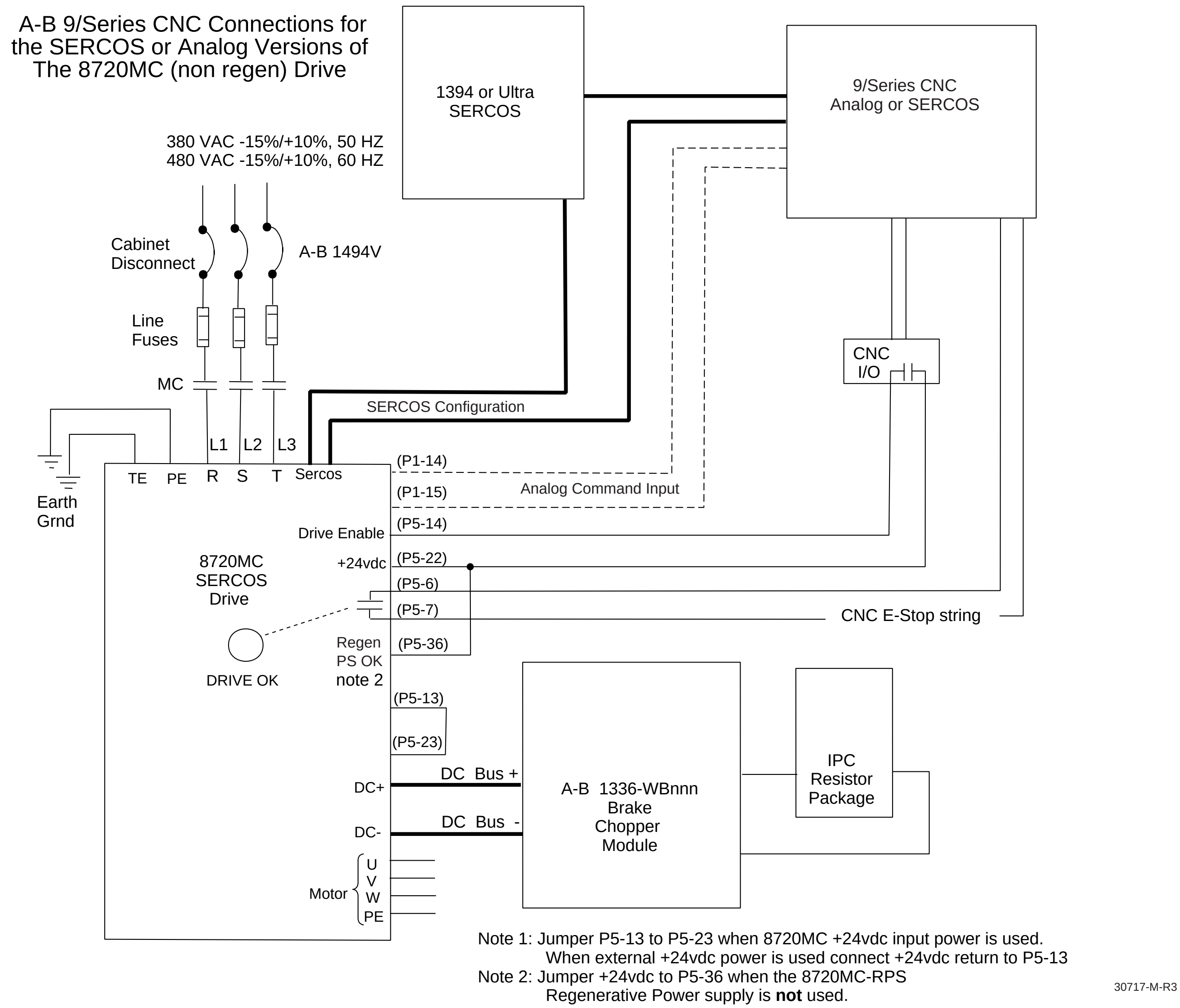
Cable Catalog Number	Amp Part Number	Length in meters (and inches)
8520-SC2	96-7002-1-2	2 ± 0.05 (79 ± 2)
8520-SC4	96-7002-1-1	4 ± 0.08 (157 ± 3)
8520-SC10	96-7002-1-3	10 ± 0.15 (394 ± 6)
8520-SC25	96-7002-1-5	25 ± 0.3 (984 ± 12)

8720MC AC Input Drives

Figure 4.13 provides information about the connections for the SERCOS or analog versions of the 8720MC non regenerative AC input B size chassis. This configuration uses a 1336-WBnnn Brake Chopper Module to compensate for high inertia loads which require rapid deceleration. For more information see publication 1336-5.65.

Since the 8720MC-RPS065 is not used in the direct AC input configuration terminal P5-36 must be jumpered to P5-22, +24 vdc, to by-pass the regenerative power supply fault. Also if P5-22 is used as the source for +24vdc for the DC inputs, as is recommended, terminal P5-13 should be jumpered to P5-23 to connect the input driver commons to the 8720MC +24vdc power supply return.

Figure 4.13
8720MC AC Input Drive Connections



8720MC Drive with a 8720MC Regenerative Power Supply

Figures 4.14 and 4.15 provide information about the AC power and logic connections for the 8720MC Drive with the 8720MC-RPS027 or the 8720MC-RPS065 Regenerative Power Supply. The RPS065 is a master/slave type regenerative converter, which can supply 37, 74 or 110 kW of 750V DC power. You can use one or several of the common bus 8720MC drives with this power supply. For more information on the 8720MC-RPS065 Regenerative Power Supply, see publication number 8720MC-RM001B, titled *8720MC-RPS065 User Manual*. It should be noted that both the RPS and the drive source 24vdc for interlocking connections. The +24 vdc power supplied on the 8720MC Drive and 8720MC- RPS should be used for the 8720MC drive/RPS interlocks as shown in Figures 4.14, 4.16, 4.17 and 4.18.

External +24vdc is not required for these interlocks. The drive and RPS 24vdc power should be kept isolated from each other as shown.

Figure 4.14
8720MC Drive with 8720MC Regenerative Power Supply

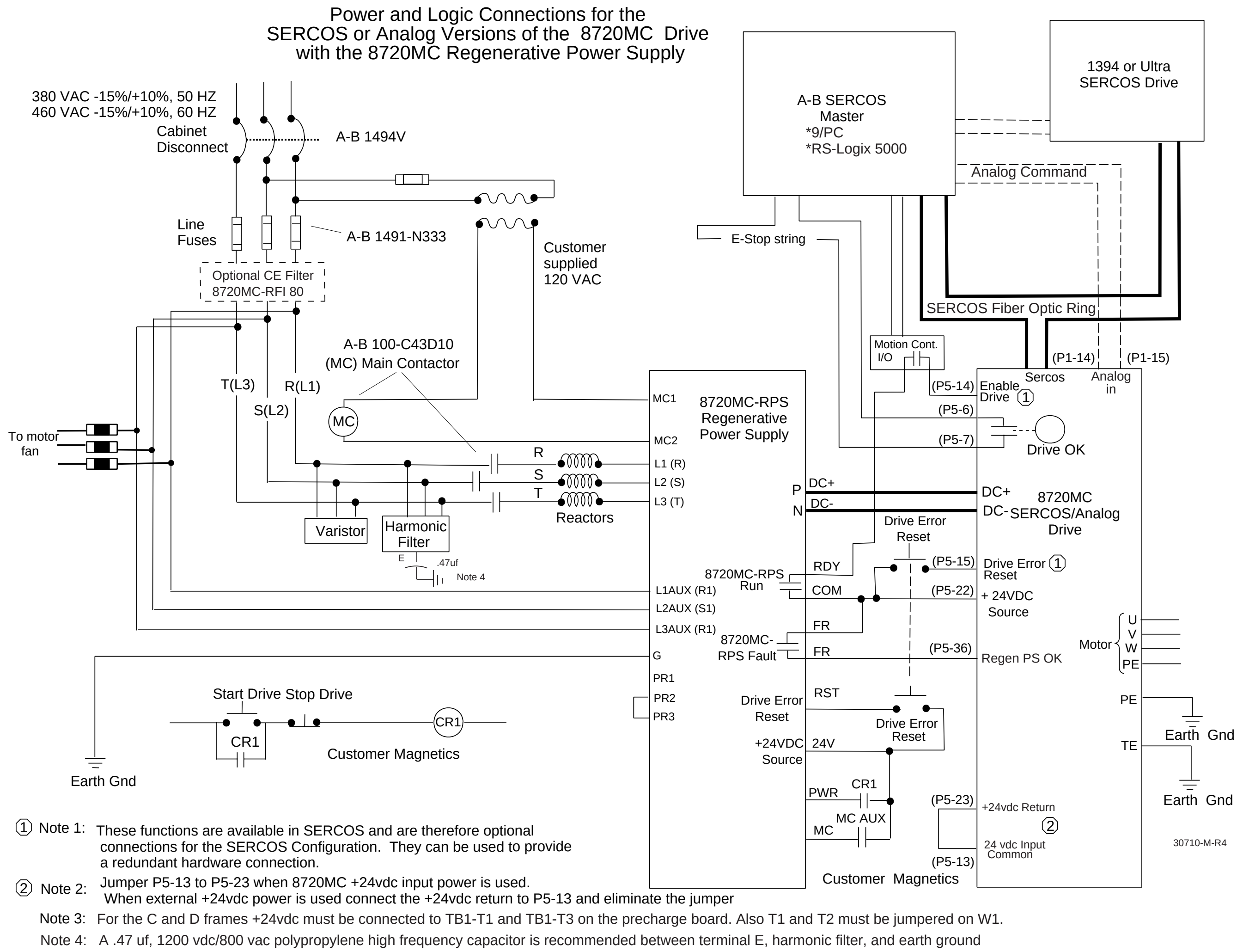
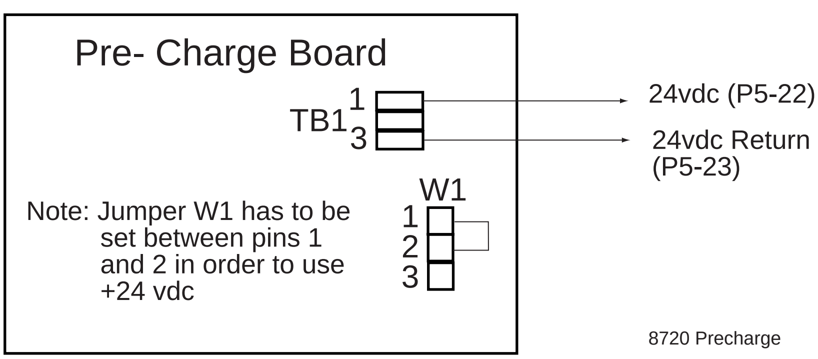
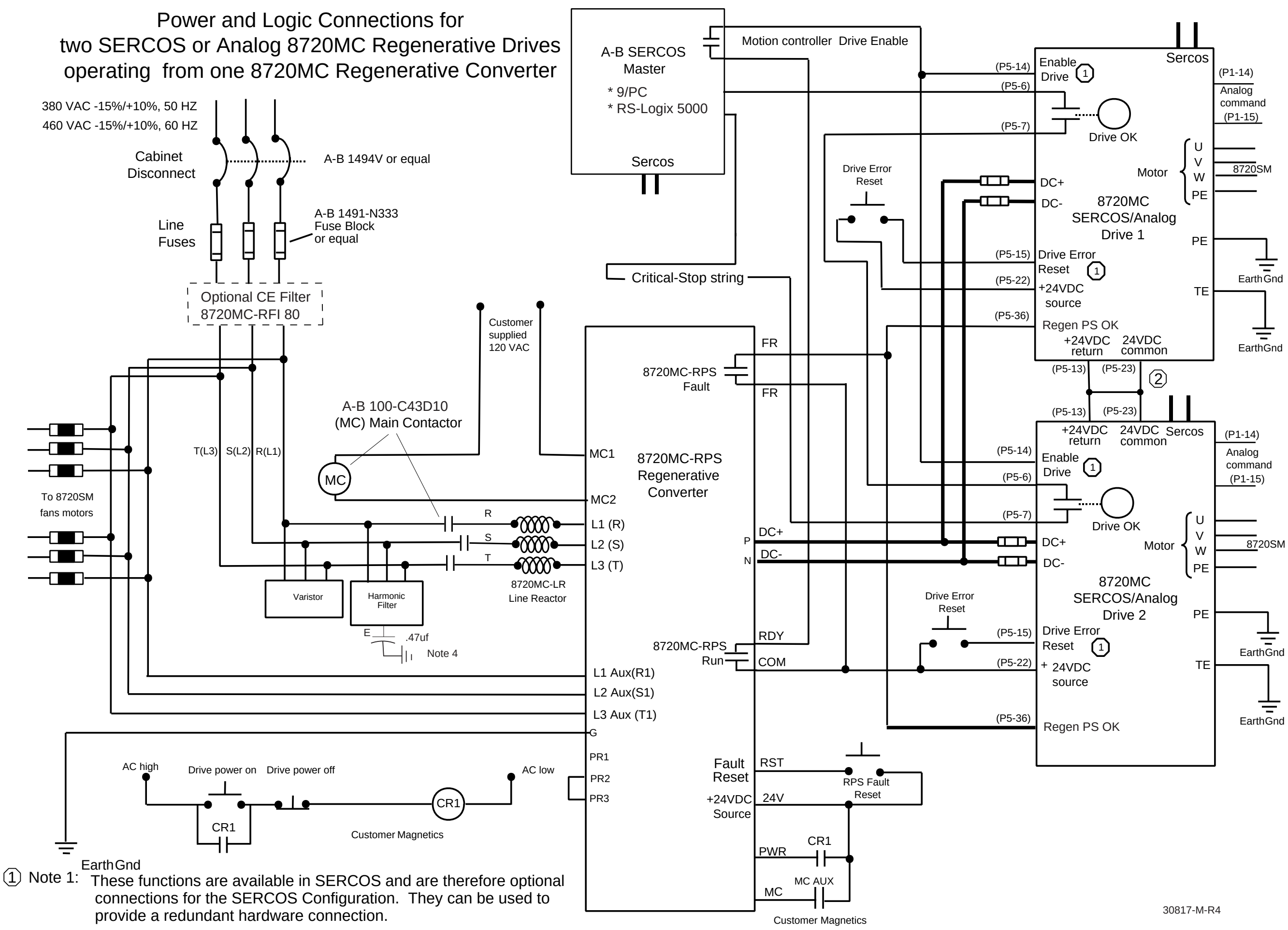


Figure 4.15
C and D Frame Precharge Board



For the C an D frame drives +24 vdc must be connected to terminal 1 and +24 vdc return must be connected to terminal 3 of TB1 on the 8720MC C or D frame precharge board. The jumper must be between pins 1 and 2 on the W1 shorting plug.

Figure 4.16
Multiple 8720MC Drives with One 8720MC Regenerative Power Supply



① Note 1: These functions are available in SERCOS and are therefore optional connections for the SERCOS Configuration. They can be used to provide a redundant hardware connection.

② Note 2: Jumper P5-13 to P5-23 when 8720MC +24vdc input power is used. When external +24vdc power is used connect the +24vdc return to P5-13 and eliminate the jumper

Note 3: For the C and D frames +24vdc must be connected to TB1-T1 and TB1-T3 on the precharge board. Also T1 and T2 must be jumpered on W1.

Note 4: A .47 uf, 1200 vdc/800 vac polypropylene high frequency capacitor is recommended between terminal E, harmonic filter, and earth ground

8720MC Drive with a 1336 Regenerative Power Supply

Figures 4.16 a provides information about the AC power and logic connections for the 8720MC Drive with the 1336R Regenerative Converter. For more information, see publication number 1336 REGEN-5.0, titled *1336R Line Regenerative Package User Manual*.

Figure 4.17
8720MC Regenerative Drive with 1336 Regenerative Power Supply

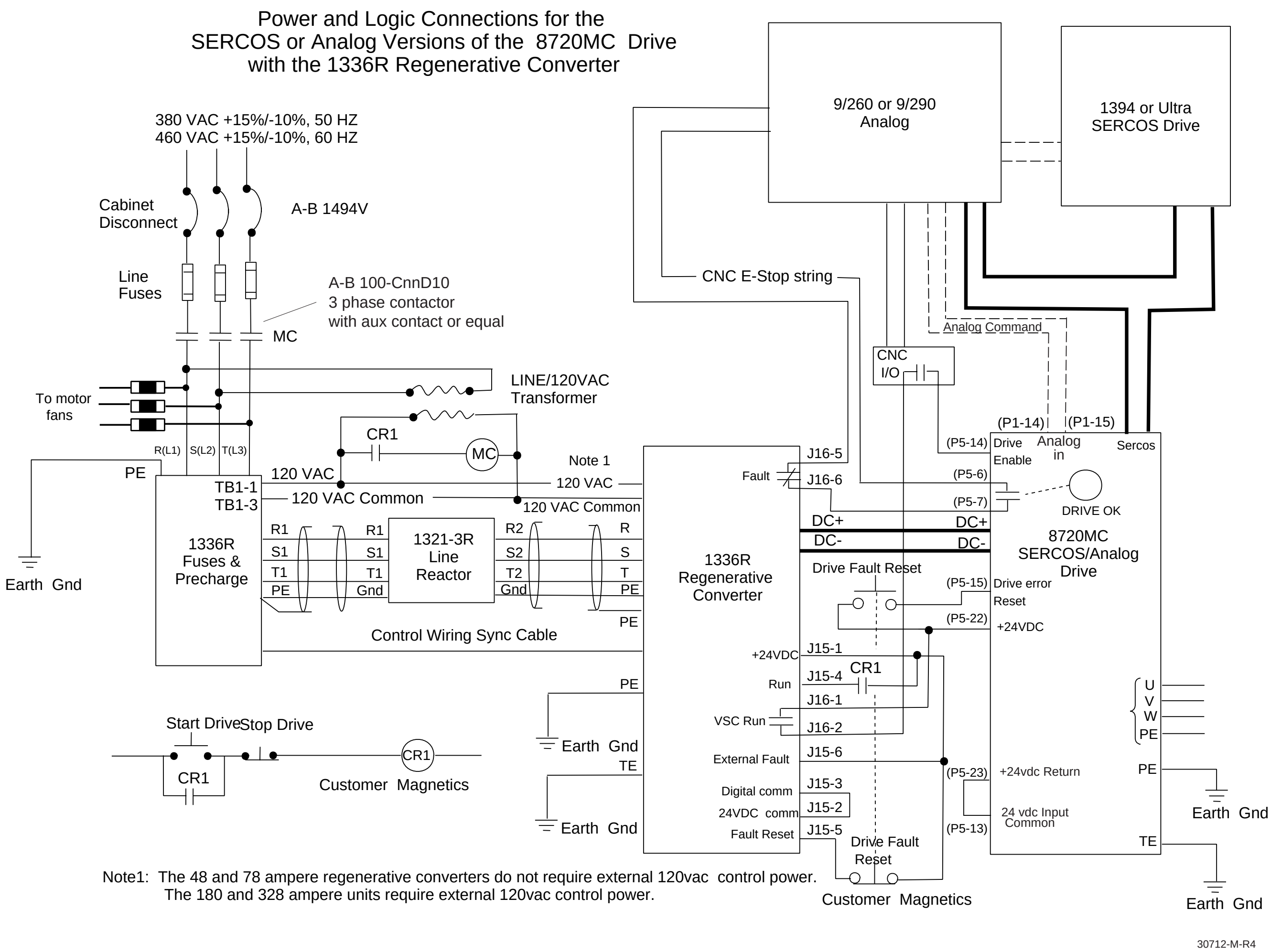
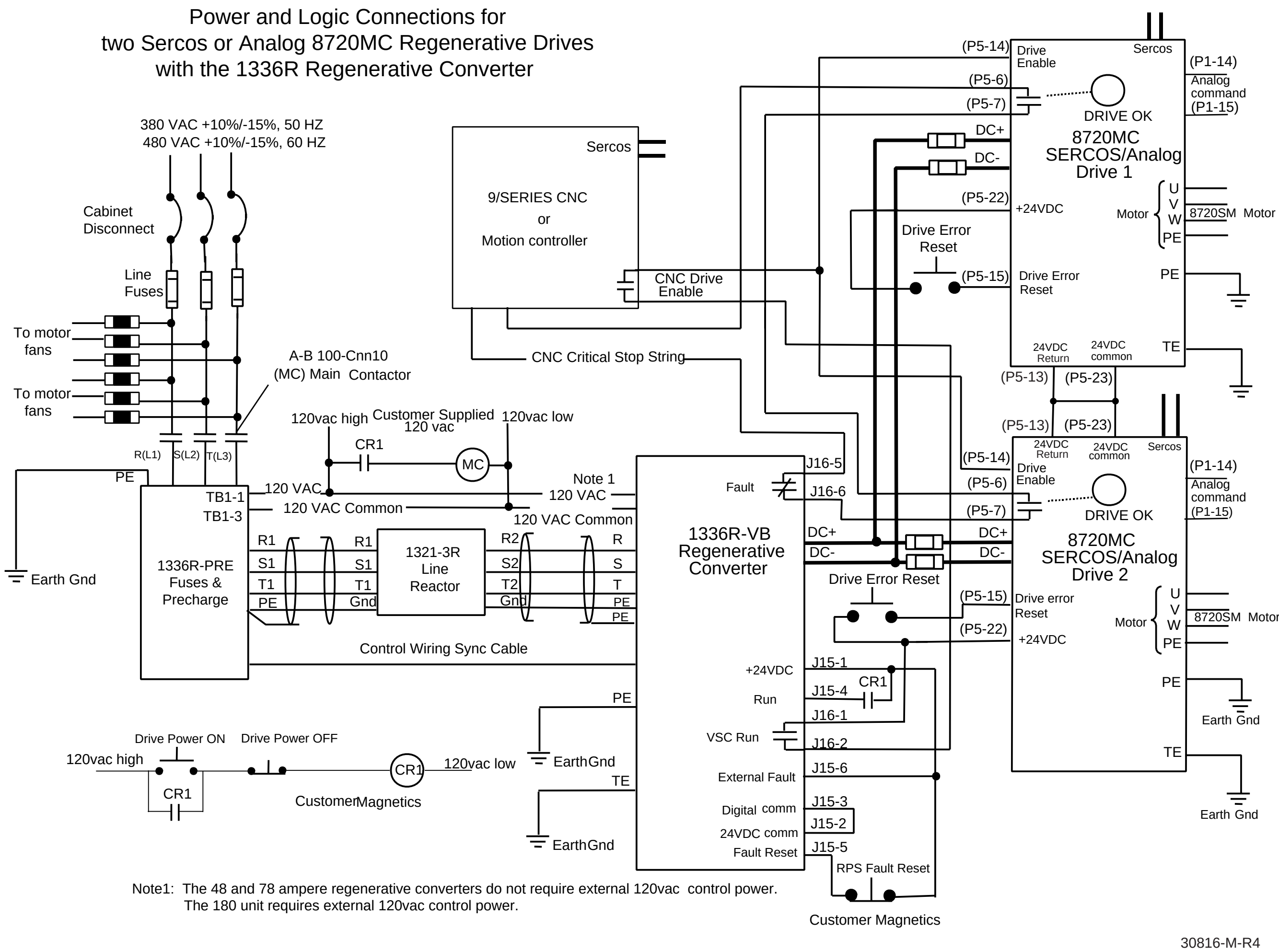


Figure 4.17 illustrates the power and logic connections for multiple 8720MC Drives operating from one 1336R Regenerative Power Supply.

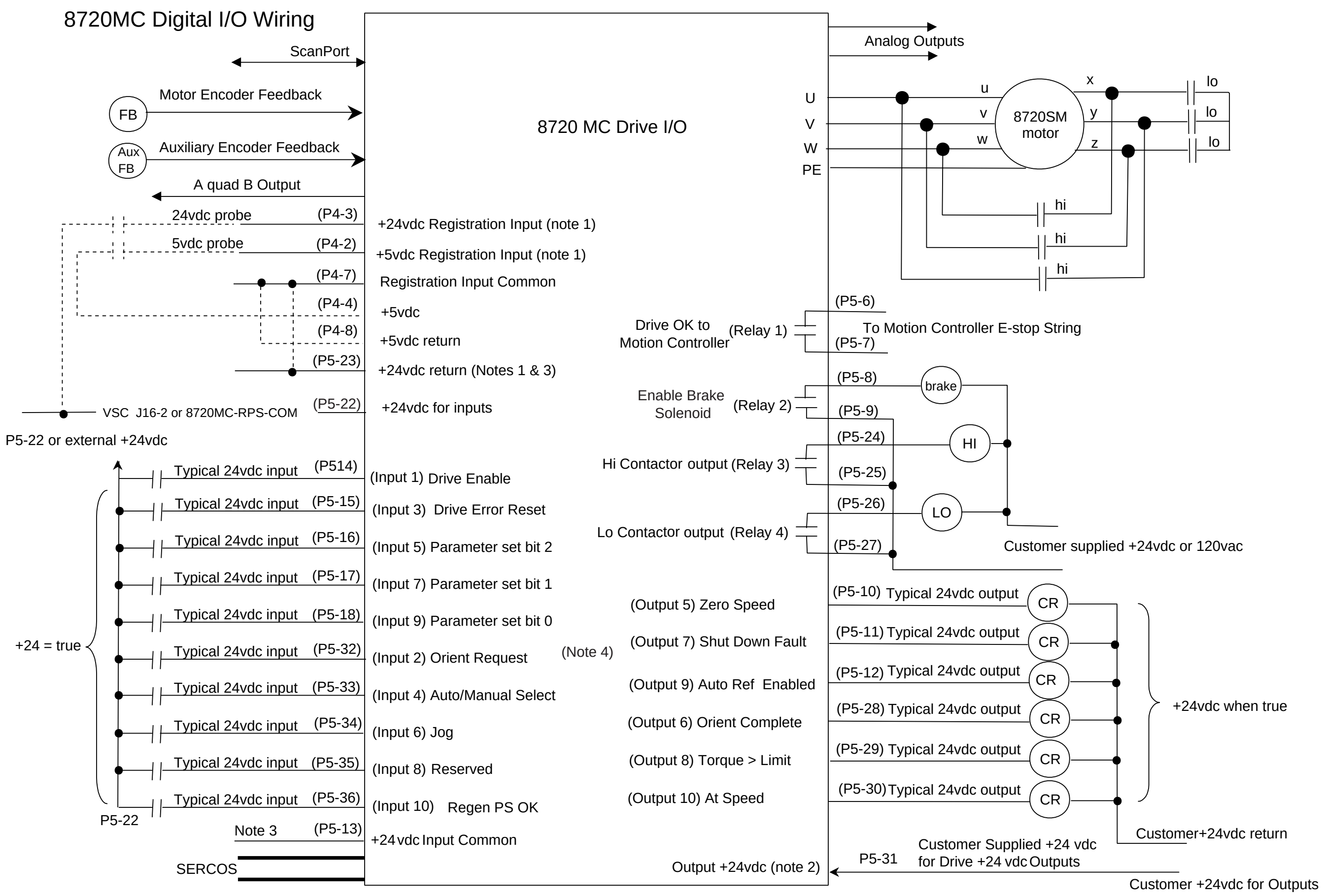
Figure 4.18
Multiple 8720MC Drives with One 1336R Regenerative Power Supply



8720MC Input/Output Wiring

Figures 4.19 through 4.21 provide information about the digital input/output and feedback wiring for the 8720MC Drive.

Figure 4.19
8720MC Input/Output Wiring



Note 1:When using the 8720MC supplied +5vdc for the probe input (P4-2), terminal P4-7 must be tied to P4-8. - Do not jumper when external +5vdc is used.
When using the 8720MC supplied +24vdc for the probe input (P4-3), terminal P4-7 must be tied to P5-23. Do not jumper when external +24vdc is used.
Note 2: When using the 6 solid state 24vdc outputs available with the 8720MC , the customer must supply external +24vdc to P5-31.
Note 3: When using the 8720MC supplied +24vdc for the 10 available inputs, terminal P5-13 must be tied to P5-23 - otherwise connect to external +24vdc return.
Note 4: The digital inputs and outputs are shown with the I/O links that occur when the drive is in the analog command configuration. See Chapter 6

30714-M-R7

Input/Output Power

Terminals P5-22 and P523 provide isolated +24V DC user power for use with registration and digital inputs. This power is limited to 120 mA continuous at 22V DC +/-25%.

Terminals P4-4 and P4-8 provide isolated +5V DC user power for use with the +5 V DC registration inputs and the A quad B output. This power is limited to 250 mA at 5 VDC +/- 10%.

There are four relay contact outputs as shown in Figures 4.18 and 4.23. The contacts are rated at 5 amps and the power must be provided externally through user 120V AC or 24V DC power supplies.

There are six 24V DC digital outputs for customer use. Each output can deliver up to 75 mA at 24V DC. Considering the limitation of 120 mA (total) at 24V DC of the 8720 MC 24V DC power supply, all power to the 24V DC digital I/O should be, in most cases, provided externally by the user as shown in figure 4.19.

The Output points are linkable to the 8720MC software. The default factory linkages for the I/O assignments are application dependent. The common default assignments are shown in figure 4.18. *Chapter 6: Interface Signal Description* describes how to link the I/O to variables other than the defaults.

Universal Feedback Interface

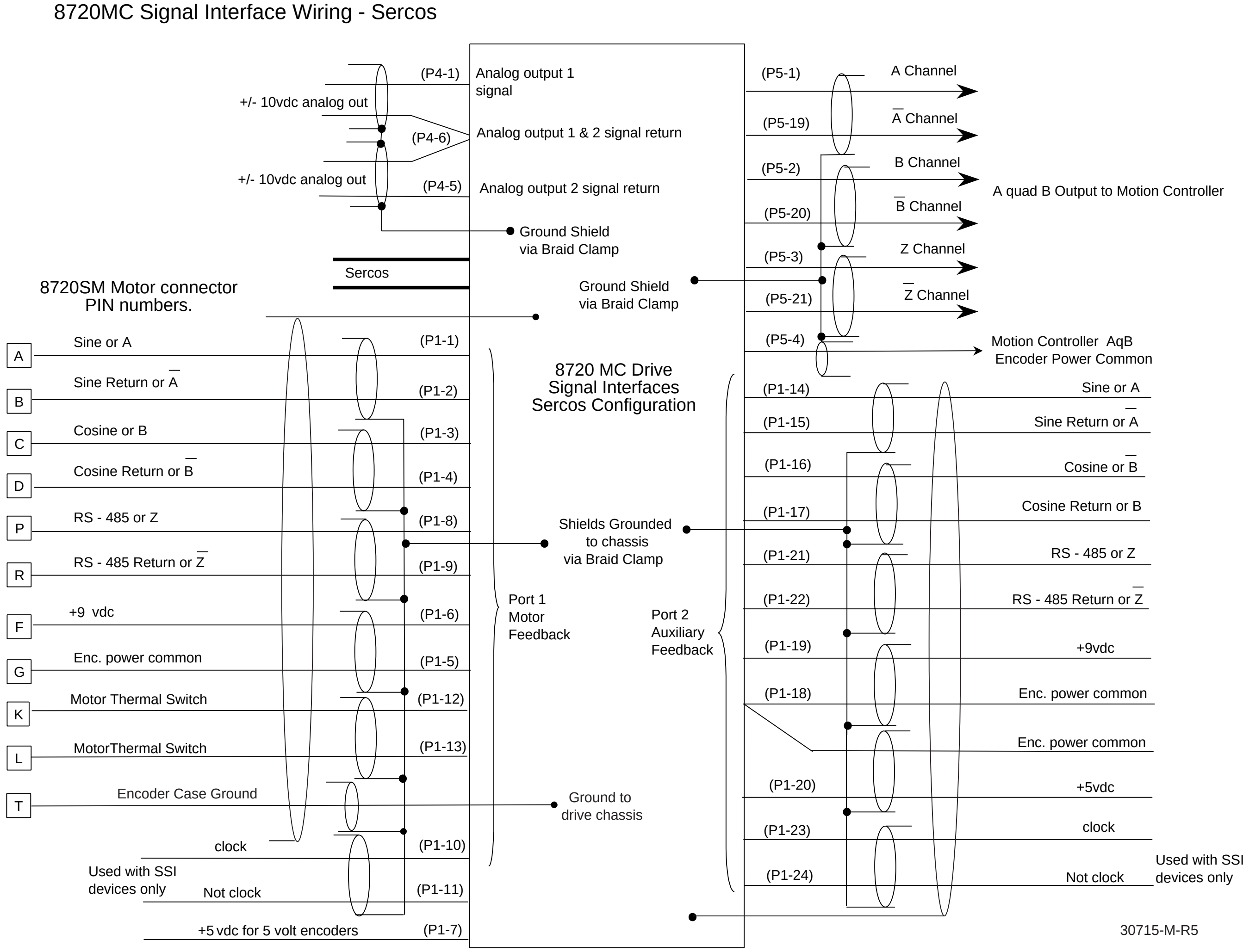
Figure 4.20 and 4.22 illustrate that the 8720MC supports a motor feedback port, an auxiliary feedback port (SERCOS version only), and an A quad B motion controller position feedback output port. The motor feedback port interfaces to the motor mounted feedback device. In the case of the 8720SM motor this is one of three devices depending on the application.

The Stegmann SNS-60 device is an incremental sine/cosine encoder used for spindle and power servo applications where an analog velocity command is the required motion controller interface. It’s output signals include a marker pulse. This device is required if the 8720MC encoder output signals are interfaced with a motion controller for position feedback.

The Stegmann SRS-60 is a single-turn absolute feedback device used in spindle applications, as well as power servo applications which require single-turn absolute feedback. This is only available in the SERCOS version.

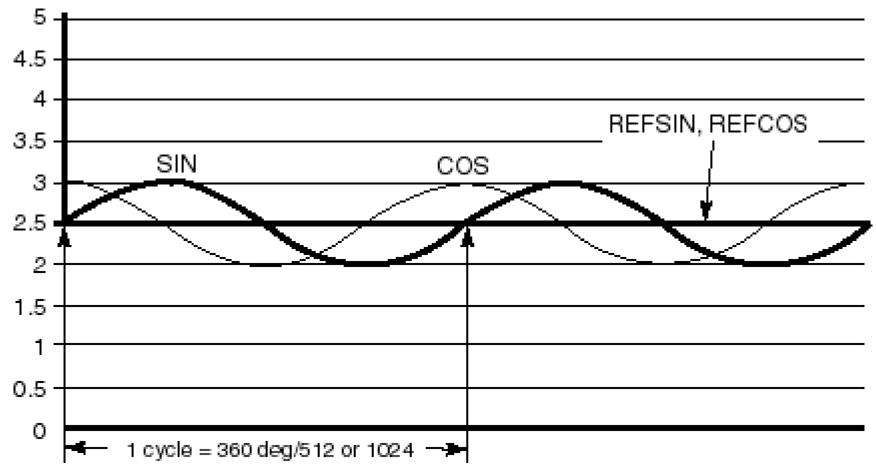
The Stegmann SRM-60 is a multi-turn absolute feedback device capable of providing absolute feedback from 0 to 4096 turns of the motor. Each of these feedback devices outputs accurate sine and cosine signals. The SNS-60, SRS-60 and SRM-60 output 1024 sinusoidal periods per revolution. These sine waves are interpolated by the 8720 MC and provide position and velocity resolution of 4 million counts per revolution.

Figure 4.20
Feedback Wiring for the 8720MC SERCOS Configuration



The universal feedback interface also supports sinusoidal gear type or magnetic frameless spindle motor feedback devices as well as A quad B square wave encoders. The feedback choice is a software configuration option. Figure 4.20 shows the nature of the sinusoidal feedback signals. A one volt peak to peak sine or cosine wave ride on a 2.5 vdc offset voltage. These signals are returned to the 8720MC via differential amplifiers and A/D converters.

Figure 4.21
Sinusoidal Encoder Signals, SRS-60, SNS-60 and SRM-60



A total of eight feedback signal wires are required: two for sine, two for cosine, two for power, and two for RS485 communication. The RS485 channel is used to store key product and initialization data at manufacture. The 8720MC can read the feedback device and identify the type of motor, type of feedback device, and the key motor and feedback device specific parameters. Any of these can be overridden during system configuration, as explained in *Chapter 7 and 8: Programming Terminals and Programming Parameters.* Provisions for the motor thermal switch are made at the feedback interface through terminals P1-12 and P1-13, as shown in Figures 4.20 and 4.22. Also the encoder case ground, motor connector pin T, should be connected to earth ground via the 8720MC chassis ground. This can be accomplished by a separate lead when using 6 paired encoder shielded cable or connecting the cable overall shield or the drain wire to pin T on the motor mating connector. See Figure 5.5 in Chapter 5 for details of the motor connector. The drive end of the encoder case ground must be connected to earth ground via the PE connection or cable clamp.

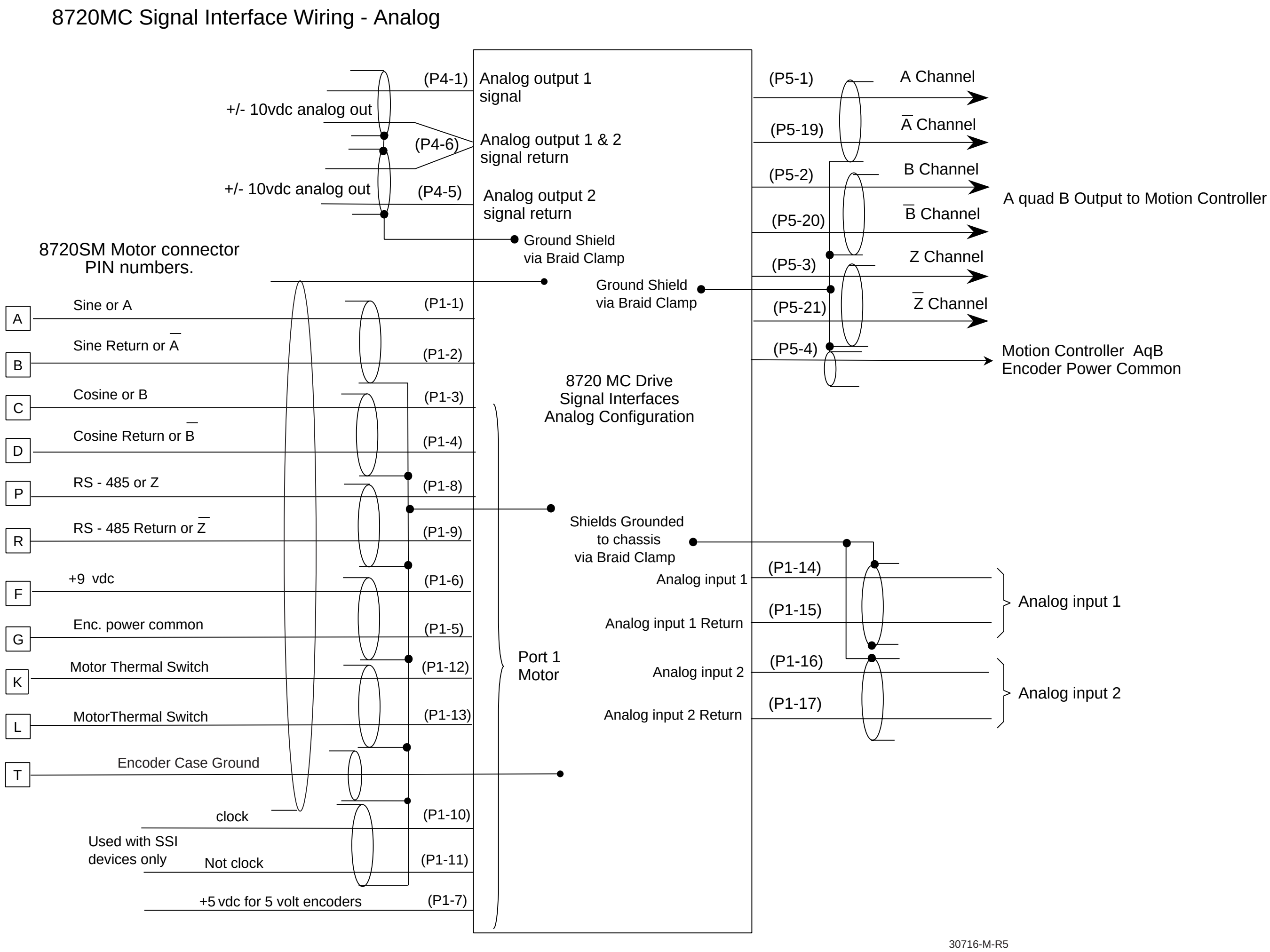
Encoder Power

The motor and auxiliary feedback port connectors provide terminals for both 5 vdc and 9 vdc encoder power. The encoder voltage to be used is determined by the feedback device selected. Table 4.15 provides a list of feedback devices and their required input voltages. The standard 8720SM motor Stegmann feedback devices use 9 vdc encoder power. Make sure the proper feedback device voltage is connected to the encoder before applying power to the 8720MC Drive. A total of 300 ma of 5 vdc encoder current is shared between the two 5 vdc encoder power terminals, P1-7 and P1-20. This means that if the 5 vdc motor feedback device uses 100 ma then 200 ma is available for the auxiliary 5 vdc feedback device. In a like manner, a total of 300 ma of 9 vdc encoder current is shared between the two 9 vdc encoder power terminals, P1-6 and P1-19.

The combined current requirements for two 5 vdc encoders or two 9 vdc encoders cannot exceed 300 ma. A single common power return terminal is provided for both 5 vdc and 9 vdc power supplies on each feedback channel. Term. P1-5 is the encoder power return for the motor feedback channel. Term. P1-18 is the power return for the auxiliary feedback channel.

A 300 ma 9 vdc encoder can be connected to the motor feedback port and a 300 ma 5 vdc to the auxiliary or visa versa.

Figure 4.22
Feedback Wiring for the 8720MC Analog Configuration



The Universal feedback interface supports a second feedback port. The “auxiliary feedback port” is provided for axis or spindle mounted feedback devices. The auxiliary feedback port is only available when the SERCOS command interface is chosen during the drive configuration. This feedback interface is shown in figure 4.20. Table 4.15 provides a list of feedback devices that are supported by the 8720MC.

Table 4.15:
Feedback Devices Supported by the 8720MC

Device	Vender	Rotary /Linear	Commutation Data Available	Output Type	Power Supply	Cycles/Pulses Per Revolution/ ML	Absolute/ Incremental
SNS-60 (Sincoder) 8720SM Motor	Stegmann	Rotary Optical	Hiperface RS485	Hiperface Differential Sine/Cosine	7-12 V 60 mA	1024 Single Marker	High Resolution Incremental
SRS-60 Sincos 8720SM Motor	Stegmann	Rotary Optical	Hiperface RS485	Hiperface Differential Sine/Cosine	7-12 V 130 mA	1024	Single-Turn Absolute
SRM-60 Sincos 8720SM Motor	Stegmann	Rotary Optical	Hiperface RS485	Hiperface Differential Sine/Cosine	7-12 V 130 mA	1024 4096 Turns	Multi-Turn Absolute
ERN480 Auxiliary	Heidenhain	Rotary Optical	N	Differential Sine/Cosine Analog Z	5 V 150 mA +/- 10%	1024-5000	Incremental
LS186 Auxiliary	Heidenhain	Linear Optical	N	Differential Sine/Cosine Analog Z	5 V 150 mA +/- 5%	20um Signal Per. 240-3040 mm ML	Incremental
LS186C Auxiliary	Heidenhain	Linear Optical	N	Differential Sine/Cosine DC Marks	5 V 150 mA +/- 5%	20um Signal Per. 240-3040 mm ML	Semi-Absolute Distance Coded
LS176 Auxiliary	Heidenhain	Linear Optical	N	Differential TTL A q B, Z	5 V 140 mA +/- 5%	4um Signal Per. 240-340 mm ML	Incremental
LS176C Auxiliary	Heidenhain	Linear Optical	N	Differential TTL A q B, DC Marks	5 V 140 mA +/- 5%	4um Signal Per. 240-340 mm ML	Semi-Absolute Distance Coded
ERN420 Auxiliary	Heidenhain	Rotary Optical	N	Differential TTL A q B, Z	5 V 150 mA +/- 10%	1024-5000	Incremental
ERM180.1 Frameless Motor	Heidenhain	Rotary Magnetic	N	Differential Sine/Cosine Analog Z	5 V 150 mA +/- 10%	ERM180.3:1024 ERM180.1:2048	Incremental
GEL 244K Frameless Motor	Lenord Bauer	Magnetic Toothed Wheel Sensor	N	Differential Sine/Cosine Analog Z	5 V 200 mA +/- 5%	256-1024 Teeth	Incremental
1392 Compatible Encoder (not available on drive)	Yaskawa	Rotary Optical	N	A q B Differential	+/- 12 VDC	1024 lines	Incremental

This list includes the feedback devices that were tested for compatibility with the 8720MC. There are a variety of other feedback devices which follow standard encoder interface practices which will interface successfully to the 8720MC. Standard A quad B differential TTL encoders and scales, as well as 1 volt peak to peak scales and encoders, are examples. Check with your local A-B technical support personnel to assure compatibility with devices not listed.

Connections to the Feedback Interface and Feedback Cables

Connections to the feedback interface are made through Weidmueller removable connectors at the 8720MC drive end. These connectors are designed for stripped #22 wire connections. A small instrument screw driver is required to release the spring loaded wire clamp. See Figure 4.11 earlier in this chapter for an illustration of the method of releasing the spring clamp. With the clamp released, the stripped wire is inserted into the connection point. Approximately 1/2 inch of insulation should be stripped from the wire. The recommended feedback interface cable has 6 twisted pairs of #22 AWG or larger wire preferably with both a foil shield around the twisted pairs and a braided shield overall and a drain wire. The wire should minimally have a PVC jacket and preferably polyethylene in areas where coolants or other corrosive chemicals will be found. Samples of acceptable feedback cable are Belden #8306. Also Olflex Unitroic - 190 CY paired cable #602206TP or Olflex Unitonic FD paired cable #35903 or #35910. Beldon #8778 has Beldfoil sheilds around each twisted pair with a drain wire for each pair. This cable can also be used if the drain wires are wrapped together and firmly held by the cable clamps. The 8720MC chassis has special shield clamps to assure that the shields are properly bonded to chassis ground. Bonding the braided shields to chassis ground is a mandatory requirement to assure signal noise immunity. The Weidmueller connectors are mechanically keyed, therefore, it is not possible to put the connectors in backward. It is possible to switch the front and back connectors, therefore, care must be taken to prevent reversing the front and back connectors. To prevent this, make sure the cables and connectors are clearly labeled. Also tie wrap the cables to the tie points provided.

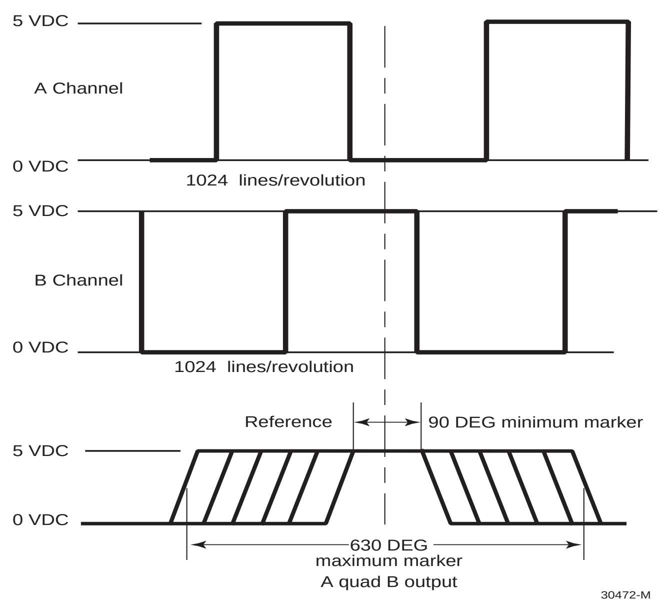
It is always good practice to keep the feedback and signal wiring separated from noise generating sources such as the motor cables. Wherever possible run the control wires in different conduits from the motor leads.

A quad B "Virtual Encoder" Output

A virtual 1024 line encoder output interface is provided for use with any motion controller which provides an analog velocity or torque command and expects a 5V TTL A quad B signal from the motor. The quadrature outputs are connected to P5-1, P5-2, P5-3, P5-19, P5-20 and P5-21, as shown earlier in Figures 4.20 and 4.22.

Figure 4.23 below shows the exact nature of the A quad B signals. If the quadrature output signals are required, the SNS-60 Sincoder must be the 8720SM motor feedback device. The marker from this feedback device has a random width from encoder to encoder. The edge rise is repeatable for any given encoder. This feedback device is best suited for uni-directional homing and referencing. The 8720MC provides the 5VDC power required to drive the signals shown in Figure 4.22. It is necessary to connect the motion controller encoder ground terminal to the 8720MC P5-4 terminal, “A quad B common.” This assures that the signals are properly referenced to the motion controller encoder ground. The motion controller will count square wave edges and will achieve a 4096 count per turn resolution.

Figure 4.23
A quad B Output



For connections to the encoder output use 4 twisted pair, #22 AWG or larger, shielded cable, Beldon 8304 or equal. A special multiplier box is available for the Stegmann encoders. This multiplier box can be used to simulate a 5120 lines per revolution virtual encoder. In this instance the motion controller will also count square wave edges but will achieve a 20480 count per turn resolution. For details contact your Rockwell Automation Motion Application Engineer.

Connecting the Analog Inputs

The 8720MC Drive has the analog inputs described in Table 4.16.

Table 4.16:
8720MC Drive Analog Inputs

Quantity	Description	Input Impedance
2	Range of ±10V	20K Ohms

These are differential inputs with noise rejection filtering. Each input has a scale factor parameter and an offset parameter for adjustment. The A/D converter is a 14-bit device, where an input value of +10V DC results in a digital value of 8192 with a scale factor of 1. Likewise, an input value of -10V DC results in a digital input value of -8192 with a scale factor of 1. Typical analog input connections are shown in Figure 4.22, earlier in this chapter.

► For velocity reference the analog input1 and 2 scale factors are set to the maximum motor speed required at 10 Volts input. For example: if the maximum required speed is 8,000 RPM a value of 8000RPM/10 volts is entered into parameter 695. This produces a velocity resolution of approximately 1 rpm per A/D bit. The required operating speed range of the motor and the available analog input signal voltage range are used to determine the scale factor values. If torque mode is activated the analog scaling will automatically be set to 2.5 volts = 100% rated motor torque. Refer to Chapter 8 for details

For connecting the analog inputs use 2 wire, 1 twisted pair, #22 AWG or larger, shielded cable. Beldon 8302 or equal.

Connecting the Analog Outputs

The 8720MC Drive has two analog outputs with a range of ±10V DC and a digital resolution of 12 bits. The following table provides additional information about the analog outputs. The typical analog output connections are shown in Figure 4.22, earlier in this chapter.

Table 4.17:
Analog Output Characteristics

Quantity	Description	Impedance
2	Range of ±10V	50 Ohms, 20 mA maximum

Each analog output can be linked to an internal 8720MC variable as is discussed in chapter 6. Each output also has a scale factor which is used to scale the output voltage to the receiving device. Refer to Chapter 8 for details.

For connecting the analog outputs use 2 wire, 1 twisted pair, #22 AWG or larger, shielded cable. Beldon 8302 or equal.

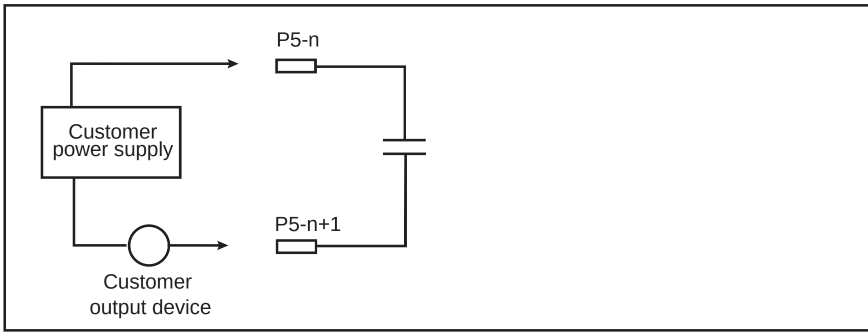
Connecting the Relay Outputs

The 8720MC Drive has four discrete outputs in the form of normally open dry relay contacts. The fault outputs from the 8720MC Drive are supplied at terminal blocks. Fault outputs provide warning or fault signals based on drive programming. The following values are the contact ratings for the programmable relays:

- 5A at 250V AC
- 5A at 30V DC

Figure 4.23 shows a typical isolated relay output circuit.Use # 16 to # 18 hook-up wire, Alpha 3075 or 3077 or equal.

Figure 4.24Typical Isolated Relay Output Connections



Isolated Relay Output Circuit
On state up to 250 vac, up to 5 A
On state up to 30 vdc, up to 5 A
4 outputs - P5-6 and P5-7
P5-8 and P5-9
P5-24 and P5-25
P5-26 and P5-27

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Connecting the Digital Inputs

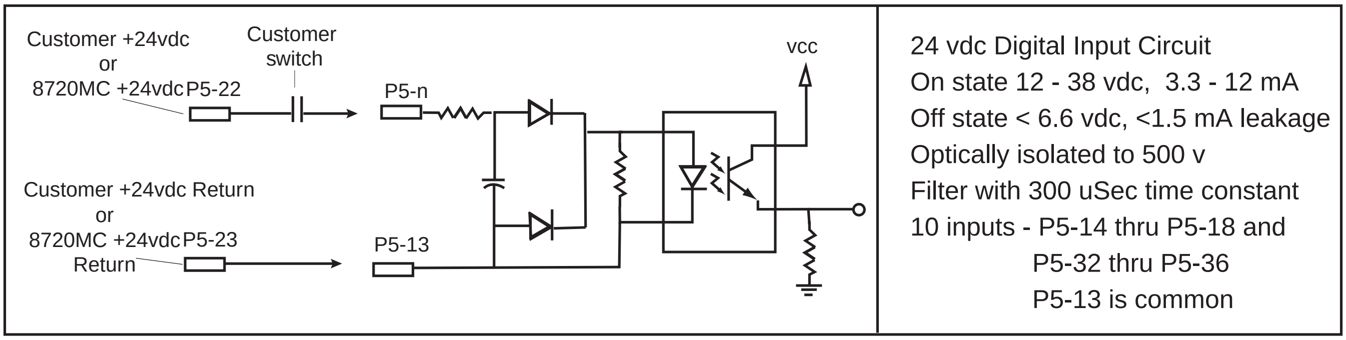
Ten digital inputs are available in the 8720MC Drive. These inputs are optically isolated to 500V from control power. They have hardware filtering with a time constant of 300 micro seconds and a software debounce, which requires stable input for 5 milli second prior to validation. Table 4.18 shows the digital input characteristics.

Table 4.18:
Digital Input Characteristics

Condition	Voltage	Amperage
On	12 - 38V DC	3.3 - 12mA
Off	less than 6.6V DC	less than 1.5mA leakage

Figure 4.24 shows the typical digital input connections. Use # 16 to #18 hook-up wire, Alpha 3075 or 3077 or equal.

Figure 4.25
Typical Digital Input Connections



Ch4-101-R2

Connecting the Digital Outputs

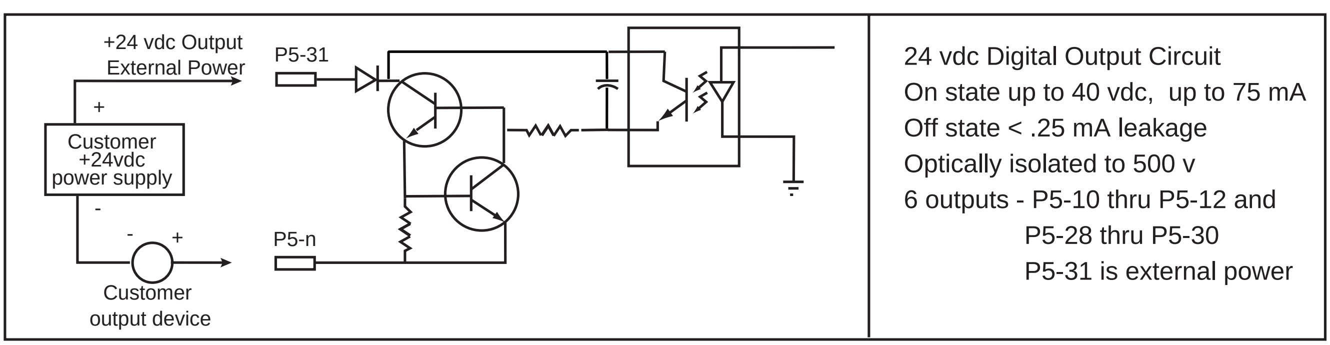
Six discrete solid state DC current sourcing outputs are available in the 8720MC Drive. These outputs are optically isolated to 500V from control power. They have hardware filtering with a time constant of 300 micro seconds and a software debounce, which requires stable input for 5 milli second prior to validation. Table 4.19 shows the digital output characteristics.

Table 4.19:
Digital Output Characteristics

Condition	Voltage	Amperage
On	Up to 40V DC	Up to 75mA current limited
Off	N/A	less than 0.25mA leakage

Figure 4.25 shows the typical digital output connections.Use # 16 to #18 hook-up wire, Alpha 3075 or 3077 or equal.

Figure 4.26
Typical Digital Output Connections



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Connecting the Registration Inputs

You can use the two registration (pulse) inputs also as digital inputs. These inputs are optically isolated to 500V from control power. The registration inputs can cause latching of the feedback position to within 4 micro seconds. Software parameters are available to cause the arming and indicate triggering of these inputs. For more information on the software parameters, refer to *Chapter 8: Programming Parameters*.

One of the registration inputs is configured for +24V DC type devices with the characteristics shown in Table 4.20. This input has hardware filtering with a time constant of 3 micro seconds and a software debounce, which requires stable input for 5 milli seconds prior to validation. The debounce applies only when the registration input is used as a digital input.

Table 4.20:
Characteristics for the +24vdc Registration Input

Condition	Voltage	Amperage
On	17.5 - 38V DC	5 - 15mA
Off	less than 6.9V DC	less than 1.5mA leakage

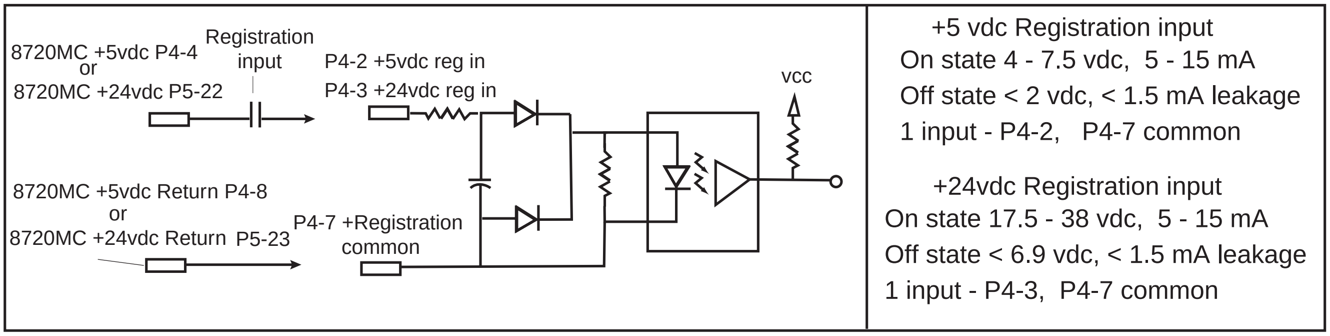
The other registration input is configured for +5V DC type devices with the characteristics shown in Table 4.21. This input has hardware filtering with a time constant of 0.3 micro seconds and a software debounce, which requires stable input for 5 milli seconds prior to validation. The debounce applies only when the registration input is used as a digital input

Table 4.21:
Characteristics for the +5vdc Registration Input

Condition	Voltage	Amperage
On	4 - 7.5V DC	5 - 15mA
Off	less than 2V DC	less than 1.5mA leakage

Figure 4.26shows the typical registration input connections. For connecting the registration inputs use 2 wire, 1 twisted pair, #24 AWG or larger, shielded cable. Alpha 6412 or equal.

Figure 4.27
Typical Registration Input Connections



Ch4-102-R2

Disconnecting the Drive Output

Any method of disconnecting the drive output terminals U, V, and W must disable the drive if opened during drive operation. If opened during drive operation, the drive may fault. You should remove the Drive Enable before the contactor is opened. When the Drive Enable is removed, the drive stops modulating.

Starting and Stopping the Motor

Before designing the input connections to the 8720MC Drive, read the Attention information shown below.

ATTENTION: The 8720MC Drive control circuitry includes solid-state components. If hazards due to accidental contact with moving machinery or unintentional flow of liquid, gas, or solids exist, an additional hard wired stop circuit may be required to remove AC line power to the drive. When AC input power is removed, there is a loss of inherent regenerative braking effect and the motor coasts to a stop. An auxiliary braking method may be required.

Electrical Interference - EMI/RFI

Immunity

The immunity of 8720MC Drives to externally generated interference should be adequate for most applications. Usually, no special precautions are required beyond the installation practices provided in this manual.

All coils of DC relays and contactors should be suppressed with diodes. All coils of AC relays and contactors should be suppressed with the manufacturers recommended coil suppressor.

In areas subject to frequent lightning strikes, additional surge suppression is advisable. You should use suitable metal oxide varistors (MOVs) connected between each line and ground.

Emission

To avoid interference with nearby sensitive equipment, you must carefully arrange the power and ground connections to the drive. Route the cable that goes to the motor well away from sensitive equipment, as the motor cable carries high energy switched voltages.

Connect the ground conductor of the motor cable to the drive ground (PE) terminal directly. Connecting this ground conductor to a cabinet ground point or ground bus bar may cause high frequency current to circulate in the ground system of the enclosure. You must solidly connect the motor end of this ground conductor to the motor case ground.

Shielded cable is recommended to prevent radiated emissions from the motor cable. Connect the shield to the drive chassis.

Common mode chokes are recommended at the drive output to reduce the common mode noise. An AC input RFI filter can be used and in most situations provides an effective reduction of RFI emissions that may be conducted into the main supply lines. It should be noted that the higher the PWM frequency the higher the chances of radiated emissions

Do I Need an RFI Filter?

The 8720MC-RPS and 1336R Regenerative Power Supplies require external harmonic filters. The 8720MC ac input drives should also be supplied with an RFI filter wired on the input to the drive to reduce the potential for noise emission. The RFI filter controls radio-frequency conducted emissions into the main supply lines and ground wiring. If you follow the cabling and installation instructions described in this manual, interference problems are unlikely when the drive is used with conventional industrial electronic circuits and systems.

You should use the optional RFI filter if:

- You must conform to a standard such as EN 5501 1, VDE0875, BSI, or FCC.
- You need to achieve very low emission levels.
- You are installing sensitive devices or circuits on the same AC supply-
- The motor cable exceeds 50 meters (164 feet). Beyond this length, capacitance to ground increases the supply emissions.
- You must comply with European CE Requirements

Important: The conformity of the drive and filter to any standard does not assure that the entire installation conforms. Other factors can influence the total installation and only direct measure can verify total conformity.

Installing an RFI Filter - CE Option

To install the RFI filter, follow the instructions provided by the filter manufacturer. In addition, you should note the following information:

- Connect the RFI filter between the incoming AC supply line and the drive power input terminals as shown in Figures 4.14 and 4.16.
- Install the filter on the same mounting plate as the drive, if possible. The filter should be physically close to the drive with short connections.
- Keep the 3 phase AC leads tightly bundled together between the RFI filter and the drive input.

Important: To assure that the RFI filter is effective, you must shield or armor the motor cable and follow the guidelines given in this manual.

RFI Filter Leakage Current

The optional RFI filter may cause ground leakage currents.Therefore, you must provide an appropriate ground connection. Refer to the grounding instructions on page 4-6.

ATTENTION: To guard against possible equipment damage, you can only use RFI filters with AC supplies that are nominally balanced with respect to ground. In some countries, three-phase supplies are occasionally connected in a 3-wire configuration with one phase grounded (Grounded Delta). The filter must not be used in Ground Delta supplies.

Motor Installation and Wiring

Chapter Objectives

Chapter 5 provides the following information so that you can mount and wire your 8720SM AC Motor:

- 8720SM AC motor overview
- before mounting your motor
- mounting your motor
- wiring your motor
- grounding your motor
- wiring a feedback device
- starting your motor
- maintaining your motor

8720SM AC Motor Overview

The 8720SM motors are high performance AC induction motors specifically designed for use with the Allen Bradley 8720MC Drives. The basic design includes Class H insulation, 1.0 service factor, 40°C ambient temperature, continuous duty. Standard motors are totally enclosed, blower cooled and meet IP55 environmental protection requirements. The 8720SM AC Motors have been designed and manufactured to meet the needs of modern high performance industrial machinery. To cover a wide variety of spindle motor requirements, both a standard single winding series of motors and a dual winding series are available. All standard motors are provided with permanently greased, sealed deep groove ball bearings.

An integrated high resolution incremental, single-turn absolute or multi-turn absolute feedback device provides responsive servo performance for both spindle and power servo applications. Highly accurate position and velocity control is readily available.

8720SM AC Spindle Motor Family

A family of thirteen standard AC spindle motors is available with power ratings from 5.5 to 93 kW (7.5 to 125 hp). The motors are designed to operate with the A-B 8720MC 380V AC to 480V AC input inverters, as well as the 8720MC regenerative power supply or the 1336R regenerative power supply. The following table provides general rating information for the 8720SM AC spindle motors.

Table 5.1:
General Information for the 8720SM Motors

Frame	kW at 1500 rpm Base Speed	Horsepower at 1500 rpm Base Speed	Rated Current (amps) at 1500 rpm Base Speed(1)
DL1106	5.5	7.5	13.5
DL1108	7.5	10	20.3
DL1110	11	15	26.8
DL1307	15	20	33.4
DL1308	18.5	25	41.4
DL1310	22	30	48
DL1611	30	40	63.1
DL1613	37	50	76.1
DL1811	45	60	93
DL1813	55	75	116
DL1815	63	85	117.5
DL2010	75	100	137
DL2012	93	125	176

NOTE (1) Currents are based on operation with the 8720MC-RPS Regenerative Power Supply. Base speed is 1500 rpm for all motors.

Before Mounting Your Motor

Handling

The 8720SM motors are equipped with lifting eye bolts. These eye bolts are provided to assist in handling and mounting the motors. The motors can accommodate either flange or foot mount. Dimensional details for mounting and lifting each of the thirteen standard frames is provided in *Chapter 3: Dimensions*.

ATTENTION: Eyebolts may unscrew during lifting. Check eyebolts to insure that they are tight. Secure eyebolts from turning. Failure to observe this precaution could result in bodily injury.

Storage

Store motors in a clean, dry area protected from extreme temperatures, moisture, shock, and vibration. Observe storage temperatures of 20°C to 80° C with a relative humidity of 5 to 95%. In addition, if motors are subjected to extended storage, follow the requirements listed in the Reliance Electric Service Bulletin A-8018 available from your Rockwell Automation Sales Office.

Important: All drains are fully operable while in storage. Store motors so that the drain is at the lowest point. Drains are located in the lower portion of the motor castings on both the drive and non-drive ends of the motor.

ATTENTION: Only qualified electrical personnel familiar with the construction and operation of this equipment and the hazards involved should install, adjust, operate, and/or service this equipment. Read and understand this chapter in its entirety before proceeding. Failure to observe precaution could result in severe bodily injury or loss of life.

The application of motors and other electrical equipment in hazardous locations is restricted by the National Electric Code. To ensure compliance, observe these regulations and consult with local code inspection and enforcement agencies.

Location

The 8720SM motors are designed for the ambient temperature indicated on the nameplate. The standard motor maximum ambient is 40°C or 104°F. Locate the motor where the ambient temperature requirements are satisfied and where clean air has free access to ventilating intake and outlet openings. Except for machines with a suitable protective enclosure, the location should be clean and dry.

NOTE: The cooling system on standard 8720SM blower cooled motors requires that clean air is forced through ducts which are integral to the stator frame. It is important that you keep these air passages clean and that sufficient clearance is provided on the motor air inlets and stator duct outlets for unrestricted air flow.

Mounting Considerations

Before mounting your 8720SM motor, consider the following:

- You can mount the motor horizontally or vertically with the shaft down or up.

- The 132mm (DL1308 thru DL2012) and larger motors are blower cooled with air flow from the drive end to the blower end. The 112mm motors (DL1106, Dl1108 and DL1110) are supplied standard with air flow from the blower end to the drive end. The air flow must be flowing in the direction of the arrow on the motor to provide adequate cooling. Both air inlets and outlets must be free of obstructions. Maintain a clearance of at least 150 mm (6 inches) at the blower exhaust area. Maintain a clearance of at least 100 mm (4 inches) at the blower inlet area. Reverse air flow motors can be provided when the application and environment are suitable. Reverse air flow motors must be purchased with a reverse air flow blower.
- When mounted, the motor must not be exposed to direct splash or spray of cutting fluids or lubricating oils.
- Motors include a labyrinth type shaft seal with flinger, which provides excellent protection against oil splash. However, it will not provide protection against oil flooding.
- In an environment where high humidity is present or the motor blower inlet air is saturated with coolant mist make sure the motor is mounted with the feet down and the drain holes at the bottom of the motor must be open.

Power Supply

The 8720SM motor is an adjustable speed motor designed for operation with the 8720MC Drive.

Verify that the motor nameplate data corresponds to the 8720MC Drive output rating.

Conduit Box

The standard conduit box location for totally enclosed motors is top mounted for left or right conduit entry without motor disassembly. The 132 mm frames and larger allow rotation of the conduit box in 90 degree increments for lead outlet at front, back, or sides. For the 112 mm frame, left and right side metric threaded outlets are standard. Use a metric conduit adaptor such as a Thomas and Betts #PG29-100 for 1 inch conduit or a #PG29-125 for 1.25 inch conduit.

Bolt and Torque Requirements

Read the following attention text before mounting your motor.

ATTENTION: You must be careful to prevent debris (such as metal shavings and conduit knockouts) from falling into the motor while performing any installation work around the motor. A hazard of personal injury and/or equipment damage exists if foreign material lodges inside the motor.

Mount your motor on a rigid, solid base or foundation. Poor base construction may cause resonances in the motor/base assembly, which can result in bearing failure and other motor damage. Use the correct grade of all hold down bolts for the type of mounting. Torque the bolts to their recommended value, as listed in Table 5.2.

Table 5.2
Motor Mounting Specifications

Hole Diameter (mm)	Bolt Size and Thread	Recommended Torque (Foot - Pounds) Bolt Grade
		8.8 System
12	M10-1.5	39
12	M10-1.5	39
14	M12-1.75	67
15	M12-1.75	67
18	M16-2.00	167
19	M16-2.00	167

Belted Drives and Coupled Drives

8720SM motors are supplied with a shaft suitable for a belt or coupled drive. Bearing loads will vary depending on the belt load. The bearing load increases as the sheave centerline moves away from the motor flange mounting surface. For more information, check belt loads against allowable radial loads, as described in the motor specification tables in *Chapter 2*.

ATTENTION: Incorrect motor rotation may cause personal injury or damage the equipment. Check the direction of the motor rotation before coupling the motor to the load.

ATTENTION: Insure that all guards are properly installed before proceeding. Exercise extreme care to avoid contacting rotating parts. Failure to observe these precautions could result in bodily injury.

Proper alignment is a key step for long life of bearings, shafts and belts, and minimum downtime. Misalignment can cause excessive vibration and damaging forces to the shaft and bearings. During high speed operation, a small unbalance can cause significant vibration. For direct coupled drives, flexible couplings facilitate alignment. For belt drives, place the sheave as close as possible to the motor bracket. Make sure to accurately dynamically balance any gears, pulleys, or couplings that are mounted to the motor shaft. Best results are obtained by balancing after the device is mounted to the shaft.

Belted Drives

If you use motor slide bases or rails, you must securely anchor them to the foundation with the proper bolts. Make sure the motor shaft and load shaft are parallel, and that the sheaves are aligned.

When a motor is belt coupled, the belt tension must not exceed the radial load capabilities of the motor bearings, as described in the motor specification tables in *Chapter 2*. The maximum allowable radial load is assumed to be applied at the end of the motor drive shaft. Do not exceed the maximum allowable radial load on the end of the shaft.

Coupled Drives

Use flexible couplings between the motor shaft and the load shaft. Align the motor shaft and the load shaft to values recommended for the specific coupling before coupling is connected.

Standard 8720SM motors will operate successfully mounted on the floor, wall, or ceiling, and with the shaft at any angle from horizontal to vertical.

Wiring Your Motor

Read the following attention text before wiring your motor.

ATTENTION: You are responsible for conforming with the National Electrical Code (NEC) and all other applicable local codes, wiring practices, grounding, disconnects, and over current protection of particular importance. Failure to observe these precautions could result in severe bodily injury or loss of life.

ATTENTION: This equipment is at line voltage when AC power is connected. Disconnect and lock out all ungrounded conductors of the AC power line. Failure to observe these precautions could result in severe bodily injury or loss of life.

Distance Between the Motor and the Drive

If the distance between the motor and the drive requires long motor cables, you may need to add an output reactor or cable terminators to limit voltage reflections at the motor. The maximum recommended cable length is 90 meters.

Cable Sizes

Table 5.3 gives the appropriate variable frequency drive shielded cable to use based on 150% overload capability and 25°C operating temperature. Use the cable described in Figure 4.8 in *Chapter 4*.

Table 5.3
Cable Sizes

1.5x Rated Continuous Motor Current	VFD Cable Size
12 amps	#16 AWG
17 amps	#14 AWG
21 amps	#12 AWG
30 amps	#10 AWG
55 amps	#8 AWG
65 amps	#6 AWG
95 amps	#4 AWG
130 amps	#2 AWG

For applications above 130 amps, use thick insulation lead wire, such as RHW-2 or equal. Make sure you thread the four wires (U, V, W, and grnd) through a single, grounded, metal conduit.

Wiring Diagram for the Motor

Figures 5.1 and 5.2 show the conduit box wiring diagrams for the 8720SM motors. Figure 5.1 is used with the DL106, 1108 and DL1110 frame motors. Figure 5.2 is used for all other motor frames. Bring 4 wire shielded Beldon VFD cable or equal to these connections: U to T1, V to T2, W to T3, and the ground wire to the ground bolt on the motor. Connect the shield to both the motor ground and the PE ground on the drive. Make sure the 8720MC Drive PE ground is connected to earth ground with an AWG 10 or larger conductor.

Figure 5.1
Wiring Diagram for 8720SM Motors - 132 MM Frame and Larger

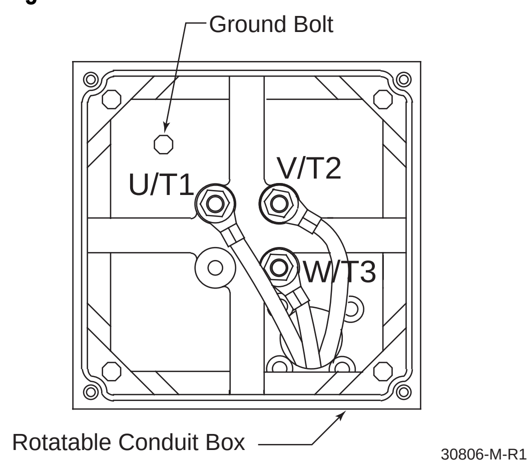
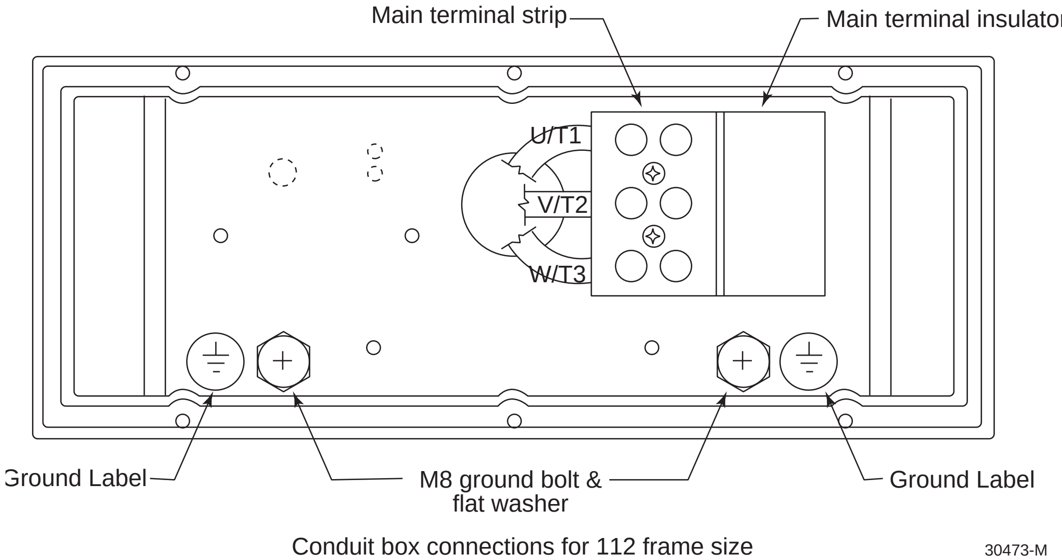


Figure 5.2
Wiring Diagram for 8720SM Motors - 112 MM Frame



Dual Voltage Motors

For dual winding motors make sure the motor leads are connected properly for the desired “Low” or “High” voltage connections, as shown in Figure 4.19. Since the high/low contactor is likely to be located in the drive cabinet it will be necessary to connect two 4 wire shielded cables from the drive cabinet to the motors.

Direction of Rotation

8720SM motors are capable of bidirectional shaft rotation. It is important that the feedback device leads and the motor leads are connected properly as shown in the wiring diagrams in chapter 4. The direction of rotation of the motor field can be reversed by changing any 2 of the 3 motor leads. The feedback electrical rotation can be changed by reversing either the sine or cosine polarity by switching the leads. For example switching P1-1 and P1-2 changes the polarity of the sine and therefore reverses the feedback rotation. If the motor field is rotating in the opposite direction of the feedback signals unstable erratic motion will result. The motor is not properly phased. If this occurs you must change the direction of rotation as follows:

1. Make sure the feedback direction is correct by applying power to the drive with the motor disabled. On the HIM or through Drive Explorer monitor the motor feedback via parameter 51. Rotate the shaft clockwise and the feedback should increase. If this is not the case either the sine or cosine leads are reversed and should be corrected. This will correct the motor phasing problem.
2. 2.If the feedback rotation was correct and therefore was not changed turn off and lock out all power to the motor.

> **!** ATTENTION: The 8720MC Drive may apply hazardous voltages to the motor leads after you have turned off power to the drive. Before proceeding, verify that the drive cannot deliver hazardous voltages and that voltage at the motor is zero. Failure to observe this precaution may result in severe bodily injury or loss of life.

3. Before proceeding, verify that the voltage at the motor leads is zero.
4. Reverse any two of the three motor power leads.

The motor should now be in phase with the feedback device

Thermal Protector (Thermostat Leads)

As a standard feature, 8720SM motors have three normally closed thermostats. There is one thermostat per phase, connected in series, with leads terminated to pins K and L in the feedback connector.To protect against overheating the motor, make sure that you connect the thermostats to the appropriate 8720MC Drive connector, Connector P1 pins 12 and 13. Prior to initial startup assure that there is very high resistance between each of the motor leads and the thermal switch leads, as well as very high resistance from ground to the thermal switch leads.

ATTENTION: Failure to connect the thermostats will void the motor warranty. Refer to Table 4.5 in *Chapter 4* for correct thermostat lead connections.

Blower Motor

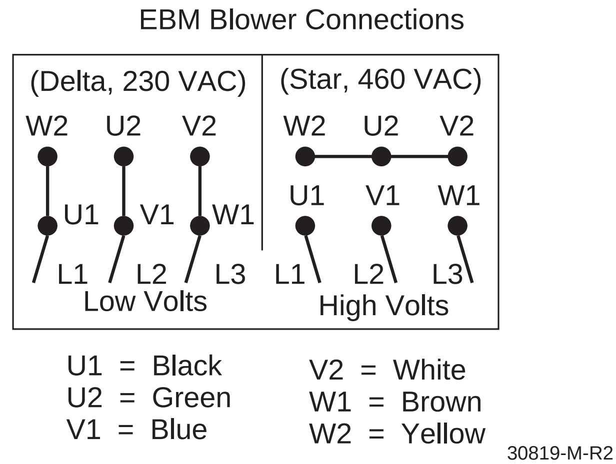
8720SM motors are blower cooled. The motors incorporate an independently powered three-phase AC blower motor to assure continuous cooling air flow, regardless of the AC motor speed.

ATTENTION: The blower motor is typically wired to the AC input of the 8720MC Drive and is energized even when the drive is not running. Before touching blower motor components, make sure to turn off and lock out or tag the main power supply. Failure to observe this precaution could result in severe bodily injury or loss of life.

Connecting the Blower Motor

The specific 8720SM AC blower motor will vary, depending on frame size and enclosure. The smallest 2 frames, 112 mm and 132 mm, DL1106 thru DL1310 have a 547 CFM blower while the 160, 180 and 200 mm frames DL1611 thru DL2012) have a 1117 CFM blower. Follow the connection diagram supplied with the blower motor, which in general will be the high voltage 460 vac connection shown in Figure 5.3. The blowers should have a fuse in each motor phase as shown in the wiring diagrams in chapter 4, Figures 4.14, 4.16, 4.17 and 4.18. The 112 mm and 132 mm frames should be fused to 1 amp maximum. The 160 mm, 180 mm and 200 mm frames should be fused to 2 amps. Use #16 to # 18 AWG 600 volt hook-up wire, Alpha 3075 or 3077 or equal.

Figure 5.3
Blower Motor Connections



To connect the blower motor:

1. Connect for high voltage, “Star”, as shown in Figure 5.3. Caution: If you connect the blower for low voltage and apply more than 240 vac to it the motor the warranty conditions are violated.
2. Check that the direction of air flow is in agreement with the “direction of air flow” arrows mounted on the motor.
3. If directional air flow is incorrect, interchange power leads L1 and L2, or U1 and V1.

Table 5.4 lists the necessary air flow CFM requirements for the 5 motor frame sizes. The cooling inlet air must not exceed 40 degrees C. Allow a 4 inch gap, minimum, at the back of the motor to assure free air flow.

If the blower motor direction of rotation is not correct the airflow will be opposite to the arrow on the motor and it will be far lower in air flow than what is required to cool the motor. In the standard configuration the 112 mm motors (DL1108 to DL1110) blow air from the blower end to the drive end. All other motors blow air from the drive end to the blower end.

Table 5.4:
8720SM Air Flow Requirements

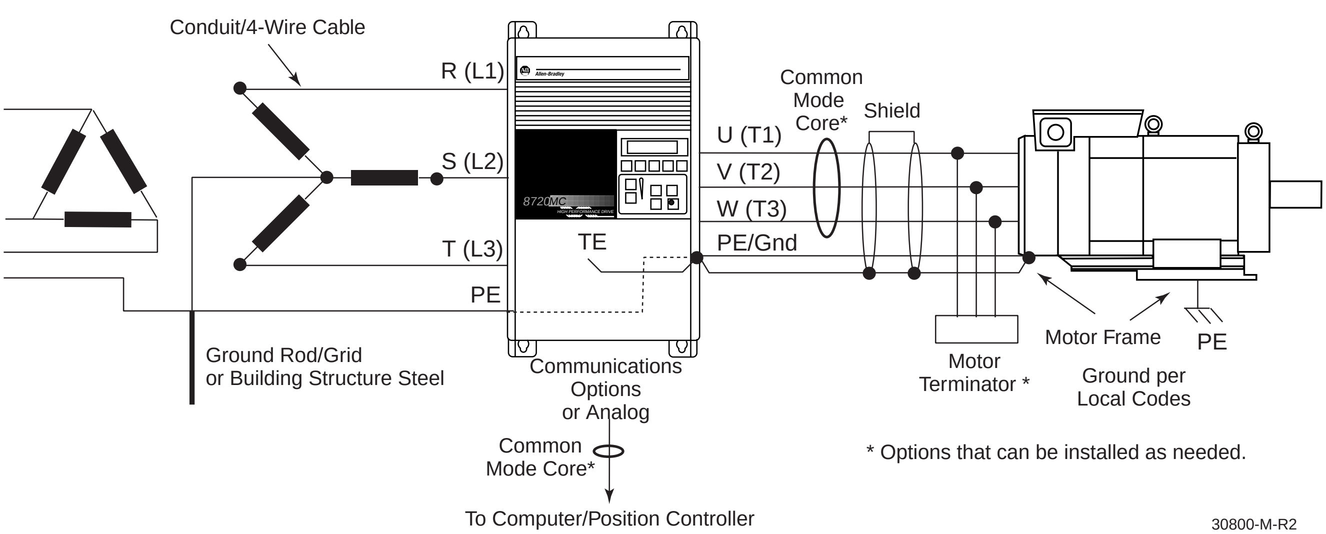
Frame Size	CFM	Static Pressure
DL 112	200	1.5
DL 130	200	1.5
DL 160	325	1.75
DL 180	425	2.00
DL 200	525	2.25

You need to properly ground your 8720SM motor.

ATTENTION: Connect an appropriate equipment grounding conductor to the 8720MC Drive ground terminal, the motor frame, the transformer enclosure if used, the drive electrical enclosure, and an appropriate grounding electrode. Failure to observe these precautions could result in severe bodily injury or loss of life.

Figure 5.5 shows general grounding information for both the 8720MC Drive and the 8720SM motor.

Figure 5.4
General Grounding Recommendations for 8720MC Drive and 8720SM Motor



You are responsible for insuring that the motor grounding method is in accordance with the National Electric Code and applicable local codes. The ground connection should be a solid and permanent metallic connection between the ground point, the motor terminal housing, and the motor frame. A ground bolt is provided inside the 8720SM motor power junction box, as show in Figures 5.1 and 5.2, earlier in this chapter.

Wiring a Feedback Device

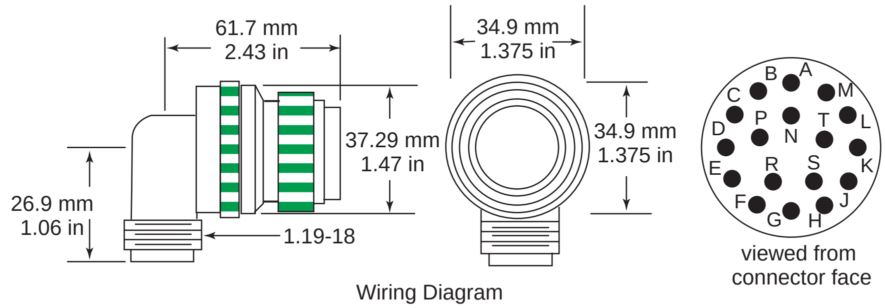
Types of Feedback Devices

The 8720SM AC motors come equipped with one of three types of integrated feedback devices:

- Incremental sine/cosine encoder - standard
- Single-turn absolute feedback encoder - optional
- Multi-turn absolute feedback encoder -optional

These feedback devices provide precision servo performance for both spindle and power servo applications. Refer to *Chapter 4* for more information about the 8720SM motor feedback device options. Table 4.9 in that chapter shows the pin designations for the P1 feedback connector on the drive. The cable connections at the drive end are made by stripping the insulation from the leads and inserting them into the spring clamp for each termination, as described in *Chapter 4*. A mating right-angle P-Lock connector is provided with each 8720SM motor. This connector is designed for solder joints at each termination. Figure 5.4, below, shows the connector terminations for the mating 17 pin P-Lock motor connector, Sine Systems catalog number P3106Z2029S23. Catalog number ST-385-16S-08D pins are also provided.

Figure 5.5
Motor Feedback Connector, Sine P-Lockr



Wiring Diagram

	MS Terminal	Internal Wire Color	Description
Twisted Pair	A	Blue	Sine
	B	Violet	Sine Return
Twisted Pair	C	Yellow	Cosine
	D	Orange	Cosine Return
	E		N/C
Twisted Pair	F	Red	Encoder Power
	G	Black	Encoder Common
	H		N/C
	J		N/C
Twisted Pair	K		Thermal Switch
	L		Thermal Switch
	M		N/C
	N	Gray	N/C
Twisted Pair	P	Brown	Non-Inverted Data
	R		Inverted Data
	S		N/C
Twisted Pair or Cable shield	T	Green	Overall Shield Encoder Case Ground

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Maximum Cable Lengths for Feedback Devices

Table 5.5 contains information about maximum cable lengths for 8720SM motor feedback devices. Feedback cable wiring should always be shielded. The recommended shielded cable is discussed in Chapter 4 of this user manual. Wherever possible separate long runs of feedback cable from the motor cable or any other power conductors to prevent unwanted noise from coupling to the feedback interface.

Table 5.5
Maximum Cable Lengths for Feedback Devices

Feedback Device	Maximum Cable Length	Attainable Resolution	Absolute Capability
SNS-60	90 m	4×10^6	none

Starting Your Motor

Checking Motor Performance

While operating the motor, observe the performance. It should run smoothly with little noise. The bearings should not overheat and should reach a leveling off of temperature.

If there is any undue noise, overheating or erratic motor performance, immediately investigate the situation and take corrective action to prevent serious damage. Before attempting any repairs, please contact your local Allen-Bradley GTS office.

Balancing the Motor

Motors are dynamically balanced to stay within a vibration limit of 12 in/sec, measured in accordance with NEMA MG1-12.06. Balance is done with a full length 1/2 height shaft key. A full shaft key is shipped with the motor. Sheave or coupling should be balanced with a 1/2 height shaft key.

Maintaining Your Motor

Read the following attention text before proceeding.

ATTENTION: Internal parts of the motor may be at line potential even when the motor is not rotating. Before performing any maintenance that involves contacting an internal part, make sure to disconnect all power from the motor. Failure to observe this precaution could result in bodily injury or loss of life.

ATTENTION: The surface of the motor may reach high temperatures. Avoid contact with motor surfaces and wear suitable protective equipment.

The standard 8720SM motors are equipped with sealed deep groove ball bearings. They are packed with the appropriate lubricant at manufacturing and, therefore, do not require any continuing maintenance.

Interface Signal Description

Chapter Objectives

Chapter 6 provides information on the various inputs and outputs available as part of the 8720MC Drive. Included are signal level definitions and detailed function descriptions for each I/O point. The following topics are covered:

- Digital Inputs and Outputs
- Registration Inputs
- Analog Inputs and Outputs
- Changing Default Digital Output Links
- Changing Default Analog Output Links
- SERCOS Interface
- SCANport Interface
- SCANport I/O Linking

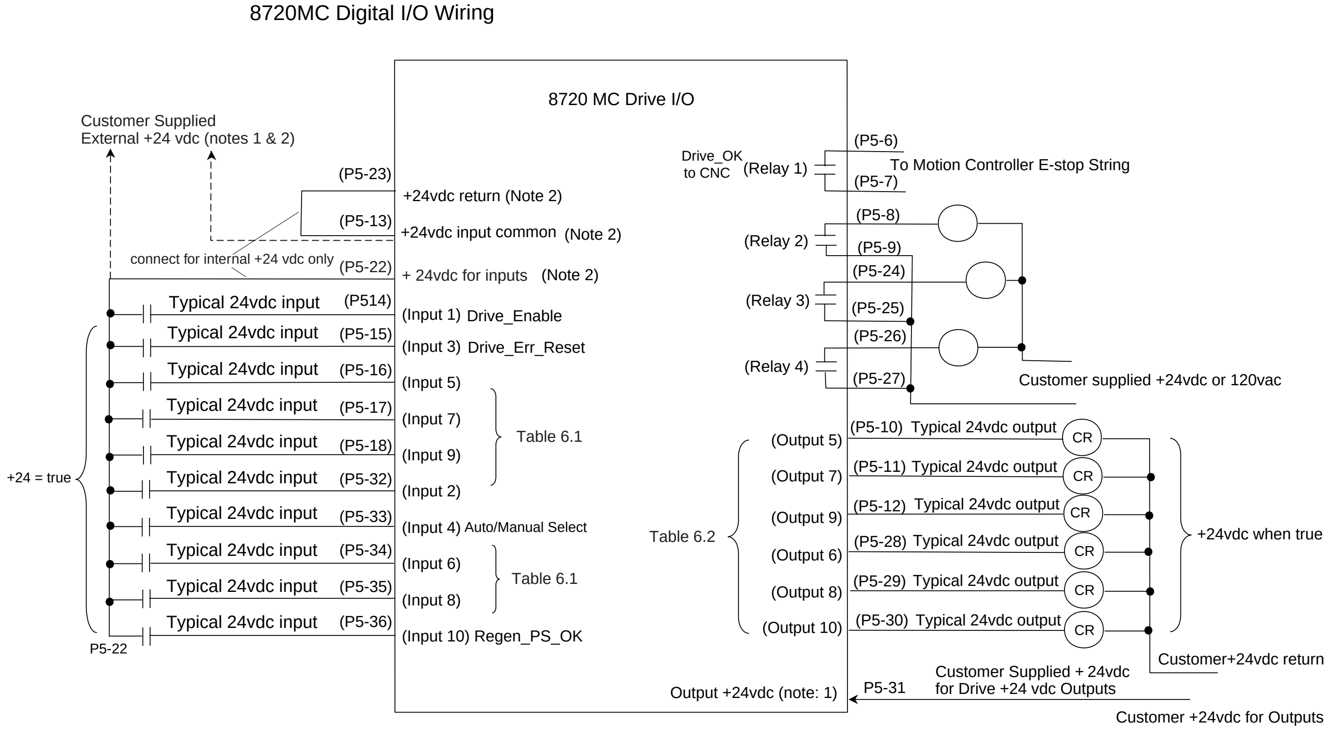
I/O Command Interface

Digital Inputs and Outputs

The 8720MC High Performance Drive supports 10 digital inputs, 4 relay contact outputs and 6 digital outputs. Figures 4.23, 4.24 and 4.25 illustrate the 8720MC circuits that provide the interface to discrete external I/O devices. Figure 4.10 and Table 4.11 illustrate the connector interface for these digital I/O. Figure 6.1 illustrates the recommended wiring for the digital I/O. The isolated +24vdc power available from the 8720MC is limited to 120 Ma and is adequate for use with the 10 digital inputs but may be inadequate when the full set of 6 digital outputs are used. When using the 8720MC isolated +24 vdc power for the digital I/O be sure to keep the current requirements below 120 Ma total for inputs and outputs. If more than 120 Ma is required plan to provide an external, +24vdc power supply.

Each major 8720MC application category, as determined by parameter 501, defines a set of I/O assignments as shown in Tables 6.1 and 6.2. The input assignments are fixed as shown in Table 6.1. The output assignments can be modified but each application category has a default set of output assignments as shown in Table 6.2. All output assignments, other than “Drive OK”, can be changed by linking different 8720MC I/O event variables to the Digital Output Parameters. Descriptions of the I/O event and digital output parameters can be found in Chapter 8.

Figure 6.1
8720MC Digital I/O Connections



Note 1: When using the 6 solid state 24vdc outputs available with the 8720MC , the customer must supply external +24vdc to P5-31.

Note 2: When using the 8720MC supplied +24vdc for the 10 available inputs, terminal P5-13 must be tied to P5-23 - otherwise connect to external +24vdc return to P5-13.

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The 24 vdc digital inputs can be operated from the isolated 8720MC +24vdc power provided on connector P5, Terminal 22 (+24vdc) and Terminal 23 (+ 24 vdc return) or an external customer supplied +24 vdc power supply. The solid lines on Figure 6.1 illustrate the proper way to connect the +24 vdc using 8720MC power. The dotted lines indicate the proper connections for external power. Choose one of the two options, not both. As mentioned earlier the 8720MC +24 vdc is limited to 120 ma. This can be used for the outputs also if the total current requirements for +24 vdc inputs, +24 vdc registration and 24 vdc outputs do not exceed 120 ma. For most industrial output device loads an external +24 vdc power supply will be required. Figure 6.1 shows the proper connections for external + 24 vdc output power.

Digital Input and Output Assignments

Parameter 501 described in Chapter 8 is used to select the primary 8720MC application category. Changing this parameter determines the source of the velocity or torque command reference and the default scaling for the command reference.

Changing parameter 501 also changes the default analog and digital I/O links as shown in tables 6.1, 6.2 and 6.3. With the exception of “Drive OK”, Digital Output 1, any of the digital or analog default output assignments can be changed. The digital input assignments are fixed as shown in Table 6.1. See the section “Changing the Default Output Links” in this chapter for details on how to change default output assignments.

Table 6.1: Digital Input Assignments Based on Application

Connection	Analog Spindle/ Power Servo	SERCOS - Spindle / Power Servo	SCANport - Spindle/ Power Servo
P5-14 / Input 1	Drive Enable	Drive Enable	Drive Enable
P5-15 / Input 3	Drive Error Reset	Drive Error Reset	Drive Error Reset
P5-16 / Input 5	Parameter set bit 2 (high/low)	Reserved	Reserved
P5-17 / Input 7	Parameter set bit 1	Reserved	Reserved
P5-18 / Input 9	Parameter set bit 0	Reserved	Reserved
P5-32 / Input 2	Orient Request	Reserved	Reserved
P5-33 / Input 4	Auto/Manual Select	Auto/Manual Select	Auto/Manual Select
P5-34 / Input 6	Jog	Reserved	Jog
P5-35 / Input 8	Reserved	Home Switch	Home Switch
P5-36 / Input 10	Regen PS - OK	Regen PS - OK	Regen PS - OK

Table 6.2: Digital Output Default Links Based on Application

Connection	IDN / Parameter Number	Analog Spindle/ Power Servo	SERCOS - Spindle / Power Servo	SCANport - Spindle/ Power Servo
P5-6&7 / Relay 1	P00162 / 662	Drive OK	Drive OK	Drive OK
P5-8&9 / Relay 2	P00163 / 663	Enable Brake Sol.	Enable Brake Sol.	Enable Brake Sol.
P5-24&25 / Relay 3	P00164 /664	Hi Winding Select	Hi Winding Select	Hi Winding Select
P5-26&27 / Relay 4	P00165 / 665	Lo Winding Select	Lo Winding Select	Lo Winding Select
P5-10 / Output 5	P00166 / 666	Zero Speed	Reserved	Reserved
P5-11 / Output 7	P00168/ 668	Shut Down Fault	Reserved	Reserved
P5-12 / Output 9	P00170 / 670	Auto Reference Enabled	Reserved	Reserved
P5-28 / Output 6	P00167 / 667	Orient Complete	Reserved	Reserved
P5-29 / Output 8	P00169 / 669	Torque ≥ Torq Limit	Reserved	Reserved
P5-30 / Output 10	P00171 / 671	At Speed	Reserved	Reserved

Default Digital Input Descriptions

Drive Enable - The drive enable input is used to inform the drive that the regenerative power supply and the motion controller are ready for the drive to follow the auto or jog reference command. Assuming there are no internal drive shut down faults the drive will apply torque to the motor as directed by the reference commands when the drive is enabled. The drive will come to a regen stop when the enable is removed.

Drive Error Reset Request - If a drive shut down fault has occurred setting the Drive_Err_Reset bit is required in order to reset the fault. The fault cannot be reset unless the drive is disabled and the fault condition is removed. A transition from low to high is required to reset a drive shut down error. Power cycling also resets the drive error.

Parameter Set Select bit 0, 1 and 2 - Setting these 3 binary bits determines which parameter set is in use and /or which motor winding, high or low, is selected. The choices are:

000 = low 0, 001 = low 1, 010 = low 2, 011 = low 3

100 = high 0, 101 = high 1, 110 = high 2. 111 = high 3

When any or all of the 3 bits change and remain changed for a 50 ms filter delay the new parameter set will be enabled.

Orient Request - When the Orient Request bit, parameter 152, is set an orient will be initiated as determined by the Auto Home Parameter, 582. In addition the orient parameters 153, orient angle, 154, orient options, 222, orient speed, and 260, positioning acc/dec rate, will be used to characterize the orient move. The orient will terminate when the motor reaches the orient position and the orient complete status bit is set. The drive is placed in positioning mode in order to execute the orient. If holding torque is required after the orient position is achieved then the orient request must be maintained even if the orient complete output is set. The drive will ignore the reference and hold position until the orient request is removed. The orient can be initiated when the motor is rotating or stationary.

Manual/Auto Select - When the manual mode bit is set true the manual mode is selected. In this mode the drive can be operated from an Internal HIM, an external HIM or a SCANport connected PLC via the jog reference and jog bit or the digital interface via analog input 2 and the jog digital input. In auto mode only the configured auto command reference is followed by the drive. Whenever the drive is switched from auto to manual the drive will come to a regenerative stop. It will follow the jog reference from the source that is providing the jog request. If the drive is switched from manual to auto the drive will also come to a regenerative stop. A positive transition on the drive enable input from 0 to +24 vdc will be required to restore auto operation of the drive wherein the drive follows the auto reference command.

Jog Request - When the drive is enabled in manual mode with no drive faults and the jog command bit on digital input 6 is set true, the drive will respond to the jog reference, Analog Input 2.

Since jog is a momentary function the drive will continue to follow the reference until the jog is released. When the jog input is released the motor will regenerate to a stop.

Regen Power Supply OK - Input 10 is used to interface to the 8720MC - RPS fault output. This is a normally open contact which is closed when there are no RPS faults. Figures 4.14 and 4.15 show how to wire this input. Since a high is required on this input it must be tied to +24vdc if the regenerative converter is not used.

Default Digital Output Descriptions

Drive OK - When the drive is clear of all shut down faults the Drive OK contact will be closed. The drive does not have to be enabled to be in the drive ok state. This normally open contact is available for use in the motion controller emergency stop string. The contact is closed when there are no faults.

Enable Brake solenoid - This output contact can be used to interface to a brake solenoid. The contact closes immediately after the drive enable is applied. The drive will apply zero speed holding torque for a configurable on delay time period after the drive has been enabled, parameter 206. This assures that there is holding torque available while the brake is being released. An additional off time delay is provided, parameter 207. The brake contact will open after a configurable time delay period (parameter 207) from when the drive enable input is removed. The drive will remain enabled for the off delay period to provide regenerative braking until the motor is at zero speed.

High Winding Select - When bit 2 of the parameter set binary code is set to 1 the High Winding Select contact is closed. When interfaced to a contactor this output can be used to select the high motor winding. This contact can be closed only when the low contact output is open.

Low Winding Select - When bit 2 of the parameter set binary code is set to 0 the Low Winding Select contact is closed. When interfaced to a contactor this output can be used to select the Low motor winding. This contact can be closed only when the High contact output is open.

Zero Speed - Parameter 124 is used to determine the zero speed window. When the motor velocity falls within the configured zero speed window for 50 ms the zero speed output is set true.

Shut Down Fault - Parameter 11 contains a bit pattern which describes a set of different conditions which can initiate a shut down fault. When any of these conditions exist the Shut Down Fault output will be true. Selection of parameter 11 in display mode via the Him or Drive Explorer$_{TM}$ will allow access to a 16 character display describing the fault.

Auto Reference Enabled - Parameter 529 (P00029) is an event link which indicates that there are no drive faults, the drive is enabled and it is in auto mode and it is capable of following the auto reference. This event has a default link to both the digital interface and the SCANport Logic Status Word.

Orient complete - If an orient has been initiated and the orient position is achieved the drive will enter an orient position achieved state. The “orient complete” output is used to indicate to the motion controller that the orient position achieved state is established. The orient complete output is turned off when the motor leaves the orient position.

Torque ≥ Torque Limit - Parameters 82 and 83 are configuration parameters which establish the + and - torque limits for the application. There are 8 sets of torque limits since they are part of the servo parameter sets. If any of these torque limits are reached or exceeded the Torque ≥ Torque Limit Output will be enabled. Parameter 520 can be used to determine the source of the torque limit

At Speed - Parameter 157 is a configuration parameter which establishes the At Speed Window. When the velocity error represented by the difference between the commanded velocity and the feedback velocity is less than parameter 157, the “At Speed” output is enabled.

Registration Inputs

The 8720MC provides 2 registration inputs. One input is for +24 vdc operation and one is for +5 vdc operation. The 8720MC can provide +5 vdc or +24 vdc to be used with a switch type registration or orient sensor. Both registration inputs can be used in a given application.

Tables 4.20 and 4.21 as well as Figure 4.26 describe the electrical characteristics of the registration inputs. From a software perspective the registration inputs are used by the 8720MC software to capture a position within 4 microseconds of a closure of the registration sensor. This can be used by the drive for orienting to a registration sensor or used by a SERCOS motion controller for probing or position registration. With a SERCOS motion controller the registered position is returned to the motion controller via the SERCOS link as a result of a Registration Procedure. The registration inputs are isolated and can use either the 8720MC +5vdc or +24vdc power or customer supplied external +5vdc or+24vdc. Figure 6.2 shows the connections required for the probe inputs when internal dc power is used.

Figure 6.2
Registration Interface Using 8720MC Internal Power

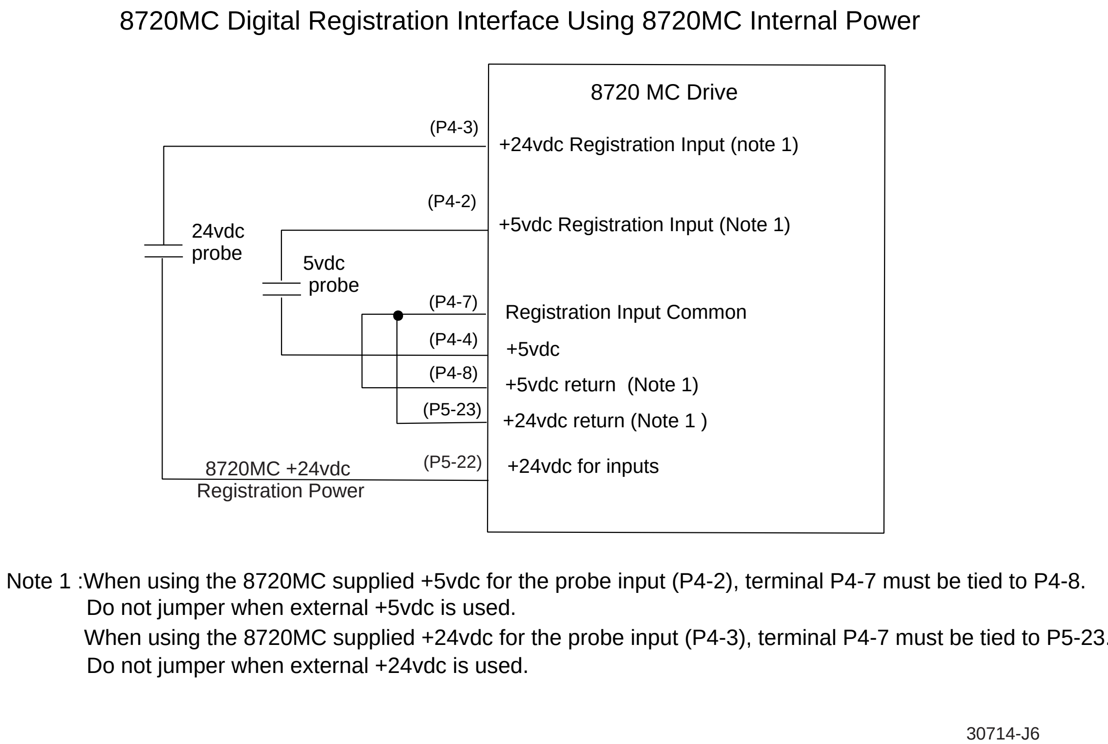
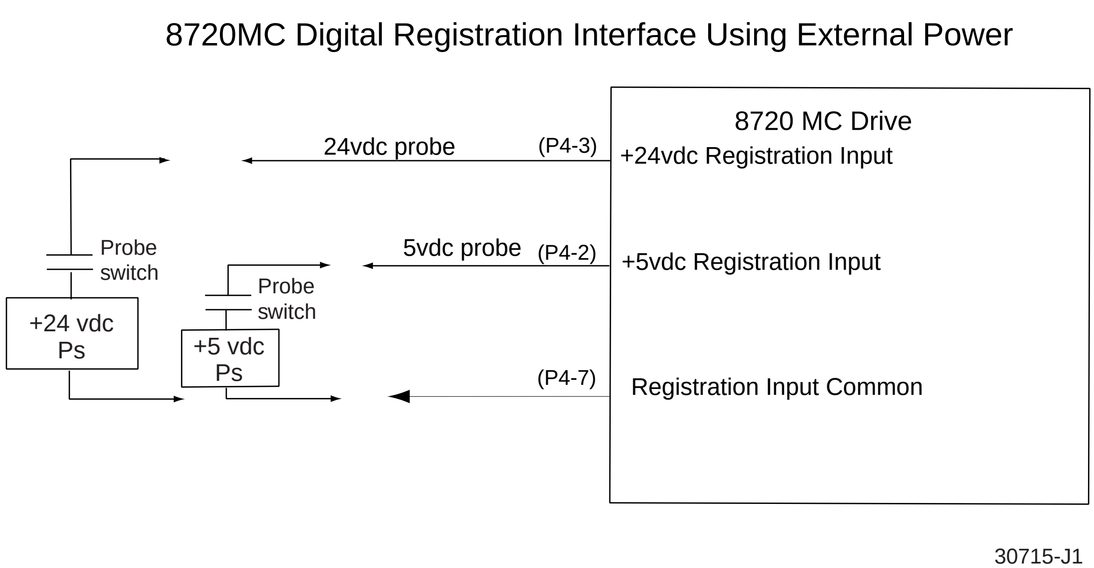


Figure 6.3 shows the connections required for the probe inputs when external, customer supplied +24vdc and/or 5 vdc power is used.

Figure 6.3
Registration interface using External Power



Analog Inputs and Outputs

The 8720MC has two +/- 10 vdc analog outputs and two +/- 10 vdc analog inputs. The analog inputs are only available in the analog input spindle or power servo software configurations, (parameter 501). In the SERCOS configuration the analog inputs are used to interface to the auxiliary, spindle or axis mounted, feedback device that is connected to the auxiliary feedback connector. In the analog input spindle or power servo software configurations, as determined by parameter 501, Analog Input 1 provides the torque or velocity command reference to the drive. Analog Input 2 provides a manual velocity reference for manual operator stations. Figure 6.4 illustrates the recommended connections for the analog inputs and outputs. Table 6.3 illustrates the default analog input links to the 8720MC software.

A description of the Analog Input Parameters, analog Inputs 1 and 2, can be found in Chapter 8 under parameters 691 to 692. Each analog input has a scaling factor associated with it, Parameters 695 and 696. Refer to Chapter 8 for details on how to use the scaling parameters with the analog inputs. The default velocity scaling is 100 rpm/volt for both analog input 1 and 2. As an example assume the motion controller is scaled such that 8 volts produces a maximum speed of 6,000 rpm. The drive should also be scaled such that 8 volts equals 6,000 rpm. This is accomplished by using a scaling factor value of 750 rpm/volt or a value of 7500 in parameter 695. The A/D resolution is +/-8192 bits or 1.2 mv/bit, based on a +/- 10 volt input command. It is always best to use the full +/-10 Volt range so that maximum velocity resolution is achieved. When in torque mode the scaling factor for analog input 1 is fixed at 2.5 volts = 100% continuous rated torque.

A description of the Analog output Parameters, analog Outputs 1 and 2, can be found in Chapter 8 under parameters 681 and 683. Each analog output has an scaling parameter associated with it. Parameters 682 and 684 are scaling parameters. Refer to Chapter 8 for details on how to use the scaling parameters with the analog outputs.

Figure 6.4

Analog Input and Output Connection Diagram

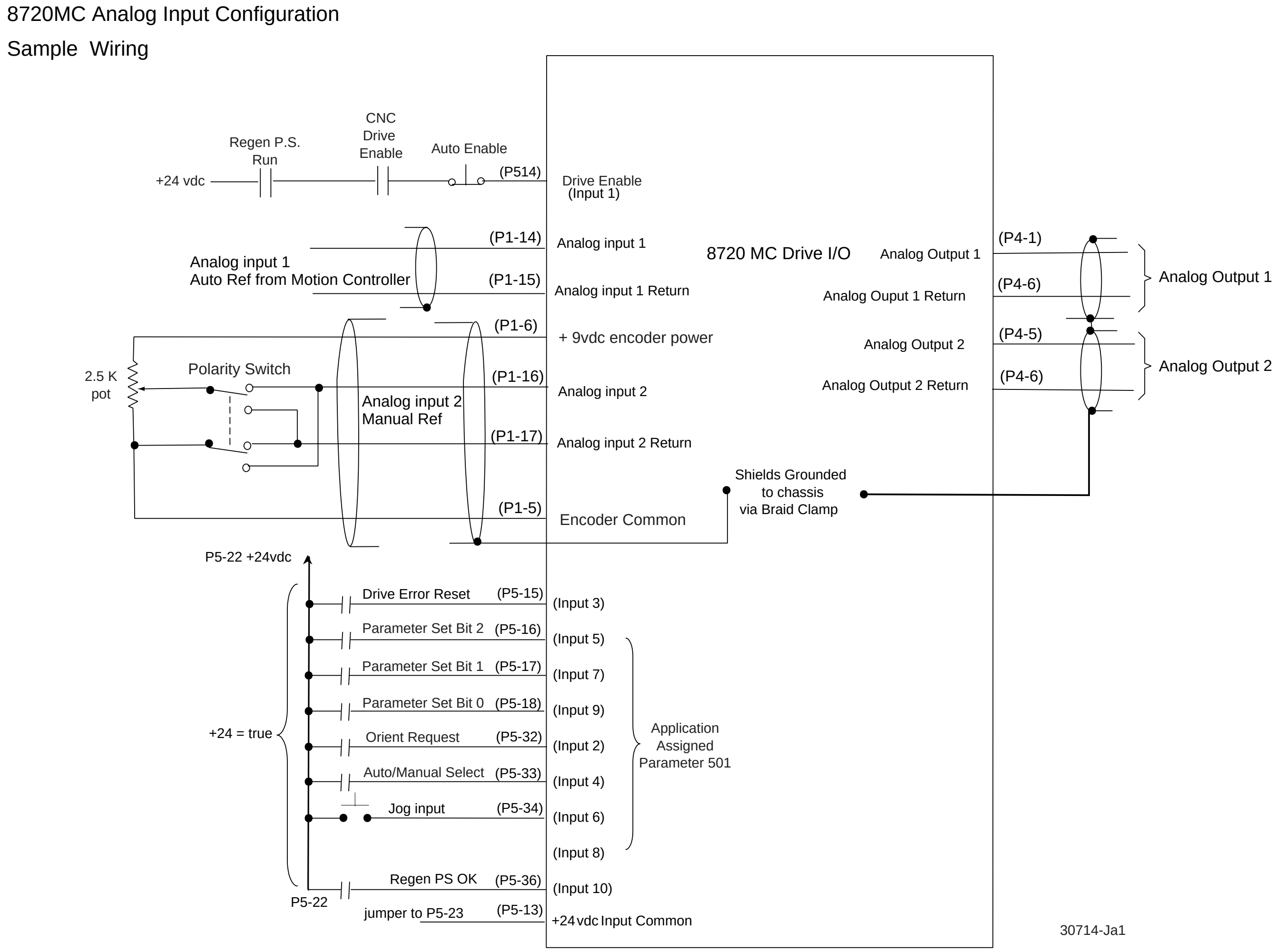


Table 6.3:
Analog Default links

Connection	IDN / Parameter Number	Analog Spindle	Analog Power Servo	SERCOS - Spindle / Power Servo	SCANport - Spindle/ Power Servo
P5-14 & 15 / Analog Input 1	P00161/ 661	Auto Velocity Reference	Auto Velocity Reference	Not Available	Reserved
P5-16 & 17 / Analog Input 2	P00164 / 664	Manual Velocity Reference.	Manual Velocity Reference.	Not Available	Manual Velocity Reference.
P4-1 & 6 / Analog Output 1	P00181 / 681	Velocity Feedback	Velocity Feedback	Velocity Feedback	Velocity Feedback
P4-5 & 6 / Analog Output 2	S00386 / 386	Motor Shaft Power	% Rated Torque IDN 00084	Motor Shaft Power	Motor Shaft Power

The analog input assignments are fixed as shown in Table 6.3. In the SERCOS configuration the analog inputs are not available since the velocity or position command is provided by the SERCOS fiber optic ring. In their place a second feedback channel is provided for spindle or axis mounted feedback devices. In the SCANport configuration the velocity or torque reference is provided by a PLC via a DeviceNet, Remote I/O or ControlNet connection to a SCANport communication bridge module. Any of the analog output default links can be changed by entering a new linkable parameter number into the Analog Output 1 or 2, parameters 681 or 683.

Changing the Default Digital Output Links

As was discussed earlier in this chapter, when you select a primary application type via parameter 501 the 8720MC establishes a default set of I/O assignments appropriate for the application per tables 6.1, 6.2 and 6.3. For most situations there is little reason to change the default I/O assignments and in fact it is not possible to change the analog or digital input assignments. If necessary, changing one or several default output assignments can be accomplished by modifying the pointer or "link" values in the digital output parameters (662 through 671). This may be accomplished with the Him module in "Program" mode or Drive Explorer$_{TM}$. Tables 6.4 and 6.5 show the linking relationship between the 8720MC I/O Event variables and the Digital output parameters. Referring to Tables 6.4 and 6.5, entering the parameter number of the "source" 8720MC I/O event into the "sink" 8720MC digital output parameter will create a link between the 8720MC I/O event variable and the digital output.

For example, assigning Digital Output 5 to the motor at "Zero_Speed" variable can be accomplished by entering the value 331 into parameter 666 using either the HIM in program mode or Drive Explorer$_{TM}$. The state of Digital Output 5 or any other digital output can be observed via the HIM module in Display Mode or Drive Explorer$_{TM}$ by selecting parameter 661, "Digital Output Status". The status of all 10 digital outputs will be displayed as a bit array. A display of 1 is true and 0 is false for each output. An x indicates an unused bit. Bit 5 will be "1" whenever the motor falls within the zero speed window.

The state of the Zero_Speed variable can also be observed by selecting parameter 331 using either the HIM in display mode or Drive Explorer$_{TM}$. It will indicate 1 for true and 0 for false.

If you change the digital output default assignments the 8720MC will change parameter 501 to "Custom Configuration" so that it is clear that this configuration has modified values which are different from the default values.

If you use Drive Explorer to restore the defaults by selecting and storing one of the application types in parameter 501 the modified parameters will be changed back to the default values associated with that application type. If you have a custom configuration Drive explorer or the HIM can be used to identify parameters which do not conform to the application defaults. Table 6.5 gives examples of parameters that can be linked to the digital outputs.

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Table 6.4:
Sinks for Digital Output Links

Sinks		
IDN Number	**Parameter Number**	**Parameter**
P00163	663	Digital_Output_2
P00164	664	Digital_Output_3
P00165	665	Digital_Output_4
P00166	666	Digital_Output_5
P00167	667	Digital_Output_6
P00168	668	Digital_Output_7
P00169	669	Digital_Output_8
P00170	670	Digital_Output_9
P00171	671	Digital_Output_10

Link

Table 6.5:
Sources for Digital Output Links

Typical Sources		
IDN Number	**Param Number**	**Parameter**
S00330	330	At Programmed Speed
S00331	331	Zero Speed
S00332	332	Motor Speed Below Threshold
S00334	334	Torque Above Limit
S00335	335	Velocity Above Limit
S00136	336	In Position
S00339	339	Speed Below Minimum
S00340	340	Speed Above Maximum
P00026	526	High Winding Enable
P00027	527	Low Winding Enable
P00028	528	Enable Brake Solenoid
P00029	529	Auto Reference Enabled
P00030	530	Manual Mode Selected
P00083	583	Orient Complete
P00115	615	Shut Down Error

Changing the default Analog Output links

The analog outputs can be changed from there default linkages in the same way as the digital outputs. The default assignments were presented in table 6.3. Tables 6.6 and 6.7 give examples off possible analog output assignments.

Table 6.6:
Typical Links for Analog Outputs

Sinks		
IDN Number	Parameter Number	Parameter
P00181	681	Analog Output 1
P00183	683	Analog Output 2

Link

Table 6.7:
Typical Sources for Analog Outputs

Typical Sources		
IDN Number	Parameter Number	Parameter
S00040	40	Velocity Feedback
S00084	84	Torque Feedback
S00159	189	Position Following Error
S00347	347	Velocity Error
S00380	380	Bus Voltage
S00385	386	Motor Shaft Power
S00036	36	Velocity Command
S00080	80	Torque Command

SERCOS Command Interface

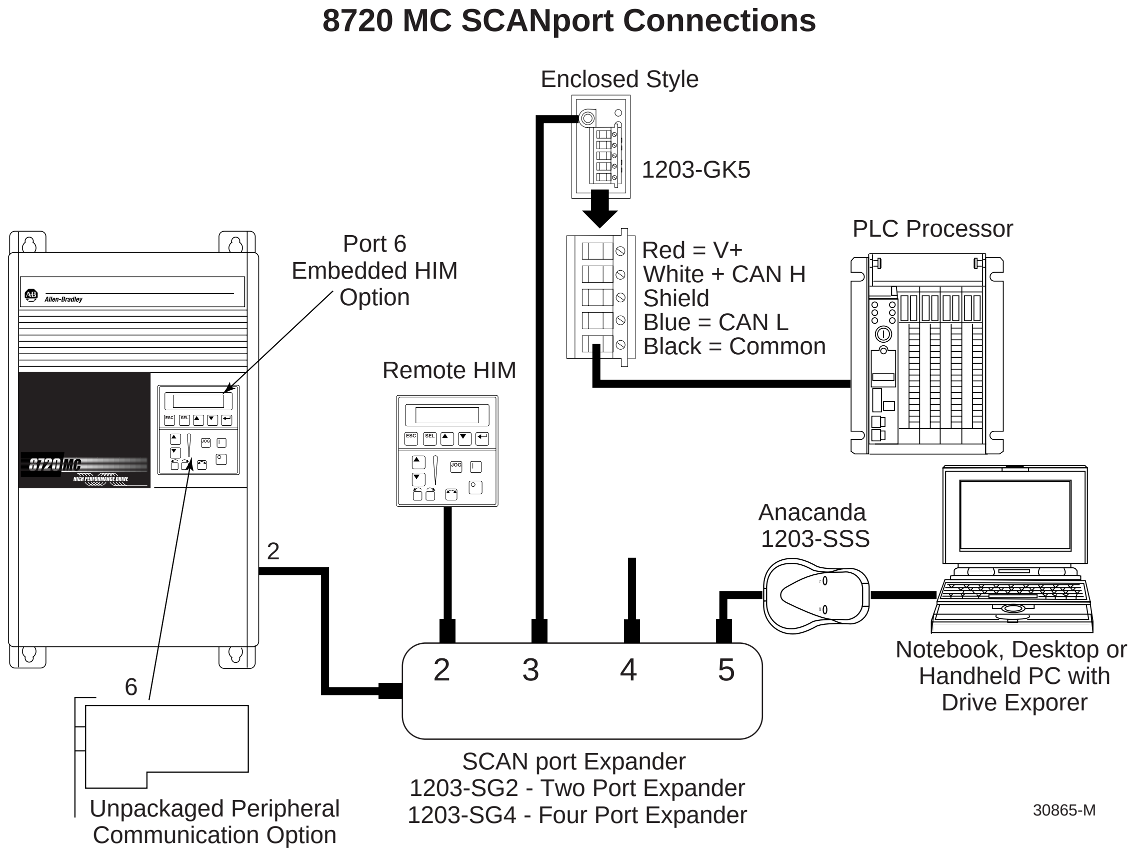
The SERCOS link to the master motion controller is made via a 4 megabit fiber optic ring. There is a receiver and a transmitter connection which is located on the 8720MC main control board. Two types of Fiber optic cables in varying lengths are available from Rockwell Automation. One type is intended for internal cabinet connections while the other is best suited for external conduits and raceways. When either SERCOS Spindle or SERCOS Power Servo applications are selected in parameter 501 all position, velocity, torque and procedure commands are delivered to the 8720MC from the master motion controller via the SERCOS ring. All position, velocity, torque feedback and status information is returned to the master motion controller from the 8720MC via the SERCOS ring. For more details on SERCOS see IEC Specification 61491 and Chapter 8 in this manual.

SCANport command interface

SCANport is a Rockwell Automation Can based peripheral communication network which is used by the 8720MC to communicate with the integral HIM, a remote HIM, a PC running Drive Explorer in a “MS - Windows” environment or a Rockwell PLC. SCANport is a multi-channel communication network which supports multiple nodes or “ports”. The 8720MC has an internal SCANport connection point and an external SCANport connection point. The integrated HIM option is connected to the internal Port 6 connector as shown in Figure 6.5.

The HIM is an optional device therefore Port 6 can also be used for other purposes such as an unpackaged peripheral communications interface module to one of Rockwell's communication networks.

Figure 6.5
SCANport Peripheral Interface



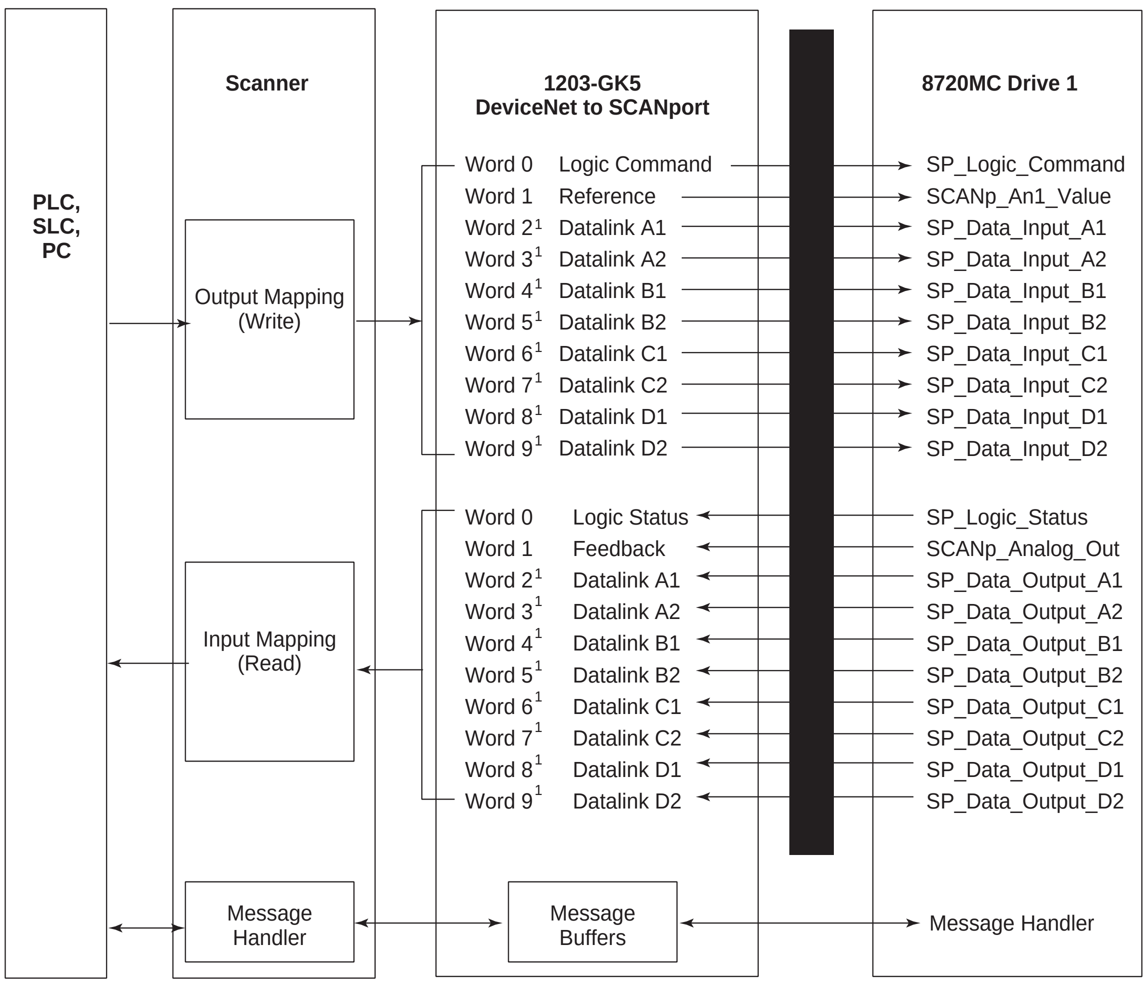
The 8720MC external SCANport connection uses the Port 2 address. It can be used as a single connection to a remote HIM or a PC or a PLC. It can also be connected to a 2 or 4 port expander as shown in Figure 6.5. The SCANport expander is very useful in situations where a PLC is used as the source of the command reference and the logic interface. The expander allows easy plug in of a Personal Computer running Drive Explorer$_{TM}$ for the purpose of displaying and/or modifying parameters as well as monitoring process parameters while the process is executing. The PLC interface is accomplished via a SCANport Gateway Module connected to one of Rockwell's communication networks such as remote I/O, DeviceNet or ControlNet. The 1203-GK5 module shown in Figure 6.5 is a stand alone DeviceNet Gateway. A PLC can use the 8720MC analog/digital interface or the SCANport digital interface for the purposes of controlling the 8720MC Drive. Use of a SCANport Gateway Module with a PLC allows the control of position as well as velocity or torque. See parameters 258, *Target_Position*, 259, *Posn-Velocity* and 260, *Posn_Accel _Rate* in Chapter 8 for details

The analog/ digital interface described in this chapter can be used when a PLC analog output module and digital I/O are the preferred interface. In this case the positioning mode is limited to the orient function.

SCANport command reference

For applications where a Rockwell digital communications network interface is the preferred interface one of the Rockwell 1200 series SCANport gateway modules must be used. Regardless of the control network the method of passing data to and from the drive is the same. Figure 6.6 illustrates the nature of the data exchanged. The illustration uses DeviceNet as an example of a Rockwell open communication network.

Figure 6.6
SCANport Gateway Communication Interface



[1] Optional enabled using DIP switches on the module.

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Basically, the communication gateway allows the exchange of ten 16 bit command input words to the drive from the PLC and ten - 16 bit status output words from the drive to the PLC. *SCANp_AN1_Value* is the parameter location (parameter 713) where the incoming velocity or torque command value, as received from the gateway, is stored. When either SCANport Spindle or SCANport Power Servo applications are selected in parameter 501 all velocity, torque and logic commands are delivered to the 8720MC from the PLC via the communication gateway on SCANport. *SCANp_Analog_Out* is the parameter location (parameter 715) where the out going actual velocity or torque value is stored.

SCANport_AN1_Value has a scaling factor associated with it as defined in chapter 8. The default velocity scaling +/-1 LSB = +/- 1 rpm. The torque scaling is fixed at +/- 1000 = +/- 100% rated torque

All velocity feedback or torque feedback and logic status information is returned to the PLC from the 8720MC via the communication gateway on SCANport. The drive can operate in position, velocity or torque modes. The mode is determined by the primary operating mode parameter for the active parameter set. There are 8 servo parameter sets available to accommodate gear range switching, high / low windings and mode switching. The active parameter set is stored in (parameter 254). Each parameter set has a primary operating mode parameter. Refer to parameter 32 in Chapter 8 for a description of the Primary Operating Mode Parameter. The SCANport gateway reference command must be scaled by the PLC if something other than the default scaling is required. The default velocity scaling +/-1 LSB = +/- 1 rpm. The torque scaling is fixed at +/- 1000 = +/- 100% rated torque

SCANport Command Logic Inputs

When SCANport is the primary command interface the velocity or the torque command is provided from an A-B PLC via a SCANport gateway. The key logic commands as described in Table 6.7 are passed through the Logic Input Command Word and the Logic Output Status Word. The following descriptions apply:

Regenerative Stop Request - When this bit is set true by the PLC the drive will come to a regenerative stop regardless of the auto or jog reference command.

Start Request - When the start command bit is set true and there are no faults the drive will respond to the auto reference in auto mode and the jog reference in manual mode. It will continue to follow the reference until there is a regenerative stop or a coast stop request or the active reference is set to zero.

Jog Request - If the drive is stopped (disabled via bit 00 of the command word) and the jog command bit is set true (rising edge) and there are no faults, the drive will assert the jog reference enabled state and follow SCANport jog reference command on SCANport Gateway Input Word 2 shown in table 6.10.

The drive will continue to follow the jog reference until the jog is released. It will then regenerate to a stop.

The manual reference request, bit 11 of the SCANport Logic Command Word, does not need to be asserted. This will automatically occur when the jog bit 02 is set.

Fault Clear - If a drive shut down fault has occurred setting the Drive_Err_Reset bit is required in order to reset the drive shut down error. The fault cannot be reset unless the fault condition is removed.

Coast Stop Request - If the drive is running and the Coast Stop Request bit is set the drive power will be removed from the motor and it will not regenerate. Under this condition the motor will coast until the friction of the motor and load bring it to a stop.

Table 6.7: SCANport Logic interface

Table 6.8: SCANport Command Input Word

SCANport Input Command Word	
Bit	**Description**
00	Regenerative Stop Request
01	Start Request
02	Jog Request
03	Fault Clear
04	Coast Stop Request
05	Parameter Set Select bit 0
06	Parameter Set Select bit 1
07	Parameter Set Select bit 2
08	Parameter Strobe
09	Orient Request
10	Home Request
11	Manual Reference Select
12	Reserved
13	Reserved
14	Reserved
15	Reserved

Table 6.9: SCANport Output Status Command

SCANport Output Status Word	
Bit	**Description**
00	Drive Enabled
01	Auto Reference Enabled
02	Rotation Direction
03	Drive OK
04	At Zero Speed
05	At Reference Speed
06	Orient complete
07	Reserved
08	Brake Solenoid enabled
09	Torque greater than Torque Limit
10	High Winding Selected
11	Low Winding Selected
12	Shut Down Fault
13	Reserved
14	Reserved
15	Manual Reference Selected

Parameter Set Select bit 0, 1 and 2 - Setting these 3 binary bits determines which parameter set is in use and /or which motor winding is selected. The choices are:

000 = low 0, 001 = low1, 010 = low 2, 011 = low 3

100 = high 0, 101 = high1, 110 = high 2. 111 = high 3

Parameter Strobe - When the parameter strobe bit is set momentarily the preselected parameter set number (bits 5, 6 and 7) will be selected and the associated parameters will be enabled.

Orient Request - The SCANport orient request is identical to the digital I/O orient request. When the Orient Request bit is set an orient will be initiated as determined by the Auto Home Parameter, parameter 582, and the orient parameters 150 motor marker offset, 153 orient angle, 154 orient options, 222 orient speed and 260 positioning acc/dec rate. The orient will terminate when the orient complete status bit is set and the orient request is removed.

Manual Reference Select - When the manual reference select bit is set true in the SCANport command word the manual (jog) reference is enabled. In this state the drive will follow the manual jog reference provided on SCANport gateway input word 2, see table 6.10. When initiating a jog the manual reference request, bit 11 of the SCANport Logic Command Word, does not need to be asserted. This will automatically occur when the jog bit 02 of the Input Command Word is set. To terminate a manual start or disable the jog reference state, with Manual Reference Select not asserted, bit 00 of the Input Command Word “Stop Request” must be set true. The auto command reference is then followed by the drive

SCANport Logic Status Outputs

Several of the logic output signals have already been defined in the section, Default Digital I/O Descriptions. The following is an explanation of those that have not already been described.

Drive Enabled - The drive is in the enabled state when the drive enable digital input is true and there are no shut down faults. Drive enabled means the power IGBT’s are switching and the drive is capable supplying motor torque.

Auto Reference Enabled - Parameter 529 (P00029) is an event link which indicates that there are no drive faults, the drive is enabled and it is in auto mode and it is capable of following the auto reference. This event has a default link to both the digital interface and the SCANport Logic Status Word.

Rotation Direction - The rotation direction bit is used to identify the direction of motor rotation.

Manual Reference Selected - Whenever the digital or SCANport interfaces select the manual reference the drive acknowledges this state by setting the manual reference selected bit 15, SCANport Output Status Word.

Table 6.10:
SCANport Gateway Data Assignments

Gateway Data Word	Data Link Identifier	8720MC Parameter Assignment	Default Link	8720MC Data Description	Data Type (16 bit word)
Input Word 0	Logic Command	717	717	SCANport Logic Command Word	bit pattern
Input Word 1	Command Reference	713	36 or 80 after scaling	SCANport velocity/torque Input Reference Value	signed integer
Input Word 2	Data In A1	725	692 after scaling	SCANport manual jog velocity	signed integer
Input Word 3	Data In A2	726	258	Target Position +/- 32,768 resolution units	signed integer
Input Word 4	Data In B1	727		Reserved	signed integer
Input Word 5	Data In B2	728		Reserved	signed integer
Input Word 6	Data In C1	729		Reserved	signed integer
Input Word 7	Data IN C2	730		Reserved	signed integer
Input Word 8	Data IN D1	731		Reserved	signed integer
Input Word 9	Data In D2	732		Reserved	signed integer
Output Word 0	Logic Status	718	718	SCANport Logic Status Word	bit pattern
Output Word 1	Velocity Feedback	715	40	SCANport Velocity Feedback	signed integer
Output Word 2	Data Out A1	733	11	Shut Down Errors	bit pattern
Output Word 3	Data Out A2	734	129	8720MC Drive Errors	bit pattern
Output Word 4	Data Out B1	735	13	Drive Status	bit pattern
Output Word 5	Data Out B2	736	386	Motor Shaft power	integer
Output Word 6	Data Out C1	737	254	Actual parameter set	binary 0 -7
Output Word 7	Data Out C2	738		Reserved	signed integer
Output Word 8	Data Out D1	739	347	Velocity Error	signed integer
Output Word 9	Data Out D2	740	84	Torque Feedback	signed integer

SCANport Data Interface

In addition to the SCANport Logic Command word, the SCANport Logic Status word, the SCANport Command Reference and the SCANport Feedback Output there are 16 additional 16 bit words which can be exchanged between an A-B PLC and the drive. Figure 6.10 describes the fixed assignments for the eight 16 bit input data words and the eight 16 bit output data words.

Chapter 7

Using the Human Interface Module (HIM)

Chapter Objectives

Chapter 7 provides the following information so that you can use the Human Interface Module:

- what is the Human Interface Module?
- HIM operation
- using the program and display modes
- viewing and changing bit definitions
- using the EEprom mode
- using the control status mode
- using the password mode
- creating and changing a link
- removing a link
- Drive Explorer$_{TM}$

What Is the Human Interface Module?

The Human Interface Module (HIM) is the standard user interface for the 8720MC Drive. When a drive mounted HIM is supplied, it can be accessed from the front of the drive. A remote Him is also available for connection via a SCANport interface cable. The HIM provides a way to display and modify drive parameters and to view the operating parameters. The HIM also provides a means of starting, stopping, jogging, switching directions and adjusting manual speeds.

When a drive mounted HIM is not supplied on enclosed drives, you must install the blank cover plate (option HAB) to close the opening in the front cover of the enclosure. Failure to install the blank cover plate allows access to electrically live parts that may result in personal injury and/or equipment damage.

HIM Display Panel and Control Panel

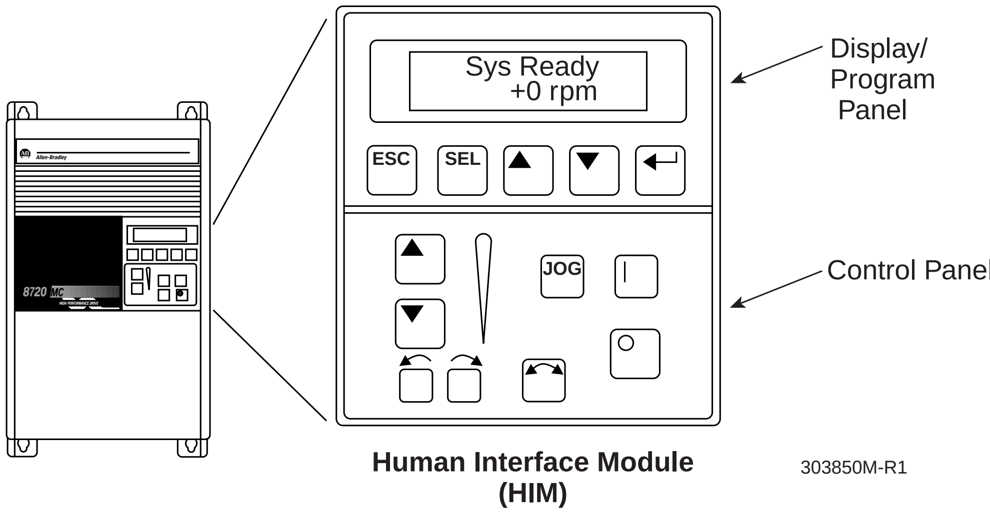
The HIM contains a display panel and a control panel:

- The display panel lets you program the drive, view the various operating parameters and monitor the drive status.

- The control panel lets you perform manual control functions such as start, stop, jog and setting the manual velocity.

Figure 7. 1 shows what a HIM looks like.

Figure 7.1
Example of a HIM



Him Display Panel Keys

The HIM programming panel provides the 5 keys and a 2 line by 16 character LCD display as shown in Figure 7.2 keys.

Figure 7.2
HIM Display Panel Keys

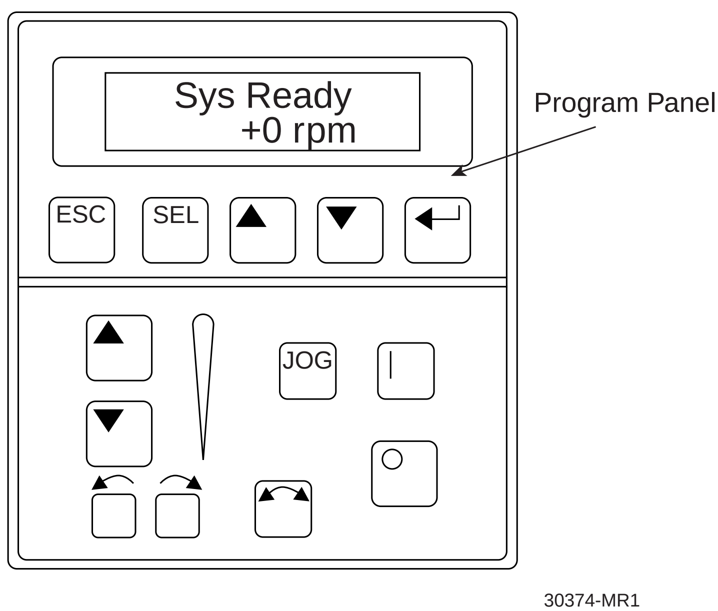


Table 7.1:
Keys on the HIM Display Panel

Press this key:	To:	It is called:
ESC	Go back one level in the menu tree that the HIM uses to organize information	Escape key
SEL	Alternates which display line (top or bottom) is currently active. Also allows navigation in numerical fields or bit patterns	Select key
▲	Increment (increase) the selected value. If no value is selected, use this key to scroll through the groups or parameters that are currently selected.	Increment key
▼	Decrement (decrease) the selected value. If no value is selected, use this key to scroll through the groups or parameters that are currently selected.	Decrement key
↵	Select the group or parameter that is currently active or enter the selected parameter value into memory. The top line of the display automatically becomes active to let you choose another parameter or group.	Enter key

HIM Control Panel Keys

The HIM provides the eight keys for motor control in the control panel section as shown in Figure 7.3:

Figure 7.3
Him Control Panel Keys

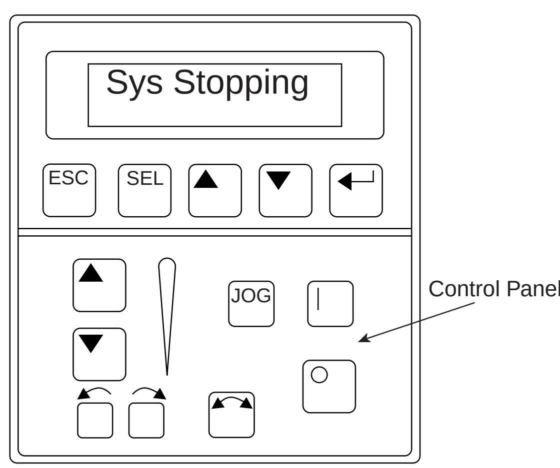


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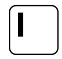
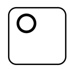
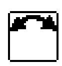
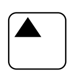
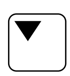
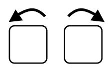
Table 7.2:
Keys on the HIM Control Panel

Press this key:	To:	It is called:
	If the drive is in manual mode and no other control devices are sending a Stop command, the start key will cause the motor to rotate in the HIM selected direction and velocity. Speed will be based on the Him reference command.	Start key
	Pressing the stop key will nitiate a stop sequence if the drive is running. The drive stops according to the stopping torque specified in parameter 571. The stop key also issues a clear fault command if the drive is currently faulted.	Stop key
	In manual mode depressing the jog key will Jog the motor at the HIM selected jog reference speed and direction. Releasing the key will initiate a decelerated stop. The drive stops according to the stopping torque specified in parameter 571.	Jog key
	Pressing the direction key will change the motor direction if it is being controlled from this HIM. The appropriate direction indicator light will light to indicate direction.	Change Direction key
 	Increase or decrease the HIM speed command. An indication of this command is shown on the visual Speed Indicator. Parameter 696 determines the maximum manual speed. Press both keys simultaneously to store the current HIM speed command in HIM memory. Cycling power or removing the HIM from the drive sets the speed command to the value stored in HIM memory. These arrows are only available with digital speed control.	Up Arrow and Down Arrow keys

HIM Control Panel Indicators

The HIM control panel has the following indicators.

Table 7.3:
Indicators on the HIM Control Panel

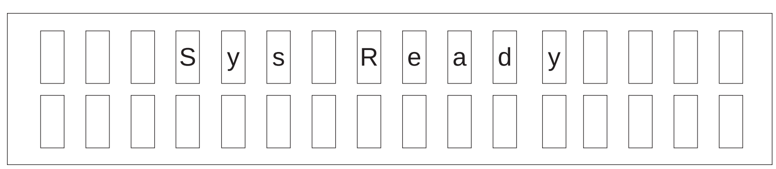
This indicator:	Provides information about:	It is called:
	The direction of motor rotation	Direction LED
	An approximate visual indication of the command manual jog speed. This indicator is only available with digital speed control.	Speed Indicator

HIM Operation

Initial Status Display

When you first apply power to the 8720MC Drive, the HIM cycles through a series of displays. These displays show the initialization and communication status. When complete, the following type of status display is shown. The display indicates the current status of the drive (such as Sys Bus Chrg or Enabled) or any faults that may be present. The display hardware is a two line, 16 characters per line, LCD display panel. Selecting one of the 2 display lines is accomplished with the “Sel” select button.

Figure 7.4
Initial Status Display



Choosing a HIM Mode

From the Initial Status Display, press any one of the five display panel keys. "*Choose Mode*" is displayed. Press the Increment or Decrement key to scroll through the modes. The navigation diagram for the available modes in shown Figure 7.5 "Him Menu Tree". The HIM modes are displayed in a circular register. Depressing the increment up key selects the next mode while depressing the decrement down key selects the previous mode. Once the desired mode is displayed it is necessary to depress the enter key to select the mode. File, group and parameter names are limited to 16 characters, one line of the HIM display. Selections within a parameter are limited to 12 characters. Because of these limitations the names may be abbreviated.

The following modes are available:

Table 7.4: HIM Modes

This mode:	Lets you:
Display	View the value of any parameter. You cannot modify parameters in this mode.
Program	Access the complete listing of parameters available for programming.
EEProm	Reset all parameters to the factory default settings or save modified parameters. In addition, you can upload/download parameters between the HIM and the drive.(remote HIM only)
Search	Search for parameters that are not at their default values.
Control Status	You can access the fault and warning queues from Control Status. A clear function clears the queue. It will not clear an active fault. Refer to *Chapter 10:Troubleshooting*, for more information about the fault and warning queues.
Password	Protect the drive parameters against programming changes by unauthorized personnel. When a password has been assigned, you must have the correct password to access the Program/ EEProm modes and the Control Logic/Clear Fault Queue menus. You can choose any five digit number between 00000 and 65535 for the password.

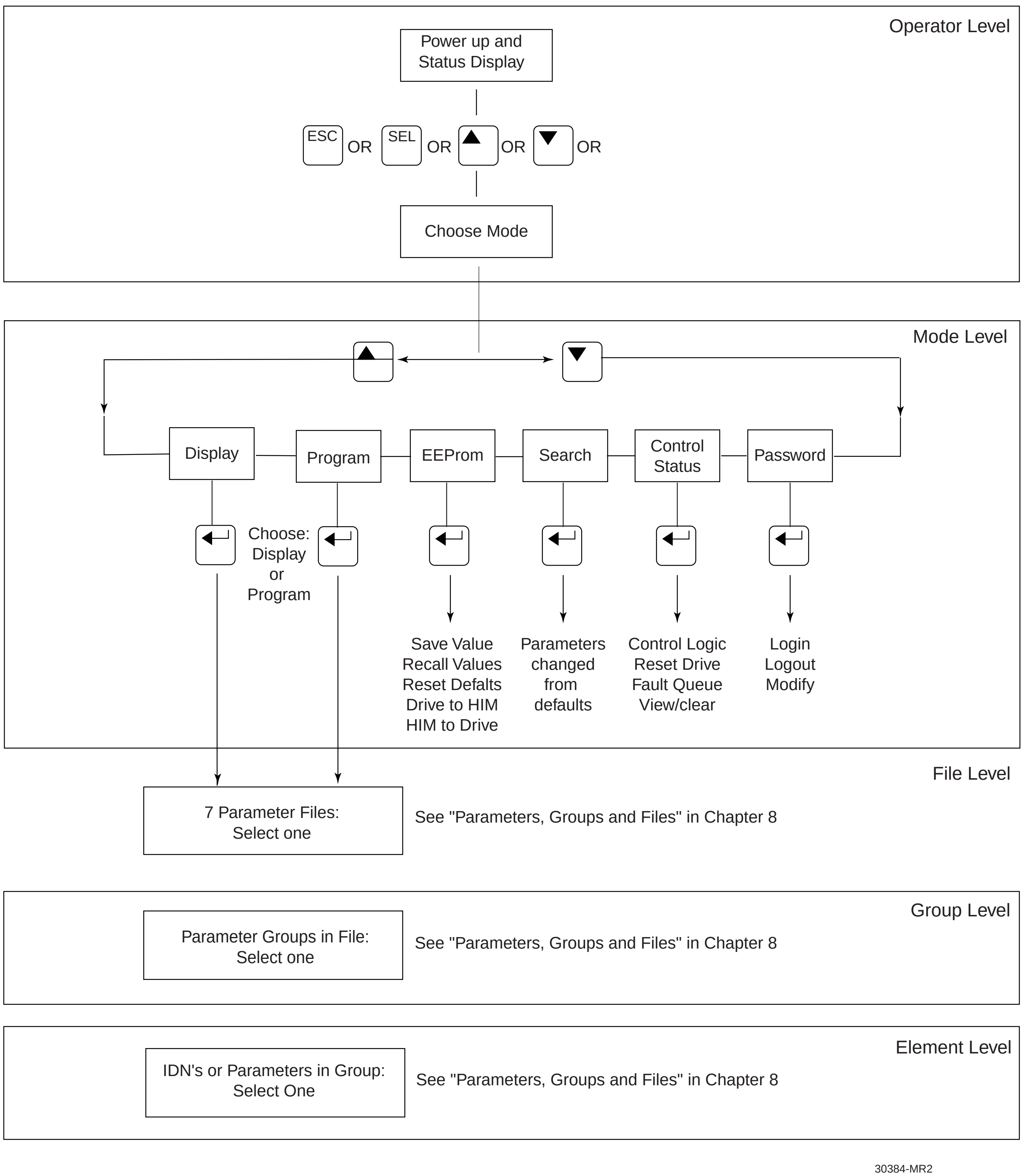
HIM Menu Tree

Figure 7.5 provides a graphical representation of the method of navigating through the modes of operation of the Him Module. “Parameter Files, Groups and Elements”, in Chapter 8, provides an overall view of the 7 major files and their associated groups and elements. Display or modification of any parameter (element) is accomplished by selecting the display or program mode, selecting a file, selecting a group within the file and selecting the desired (element) or parameter. All parameters may be read. If the parameter is a read/ write parameter it may be modified from its default value. See “Using Display and Programming modes” in this chapter. The parameters or elements may be replicated in different groups and files to simplify the navigation process and enhance functional organization. The HIM increment, decrement, select and enter keys are used to navigate through the files, groups and elements.

HIM Menu Tree

Figure 7.5 shows the HIM menu tree.

Figure 7.5
HIM Menu Tree



Using the Program and Display Modes

The Display and Program modes let you view and modify parameters. To use these modes, follow these steps:

1. Press any key from the status display. *Choose Mode* is shown.
2. Press the increment up key or the decrement down key to display "Program" if you want to change the value of a parameter or "Display" if you only want to view the value of a parameter.
3. Press the enter key
4. Press the increment up key or the decrement down key to scroll through the available files. You may choose among the following files: Status/Faults, Control, Procedure, Motor/Drive/Fdbk, Servo Loop, I/O Interface, or Communications.
5. After displaying the desired file press the enter key to display the groups within the file.
6. Press the increment up key or the decrement down key to scroll through the available groups. See *Chapter 8: Programming Parameters* for the groups that are available for each file.
7. After displaying the desired group press the enter key to display the parameters (elements) within the group.
8. Press the increment up key or the decrement down key to scroll through the parameters (elements) for the group you chose.
9. After displaying the desired parameter name press the enter key to select the parameter.

Modifying Parameters

Once you have selected a read/write parameter in "Program" mode you can modify it by making the parameter's value active. This is done be depressing the "Select" key. If the parameter is a value like: "+_ Velocity_Limit_0" the least significant character will blink on the bottom data line. The value can be increased or decreased with the increment and decrement buttons. The select key can be used to move from character to character. After all the characters have been changed to the desired value depressing the enter key will store the new value.

If the value is an enumerated selection the currently active selection will be displayed on the bottom line. The selection may be changed by using the increment and decrement keys to scroll through the available choices. Once finding the desired new selection depressing the enter key will store the change.

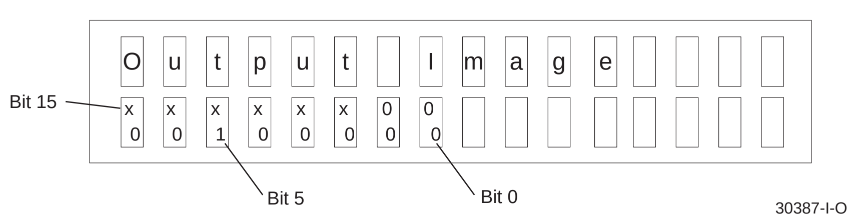
Viewing Bit Pattern

Some parameters, such as "Dig_Output_Status" (parameter 661), have a bit pattern that you can view, and in some cases, change. You can use your HIM to see what each bit means.

For example, if you want to check if the orient complete bit is being set for your analog spindle application perform the following: Navigate through the HIM menu tree structure to parameter 667, “Digital_Output_6”, which is located in the file: “I/O Interface” and the group: “Digital Outputs”.

1. Make sure the output link for Digital Output 6 is parameter 583 “Orient Complete”. This is the default link for the analog spindle configuration as determined by parameter 501.
2. Navigate through the HIM menu tree structure to parameter 661 “Dig_Output_Status”, which is located in the file: “I/O Interface” and the group: “Digital Outputs”.
3. Press the enter key to view the bit pattern definition. Bit 0 is located in the lower right. The bits are numbered from 15 to 8 on the top row and 7 to 0 are on the bottom row. An “x” in any bit position indicates that bit is not defined. A “1” indicates the output is on. A “0” indicates the output is off.
4. In this example, if we were to execute a spindle orient, output 6 would transition from 0 to 1 after the orient was complete. This means that bit 5 of the Dig_Output_Status would transition from 0 to 1 as shown in figure 7.6.
5. For the 8720MC there are 10 digital outputs in the file: “I/O Interface” and the group: “Digital Outputs”. Depressing the increment up key will progressively steps your through the output assignments for digital outputs 1 thru 10. If you wish to change an output assignment, first locate the output you wish to change and then press enter. Press select to locate the curser in the parameter field. Use the increment up and increment down keys to change the output parameter assignment. Press enter to save your changes and press exit to step up one level in the parameter tree.

Figure 7.6
Bit Pattern Display



Changing a Bit in a Bit Pattern

Some of the bit pattern parameters can be changed. For example, if you wish to change the configuration selections for the auto tune procedure. First, using the increment, decrement and enter keys navigate to parameter 546 in the file “Procedure” and the group “Auto Tune”. This is a bit pattern used to select the auto tune options. Using the select key you can highlight the bit you wish to change. Depressing the enter key changes the bit from 1 to 0. Depressing the enter key again changes the bit back to 1. When the bit is highlighted the top line contains the description of the bit. For example bit 0 = “*Auto Save*”.

Using the EEProm Mode

You can use EEProm mode to save values, recall values, reset values to the factory defaults, upload a parameter profile from the drive to the HIM, or download a parameter profile. To perform any of these functions, you need to first enter EEProm mode by selecting it from the *Choose Mode* prompt.

Saving Values/Recalling Values

The 8720MC Drive stores parameters in flash memory. When the drive is shipped from the factory a set of default values for all the parameters is provided. Most of these default parameters are suitable for a wide variety of applications and therefore will not need to be changed. The motor and amplifier specific parameters in the file “Motor/Drive/Fdbk” are directly read from the motor feedback device and the power structure of the 8720MC therefore these parameters should not be changed. Several of the Servo Loop parameters can be auto tuned by the drive and therefore these parameters should not require manual entry by the user. Under the EEProm mode you can:

1. Select *Restore Defaults*
2. Select *Save Values*
3. Select *Recall Values*
4. Upload or download parameters from the HIM or Drive Explorer

Restoring the Factory Default Values

To reset the values of all parameters to the factory default values, first disable the drive if it is enabled, then:

1. From the EEProm mode prompt, press the increment up key or the decrement down key until “Reset Defaults” is displayed.
2. Press the enter key to restore all parameters to their original factory setting.
3. Press Escape. Reprogram Fault is displayed.
4. Press the Stop key to reset the fault. If A-B Application, parameter 501 was previously set to a value other than analog spindle, cycle drive power to reset.

Saving Values to Flash Memory

When parameter changes are made their new values are stored in volatile memory. This means if power is removed any parameters which were changed and were not saved will be lost. For this reason it is always good practice to save modified parameters to flash memory after making changes. This can be done from the HIM or Drive Explorer. With the HIM, from the EEProm mode prompt press the increment up key or the decrement down key until “Save” is displayed. Depressing the enter key will execute the save.

Recalling Values from Flash Memory

It is possible to make changes to parameters on an experimental basis which do not produce the desired benefit. In this situation it is possible to recall the flash stored values without cycling power by disabling the drive, choosing the “Recall” selection under the EEProm mode and depressing the enter key.

Uploading a Parameter Profile

You can transfer a parameter profile from the 8720MC Drive to a **remote** HIM, Cat. No. 1201-HAx, as a means of transferring a parameter set from one 8720MC to another. This functionality is not available with the 8720MC built in HIM. To upload a parameter profile from the drive to the HIM:

1. From the EEProm mode prompt, press the increment up key or the decrement down key until “*Drive -> HIM”* is displayed.

2. Press a - A profile name (up to 14 characters) is displayed on line 2 of the HIM.

3. Change this name or enter a new name. Use the increment up key to move the cursor to the left. Use the increment up key or the decrement down key to change the characters.

4. Press enter. An informational display is shown. This display indicates the drive type and firmware version.

5. Press enter to start the upload. The parameter number currently being uploaded is displayed on line I of the HIM. Line 2 indicates the total progress. Press ESC to stop the upload.

6. Press enter when “*COMPLETE”* is displayed on line 2. If line 2 reports “*ERROR”*, refer to Chapter 10.Troubleshooting.

Downloading a Parameter Profile

To download a parameter profile from the remote HIM to a drive:

The download function is only available when a valid profile is stored in the HIM.

1. From the EEProm mode prompt, press the increment up key or the decrement down key until “*HIM →Drive*” is displayed.
2. Press enter. A profile name (up to 14 characters) is displayed on line 2 of the HIM.
3. Press the increment up key or the decrement down key to scroll to a second profile (if available).
4. Press enter when the desired profile name is displayed. An information display is shown that indicates the version numbers of the profile and the drive.
5. Press enter to start the download. The parameter number currently being downloaded is displayed on line I of the HIM. Line 2 indicates the total progress. Press ESC to stop the download.
6. Press enter when “*COMPLETE*” is displayed on line 2. If line 2 reports ‘*ERROR*”, refer to the following table.

Table 7.5:
Error Message Table

If you receive this error:	Then
Error 1	An EEPROM CRC error occurred.
Error 2	The profile is a different length than the master.
Error 3	You are downloading between different types of masters.
Error 4	The data is out or range or illegal
Error 5	You attempted the download while the drive was running.
Error 6	You are downloading between different types of masters.

Using the Search Mode

Search mode lets you search through the parameter list and display all parameters that are not at the factory default values. You can also search for links that are not the factory defaults.

To use Search mode:

1. From the status display, press any key. “*Choose Mode*” is shown.
2. Press the increment up key or the decrement down key to display “*Search*” mode.
3. Press enter
4. To search through the parameter list, press the increment up key or the decrement down key. The HIM will search in ascending or descending order depending on which key was depressed. The display will scroll and stop at the next parameter or link which is

not at it's default value.

5. Press the increment up key or the decrement down key again. The HIM searches for the next parameter which is not at it's default value. In this way all parameters/links that are not at their factory defaults can be displayed on the HIM.
6. Press the escape key to leave search mode and return to the next higher level in the HIM logic tree.

Viewing the Fault Queue/Warning Queue

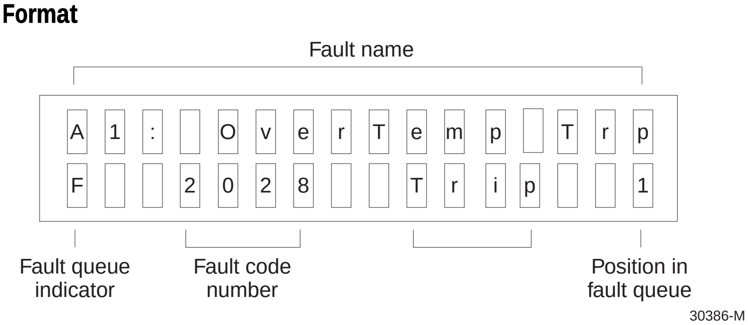
Control Status mode lets you view the fault queue

To view the fault queue:

1. Press any key from the status display. "*Choose Mode*" is shown.
2. Press the increment up key or the decrement down key to show "*Control Status*".
3. Press enter to select Control Status
4. Press the increment up key or the decrement down key until "*Fault Queue*" is displayed.
5. Press enter to select "Fault Queue"
6. Press the increment up key or the decrement down key until "*View Queue*" is displayed.
7. Press enter to select "View Queue"

The fault queue can contain up to 32 faults. The 8720MC Drive reports the faults using the following format.

Figure 7.7
Fault Format



- The trip indicator is only present if this fault caused the drive to trip.
- The last number (1) indicates this faults position within the fault queue.

Using the Password Mode

Password mode lets you enable password protection and change the password. By default, the password is 0, which disables password protection. To use Password mode:

1. Press any key from the status display. “Choose Mode” is shown.

2. Press the increment up key or the decrement down key to show “*Password*”.

3. Press the enter key

4. Press the increment up key or the decrement down key until “*Modify*” is displayed.

5. Press the enter key

6. “Enter Password” is displayed on the top line and a blinking 0 appears on the bottom line.

7. Press the increment up key or the decrement down key to increase or decrease the least significant digit. Press the select key to go to the next most significant digit and repeat until the desired password number is displayed. The number can range from 0 to 65535. 0 is the default value meaning there is no password.

8. Press enter to save your new password.

Programming a Password When Drive Power is Applied

With a Series B remote HIM, you can program Password mode to be displayed when drive power is applied. To do this, you need to press the Increment and Decrement keys simultaneously while the Password display is shown.

Once you set the password, the Program/EEProm modes and the Control Logic/Clear Queue menus are password protected and are not displayed in the menu. To access these modes, you need to:

1. Press any key from the status display. Choose Mode is shown.

2. Press the increment up or decrement down keys to show “*Password*.”

3. Press the enter key. “*Enter Password”* is displayed.

4. Press the increment up or the decrement down key until the correct password digit is displayed. The select key can be used to move the cursor from digit to digit.

5. When the correct password number is displayed press enter

You can now access the Program and EEProm modes.

Logging Out

To prevent future access to program changes, you need to logout:

1. Press any key from the status display. "*Choose Mode*" is shown.
2. Press the increment up or the decrement down key to show "*Password*".
3. Press enter
4. Press the increment up or the decrement down key until "*Logout*" is displayed.
5. Press enter to log out of Password mode.

Creating or Changing a Link

The 8720MC analog, digital and SCANport outputs can be linked to different variables within the 8720 system. The analog, digital and SCANport inputs have fixed links and cannot be modified. The outputs have default links as discussed in Chapter 6. These default links were chosen to suit most spindle or power servo applications. If the 8720MC application needs a different set of outputs the output links my be changed. To change an output parameter link you simply select the output parameter and change its address value so that it points to the parameter that you wish to link to that output. For example, if you wish to link parameter 380, "Bus_Voltage" to "Analog_Output_2", the following procedure should be followed:

1. From the "*Choose Mode*" prompt, use the increment up key or the decrement down key to display "*Program*" and press the enter key.
2. Press the increment up key or the decrement down key to display the "*I/O Interface*" file. Pressing the enter key will select this file.
3. Press the increment up key or the decrement down key to display the "*Analog_Output*" group. Pressing the enter key will display this group parameters.
4. Use the increment up key or the decrement down key to scroll through the parameter list until you come to "*Anaout_Ch2_Selec*", parameter 683. Pressing the enter key will select this parameter. For a spindle application the value displayed will be the factory default setting of "386", the parameter number for *Mtr_Shaft_Power.*
5. Press the select key and the character 6 will blink indicating that the parameter number may be changed.
6. Press the decrement down key to decrease the parameter number to 380 which is the parameter number for DC_Bus_Voltage.
7. Press the enter key to store the value.
8. Press escape when you have finished to exit the Set Links mode.
9. If you wish to retain the new output link after power is recycled you must store it to non volatile flash memory. See "Storing Values to Flash Memory" in this chapter.

10. The available output links are discussed in Chapter 6. If you attempt to link to a reserved parameter the drive will display a numerical value of 12. The output will be disabled.

Removing a Link

You may remove an output link by setting it's parameter address value to zero. The procedure for changing a parameter link discussed above may be used for this purpose if the parameter address value is changed to zero. Note that the displayed value will be 12 since 0 is a reserved parameter.

ATTENTION: Be careful when removing links. If the source parameter has already written a value to the destination parameter, the destination parameter retains the value until you explicitly remove it. For some parameters, this may produce undesirable results.

A-B Drive Explorer

The functionality available on the HIM module is also available on a MS Windows 95, CE and NT $_{TM}$ compatible A-B program called Drive Explorer$_{TM}$. A desktop, laptop or handheld PC can be connected to the SCANport connector via a catalog number 1203-SSS Anacanda$_{TM}$ adaptor and the PC serial port. The additional power of a Windows PC significantly simplifies the 8720MC configuration task. For details on Drive Explorer see publication 9306-5.0 Drive Explorer User Manual.

Programming Parameters

Chapter Objectives

Chapter 8 provides the following information so that you can program your 8720MC Drive:

- parameter files and groups
- numerical listing of the parameters
- parameter conventions
- parameter descriptions

Understanding the Parameter Files and Groups

The 8720MC Parameters are divided into 7 files to help organize the parameters into logical groupings that simplify programming and operator access. Each of the 7 files are divided into groups, and each parameter is an element in a specific group. Parameters may be used as elements in more than one group. When using the file/group/element navigation method, searching is accomplished by first finding a file, then a group within the file, and then a specific element within the group. Once finding the element or "parameter" it may be read, modified or linked depending on the type of parameter. Each parameter has a SERCOS IDN number and an 8720MC parameter number. The tables in this chapter provide a cross reference between the SERCOS IDN's and the 8720MC parameter numbers

You can also view the parameters in a linear mode. This lets you view the entire parameter table in numerical order. You can access the linear mode from the bottom of any group. The parameter numbers range from 0 to 999. The list of parameters used is far less than 1,000 since there are reserved spaces provided for future product growth.

The current tools available to read, modify or link the 8720MC parameters are:

- (1) an integral HIM module
- (2) a remote HIM module
- (3) Drive Explorer$_{TM}$

Drive Explorer$_{TM}$ is an Allen-Bradley Windows NT/Windows 95/Windows CE$_{TM}$ compatible drive configuration program. For more information on Drive Explorer see Publication 9306-5.0, "Drive Explorer$_{TM}$ User Manual".

The following tables list the parameters that are available in each file and group.

Parameter Groups, Files and Elements

Param No.	IDN Number	ELEMENT NAME	
		FILE : GROUP	

Status/Faults : Drive Status

Param No.	IDN Number	ELEMENT NAME	
13	S00013	Drive_Status	
380	S00380	DC_Bus_Voltage	
386	S00386	Mtr_Shaft_Power	
520	P00020	Cur_Limit_Source	
661	P00161	Output_Image	
690	P00190	Input_Image	
717	P00217	Logic_Command	
718	P00218	SP_Logic_Status	

Status/Faults : Errors

Param No.	IDN Number	ELEMENT NAME	
11	S00011	Shut_Down_Errors	
14	S00014	Commun_Errors	S
99	S00099	Drive_Err_Reset	
129	S00129	A-B_Fault	

Status/Faults : Setup

Param No.	IDN Number	ELEMENT NAME	
57	S00057	In_Posn_Value	
124	S00124	Zero_Spd_Window	
125	S00125	Speed_Threshold	
126	S00126	Torque_Threshold	
157	S00157	At_Spd_Window	
159	S00159	Max_Foll_Error	
220	S00220	Min_Spindle_Spd	
221	S00221	Max_Spindle_Spd	
272	S00272	Speed_Window_%	

NOTE: S = SERCOS specific,
* = included in the 02.001 analog software release

Control : Velocity

Param No.	IDN Number	ELEMENT NAME	
36	S00036	Velocity_Command	
37	S00037	Velocity_Offset	S
40	S00040	Velocity_Fdback	
43	S00043	Velocity_Polarity	S
44	S00044	Vel_Scale_Type	S
45	S00045	Vel_Scale_Factor	S
46	S00046	Vel_Scale_Expon	S
347	S00347	Velocity_Error	

Control : Position

Param No.	IDN Number	ELEMENT NAME	
47	S00047	Position_Command	
51	S00051	Motor_Posn_Fback	
53	S00053	Aux_Posn_Fback	S
55	S00055	Posn_Polarity	S
76	S00076	Position scaling	S
77	S00077	Posn_Scal_Factor	S
78	S00078	Posn_Scale_Expon	S
79	S00079	Rot_Posn_Resolut	
103	S00103	Modulo_Value	
189	S00189	Posn_Foll_Error	

Control : Torque

Param No.	IDN Number	ELEMENT NAME	
80	S00080	Torque_Command	
84	S00084	Torque_Feedback	
85	S00085	Torque_Polarity	S
86	S00086	Torq_Scale_Type	S
93	S00093	Torq_Scal_Factor	S
94	S00094	Torq_Scale_Expon	S
571	P00071	Stopping_Torque	
572	P00072	Stop_Time_Limit	

Control : Acceleration

Param No.	IDN Number	ELEMENT NAME	
160	S00160	Acc_Scale_Type	S
161	S00161	Acc_Scale_Factor	S
162	S00162	Acc_Scale_Expon	S
260	S00260	Posn_Acc_Rate	

Procedure : Orient

Param No.	IDN Number	ELEMENT NAME	
154	S00154	Orient_Options	
582	P00082	Auto_Home	
103	S00103	Modulo_Value	
150	S00150	Mtr_Marker_Ofset	
151	S00151	Aux_Marker_Ofset	S
152	S00152	Spin_Orient_Req	
153	S00153	Orient_Angle	
222	S00222	Spin_Orient_Spd	
260	S00260	Posn_Acc_Rate	

Procedure : Parameter Switch

Param No.	IDN Number	ELEMENT NAME	
216	S00216	Switch_Param_Set	S
217	S00217	Select _Param_Set	
254	S00254	Actual_Param_Set	

Procedure: Auto Tune

Param No.	IDN Number	ELEMENT NAME	
541	P00041	ATune_Select	
542	P00042	ATune_Torq_Limit	
543	P00043	ATune_Vel_Limit	
544	P00044	ATune_Posn_Limit	
546	P00046	ATune_Config	
547	P00047	ATune_Status	

Motor/Drive/Fdbk : Drive Data

Param No.	IDN Number	ELEMENT NAME	
501	P00001	A-B_Application	
110	S00110	Drive_Peak_Amps	
112	S00112	Drive_Cont_Amps	
141	S00141	Motor_Data	
522	P00022	PWM_Frequency	
563	P00063	Regen_Energy_Val	
30	S00030	Version_Data	

Motor/Drive/Fdbk : Motor Data

Param No.	IDN Number	ELEMENT NAME	
777	P00277	Motor_Select	
141	S00141	Motor_Data	
109	S00109	Mtr_Peak_Current	
111	S00111	Mtr_Cont_Curent	
113	S00113	Max_Mtr_Speed	
114	S00114	Mtr_Torq_Overld	
196	S00196	Mtr_Cont_Current	
741	P00241	Enc_Mem_Map_Rev	
742	P00242	Motor_Parm_Rev	
778	P00278	Motor_Type	
779	P00279	Motor_Pole_Count	
780	P00280	Mtr_Rated_Accel	
781	P00281	Base_Speed	
782	P00282	Motor_Rated_Power	
783	P00283	Motor_Max_Volts	
784	P00284	Mtr_Rated_Volts	
785	P00285	Rated_Torque	
786	P00286	Motor_Back_EMF	
787	P00287	R1_Motor_Stator	
788	P00288	R2_Motor_Rotor	
789	P00289	X1_Stator_Self/Lk	
790	P00290	XM_Stator_Mutual	
791	P00291	X2_Rotor_Leakage	
792	P00292	Mtr_Mag_Current	
793	P00293	Mtr_Slip_Freq	

Motor/Drive/Fdbk : Motor Feedback

Param No.	IDN Number	ELEMENT NAME	
116	S00116	Mtr_Fdbk_Resoluti	
177	S00177	Motor_Abs_Offset	S
277	S00277	Mtr_Fbck_Config1	
502	P00002	Mtr_Fbck_Type	

Motor/Drive/Fdbk : Mechanics

Param No.	IDN Number	ELEMENT NAME	
121	S00121	Input_Gear_Rev	S
122	S00122	Output_Gear_Rev	S
123	S00123	Linr_Feed_Const	S

Motor/Drive/Fdbk : Brake

Param No.	IDN Number	ELEMENT NAME	
206	S00206	Drive_On_Delay	
207	S00207	Drive_Off_Delay	

Motor/Drive/Fdbk : Aux Feedback

Param No.	IDN Number	ELEMENT NAME	
115	S00115	Aux_Fbck_Config1	S
117	S00117	AuxFdbk_Resoluti	S
118	S00118	Aux_Linear_Resol	S
165	S00165	Dcscale_Lg_Pdist	S
166	S00166	Dcscale_Sm_Pdist	S
173	S00173	Marker_Posn_A	S
174	S00174	Marker_Posn_B	S
178	S00178	Aux_Abs_Offset	S
503	P00003	AuxFbck_Type	

Parameter Groups, Files and Elements

FILE : GROUP

Servo Loop : Group 0

Param No.	IDN Number	ELEMENT NAME
32	S00032	Prim_Op_Mode_0
38	S00038	+Vel_Limit_0
39	S00039	-Vel_Limit_0
82	S00082	+Torque_Limit_0
83	S00083	-Torque_Limit_0
100	S00100	Vel_Prop_Gain_0
101	S00101	Vel_Integ_Time_0
104	S00104	Pos_Loop_Gain_0
105	S00105	Pos_Integ_Time_0
136	S00136	Accel_Limit_0 *
137	S00137	Decel_Limit_0 *
296	S00296	Vel_Fdfwd_Gain_0
348	S00348	Acc_Fdfwd_Gain_0
523	P00023	System_Accel_0
561	P00061	Torq_Notch_Freq0
562	P00062	Torq_Lowpas_Frq0

Servo Loop : Group 1

Param No.	IDN Number	ELEMENT NAME
811	S10032	Prim_Op_Mode_1
812	S10038	+Vel_Limit_1
813	S10039	-Vel_Limit_1
814	S10082	+Torque_Limit_1
815	S10083	-Torque_Limit_1
816	S10100	Vel_Prop_Gain_1
817	S10101	Vel_Integ_Time_1
818	S10104	Pos_Loop_Gain_1
819	S10105	Pos_Integ_Time_1
825	S10136	Accel_Limit_1 *
826	S10137	Decel_Limit_1 *
820	S10296	Vel_Fdfwd_Gain_1
821	S10348	Acc_Fdfwd_Gain_1
822	P00322	System_Accel_1
823	P00323	Torq_Notch_Freq1
824	P00324	Torq_Lowpas_Frq1

Servo Loop : Group 2

Param No.	IDN Number	ELEMENT NAME
831	S20032	Prim_Op_Mode_2
832	S20038	+Vel_Limit_2
833	S20039	-Vel_Limit_2
834	S20082	+Torque_Limit_2
835	S20083	-Torque_Limit_2
836	S20100	Vel_Prop_Gain_2
837	S20101	Vel_Integ_Time_2
838	S20104	Pos_Loop_Gain_2
839	S20105	Pos_Integ_Time_2
845	S20136	Accel_Limit_2 *
846	S20137	Decel_Limit_2 *
840	S20296	Vel_Fdfwd_Gain_2
841	S20348	Acc_Fdfwd_Gain_2
842	P00342	System_Accel_2
843	P00343	Torq_Notch_Freq2
844	P00344	Torq_Lowpas_Frq2

Servo Loop : Group 3

Param No.	IDN Number	ELEMENT NAME
851	S30032	Prim_Op_Mode_3
852	S30038	+Vel_Limit_3
853	S30039	-Vel_Limit_3
854	S30082	+Torque_Limit_3
855	S30083	-Torque_Limit_3
856	S30100	Vel_Prop_Gain_3
857	S30101	Vel_Integ_Time_3
858	S30104	Pos_Loop_Gain_3
859	S30105	Pos_Integ_Time_3
865	S30136	Accel_Limit_3 *
866	S30137	Decel_Limit_3 *
860	S30296	Vel_Fdfwd_Gain_3
861	S30348	Acc_Fdfwd_Gain_3
862	P30362	System_Accel_3
863	P30363	Torq_Notch_Freq3
864	P30364	Torq_Lowpas_Frq3

FILE : GROUP

Servo Loop : Group 4

Param No.	IDN Number	ELEMENT NAME
871	S40032	Prim_Op_Mode_4
872	S40038	+Vel_Limit_4
873	S40039	-Vel_Limit_4
874	S40082	+Torque_Limit_4
875	S40083	-Torque_Limit_4
876	S40100	Vel_Prop_Gain_4
877	S40101	Vel_Integ_Time_4
878	S40104	Pos_Loop_Gain_4
879	S40105	Pos_Integ_Time_4
885	S40136	Accel_Limit_4 *
886	S40137	Decel_Limit_4 *
880	S40296	Vel_Fdfwd_Gain_4
881	S40348	Acc_Fdfwd_Gain_4
882	P00382	System_Accel_4
883	P00383	Torq_Notch_Freq4
884	P00384	Torq_Lowpas_Frq4

Servo Loop : Group 5

Param No.	IDN Number	ELEMENT NAME
891	S50032	Prim_Op_Mode_5
892	S50038	+Vel_Limit_5
893	S50039	-Vel_Limit_5
894	S50082	+Torque_Limit_5
895	S50083	-Torque_Limit_5
896	S50100	Vel_Prop_Gain_5
897	S50101	Vel_Integ_Time_5
898	S50104	Pos_Loop_Gain_5
899	S50105	Pos_Integ_Time_5
905	S50136	Accel_Limit_5 *
906	S50137	Decel_Limit_5 *
900	S50296	Vel_Fdfwd_Gain_5
901	S50348	Acc_Fdfwd_Gain_5
902	P00402	System_Accel_5
903	P00403	Torq_Notch_Freq5
904	P00404	Torq_Lowpas_Frq5

Servo Loop : Group 6

Param No.	IDN Number	ELEMENT NAME
911	S60032	Prim_Op_Mode_6
912	S60038	+Vel_Limit_6
913	S60039	-Vel_Limit_6
914	S60082	+Torque_Limit_6
915	S60083	-Torque_Limit_6
916	S60100	Vel_Prop_Gain_6
917	S60101	Vel_Integ_Time_6
918	S60104	Pos_Loop_Gain_6
919	S60105	Pos_Integ_Time_6
925	S60136	Accel_Limit_6 *
926	S60137	Decel_Limit_6 *
920	S60296	Vel_Fdfwd_Gain_6
921	S60348	Acc_Fdfwd_Gain_6
922	P00422	System_Accel_6
923	P00423	Torq_Notch_Freq6
924	P00424	Torq_Lowpas_Frq6

Servo Loop : Group 7

Param No.	IDN Number	ELEMENT NAME
931	S70032	Prim_Op_Mode_7
932	S70038	+Vel_Limit_7
933	S70039	-Vel_Limit_7
934	S70082	+Torque_Limit_7
935	S70083	-Torque_Limit_7
936	S70100	Vel_Prop_Gain_7
937	S70101	Vel_Integ_Time_7
938	S70104	Pos_Loop_Gain_7
939	S70105	Pos_Integ_Time_7
945	S70136	Accel_Limit_7 *
946	S70137	Decel_Limit_7 *
940	S70296	Vel_Fdfwd_Gain_7
941	S70348	Acc_Fdfwd_Gain_7
942	P00442	System_Accel_7
943	P00443	Torq_Notch_Freq7
944	P00444	Torq_Lowpas_Frq7

FILE : GROUP

I/O Interface : Digital Outputs

Param No.	IDN Number	ELEMENT NAME
661	P00161	Output_Image
662	P00162	Output_01_Source
663	P00163	Output_02_Source
664	P00164	Output_03_Source
665	P00165	Output_04_Source
666	P00166	Output_05_Source
667	P00167	Output_06_Source
668	P00168	Output_07_Source
669	P00169	Output_08_Source
670	P00170	Output_09_Source
671	P00171	Output_10_Source

I/O Interface : Digital Inputs

Param No.	IDN Number	ELEMENT NAME
690	P00190	Dig_Input_Status

I/O Interface : Event Links

Param No.	IDN Number	ELEMENT NAME
330	S00330	At_Prog_Speed
331	S00331	Zero_Speed
332	S00332	Vel_Below_Thresh
334	S00334	Torq_Above_Limit
335	S00335	Vel_Above_Limit
336	S00336	In_Position
339	S00339	Spd_Below_Min
340	S00340	Spd_Above_Max
526	P00026	HI_Wind_enable
527	P00027	Lo_Wind_Enable
528	P00028	Enable_Brake_Sol
529	P00029	Auto_Ref _Enabled
530	P00030	Manual _Mode_On
583	P00083	Orient_Complete
610	P00110	Drive_OK
615	P00115	Shut_down_Error
617	P00117	Power_Supply_OK

I/O Interface : Analog Inputs

Param No.	IDN Number	ELEMENT NAME
691	P00191	AnaInput_1_Value
692	P00192	AnaInput_2_Value
693	P00193	AnaInput_1_Offse
694	P00194	AnaInput_2_Offse
695	P00195	Analog_Vel_Scale
696	P00196	Manual_Vel_Scale

I/O Interface : Analog Outputs

Param No.	IDN Number	ELEMENT NAME
681	P00181	AnaOut_Ch1_Selec
682	P00182	AnaOut_Ch1_Gain
683	P00183	AnaOut_Ch2_Selec
684	P00184	AnaOut_Ch2_Gain

FILE : GROUP

Communication: SCANp_Ref/Fdback

Param No.	IDN Number	ELEMENT NAME
713	P00213	SCANp_An1_Value
715	P00215	Analog_Out_Parm

Communication: SCANp Data In

Param No.	IDN Number	ELEMENT NAME
716	P00216	SP_ Logic_Mask
717	P00217	Logic_Command
725	P00225	SP_Data_Input_A1
726	P00226	SP_Data_Input_A2
727	P00227	SP_Data_Input_B1
728	P00228	SP_Data_Input_B2
729	P00229	SP_Data_Input_C1
730	P00230	SP_Data_Input_C2
731	P00231	SP_Data_Input_D1
732	P00232	SP_Data_Input_D2

Communication: SCANp Data Out

Param No.	IDN Number	ELEMENT NAME
718	P00218	SP_Logic_Status
733	P00233	SP_Data_Out_A1
734	P00234	SP_Data_Out_A2
735	P00235	SP_Data_Out_B1
736	P00236	SP_Data_Out_B2
737	P00237	SP_Data_Out_C1
738	P00238	SP_Data_Out_C2
739	P00239	SP_Data_Out_D1
740	P00240	SP_Data_Out_D2

Standard 8720MC Parameters in Numerical Order

SERCOS IDN No.	8720MC Param No.	DESCRIPTION	16 Character Name	File	Group	SERCOS Only?
S00011	11	Class 1 diagnostics	Shut_Down_Errors	Status/Faults	Errors	
S00013	13	Class 3 diagnostics	Drive_Status	Status/Faults	Drive Status	
S00014	14	Interface status	Commun_Errors	Status/Faults	Errors	yes
S00030	30	Manufacturer version	Version_Data	Motor/Drive/Fdbk	Drive Data	
Sn0032	32	Primary operation mode - 8 groups (n = 0 - 7)	Prime_OP_Mode_0	Servo Loop	Group 0	
S00036	36	Velocity command	Velocity_Command	Control	Velocity	
Sn0038	38	Positive velocity limit value	+Vel_Limit_0	Servo Loop	Group 0	
Sn0039	39	Negative velocity limit value	-Vel_Limit_0	Servo Loop	Group 0	
S00040	40	Velocity feedback value	Velocity_Fback	Control	Velocity	
S00043	43	velocity polarity parameter (Reserved)	Velocity_Polarity	Control	Velocity	yes
S00044	44	Velocity data scaling type (Reserved)	Vel_Scale_Type	Control	Velocity	yes
S00045	45	Velocity data scaling factor (Reserved)	Vel_Scale_Factor	Control	Velocity	yes
S00046	46	Velocity data scaling exponent (Reserved)	Vel_Scale_Expon	Control	Velocity	yes
S00047	47	Position command value	Position_Command	Control	Position	
S00051	51	Position feedback value 1 (Motor feedback)	Motor_Posn_Fback	Control	Position	
S00053	53	Position feedback value 2 (External feedback)	Aux_Posn_Fback	Control	Position	yes
S00055	55	Position polarity parameter	Posn_Polarity	Control	Position	yes
S00057	57	Position window (in position)	In_Posn_Value	Status/Faults	Setup	
S00076	76	Position data scaling type	Posn_Scaling	Control	Position	yes
S00077	77	Linear position data scaling factor (Reserved)	Posn_Scal_Factor	Control	Position	yes
S00078	78	Linear position data scaling exponent (Reserved)	Posn_Scale_Expon	Control	Position	yes
S00079	79	Rotational position resolution	Rot_Posn_Resolut	Control	Position	
S00080	80	Torque command value	Torque_Command	Control	Torque	
Sn0082	82	Positive torque limit value (n=0-7)	+Torque_Limit_0	Servo Loop	Group 0	
Sn0083	83	Negative torque limit value (n=0-7)	-Torque_Limit_0	Servo Loop	Group 0	
S00084	84	Torque feedback value	Torque_Fback	Control	Torque	
S00085	85	Torque polarity parameter (Reserved)	Torque_Polarity	Control	Torque	yes
S00086	86	Torque/force data scaling type (Reserved)	Torq_Scale_Type	Control	Torque	yes
S00093	93	Torque/force data scaling factor (Reserved)	Torq_Scal_Factor	Control	Torque	yes
S00094	94	Torque/force data scaling exponent (Reserved)	Torq_Scale_Expon	Control	Torque	yes
S00099	99	Reset class 1 diagnostic	Drive_Err_Reset	Status/Faults	Errors	
Sn0100	100	Velocity loop proportional gain	Vel_Prop_Gain_0	Servo Loop	Group 0	
Sn0101	101	Velocity loop integral action time	Vel_Integ_Time_0	Servo Loop	Group 0	
S00103	103	Modulo value (rotary roll over)	Modulo_Value	Control	Position	

Standard 8720MC Parameters in Numerical Order

SERCOS IDN No.	8720MC Param No.	DESCRIPTION	16 Character Name	File	Group	SERCOS Only?
Sn0104	104	Position loop Kv-factor	Pos_Loop_Gain_0	Servo Loop	Group 0	
Sn0105	105	Position loop integral action time	Pos_Int_Time_0	Servo Loop	Group 0	
S00109	109	Motor peak current	Mtr_Peak_Current	Motor/Drive/Fdbk	Motor Data	
S00110	110	Amplifier peak current	Drive_Peak_Amps	Motor/Drive/Fdbk	Drive Data	
S00111	111	Motor continuous stall current	Mtr_Cont_Current	Motor/Drive/Fdbk	Motor Data	
S00112	112	Amplifier rated current	Drive_Cont_Amps	Motor/Drive/Fdbk	Drive Data	
S00113	113	Maximum motor speed	Max_Mtr_Speed	Motor/Drive/Fdbk	Motor Data	
S00116	116	Resolution of motor feedback 1	MtrFdbk_Resoluti	Motor/Drive/Fdbk	Motor Feedback	
S00121	121	Input revolutions of load gear	Input_Gear_Rev	Motor/Drive/Fdbk	Mechanics	yes
S00122	122	Output revolutions of load gear	Output_Gear_Rev	Motor/Drive/Fdbk	Mechanics	yes
S00123	123	Feed constant	Lin_Feed_Const	Motor/Drive/Fdbk	Mechanics	yes
S00124	124	Standstill window (zero speed)	Zero_Spd_Window	Status/Faults	Setup	
S00125	125	Velocity threshold $n_{x,}$ ($n_{feedback} < n_x$)	Speed_Threshold	Status/Faults	Setup	
S00126	126	Torque threshold $T_{x,}$ ($T > T_x$)	Torque_Threshold	Status/Faults	Setup	
S00129	129	8720MC drive error	A-B Fault	Status/Faults	Errors	
S00136	136	Acceleration limit for servo Parameter set 0	Accel_Limit_0	Servo Loop	Group 0	
S00137	137	Deceleration limit for servo Parameter set 0	Decel_Limit_0	Servo Loop	Group 0	
S00141	141	Motor Identification - 8720SM Catalog Number	Motor_Data	Motor/Drive/Fdbk	Drive Data	
S00150	150	Reference offset 1 (motor marker offset)	Mtr_Marker_Ofset	Procedure	Orient	
S00151	151	Reference offset 2 (aux marker offset)	Aux_Marker_Ofset	Procedure	Orient	yes
S00152	152	Position spindle procedure command	Spin_Orient_Req	Procedure	Orient	
S00153	153	Spindle angle position (absolute)	Orient_Angle	Procedure	Orient	
S00154	154	Spindle position parameter	Orient_Options	Procedure	Orient	
S00157	157	Velocity window (at speed)	At_Spd_Window	Status/Faults	Setup	
S00159	159	Monitoring window (Max following error)	Max_Foll_Error	Status/Faults	Setup	
S00160	160	Acceleration data scaling type	Acc_Scale_Type	Control	Acceleration	yes
S00161	161	Acceleration data scaling factor	Acc_Scale_Factor	Control	Acceleration	yes
S00162	162	Acceleration data scaling exponent	Acc_Scale_Expon	Control	Acceleration	yes
S00177	177	Motor absolute machine zero position Offset	Mtr_Abs_Offset	Motor/Drive/Fdbk	Motor Feedback	yes
S00189	189	Following distance	Posn_Foll_Error	Control	Position	
S00196	196	Motor rated current	Mtr_Cont_Current	Motor/Drive/Fdbk	Motor Data	
S00206	206	Delay Time Before Brake Solenoid is Enabled	Drive_On_Delay	Motor/Drive/Fdbk	Brake	
S00207	207	Delay Time Before Brake Solenoid is Disabled	Drive_Off_Delay	Motor/Drive/Fdbk	Brake	
S00216	216	Switch parameter set procedure command	Switch_Param_Set	Procedure	Parameter Switch	yes

Standard 8720MC Parameters in Numerical Order

SERCOS IDN No.	8720MC Param No.	DESCRIPTION	16 Character Name	File	Group	SERCOS Only?
S00217	217	Parameter set preselection	Select _Param_Set	Procedure	Parameter Switch	
S00220	220	Minimum spindle speed	Min_Spindle_Spd	Status/Faults	Setup	
S00221	221	Maximum spindle speed	Max_Spindle_Spd	Status/Faults	Setup	
S00222	222	Spindle positioning speed	Spin_Orient_Spd	Procedure	Orient	
S00254	254	Actual parameter set	Actual_Param_Set	Procedure	Parameter Switch	
S00258	258	Target position for positioning mode	Target_Position	Linear List	Linear List	
S00259	259	Velocity for positioning mode	Posn _Velocity	Linear List	Linear List	
S00260	260	Positioning Acceleration	Posn_Acc_Rate	Procedure	Orient	
S00272	272	Velocity window percentage	Speed_Window_%	Status/Faults	Setup	
S00277	277	Position feedback 1 type (extended)	Mtr_Fbck_Config1	Motor/Drive/Fdbk	Motor Feedback	
Sn0296	296	Velocity feed forward gain	Vel_Fdfwd_Gain_0	Servo Loop	Group 0	
S00330	330	Status "$n_{feedback}$ = "$n_{command}$"	At_Prog_Speed	I/O Interface	Event Links	
S00331	331	Status "$n_{feedback}$ = 0"	Zero_Speed	I/O Interface	Event Links	
S00332	332	Status "$n_{feedback}$<n_x"	Vel_Below_Thresh	I/O Interface	Event Links	
S00333	333	Status "T≥ $T_{x,}$ Torque above Threshold	Torq_Above_Thres	Linear List	Linear List	
S00334	334	Status "T≥ T_{limit}	Torq_Above_Limit	I/O Interface	Event Links	
S00335	335	Status "$n_{command}$ > n_{limit}"	Vel_Above_Limit	I/O Interface	Event Links	
S00336	336	Status "In position"	In_Position	I/O Interface	Event Links	
S00339	339	Status "$n_{feedback}$ ≤ Minimum spindle speed"	Spd_Below_Min	I/O Interface	Event Links	
S00340	340	Status "$n_{feedback}$ > Maximum spindle speed"	Spd_Above_Max	I/O Interface	Event Links	
S00347	347	Velocity Error	Velocity_Error	Control	Velocity	
Sn0348	348	Acceleration Feed Forward Gain	Acc_Fdfwd_Gain_0	Servo Loop	Group 0	
S00380	380	DC Bus Voltage Value	DC_Bus_Voltage	Status/Faults	Drive Status	
S00384	384	Drive heat sink temperature	Heatsink_Temp	Linear List	Linear List	
S00386	386	Estimated shaft motor power in kw	Mtr_Shaft_Power	Status/Faults	Drive Status	

A-B (S) Parameter Descriptions

This section of chapter 8 provides detailed definition of the A-B standard SERCOS (IDN's) supported by the 8720MC Drive. These parameters are required to provide the basic drive functionality defined in the IEC 61491 Standard. To simplify the 8720MC displays and data base the standard SERCOS IDN's, S00001 thru S00500 are found in 8720MC parameters 1 thru 500. Some of the parameters are, "R", read only and are available for display only. Some are, "R/W", user read/write variables which can be modified via the HIM module or other SCANport device such as Drives Explorer$_{TM}$ operating on a Windows$_{TM}$ CE, NT or 95 platform. "L" variables can be linked to outputs. The SERCOS master can also modify parameters via the SERCOS service channel. For more in depth knowledge of SERCOS parameters and operation refer to IEC Standard IEC 61491. Each parameter explaination gives a cross reference to both the SERCOS parameter number and the 8720MC parameter number.

A-B (S) Parameter Descriptions

IDN: S00011	**Name:** Shut_Down_Errors		**Data Display:** Bit pattern	R
Parameter No. 11 **File:** Status/Faults **Group:** Errors	**Description:** Class 1 diagnostic (C1D). Drive shut-down error. A drive error status of C1D leads to the following: a) A best case deceleration followed by torque release at $n_{feedback}$ = 0 (Parameter 331) b) The drive shut-down error bit for C1D is set to '1' in the SERCOS drive status (bit 13). The error bit is reset to '0' by the drive only when no errors of C1D exists and after the command 'reset class 1 diagnostic' (IDN 00099) has been received by the drive via the SERCOS service channel. In the analog configuration, parameter 615 is set true indicating there is a shut down failure. **Enumerated Bit Pattern:** Structure of C1D: Bit 0: Drive overload shut-down Bit 1: Drive over temperature shut-down Bit 2: motor over temperature shut-down Bit 3: cooling error shut-down (not supported in 8720MC) Bit 4: control voltage error (not supported in 8720MC) Bit 5: feedback error Bit 6: error in the "commutation" system (not supported in 8720MC) Bit 7: overcurrent error Bit 8: overvoltage error Bit 9: undervoltage error Bit 10: power supply phase error (not supported in 8720MC) Bit 11: excessive following error (see IDN 00159) Bit 12: communication error Bit 13: overtravel limit is exceeded (not supported in drive) Bit 14: reserved Bit 15: A-B drive fault (see IDN 00129) 0 = no error 1 = error			
Default NA:	**Length** 2 bytes	**Minimum/Maximum** NA	**Scaling Resolution** NA	**Units** NA

<table>
<tr><td>IDN: S00013</td><td colspan="2">Name: Drive_Status</td><td>Data Display: Bit pattern</td><td>R</td></tr>
<tr><td>Parameter No.
13
File:
Status/Faults
Group:
Drive Status</td><td colspan="4">Description: Class 3 diagnostic (C3D). Drive operation status flags.
When a condition changes in the drive, the corresponding bit changes in the C3D, this sets the change bit for C3D in the SERCOS drive status (bit 11) to a binary ’1’. When the C3D is read via the service channel, the C3D change bit is reset to ’0’. Bits defined by C3D are also defined by IDNs.

Enumerated Bit Pattern:
Structure of C3D:
Bit 0: $n_{feedback} = n_{command}$ (see IDN 00330) “At_Prog_Speed”
Bit 1: $n_{feedback} = 0$ (see IDN 00331) “Zero Speed”
Bit 2: $n_{feedback} < n_x$ (see IDN 00332) “Velocity Below Threshold”
Bit 3: $T \geq T_x$ (see IDN 00333) “Torque Above Threshold”
Bit 4: $T \geq T_{limit}$ (see IDN 00334) “Torque Above Limit”
Bit 5: $n_{command} > |n$ limit (see IDN 00335) “Velocity Above Limit”
Bit 6: In Position (see IDN 00336)
Bit 7: $P \geq P_x$ (see IDN 00337) not supported in the 8720MC
Bit 8: reserved
Bit 9: $n_{feedback} \leq$ minimum spindle speed (see IDN 00339) “Speed Below Minimum”
Bit 10: $n_{feedback} \geq$ maximum spindle speed (see IDN 00340) “Speed Above Maximum”
Bit 11: Reserved
Bit 12: Reserved
Bit 13: Reserved
Bit 14: reserved
Bit 15: A-B Drive Status (see IDN 00182)

Bit = 0, condition does not exist
Bit = 1, condition exists</td></tr>
<tr><td>Default:
NA</td><td>Length
2 bytes</td><td>Minimum/Maximum
NA</td><td>Scaling Resolution
NA</td><td>Units
NA</td></tr>
</table>

<table>
<tr><td>IDN: S00030</td><td colspan="2">Name: Version_Data</td><td>Data Display: ascii characters</td><td>R</td></tr>
<tr><td>Parameter No.
30
File:
Motor/Drive/
Fdbk
Group:
Drive Data</td><td colspan="4">Description: Manufacturer version. The operation data of the manufacturer version contains the actual version and additional information of the manufacturer. The structure of the manufacturer version appears as:
Vers: 01.00, where the first 2 numbers are the major revision and the second 2 numbers are the minor revision.</td></tr>
<tr><td>Default:
NA</td><td>Length
variable
characters</td><td>Minimum/Maximum
NA</td><td>Scaling Resolution
NA</td><td>Units
NA</td></tr>
</table>

<table>
<tr><td>IDN: 00032</td><td colspan="2">Name: Prime_OP_Mode_n</td><td>Data display: enumerated selection</td><td>R/W</td></tr>
<tr><td>Parameter No.
32
File:
Servo Loop
Group:
Group 0</td><td colspan="4">Description:
Primary operation mode - There are 8 groups of servo parameters (n = 0 - 7) and “Primary Operating Mode” is one of them. The choices available for primary operating mode are:
Enumerated Bit Pattern:
bits 0-2
001 - Torque Mode
010 - Velocity Mode
011 - Position with feedback 1, motor feedback (SERCOS only)
100 - Position with feedback 2, auxiliary feedback (SERCOS only)
101 - Position Control using both motor and auxiliary feedback (SERCOS only)
bit 3 - 15 reserved
In the analog version each of the 8 parameter sets has a “Prime_Op_Mode_n” parameter. Group zero is parameter 32. In the SERCOS version the drive modes of operation defined by this parameter becomes active when the operation mode is selected via bits 9 and 8 in the SERCOS control word of the MDT. The activated operation mode is indicated by bits 9 and 8 of the SERCOS drive status in the AT telegram from the drive to the master.
In the analog configuration only position with motor feedback (feedback 1), velocity and torque modes are available. The operating mode can be changed on line in the analog version by switching parameter sets.</td></tr>
<tr><td>Default: 010, velocity</td><td>Length
2 bytes</td><td>Minimum/Maximum
NA</td><td>Scaling Resolution
NA</td><td>Units
NA</td></tr>
</table>

<table>
<tr><td>IDN: S00036</td><td colspan="2">Name: Velocity_Command</td><td>Data Display: decimal</td><td>R, Link</td></tr>
<tr><td>Parameter No.
36
File:
Control
Group:
Velocity</td><td colspan="4">Description: Velocity command value.This parameter contains the value of the reference velocity command. Possible sources are Analog Input 1 (parameter 691), SCANp An1 Value (parameter 713), and the SERCOS cyclic telegram. The source of the velocity reference command is determined by parameter 501, “A-B Application”. With the suggested feedback and motor wiring a positive velocity reference produces clockwise rotation when viewed from the shaft end of the motor.</td></tr>
<tr><td>Default:
0</td><td>Length
2 bytes</td><td>Analog/SCANport Min/Max
Min. ≥ -30,000
Max. ≤ +30,000</td><td>Analog/SCANport Scaling Resolution
1 = 1RPM</td><td>Units
RPM</td></tr>
<tr><td>Default:
0 - preferred scaling</td><td>Length
4 bytes</td><td>SERCOS Min/Max
Min.≥ -2^{31}
Max. ≤ $+2^{31} - 1$</td><td>SERCOS Scaling Resolution
Scaling type: IDN 00044
Scaling factor: IDN 00045
Scaling exponent: IDN 00046</td><td>Units
IDN 00044</td></tr>
</table>

IDN: S00038	**Name:** +Vel_Limit_0		**Data Display:** signed decimal	R/W
Parameter No. 38 **File:** Servo Loop **Group:** Group 0	**Description:** Positive velocity limit value. This parameter describes the maximum allowable velocity in the positive direction. If the velocity limit value is exceeded, the drive responds by setting the status '$n_{command}$ > n_{limit}' in C3D (see IDN 00013) as well as parameter 335 "Vel_Above_Limit". This parameter appears in 8 sets of servo loop parameters. Parameter 38 appears in Group 0. See Parameter Groups, Files and Elements in this chapter. The commanded positive RPM will be limited to this value. If for any reason the actual motor velocity exceeds + Vel_Limit_0 by 50% an overspeed fault will disable the drive.			
Default: 6000	**Length** 2 bytes	**Analog/SCANport Min/Max** Min. ≥ 0 Max. ≤ +30,000	**Analog/SCANport Scaling Resolution** 1 = 1RPM	**Units** RPM
Default: 6000	**Length** 4 bytes	**Minimum/Maximum** Min. ≥ 0 Max. ≤ $+2^{31} - 1$	**Scaling Resolution** Scaling type: IDN 00044 Scaling factor: IDN 00045 Scaling exponent: IDN 00046	**Units** IDN 00044

IDN: S00039	**Name:** -Vel_Limit_0		**Data Display:** signed decimal	R/W
Parameter No. 39 **File:** Servo Loop **Group:** Group 0	**Description:** Negative velocity limit value. This parameter describes the maximum allowable velocity in the negative direction. If the velocity limit value is exceeded, the drive responds by setting the status '$n_{command}$ > n_{limit}' in C3D (see IDN 00013) as well as parameter 335 "Vel_Above_Limit". This parameter appears in 8 sets of servo loop parameters. Parameter 39 appears in Group 0. See Parameter Groups, Files and Elements in this chapter. The commanded negative RPM will be limited to this value. If for any reason the actual motor velocity exceeds - Vel_Limit_0 by 50% an overspeed fault will disable the drive.			
Default: -6000	**Length** 2 bytes	**Analog/SCANport Min/Max** Min. ≥ -30,000 Max. ≤ 0	**Analog/SCANport Scaling Resolution** 1 = 1RPM	**Units** RPM
Default: -6000	**Length** 4 bytes	**MInimum/Maximum** Min. ≥ -2^{31} Max. ≤ 0	**Scaling Resolution** Scaling type: IDN 00044 Scaling factor: IDN 00045 Scaling exponent: IDN 00046	**Units** IDN 00044

IDN: S00040	**Name:** Velocity_Fback		**Data Display:** Decimal	R, Link
Parameter No. 40 **File:** Control **Group:** Velocity	**Description:** The velocity feedback value. In the SERCOS configuration the velocity feedback value is transferred from the drive to the control unit in each AT cyclic telegram in order to allow the control unit to have access to the actual velocity. In both the analog and SERCOS configurations the motor encoder supplied velocity feedback is used to close the velocity loop. With the suggested feedback and motor wiring a positive velocity reference produces clockwise rotation when viewed from the shaft end of the motor.			
Default: 0	**Length** 2 bytes	**Analog/SCANport Min/Max** Min. ≥ -30,000 Max. ≤ 30,000	**Analog/SCANport Scaling Resolution** 1 = 1RPM	**Units** RPM
Default: 0	**Length** 4 bytes	**Minimum/Maximum** Min. ≥ -2^{31} Max. ≤ $+2^{31} - 1$	**Scaling Resolution** Scaling type: IDN 00044 Scaling factor: IDN 00045 Scaling exponent: IDN 00046	**Units** IDN 00044

IDN: S00043	**Name:** Velocity_Polarity		**Data display:** enumeration of choices	R/W
Parameter No. 43 **File:** Control **Group:** Velocity	**Description:** Velocity polarity parameter. This parameter is used to switch polarities of velocity data for specific applications. Polarities are not switched internally but externally (on the input and output) of a closed loop system. The motor shaft turns clockwise when there is a positive velocity command difference and no inversion is programmed. SERCOS version only. **Enumeration:** Structure of velocity polarity parameter (see figure C.5): Bit 0 – Velocity command value 0 = non-inverted 1 = inverted Bit 1 – Additive velocity command value (SERCOS Configuration only) 0 = non-inverted 1 = inverted Bit 2 – Velocity feedback value 0 = non-inverted 1 = inverted Bits 15-3 (reserved) This parameter is available with the 8720MC SERCOS Release.			
Default: x000	**Length** 2 bytes	**Minimum/Maximum** NA	**Scaling Resolution** NA	**Units** NA

IDN: S00044	**Name:** Vel_Scale_Type		**Data Display:** bit pattern	R/W
Parameter No. 44 **File:** Control **Group:** Velocity	**Description:** SERCOS Velocity Data Scaling Type. A variety of scaling methods can be selected by means of the scaling type parameter. Bit 5 is set to "minutes" for preferred data. **Enumeration:** Structure of velocity data scaling type: Bits 2–0: Scaling method 000 = no scaling 001 = linear scaling 010 = rotational scaling Bit 3: 0 = preferred scaling 1 = parameter scaling Bit 4: Units for linear scaling 0 = meters (m) 1 = inches (in) Bit 4: Units for rotational scaling 0 = revolutions (R) 1 = (reserved) Bit 5: Time units 0 – minutes (min) 1 – seconds (s) Bit 6: Data reference 0 – at the motor shaft 1– at the load (all other bits are reserved) This parameter is available with the 8720MC SERCOS Release.			
Default x000x010**:**	**Length** 2 bytes	**Minimum/Maximum** NA	**Scaling Resolution** NA	**Units** NA

IDN: S00045	**Name:** Vel_Scale_Factor		**Data Display:** integer	R/W
Parameter No. 45 **File:** Control **Group:** Velocity	**Description:** Velocity data scaling factor. This parameter defines the scaling factor for all velocity data in a SERCOS configured drive. This parameter is available with the 8720MC SERCOS Release.			
Default: preferred	**Length** 2 bytes	**SERCOS Min/Max** Min. ≥ 1 Max. ≤ $+2^{15}$ - 1	**SERCOS Scaling Resolution** Structure of the scaling factor: Bits 15-0: factor	**Units** scaler

IDN: S00046	**Name:** Vel_Scale_Expon		**Data Display:** signed integer	R/W
Parameter No. 46 **File:** Control **Group:** Velocity	**Description:** Velocity data scaling exponent. This parameter defines the scaling exponent for all velocity data in a SERCOS configured drive.			
Default: preferred	**Length** 2 bytes	**SERCOS Min/Max** Min. $\geq -2^{15}$ Max. $\leq +2^{15} - 1$	**SERCOS Scaling Resolution** Structure of the scaling exponent: Bit 15: Sign of the exponent 0 – positive 1 – negative Bits 14-0: Exponent	**Units** scaler

IDN: S00047	**Name:** Position_Command		**Data Display:** decimal	R/W
Parameter No. 47 **File:** Control **Group:** Position	**Description:** Position command value. In the SERCOS configurations, during the positioning mode of operation, the position command values are transferred from the motion control unit to the drive in the cyclic master data telegram via IDN00047. In the analog versions the only commanded position is the orient position. See parameter 153,"Orient angle". In the SCANport configurations the position is available from 1203 Gateway Communication Modules via parameter 258 "Target Position"			
Default: NA	**Length** 2 bytes	**Analog/SCANport Min/Max** Min. $\geq$ -32768 Max. $\leq$ +32767	**Analog/SCANport Scaling Resolution** 360/IDN00079 = rotary position increment in deg. IDN 00079 = rotary position increment in counts/rev.	**Units** IDN 00079
Default: NA	**Length** 4 bytes	**SERCOS Min/Max** Min. $\geq -2^{31}$ Max. $\leq +2^{31} - 1$	**SERCOS Scaling Resolution** Scaling type: IDN 00076 Scaling factor: IDN 00077 Scaling exponent: IDN 00078 Rotational position resolution: IDN 00079	**Units** IDN 00076

IDN: S00051	**Name:** Motor_Posn_Fback		**Data Display:** Resolution Units	R
Parameter No. 51 **File:** Control **Group:** Position	**Description:** Position feedback value 1 (motor feedback). This value is available from the drive to the SERCOS master in the SERCOS configuration via the AT cyclic telegram. In the analog spindle and power servo configurations the feedback is always scaled for rotary feedback with modulo format using parameter scaling. This means that the resolution of the feedback as displayed in IDN 00051 is defined by IDN 00079 and the feedback is modulo in that it ranges from 0 to IDN 00103 counts absolute and rolls over to zero. In the analog spindle and power servo configurations the absolute zero of the rotary axis feedback can be shifted clockwise or counter-clockwise via parameter 150, "Motor Marker Offset". The HIM display of parameter 51 in the analog configurations will be the absolute accumulation of the modulo axis feedback after it is modified by parameter 150. This is true after the first orient regardless of whether the feedback type is incremental or single turn absolute. In the analog version the display is in rotary resolution units as defined in parameter 79. It's range will be 0 to parameter 103, the modulo rotary axis value.			
Default: NA	**Length** 2 bytes	**Analog/SCANport Min/Max** Min. ≥ -32768 Max. ≤ +32767	**Analog/SCANport Scaling Resolution** 360/param 79 = rotary position increment in deg.	**Units** param.79
Default: NA	Length 4 bytes	**SERCOS Min/Max** Min. ≥ -2^{31} Max. ≤ $+2^{31} - 1$	**SERCOS Scaling Resolution** Scaling type: IDN 00076 Scaling factor: IDN 00077 Scaling exponent: IDN 00078 Rotational position resolution: IDN 00079	**Units** IDN 00076

IDN: S00053	**Name:** Aux_Posn_Fback		**Data Display:** Decimal	R
Parameter No. 53 **File:** Control **Group:** Position	**Description:** Position feedback value 2 (auxiliary feedback). This value is available from the drive to the SERCOS master in the SERCOS configuration via the cyclic telegram. It is used for slide or spindle mounted feedback devices such as linear scales or toothed wheel spindle encoders. This parameter is <u>not</u> available for analog configurations.			
Default: NA	**Length** 4 bytes	**SERCOS Min/Max** Min. ≥ -2^{31} Max. ≤ $+2^{31} - 1$	**SERCOS Scaling Resolution** Scaling type: IDN 00076 Scaling factor: IDN 00077 Scaling exponent: IDN 00078 Rotational position resolution: IDN 00079	**Units** IDN 00076

IDN: S00055	**Name:** Posn_Polarity		**Data display:**	R/W
Parameter No. 55 **File:** Control **Group:** Position	**Description:** Position polarity parameters. This parameter is used to switch polarities of reported position data for specific applications. Polarities are switched outside (i.e. on the input and output) of a closed loop system. The motor shaft turns clockwise (when viewed from the output shaft) when there is a positive position command difference and no inversion is programmed. **Enumerations:** Structure of the Position polarity parameter: Bit 0 Position command value 0 = Non-inverted 1 = Inverted Bit 1 Additive position command value 0 = Non-inverted 1 = Inverted Bit 2 Position feedback value 1 0 = Non-inverted 1 = Inverted Bit 3 Position feedback value 2 0 = Non-inverted 1 = Inverted Bit 4 Position limit values 0 – disabled 1 – enabled Bit 5: Underflow / Overflow threshold (IDN 00280, 00281) 0 – disabled 1 – enabled Bits 15-6 (reserved) This parameter is available with the 8720MC SERCOS Release.			
Default: 0	**Length** 2 bytes	**SERCOS Min/Max** NA	**SERCOS Scaling Resolution** NA	**Units** NA

IDN: S00057	**Name:** IN_Posn_Value		**Data Display:** Decimal, nnn.nn	R/W
Parameter No. 57 **File:** Status/Fault **Group:** Setup	**Description:** Position window. When the difference between the accumulated position command value and the position feedback value is within the range of the position window, then the drive sets the status “in position” (IDN 00336). When needed, the status 'in position' is assigned to a real-time status bit within the drive status and then transferred to the control unit (see IDN 00305).			
Analog/ SCANport Default: 10 counts	**Length** 2 bytes	**Analog/SCANport Minimum/Maximum** Min. ≥ 0 Max. ≤ +30,000	**Analog/SCANport Scaling Resolution** 1 = 1 count/rev as determined by parameter 79, with parameter 79 set at 3,600 then each count will equal. 1 degree e.g. with IDN 00079 set for 3600, 2 = .2 degree	**Units** IDN00079 counts/rev
Default:	**Length** 4 bytes	**SERCOS Min/Max** Min. ≥ 0 Max. ≤ $+2^{31} - 1$	**SERCOS Scaling Resolution** Scaling type: IDN 00076 Scaling factor: IDN 00077 Scaling exponent: IDN 00078 Rotational position resolution: IDN 00079	**Units** IDN 00076

<table>
<tr><td>IDN: S00076</td><td colspan="2">Name: Position Scaling</td><td>Data Display: Bit pattern</td><td>R/W</td></tr>
<tr><td>Parameter No.
76
File:
Control
Group:
Position</td><td colspan="4">Description: Position data scaling type. A variety of scaling methods can be selected by means of the scaling type parameter (see also figure 51). This parameter applies to the SERCOS and 32 bit SCANport (DPI) configurations. By default the analog version uses rotational and parameter scaling. For any analog application using positioning, as with spindle orient, bit 7, Processing format, should be set to “modulo”. Resolution is determined by parameter 79. For more details see IEC 61491, page 213.

Enumerated Bit Pattern:
Structure of position data scaling type:
Bits 2–0: Scaling method
000 – no scaling
001 – linear scaling
010 – rotational scaling
Bit 3:
0 – preferred scaling
1 – parameter scaling
Bit 4: Units for linear scaling or Bit 4: Units for rotational scaling
0 – meters (m) 0 – degrees
1 – inches (in) 1 – (reserved)
Bit 5: (reserved)
Bit 6: Data reference
0 – at the motor shaft
1 – at the load
Bit 7: Processing format
0 – absolute format
1 – modulo format (see IDN 00103)
(all other bits are reserved)
This parameter is available with the 8720MC SERCOS Release.</td></tr>
<tr><td>Default:
x00x01010</td><td>Length
2 bytes</td><td>SERCOS Min/Max
NA</td><td>SERCOS Scaling Resolution
NA</td><td>Units
NA</td></tr>
</table>

<table>
<tr><td>IDN: S00077</td><td colspan="2">Name: Posn_Scal_Factor</td><td>Data Display: integer</td><td>R/W</td></tr>
<tr><td>Parameter No.
77
File:
Control
Group:
Position</td><td colspan="4">Description: Linear position data scaling factor. This parameter defines the scaling factor for all linear position data in a drive. Parameter 77 applies to the SERCOS and 32 bit SCANport (DPI) configurations when preferred scaling is not used. Parameter 79, <u>not 77</u>, is used for analog configurations.
This parameter is available with the 8720MC SERCOS Release.</td></tr>
<tr><td>Default:
1</td><td>Length
2 bytes</td><td>SERCOS Min/Max
Min.≥1
Max. $\leq +2^{16} - 1$</td><td>SERCOS Scaling Resolution
Structure of the scaling factor:
Bits 15-0: factor</td><td>Units
NA</td></tr>
</table>

IDN: S00078	**Name:** Posn_Scale_Expon		**Data Display**: Signed integer	R/W
Parameter No. 78 **File:** Control **Group:** Position	**Description:** Linear position data scaling exponent. This parameter defines the scaling exponent for all linear position data in a SERCOS configured drive. Parameter 78 applies to the SERCOS and 32 bit SCANport (DPI) configurations when preferred scaling is not used. Parameter 79, <u>not 78</u>, is used for analog configurations. This parameter is available with the 8720MC SERCOS Release.			
Default: Preferred 10^{-4} degree 10^{-6} inch	**Length** 2 bytes	**Minimum/Maximum** Min. $\geq -2^{15}$ Max. $+2^{15}-1$	**Scaling Resolution** Structure of the scaling exponent: Bit 15: Sign of the exponent 0 – positive 1 – negative Bits 14–0: Exponent	**Units** NA

IDN: S00079	**Name:** Rot_Posn_Resolut		**Data Display:** integer	R/W
Parameter No. 79 **File:** Control **Group:** Position	**Description:** Rotational position resolution. This parameter defines the rotational position resolution for all position data in a drive when rotational scaling and parameter scaling are selected in IDN 00076. With the analog configuration the default scaling is rotational and parameter scaling therefore parameter 79 is required to determine the position resolution for orient. Parameter 79 is entered as an integer value representing the number of position counts per revolution of the motor.			
Default: 3600 counts or .1 deg	**Length** 2 bytes	**Analog Minimum/Maximum** Min. ≥ 1 Max. $\leq +65535$	**Analog Scaling Resolution** 1 = 1 drive feedback count 360/IDN00079 = rotary position increment in deg.	**Units** counts/rev.

IDN: S00080	**Name:** Torque_Command		**Data Display:** decimal	R/W
Parameter No. 80 **File:** Control **Group:** Torque	**Description:** Torque command value. In the SERCOS configuration, during the torque control operation mode of the drive, torque command values are transferred from the control unit to the drive via IDN 00080 in the cyclic master data telegram. This functionality is not supported in the standard 8720MC telegram, “telegram type 5” and therefore a telegram including torque must be chosen. The IEC 61491 SERCOS Standard supports this capability.			
Analog/ **SCANport** **Default:** 0.0	**Length** 2 bytes	**Analog/SCANport** **Minimum/Maximum** Min. ≥ -1000.0 Max. $\leq +1000.0$	**Analog/SCANport Scaling Resolution** 1=.1%	**Units** %
Default: 0	**Length** 2 bytes	**SERCOS Min/Max** Min. $\geq -2^{15}$ Max. $\leq +2^{15}-1$	**SERCOS Scaling Resolution** Scaling type: IDN 00086 Scaling factor: IDN 00093 Scaling exponent: IDN 00094	**Units** IDN 00086

IDN: S00082	**Name:** +Torque_Limit_0		**Data Display:** decimal	R/W
Parameter No. 82 **File:** Servo Loop **Group:** 0	**Description:** The positive torque limit value limits the maximum torque in the positive direction. If the torque limit value is exceeded, the drive sets the status '$T \geq T_{limit}$' in C3D (IDN 00013). There are 8 sets of + Torque Limit and - Torque limit parameters. +Torque_Limit_0 applies to group zero.			
Analog/ SCANport Default: 400.0	**Length** 2 bytes	**Analog/SCANport Minimum/Maximum** Min. ≥ 0 Max. ≤ +1000.0	**Analog/SCANport Scaling Resolution** 1=.1%	**Units** %
Default: 400.0	**Length** 2 bytes	**SERCOS Min/Max** Min. ≥ 0 Max. ≤ $+2^{15} - 1$	**SERCOS Scaling Resolution** Scaling type: IDN 00086 Scaling factor: IDN 00093 Scaling exponent: IDN 00094	**Units** IDN 00086

IDN: S00083	**Name:** -Torque_Limit_0		**Data Display:** decimal	R/W
Parameter No. 83 **File:** Servo Loop **Group:** 0	**Description:** The negative torque limit value limits the maximum torque in the negative direction. If the torque limit value is exceeded, the drive sets the status '$T \geq T_{limit}$' in C3D (IDN 00013). There are 8 sets of + Torque Limit and - Torque limit parameters			
Analog/ SCANport Default: -400.0	**Length** 2 bytes	**Analog/SCANport Minimum/Maximum** Min. ≥ -1000.0 Max. ≤ 0	**Analog/SCANport Scaling Resolution** 1=.1%	**Units** %
Default: -400.0	**Length** 2 bytes	**SERCOS Minimum/Maximum** Min. ≥ -2^{15} Max. ≤ 0	**Scaling Resolution** Scaling type: IDN 00086 Scaling factor: IDN 00093 Scaling exponent: IDN 00094	**Units**

IDN: S00084	**Name:** Torque_Fback		**Data display: decimal**	R, Link
Parameter No. 84 **File:** Control **Group:** Torque	**Description:** The torque feedback value can be is transferred from the drive to the control unit via the SERCOS AT cyclic data telegram. This functionality is not supported in the standard 8720MC telegram, "telegram type 5" and therefore a telegram including torque must be chosen. The IEC 61491 SERCOS Standard supports this capability.			
Analog/ SCANport Default: 0.0	**Length** 2 bytes	**Analog/SCANport Minimum/Maximum** Min. ≥ -1000.0 Max. ≤ +1000.0	**Analog/SCANport Scaling Resolution** 1=.1%	**Units** %
Default: 0	**Length** 2 bytes	**SERCOS Min/Max** Min. ≥ -2^{15} Max. ≤ $+2^{15} - 1$	**SERCOS Scaling Resolution** Scaling type: IDN 00086 Scaling factor: IDN 00093 Scaling exponent: IDN 00094	**Units** IDN 00086

IDN: S00085	**Name:** Torque_Polarity		**Data Display:** Bit pattern	R/W
Parameter No. 85 **File:** Control **Group:** Torque	**Description:** Torque polarity parameter. This parameter is used to switch polarities of reported torque data for specific applications. Polarities are not switched internally but externally (on the input and output) of a closed loop system. The motor shaft turns clockwise when there is a positive torque command difference and no inversion. **Enumerated Bit Pattern:** Structure of torque polarity parameter (see figure C.7): Bit 0 – Torque command value 0 = non-inverted 1 = inverted Bit 1 – Additive torque command value 0 = non-inverted 1 = inverted Bit 2 – Torque feedback value 0 = non-inverted 1 = inverted Bits 15-3 (reserved) This parameter is available with the 8720MC SERCOS Release.			
Default: x000	**Length** 2 bytes	**Minimum/Maximum** NA	**Scaling Resolution** NA	**Units** NA

<table>
<tr><td>IDN: S00086</td><td colspan="2">Name: Torq_Scale_Type</td><td>Data Display: Bit pattern</td><td>R/W</td></tr>
<tr><td>Parameter No.
86
File:
Control
Group:
Torque</td><td colspan="4">Description: Torque/force data scaling type. In the SERCOS configuration a variety of scaling methods can be selected by means of this scaling type parameter. In the analog configuration percent scaling of motor torque is the only available choice. For more details see IEC 61491, page 223.

Enumerated Bit Pattern:
Structure of torque/force data scaling type:
Bits 2–0: Scaling method
000 – percentage scaling
001 – linear scaling (force)
010 – rotational scaling (torque)
Bit 3:
0 – preferred scaling
1 – parameter scaling
Bit 4: Units for force or Bit 4: Units for torque
0 – newton (N) 0 – newton metre (Nm)
1 – pound force (lbf) 1 – inch pound force (in lbf)
Bit 5: (reserved)
Bit 6: Data reference
0 – at the motor shaft
1 – at the load
(all other bits are reserved)
This parameter is available with the 8720MC SERCOS Release.</td></tr>
<tr><td>Default:
x000</td><td>Length
2 bytes</td><td>Minimum/Maximum
NA</td><td>Scaling Resolution
NA</td><td>Units
NA</td></tr>
</table>

<table>
<tr><td>IDN: S00093</td><td colspan="2">Name: Torq_Scal_Factor</td><td>Data Display: integer</td><td>R/W</td></tr>
<tr><td>Parameter No.
93
File:
Control
Group:
Torque</td><td colspan="4">Description: Torque/force data scaling factor. In the SERCOS configuration this parameter defines the scaling factor for all torque/force data in a drive. This parameter is only used when the preferred scaling is <u>not</u> selected in IDN 00086. In the analog configuration the scale factor is always 1.
This parameter is available with the 8720MC SERCOS Release.</td></tr>
<tr><td>Default:
1</td><td>Length
2 bytes</td><td>Minimum/Maximum
Min. ≥ 1
Max. $\leq +2^{16} - 1$</td><td>Scaling Resolution
Structure of the torque/force data scaling factor:
Bits 15-0: factor</td><td>Units
scaler</td></tr>
</table>

IDN: S00094	**Name:** Torq_Scale_Expon		**Data display:** integer	R/W
Parameter No. 94 **File:** Control **Group:** Torque	**Description:** Torque/force data scaling exponent. TIn the SERCOS configuration his parameter defines the scaling exponent for all torque/force data in a drive. This parameter is only used when the preferred scaling is not selected in IDN 00086. In the analog configuration the scale exponent is always 10^{-1}. This parameter is available with the 8720MC SERCOS Release.			
Default: 10^{-1}	**Length** 2 bytes	**Minimum/Maximum** Min. $\geq -2^{15}$ Max. $\leq +2^{15} - 1$	**Scaling Resolution** Structure of the torque/force data scaling exponent: Bit 15: Sign of the exponent 0 – positive 1 – negative Bits 14-0: Exponent	**Units** scaler

IDN: S00099	**Name:** Drive_Err_Reset		**Data Display:** Bit pattern	R
Parameter No. 99 **File:** Status/Faults **Group:** Errors	**Description:** Reset class 1 diagnostic. In the SERCOS configuration when this procedure command is received by the drive via the service channel and no error exists in IDN 00011, "Class 1 Diagnostics" (C1D) or IDN 000129, "A-B Fault", the manufacturer's C1D, the drive shut-down error bit in the SERCOS drive status word (bit 13), will be reset by the drive. This essentially means that any shut-down errors detected by the drive and subsequently removed will be reset by the drive. (see IDN 00011, and IDN 00129). In the analog configuration this function is provided by the Drive Error Reset reset input. **Enumerated Bit Pattern:** Structure of reset class 1 diagnostic: (see IEC 61491, table 16, 7.4.4) Structure of procedure command acknowledgment (see IEC 61491, table 17, 7.4.4)			
Default: NA	**Length** 2 bytes	**Minimum/Maximum** NA	**Scaling Resolution** NA	**Units** NA

IDN: S00100	**Name:** Vel_Prop_Gain_0		**Data Display:** integer	R/W
Parameter No. 100 **File:** Servo Loop **Group:** group 0	**Description:** Velocity loop proportional gain. This is one of the parameters included in the 8 sets of servo loop parameters. Increasing this parameter produces faster velocity loop dynamic response with higher risk of instability. It will also reduce the dynamic velocity error. Decreasing this parameter will soften the dynamic response, increase the dynamic velocity error and reduce the velocity loop instability. This parameter may be auto tuned. See parameter 541			
Default: 600	**Length** 2 bytes	**Minimum/Maximum** Min. ≥ 0 Max. $\leq +30000$	**Scaling Resolution** 1 = 1/sec	**Units** 1/sec

IDN: S00101	**Name:** Vel_Integ_Time_0		**Data Display:** decimal	R/W
Parameter No. 101 **File:** Servo Loop **Group:** group 0	**Description:** Velocity loop integral action time. This is one of the parameters included in the 8 sets of servo loop parameters. Decreasing this value will increase the dynamic response in the velocity loop and reduce the steady state velocity error. This value will be modified as a result of auto tuning.			
Default: 240	**Length** 2 bytes	**Minimum/Maximum** Min. ≥ 0 Max. ≤ +6553.5	**Scaling Resolution** 1 = .1 msec	**Units** msec

IDN: S00103	**Name:** Modulo_Value		**Data Display:** integer	R/W
Parameter No. 103 **File:** Control **Group:** Position	**Description:** Modulo value. In the SERCOS configuration if the modulo format is selected in the position scaling parameter (IDN 00076), the modulo value defines the range that the drive & control must implement. This value determines the roll over point of a modulo axis. In the analog configuration the position data scaling type is always rotary axis. For example, if a 360 degree roll over point is desired, 3600 must be entered into IDN 00103, assuming IDN 00079 is set up for a resolution of 3600 counts per revolution. In this configuration the motor will move from o to 359.9 and roll over to zero in one motor revolution when rotating in the positive clockwise direction and viewing from the shaft end of the motor. As another example a 7200 count modulo rotary axis can be set up by entering 7200 in IDN 00103 and 7200 in IDN 00079. In this case the position feedback display will rollover after 7200 feedback counts of the motor. As yet another example, a 30,000 count modulo rotary axis can be set up by entering 30,000 in IDN 00103 and 30,000 in IDN 00079. In this case the position feedback will accumulate from 0 to 29999 and rollover back to 0 after 1 revolution of the motor and the resolution will be one in 30,000. It is always a good practice for applications using orient to set the value of parameter 103 to the same value as parameter 79, "Rotary Position Resolution". This assures that an orient from stand still will take one revolution.			
Default: 3600 counts	**Length** 2 bytes	**Analog Minimum/Maximum** Min. ≥ +1 Max. ≤ +65535	**Analog Scaling Resolution** 1 = 1 count as determined by parameter 79	**Units** param 79 in counts
Default:	**Length** 4 bytes	**Minimum/Maximum** Minimum Input: ≥ 1 Maximum Input: ≤ 2^{31}-1	**Scaling Resolution** Scaling type IDN 00076 Scaling factor IDN 00077 Scaling exponent IDN 0078 Rotational position resolution IDN 00079 Preferred scaling: –rotational = 1x10-4 degrees –linear = 1x10-7 m or 1x10-6 in	**Units** IDN 00076

IDN: S00104	**Name:** Pos_Loop_Gain_0		**Data Display:** Decimal	R/W
Parameter No. 104 **File:** Servo Loop **Group:** group 0	**Description:** Position loop *K*V -factor. The *K*V-factor determines the gain of the position loop regulator throughout the entire velocity range. Increasing this parameter produces faster position loop dynamic response with higher risk of instability. It will also reduce the dynamic position error. Decreasing this parameter will soften the dynamic response, increase the dynamic position error and reduce the position loop instability.			
Default: 60	**Length** 2 bytes	**Minimum/Maximum** Min. ≥ 0 Max. ≤ 30,000	**Scaling Resolution** 1 = .01 m/min/mm or .01 in/min/.001 in	**Units** (m/min)/ mm

IDN: S00105	Name: Pos_Int_Time_0		Data Display: Decimal	R/W
Parameter No. 105 **File:** Servo loop: **Group:** group 0	**Description:** Position loop integral action time. Increasing this parameter will increase the integration time and thus reduce the dynamic response. Decreasing this parameter will decrease the integration time and thus increase the dynamic response.			
Default: 6553.5	**Length** 2 bytes	**Minimum/Maximum** Min. ≥ .1 Max. ≤ 6553.5	**Scaling Resolution** 1 = .1 msec	**Units** msec

IDN: S00109	Name: Mtr_Peak_Current		Data Display: Decimal	R/W
Parameter No. 109 **File:** Motor/Drive/ Fdbk **Group:** Motor Data	**Description:** If the motor peak current is less than the capacity of the drive amplifier, the amplifier is automatically limited to the level of the motor peak current. Parameter 109 (IDN00109), motor peak RMS current at rated (base) speed. For a standard 8720SM motor with Stegmann feedback this value is read from the motor encoder memory.			
Default: From motor encoder	**Length** 2 bytes	**Analog Minimum/Maximum** Min. ≥ 0 Max. ≤1000.0	**Analog Scaling Resolution** 1 = .1 amps	**Units** amps
Default: From motor encoder	**Length** 4 bytes	**SERCOS Min/Max** Min. ≥ 0 Max.≤ 2^{32} - 1	**SERCOS Scaling Resolution** 1 = .001 amps	**Units** amps

IDN: S00110	Name: Drive_Peak_Amps		Data Display: Decimal	R
Parameter No. 110 **File:** Motor/Drive/ Fdbk **Group:** Drive Data	**Description:** The amplifier peak current is limited by the drive hardware, which means that the current for the maximum attainable torque limit value is fixed as well. This parameter is determined by the drive and can't be changed.			
Default: From drive amplifier	**Length** 2 bytes	**Analog Minimum/Maximum** Min. ≥ 0 Max. ≤ 3000.0	**Analog Scaling Resolution** 1 = .1 amps	**Units** amps
Default: From drive amplifier	**Length** 4 bytes	**SERCOS Min/Max** Min. ≥ 0 Max.≤ 2^{32} - 1	**SERCOS Scaling Resolution** 1 = .001 amps	**Units** amps

IDN: S00111	**Name:** Mtr_Cont_Current		**Data Display:** Decimal	R/W
Parameter No. 111 **File:** Motor/Drive/ Fdbk **Group:** Motor Data	**Description:** The motor continuous stall current is the current at which the motor produces the continuous standstill torque according to the motor spec sheet. For all motors except for asynchronous motors, this parameter is used as a reference for all torque data and for determining motor-related current values. This parameter is ignored for induction motors therefore it does not apply to 8720SM motors.			
Default: null	**Length** 4 bytes	**Minimum/Maximum** Min. $\geq$ 0 Max.$\leq$ 1000.0	**SERCOS Scaling Resolution** 1 = .1 amps	**Units** amps

IDN: S00112	**Name:** Drive_Cont_Amps		**Data Display:** Decimal	R/W
Parameter No. 112 **File:** Motor/Drive/ Fdbk **Group:** Drive Data	**Description:** The amplifier rated current is equal to the allowable continuous current of the drive unit. This parameter is determined by the drive and can't be changed.			
Default: From drive amplifier	**Length** 2 bytes	**Analog Minimum/Maximum** Min. $\geq$ 0 Max. $\leq$ 1000.0	**Analog Scaling Resolution** 1 = .1 amps	**Units** amps
Default: From drive amplifier	**Length** 4 bytes	**Minimum/Maximum** Min. $\geq$ 0 Max.$\leq 2^{32} - 1$	**SERCOS Scaling Resolution** 1 = .001 amps	**Units** amps

IDN: S00113	**Name:** Max_Mtr_Speed		**Data Display:** Integer	R/W
Parameter No. 113 **File:** Motor/Drive/ Fdbk **Group:** Motor Data	**Description:** The maximum motor speed is the maximum rated operating speed of the motor. With the standard 8720SM motors this value is stored in the motor encoder. If this value is exceeded by 20% an overspeed fault will disable the drive. Parameter 129, "A-B Faults", bit 15 will be set true.			
Default: From motor encoder	**Length** 2 bytes	**Analog Minimum/Maximum** Min. $\geq$ 0 Max. $\leq$ 30,000	**Analog Scaling Resolution** 1 = 1 rpm	**Units** rpm
Default: From motor encoder	**Length** 4 bytes	**SERCOS Min/Max** Min. $\geq$ 0 Max.$\leq 2^{32} - 1$	**SERCOS Scaling Resolution** 10^{-4}	**Units** min^{-1}

IDN: S00116	**Name:** MtrFdbk_Resoluti		**Data Type:** integer	R/W
Parameter No. 116 **File:** Motor/Drive/ Fdbk **Group:** Motor Feedback	**Description:** For rotary feedback the resolution parameter of feedback 1 (motor feedback) defines the number of cycles per revolution of the motor. For a sinusoidal device this represents the number of periods per revolution. For a TTL devices this represents the number of lines per motor revolution. For a linear feedback the grid constant is entered. For the standard Stegmann motor feedback devices this will be self identified at 1024 counts.			
Default: From motor encoder	**Length** 2 bytes	**Analog Minimum/Maximum** Min. ≥ 0 Max. $\leq$ 32,000	**Analog Scaling Resolution** 1 = 1 cycle/motor revolution	**Units** fdbk cycles
Default: From motor encoder	**Length** 4 bytes	**SERCOS Min/Max** Min. ≥ 0 Max.$\leq 2^{32} - 1$	**SERCOS Scaling Resolution** 1 [cycles/motor revolution]	**Units** fdbk cycles

IDN: S00121	**Name:** Input_Gear_Rev		**Data Display:** Integer	R/W
Parameter No. 121 **File:** Motor/Drive/ Fdbk **Group:** Mechanics	**Description:** Input revolutions of load gear set as viewed from the motor. Input revolutions must be entered as an integer value. This parameter applies to the SERCOS configuration only.			
Analog Default: 1	**Length** 2 bytes	**Analog Minimum/Maximum** Min. ≥ 0 Max. $\leq$ +65535	**Analog Scaling Resolution** 1 revolution of the input shaft	**Units** revs
Default: 1	**Length** 4 bytes	**Minimum/Maximum** Min. ≥ 0 Max. $\leq +2^{32} - 1$	**Scaling Resolution** 1 [input revolution]	**Units** revs

IDN: S00122	**Name:** Output_Gear_Rev		**Data Display:** Integer	R/W
Parameter No. 122 **File:** Motor/Drive/ Fdbk **Group:** Mechanics	**Description:** Output revolutions of load gear set. Output revolutions must be entered as an integer value. For example: If the input makes 4 turns for each output revolution, a value of 4 is entered into parameter 121 and a value of 1 is entered into parameter 122. This parameter applies to the SERCOS configuration only.			
Analog Default: 1	**Length** 2 bytes	**Analog Minimum/Maximum** Min. ≥ 0 Max. $\leq$ +65535	**Analog Scaling Resolution** 1 revolution of the output shaft	**Units** revs
Default: 1	**Length** 4 bytes	**SERCOS Min/Max** Min. ≥ 0 Max.$\leq 2^{32} - 1$	**SERCOS Scaling Resolution** 1 [output revolution]	**Units** revs

IDN: S00123	**Name:** Lin_Feed_Const		**Data Display:**	
Parameter No. 123 **File:** Motor/Drive/ Fdbk **Group:** Mechanics	**Description:** The feed constant describes the machine element which converts a rotational motion into a linear motion. The feed constant indicates the linear distance during one revolution of the feed motor. This parameter is used with the SERCOS configuration.			
Default: 1	**Length** 4 bytes	**SERCOS Min/Max** Min. ≥ 0 Max.≤ 2^{32} - 1	**Scaling Resolution**	**Units**

IDN: S00124	**Name:** Zero_Spd_Window		**Data Display:** Integer	R/W
Parameter No. 124 **File:** Status/faults **Group:** Setup	**Description:** The standstill window describes the amount of the deviation of the velocity from 0. If the velocity feedback value is within the standstill window the drive sets the status *n* feedback = 0 (IDN 00331).			
Analog Default: 10	**Length** 2 bytes	**Analog Minimum/Maximum** Min. ≥ 0 Max. ≤ +30,000	**Analog Scaling Resolution** 1 = 1 rpm	**Units** rpm
Default:	**Length** 4 bytes	**SERCOS Min/Max** Min. ≥ 0 Max.≤ 2^{32} - 1	**SERCOS Scaling Resolution** Scaling type: IDN 00044 Scaling factor: IDN 00045 Scaling exponent: IDN 00046	**Units** IDN 00044

IDN: S00125	**Name:** Speed_Threshold		**Data Display:** Integer	R/W
Parameter No. 125 **File:** Status/faults **Group:** Setup	**Description:** Velocity threshold (n_x). If the velocity feedback value falls below the velocity threshold *n*x, the drive sets the status '*n*feedback < *n*x ' (IDN 00332) in C3D.			
Analog Default: 1000	**Length** 2 bytes	**Analog Minimum/Maximum** Min. ≥ 0 Max. ≤ +30,000	**Analog Scaling Resolution** 1 = 1 rpm	**Units** rpm
Default: 1	**Length** 4 bytes	**SERCOS Min/Max** Min. ≥ 0 Max.≤ 2^{32} - 1	**SERCOS Scaling Resolution** Scaling type: IDN 00044 Scaling factor: IDN 00045 Scaling exponent: IDN 00046	**Units** IDN 00044

IDN: S00126	**Name:** Torque_Threshold		**Data Display:** decimal	R/W
Parameter No. 126 **File:** Status/faults **Group:** Setup	**Description:** Torque threshold (*T*x). If the torque feedback value exceeds the torque threshold *T* x, the drive sets the status '$T \geq Tx$' in C3D (IDN 00333).			
Analog Default: 100.0	**Length** 2 bytes	**Analog Minimum/Maximum** Min. ≥ 0 Max. ≤ +1000.0	**Analog Scaling Resolution** 1 = .1 %	**Units** % Rated motor torq
Default: 100.0	**Length** 2 bytes	**SERCOS Min/Max** Min. ≥ 0 Max.≤ 2^{15}- 1	**SERCOS Scaling Resolution** Scaling type: IDN 00086 Scaling factor: IDN 00093 Scaling exponent: IDN 00094	**Units** IDN 00086

IDN: S00129	**Name:** A-B Fault		**Data Display:** Bit pattern	R
Parameter No. 129 **File:** Status/Faults **Group:** Errors	**Description:** Manufacturer class 1 diagnostic. The 8720MC defines additional shut-down errors in manufacturer class 1 diagnostic (C1D). If an error is set in the manufacturer class 1 diagnostic, the manufacturer-specific error bit in class 1 diagnostic (see IDN 00011) is set as well. The drive cancels the manufacturer-specific error and resets to '0' only if the error in manufacturer class 1 diagnostic has been eliminated and on receiving the command 'reset class 1 diagnostic' (see IDN 00099) via the SERCOS service channel or the drive error reset input. **Enumerated faults:** 0: positive software overtravel fault 1: negative software overtravel fault 2: + hardware overtravel 3: - hardware overtravel 4: motor feedback 1 lost signal 5: motor feedback 1 noise fault 6: aux feedback 2 lost signal 7: aux feedback 2 noise fault 8: reserved 9: reserved 10: reserved 11: reserved 12: reserved 13: Power structure ground short 14: Drive Hardware Fault 15: Overspeed = 120% of parameter 113, "Max Motor Speed", or 150% of the velocity limits set for the active servo loop parameter set, parameters 38 and 39 for servo loop group 0, etc.			
Default: NA	**Length** 2 bytes	**Minimum/Maximum** NA	**Scaling Resolution** NA	**Units** NA

IDN: S00136	**Name:** Accel_Limit_0		**Data Display:** Integer	R/W
Parameter No. 136 **File:** Servo loop **Group:** Group 0	**Description:** Acceleration Limit Parameter 136 contains the desired acceleration limit for parameter set zero in radians per sec^2. This parameter applies to the command reference regardless of it's source e. g. Analog input, SCANport or HIM. Reducing the acceleration rate will prevent shocking the mechanical system while increasing the speed.			
Default: 65535	**Length** 2 bytes	**Analog/SCANport Min/Max** Min. ≥ 0 Max. ≤ 65535	**Analog/SCANport Scaling Resolution** 1 = 1rad/sec^2	**Units** rad/sec^2
Default: 65535	**Length** 4 bytes	**Minimum/Maximum** Min. ≥ 0 Max. ≤ $+2^{31} - 1$	**Scaling Resolution** Scaling type: IDN 00160 Scaling factor: IDN 00161 Scaling exponent: IDN 162	**Units** IDN 00160

IDN: S00137	**Name:** Decel_Limit_0		**Data Display:** Signed Integer	R/W
Parameter No. 137 **File:** Servo loop **Group:** Group 0	**Description:** Deceleration Limit Parameter 137 contains the desired deceleration limit for parameter set zero in radians per sec^2. This parameter applies to the command reference regardless of it's source e. g. Analog Input, SCANport or HIM. Reducing the deceleration rate may be required to prevent bus over voltage when neither a regenerative converter or a brake chopper are required. Also reducing the deceleration rate may be required to prevent overcurrent faults caused by fast deceleration at high speeds.			
Default: -32768	**Length** 2 bytes	**Analog/SCANport Min/Max** Min. ≤ 0 Max. ≥ –32768	**Analog/SCANport Scaling Resolution** 1 = 1rad/sec^2	**Units** rad/sec^2
Default: -32768	**Length** 4 bytes	**Minimum/Maximum** Min. ≤ 0 Max. ≥ -2^{31}	**Scaling Resolution** Scaling type: IDN 00160 Scaling factor: IDN 00161 Scaling exponent: IDN 162	**Units** IDN 00160

IDN: S00141	**Name:** Motor_Data		**Data Display:** Ascii representation of Enumeration	R
Parameter No. 141 **File:** Motor/Drive/ Fdbk **Group:** Drive Data, Motor Data	**Description:** Motor Catalog Number Parameter 141 contains the Allen-Bradley catalog number of the motor. This is a 64 character string which contains multiple display elements. The data which can be displayed is as follows: * 8720SM motor catalog number * 8720SM motor serial number * Date motor manufactured * Manufacturing lot * Motor ID Number			
Default: From motor encoder mem.	**Length** 64 character string	**Minimum/Maximum** NA	**Scaling Resolution** NA	**Units** NA

IDN: S00150	**Name:** Mtr_Marker_Ofset		**Display format:** signed integer	R/W
Parameter No. 150 **File:** Procedure **Group:** Orient, Homing	**Description:** Reference offset 1 is used to offset the motor encoder zero point. This parameter describes the distance between the incremental encoder zero reference marker pulse or the single turn absolute encoder zero reference point and the desired mechanical zero reference of the axis motor or spindle motor. "Position feedback 1", parameter 51 - the motor mounted feedback rotary position feedback value, can be modified with this offset. Parameter 150 provides an offset that compensates for rotary mis-alignment between the encoder zero point and the desired mechanical zero of the spindle or axis. This parameter is used to configure the axis or spindle motor zero during startup. A - value produces a clockwise offset angle when facing the shaft end of the motor and a + value produces a counter-clockwise offset. It should be noted that this is the opposite sense to the position and orient angle signs. To prevent reversals during orient use a - signed offset for cw orient and a + signed offset for ccw orient.			
Analog Default: 0.00	**Length** 2 bytes	**Analog Minimum/Maximum** Min. ≥ -32768, Max. ≤ +32767	**Analog Scaling Resolution** 1 = 1 count as determined by parameter 79 e.g.: with IDN 00079 at 3600 cnts/rev, 1 count = .1 degree, Practical Range = -360.0 to + 360.0 degrees	**Units** param. 79 Counts/rev
SERCOS Default: 0.0	**Length** 4 bytes	**SERCOS Min/Max** Min. ≥ -2^{31} Max. ≤ $+2^{31} - 1$	**SERCOS Scaling Resolution** Scaling type: IDN 00076 Scaling factor: IDN 00077 Scaling exponent: IDN 00078 Rotational position resolution: IDN 00079	**Units** IDN 00076

IDN: S00151	**Name:** Aux_Marker_Ofset		**Display format:** signed integer	R/W
Parameter No. 151 **File:** Procedure **Group:** orient, homing	**Description:** Reference offset 2 is used to offset the axis or spindle mounted encoder zero point. This parameter describes the distance between the incremental encoder zero reference marker pulse or the single turn absolute encoder zero reference point and the desired mechanical zero reference of the axis or spindle. "Position feedback 2", parameter 53 - the axis or spindle mounted feedback device position feedback value can be modified with this offset. Parameter 151 provides an offset that compensates for mis-alignment between the spindle or axis mounted encoder zero point and the desired mechanical zero of the spindle or axis. This parameter is used to configure the axis or spindle zero during startup. Parameter 151 is used in the SERCOS configuration only. The secondary auxiliary feedback port is not available in the analog configuration. A + value produces a clockwise offset angle when facing the shaft end of the motor and a - value produces a counter-clockwise offset.			
SERCOS Default: 0.0	**Length** 4 bytes	**SERCOS Min/Max** Min. ≥ -2^{31} Max. ≤ $+2^{31} - 1$	**SERCOS Scaling Resolution** Scaling type: IDN 00076 Scaling factor: IDN 00077 Scaling exponent: IDN 00078 Rotational position resolution: IDN 00079	**Units** IDN 00076

IDN: S00152	Name: Spin_Orient_Req		Data display: Bit pattern	R/W
Parameter No. 152 **File:** Procedure **Group:** Orient	**Description:** Spindle Orient Procedure Command. This procedure command automatically switches the drive to internal position loop control, below the spindle orient speed (IDN 00222), and initiates an orient to the defined orient position. In a SERCOS drive when bits 0 and 1 of parameter 152 are set true an orient is requested. Orient is also requested when input 2 is set true at the digital interface. While the orient procedure is active, all changes to external velocity, position or torque command values are ignored. If the drive is stopped an orient procedure command initiates a clockwise, counter-clockwise or shortest path orient depending on the spindle Orient Options, Parameter 154 (IDN 00154). The drive positions the spindle to the programmed orient angle, parameter 153 (IDN 00153), using the spindle orient speed specified in parameter 222 and the position acceleration rate defined in parameter 260. The actual target position is derived from the motor or spindle mounted encoder as determined by it's zero reference marker in the case of an incremental encoder or it's absolute zero position in the case of a single turn absolute encoder. For motor mounted feedback the target position is calculated by the 8720MC as encoder zero – parameter 150 + parameter 153. For spindle mounted feedback in the SERCOS configuration the final position is calculated by the 8720MC as encoder zero ± parameter 151 ± parameter 153. When the drive interpolator reaches the selected orient position, the drive sets the status "Orient Complete", parameter 583. The status "In Position" (parameter 336) is true as long as the drive is in the orient position and the spindle position is within the in- position band established by parameter 57, "IN_Pos_Value". If the drive is rotating at a speed higher than the orient speed when the orient request is received the drive will decelerate at the acceleration rate defined in parameter 260 to the orient speed defined in parameter 222. If parameter 154 calls for clockwise orient and the drive is already rotating clockwise and the drive has decelerated to orient speed, the drive will place itself in positioning mode and decelerate to the calculated target orient angle moving in the clockwise direction. If parameter 154 calls for counter-clockwise orient and the drive is already rotating clockwise and the drive has decelerated to orient speed the drive will place itself in positioning mode and decelerate to a stop. It will then move to the calculated target orient angle moving in the counter-clockwise direction. If parameter 154 calls for shortest path orient and the drive is already rotating clockwise or counter-clockwise once the drive decelerates to orient speed the drive will place itself in positioning mode and decelerate to the calculated target orient angle moving in the same direction as the spindle was rotating when the orient request occurred. For motor mounted feedback the target position is calculated by the 8720MC as encoder zero – parameter 150 + parameter 153. For spindle mounted feedback in the SERCOS configuration the final position is calculated by the 8720MC as encoder zero ± parameter 151 ± parameter 153. Since it is being subtracted a - value in parameter 151 produces a clockwise offset angle when facing the shaft end of the motor or the drive end of the spindle and a + value in parameter 151 produces a counter-clockwise offset. The drive will remain oriented in servo position lock as long as the spindle orient request input is enabled. When the orient request is removed the drive switches over to the mode of operation called for in the mode parameter of the active parameter set. The drive will immediately follow the auto reference if auto mode is active. **Comments:** In the SERCOS configuration the definition of the structure of the Spindle Orient Procedure Command is described in table 16, 7.4.4 of IEC Specification 61491. The definition of the structure of procedure command acknowledgment is described table 17, 7.4.4 of IEC Specification 61491.			
Default: null	**Length** 2 bytes	**Minimum/Maximum** NA	**Scaling Resolution** NA	**Units** NA

<table>
<tr><td>IDN: S00153</td><td colspan="2">Name: Orient_Angle</td><td>Data Display: integer</td><td>R/W</td></tr>
<tr><td>Parameter No.
153
File:
Procedure
Group:
Orient</td><td colspan="4">Description: Spindle angle position. This parameter is the absolute spindle position angle relative to the zero position reference point as modified by the motor marker offset (parameter 150) or the spindle mounted encoder marker offset (parameter 151, SERCOS and SCANport configurations only). Parameter 153 can be provided by a SCANport peripheral port terminal or a SCANport gateway communication module via explicit message or the SERCOS link. It is enabled only in connection with the spindle orient request command (see IDN 00152). For a motor mounted feedback source a + sign produces a clockwise orient angle when facing the shaft end of the motor. For a spindle mounted feedback source a + sign produces a clockwise orient angle when viewed from the face of the spindle. A value greater than 1 revolution in resolution counts produces a multiple turn orient from a stand still position. Also for orients the sign of "orient_angle" should agree with the orient direction established by parameter 154, if clockwise or counter- clockwise is selected. For example: with parameter 79 and parameter 103 both set at 3600 counts and parameter 153 "orient angle" set to 0 counts, a stand still cw orient will take 1 revolution. If parameter 153 is changed to 3600 counts a stand still cw orient will take 2 revolutions. If parameter 153 is changed to 7200 counts a stand still cw orient will take 3 revolutions, etc. If ccw orient is desired parameter 153 should have a negative value.,</td></tr>
<tr><td>Analog/
SCANport
Default:
0.00</td><td>Length
2 bytes</td><td>Analog/SCANport Minimum/Maximum
Min. ≥ -32768
Max. ≤ +32767</td><td>Analog /SCANport Scaling Resolution
1 = 1 count as determined by parameter 79,
with paramter 79 set at 3600 cnts/rev, 1 increment = .1 degree, Range = -3276.8 to +3276.7 degrees</td><td>Units
param 79 counts</td></tr>
<tr><td>SERCOS
Default:
0.0</td><td>Length
4 bytes</td><td>SERCOS Min/Max
Min. ≥ -2^{31}
Max. ≤ $+2^{31} - 1$</td><td>SERCOS Scaling Resolution
Scaling type: IDN 00076
Scaling factor: IDN 00077
Scaling exponent: IDN 00078
Rotational position resolution: IDN 00079 (see 8.6.1)</td><td>Units
IDN 00076</td></tr>
</table>

<table>
<tr><td>IDN: S00154</td><td colspan="2">Name: Orient_Options</td><td>Data display: bit pattern</td><td>R/W</td></tr>
<tr><td>Parameter No.
154
File:
Procedure
Group:
Orient</td><td colspan="4">Description: Spindle Orient Configuration Parameter. When the velocity feedback value is equal to zero, as defined by the zero speed window (parameter 124) and the spindle orient request is active, the direction and source of feedback device for spindle orient is defined by this parameter.
If the spindle velocity value is not equal to zero and the current turning direction does not match the configured orient direction (ccw or cw) the spindle will stop and return to target orient position in the selected orient direction. If shortest path is selected and the spindle is rotating when the orient request is received the spindle will orient in the direction of rotation.

Enumerated Bit Pattern:
Structure of spindle position parameter:
Bit 0-1: 00 – rotate clockwise
01 – rotate counter-clockwise
10 – take shortest path
Bit 2: 0 - spindle angle position (IDN 00153) - SERCOS version
Bit 3: 0 – motor feedback - SERCOS version
1 – spindle feedback
For orients greater than 360 degrees the clockwise or counter-clockwise orient direction must be selected. Also the sign of the orient angle should agree with the orient direction. That is if a clockwise orient greater than 360 degrees is required the orient angle, parameter 153, should be expressed as a positive angle. If a counter-clockwise orient greater than 360 degrees is required the orient angle should be expressed as a negative angle.</td></tr>
<tr><td>Default:
0000</td><td>Length
2 bytes</td><td>Minimum/Maximum
NA</td><td>Scaling Resolution
NA</td><td>Units
NA</td></tr>
</table>

IDN: S00157	**Name:** At_Spd_Window		**Data display:** Integer	R/W
Parameter No. 157 **File:** Status/faults **Group:** setup	**Description:** The velocity window relates the current velocity to the velocity command value (IDN 00036). If the current velocity feedback value falls within the calculated velocity window, the drive sets the status "$n_{\text{feedback}} = n_{\text{command}}$" (IDN 00330). A value of zero disables the occurrence of the At_Prog_Speed event, parameter 330			
Analog/ SCANport Default: 10	**Length** 2 bytes	**Analog/SCANport Minimum/Maximum** Min. ≥ 0 Max. ≤ +30,000	**Analog/SCANport Scaling Resolution** 1 RPM, range - 0 to +30,000 RPM	**Units** RPM
Default: 5	**Length** 4 bytes	**SERCOS Min/Max** Min. ≥ 0 Max. ≤ $+2^{31} - 1$	**SERCOS Scaling Resolution** Scaling type: IDN 00044 Scaling factor: IDN 00045 Scaling exponent: IDN 00046	**Units** IDN 00044

IDN: S00159	**Name:** Max_Foll_Error		**Data Display:** integer	R/W
Parameter No. 159 **File:** Status/faults **Group:** setup	**Description:** Monitoring window. By means of the monitoring window, the maximum position deviation, as referenced to the active actual position value, can be defined for the position feedback value. When the position error value exceeds the maximum position window value, the drive sets an error for excessive position deviation in C1D (IDN 00011).			
Analog/ SCANport Default: 30,000	**Length** 2 bytes	**Analog/SCANport Minimum/Maximum** Min. ≥ 0 Max. ≤ +65535	**Analog/SCANport Scaling Resolution** 360/IDN 00079, default: with IDN 00079 at 3600 cnts/rev, increment = .1 degree, Range = 0 to +3276.7 degrees	**Units** Param 79 counts/rev
Default: $+2^{31} - 1$	**Length** 4 bytes	**Minimum/Maximum** Min. ≥0 Max. ≤ $+2^{31} - 1$	**Scaling Resolution** Scaling type IDN 00076 Scaling factor IDN 00077 Scaling exponent IDN 00078 Rotational position resolution IDN 00079 (see 8.6.1)	**Units** IDN 00076

IDN: S00160	Name: Acc_Scale_Type		Data Display: Bit pattern	R/W
Parameter No. 160 **File:** Control **Group:** Acceleration	**Description:** Acceleration data scaling type. A variety of scaling methods can be selected by means of the acceleration data scaling type parameter. This parameter is used with SERCOS configuration. For the analog configuration see parameter 260. **Enumerated Bit Pattern:** Structure of the acceleration data scaling type: Bits 2–0: Scaling method 000 – no scaling 001 – linear scaling 010 – rotational scaling Bit 3: 0 – preferred scaling 1 – parameter scaling Bit 4: Units for linear scaling 0 – meters (m) 1 – inches (in) see annex K Bit 4: Units for rotational scaling 0 – radian (rad) 1 – (reserved) Bit 5: Time units 0 – seconds (s) 1 – (reserved) Bit 6: Data reference 0 – at the motor shaft 1 – at the load (see 8.8) (all other bits are reserved)			
Default: Preferred	**Length** 2 bytes	**Minimum/Maximum** NA	**Scaling Resolution** NA	**Units** NA

IDN: S00161	Name: Acc_Scale_Factor		Data Display: Integer	R/W
Parameter No. 161 **File:** Control **Group:** Acceleration	**Description:** Acceleration data scaling factor. In the SERCOS configuration this parameter defines the scaling factor for all acceleration data in a drive.			
Default: preferred	**Length** 2 bytes	**Minimum/Maximum** Min. ≥ 1 Max. $\leq +2^{31} - 1$	**Scaling Resolution** Structure of the scaling factor: Bits 15-0: factor	**Units** scaler

IDN: S00162	**Name:** Acc_Scale_Expon		**Data Display:** Integer	R/W
Parameter No. 162 **File:** Control **Group:** Acceleration	**Description:** Acceleration data scaling exponent. This parameter defines the scaling exponent for all acceleration data in a drive.			
Default: preferred	**Length** 2 bytes	**Minimum/Maximum** Min. ≥ -2^{15} Max. ≤ $+2^{15}-1$	**Scaling Resolution** Structure of the scaling exponent: Bit 15: Sign of the exponent 0 – positive 1 – negative Bits 14-0: Exponent	**Units** scaler

IDN: S00177	**Name:** Motor_Abs_Offset		**Data Display:** Decimal	R/W
Parameter No. 177 **File:** Motor/Drive/ Fdbk **Group:** Motor Feedback	**Description:** Absolute distance 1. This parameter describes the distance between the machine zero point and the zero point of an absolute feedback system on the motor. This parameter is used with the SERCOS configuration.			
Default: 0	**Length** 4 bytes	**SERCOS Min/Max** Min. ≥ -2^{31} Max. ≤ $+2^{31} - 1$	**SERCOS Scaling Resolution** Scaling type: IDN 00076 Scaling factor: IDN 00077 Scaling exponent: IDN 00078 Rotational position resolution: IDN 00079	**Units** IDN 00076

IDN: S00189	**Name:** Posn_Foll_Error		**Data Display:** **Integer**	R,Link
Parameter No. 189 **File:** Control **Group:** Position	**Description:** Following distance. The drive uses the operation data of this IDN to store the distance between position command value and the appropriate position feedback value 1/2. Calculation of the following distance: following distance = position command value – position feedback value 1/2			
Analog/ SCANport Default: 0.00	**Length** 2 bytes	**Analog/SCANport Minimum/Maximum** Min. ≥ -32768 Max. ≤ +32767	**Analog /SCANport Scaling Resolution** 1 = 1 count as determined by parameter 79, with paramter 79 set at 3600 cnts/rev, 1 increment = .1 degree, Range = -3276.8 to +3276.7 degrees	**Units** param 79 counts
Default: 0	**Length** 4 bytes	**SERCOS Min/Max** Min. ≥ -2^{31} Max. ≤ $+2^{31} - 1$	**Scaling Resolution** Scaling type: IDN 00076 Scaling factor: IDN 00077 Scaling exponent: IDN 00078 Rotational position resolution: IDN 00079	**Units** IDN 00076

IDN: S00196	**Name:** Mtr_Cont_Current		**Data Display:**	R/W
Parameter No. 196 **File:** Motor/Drive/ Fdbk **Group:** Motor Data	**Description:** Motor rated current. The motor rated current is the current at which the motor produces the rated torque according to the motor spec sheet. For all asynchronous motors, this parameter is used as a reference for all torque data and for determining motor related current values.			
Analog Default: Motor encoder	**Length** 2 bytes	**Analog Minimum/Maximum** Min. ≥ 0 Max. ≤ +1000.0	**Analog Scaling Resolution** 1 = .1 amp	**Units** amp
Default: Motor encoder	**Length** 4 bytes	**SERCOS Min/Max** Min. ≥ 0 Max. ≤ $+2^{31}$ - 1	**SERCOS Scaling Resolution** 1 = .001 amp	**Units** amp

IDN: S00206	**Name:** Drive_On _Delay		**Data Display:** Decimal	R/W
Parameter No. 206 **File:** Motor/Drive/ Fdbk **Group:** Brake	**Description:** Drive on delay time. When "drive on" and "drive enable" are set (bits 14 and 15 of the SERCOS master control word) torque is activated at once, but the drive follows the command values after this waiting time has elapsed. In the analog configuration this delay occurs after the drive enable input is energized. This allows the drive time to develop holding torque before energizing the release brake solenoid.			
Default: 0	**Length** 2 bytes	**Minimum/Maximum** Min. ≥ 0 Max. ≤ +6,553.5	**Scaling Resolution** 1 = .1 msec	**Units** msec

IDN: S00207	**Name:** Drive_Off _Delay		**Data Display:** Decimal	R/W
Parameter No. 207 **File:** Motor/Drive/ Fdbk **Group:** Brake	**Description:** Drive off delay time. After "drive off" (bit 15 of the SERCOS master control word) is reset and $n_{feedback = 0}$ (parameter 124) is reached, the torque remains activated in the drive until this waiting time is elapsed. In the analog configuration this delay occurs after the zero speed output is energized. This allows the drive time to develop holding torque before de energizing the release brake solenoid.			
Default: 0	**Length** 2 bytes	**Minimum/Maximum** Min. ≥ 0 Max. ≤ +6,553.5	**Scaling Resolution** 1 = .1 msec	**Units** msec

IDN: S00216	**Name:** Switch_Param_Set		**Data Display:** Bit pattern	R/W
Parameter No. 216 **File:** Procedure **Group:** parameter switch	**Description:** Switch parameter set procedure command. This procedure command allows the system to switch parameter sets. The drive switches to the parameter set which is programmed in the parameter set preselection (IDN 00217). This parameter is used with the SERCOS configuration. If this parameter is set true, "1", the active parameter set will be changed to the selected value in paramter 217. **Enumerated Bit Pattern:** Structure of the switch parameter set procedure command: see IEC 61491, table 16, 7.4.4. Structure of command acknowledgment: see table IEC 61491,17, 7.4.4.			
Default: 0	**Length** 2 bytes	**Minimum/Maximum** NA	**Scaling Resolution** NA	**Units** NA

IDN: S00217	**Name:** Select_Param_Set		**Data Display:** Binary	R/W
Parameter No. 217 **File:** Procedure **Group:** parameter switch	**Description:** Parameter set preselection. In the SERCOS configuration the desired parameter set of the drive is selected by means of the parameter set preselection. The switch parameter set procedure command (see IDN 00216) is used to switch parameter sets. If the drive has no switchable parameter sets, it will only accept parameter set 0. Therefore, parameter set 0 must be available in every drive and will be activated during initialization. In the analog configuration the binary set code is provided to the drive via the digital input. Changing the digital input binary value will initiate switching of the parameter set. **Enumerated Bit Pattern:** Structure of parameter set preselection: Bit 2 – 0: 0 0 0 – parameter set 0 0 0 1 – parameter set 1 0 1 0 – parameter set 2 0 1 1 – parameter set 3 1 0 0 – parameter set 4 1 0 1 – parameter set 5 1 1 0 – parameter set 6 1 1 1 – parameter set 7 (all other bits are reserved) Bit 2 of parameter 217 is linked to Digital Input 5. In addition to being used to select the parameter set, if Digital Input 5 is true, +24 vdc, the high winding will be selected for a dual wound motor and the "High Winding Enable" linkable variable (parameter 526) will be true. In the Spindle configuration this is linked to Relay Output 3 and this relay contact output can be used to close a the high winding motor contactor and open the low winding contactor. If Digital Input 5 is false, 0 vdc, the Low winding will be selected for a dual wound motor and the "Low Winding Enable" linkable variable (parameter 527) will be true. In the Spindle configuration this is linked to Relay Output 4 and this relay contact output can be used to close a the low winding motor contactor and open the high winding contactor. Bits 1 and 0 of parameter 217 are also linked to Digital Inputs 7 and 9. In dual winding applications this interface allows for 4 sets of high winding servo parameters and 4 sets of low winding parameters. In single winding configurations all 8 sets of parameters are available and the high and low winding relay outputs can be linked to other 8720MC event links. This value can be set via drive explorer or the HIM as well.			
Default: 000	**Length** 2 bytes	**Minimum/Maximum** Min. ≥ 0 Max. ≤ 7 binary	**Scaling Resolution** NA	**Units** NA

IDN: S00220	**Name:** Min_Spindle_Spd		**Data Display:** integer	R/W
Parameter No. 220 **File:** Status/Faults **Group:** Setup	**Description:** Minimum spindle speed. When the speed falls below minimum spindle speed, the state "Speed Below Minimum" (IDN 00339, parameter 339) is created. This event can be linked to a digital output or SCANport status bit. It can also be assigned to a real time SERCOS status bit.			
Analog Default: 10,000	**Length** 2 bytes	**Analog Minimum/Maximum** Min. ≥ 0 Max. ≤ +30,000	**Analog Scaling Resolution** 1 = 1 rpm	**Units** rpm
Default: 0	**Length** 4 bytes	**Minimum/Maximum** Min.≥ 0 Max.≤ 2^{31} - 1	**Scaling Resolution** 10^{-4}	**Units** min^{-1}

IDN: S00221	**Name:** Max_Spindle_Spd		**Data Display:** integer	R/W
Parameter No. 221 **File:** Status/Faults **Group:** Setup	**Description:** Maximum spindle speed. When the speed moves above the maximum spindle speed, the state "Speed Above Maximum" (IDN 00340, parameter 340) is created. This event can be linked to a digital output or SCANport status bit. It can also be assigned to a real time SERCOS status bit.			
Analog Default: 10,000	**Length** 2 bytes	**Analog Minimum/Maximum** Min. ≥ 0 Max. ≤ +30,000	**Analog Scaling Resolution** 1 = 1 rpm	**Units** rpm
Default: 2^{31} - 1	**Length** 4 bytes	**Minimum/Maximum** Min.≥ 0 Max.≤ 2^{31} - 1	**Scaling Resolution** 10^{-4}	**Units** min^{-1}

IDN: S00222	**Name:** Spind_Orient_Spd		**Data Display:** decimal	R/W
Parameter No. 222 **File:** Procedure **Group:** Orient	**Description:** Spindle positioning speed. When the orient spindle procedure command (see IDN 00152, parameter 152) is received, the drive accelerates or decelerates to the spindle orient speed, depending upon the current speed. The spindle orient speed is the velocity at which the orient is executed.			
Analog/ SCANport Default: 100	**Length** 2 bytes	**Analog/SCANport Minimum/Maximum** Min. ≥ 0 Max. ≤ +30,000	**Analog/SCANport Scaling Resolution** 1 = 1 RPM	**Units** RPM
SERCOS Default: 50.0	**Length** 4 bytes	**SERCOS Min/Max** Min. ≥ 0 Max. ≤ +2^{31} - 1	**SERCOS Scaling Resolution** 10^{-4}	**Units** RPM

IDN: S00254	**Name:** Actual_Param_Set		**Data Display:** bit pattern	R
Parameter No. 254 **File:** Procedure **Group:** parameter switch	**Description:** Actual parameter set. This parameter stores the current active parameter set in the drive. In the SERCOS configuration if a new parameter set is to be activated, it must first be preselected using parameter set preselection (IDN 00217, parameter 217). Parameter set 0 must be active in every drive before and during initialization. In the analog version the actual parameter set can be linked to the SCANport output word. Structure of the actual parameter set: Bit 2 – 0: 0 0 0 – parameter set 0 active 0 0 1 – parameter set 1 active 0 1 0 – parameter set 2 active 0 1 1 – parameter set 3 active 1 0 0 – parameter set 4 active 1 0 1 – parameter set 5 active 1 1 0 – parameter set 6 active 1 1 1 – parameter set 7 active (all other bits are reserved)			
Default: 000	**Length** 2 bytes	**Minimum/Maximum** Min. ≥ 0 Max. ≤ 7 binary	**Scaling Resolution** NA	**Units** NA

IDN: S00258	**Name:** Target_Position		**Data Display:** decimal	R/W
Parameter No. 258 **File:** LInear list **Group:** LInear list	**Description:** Target Position - The target position may be provided by the DPI master via SCANport “Data IN A2” or the SERCOS master. For example with the DPI configuration selected in parameter 501 and the resolution set to 3000 units in Parameter 79 and a modulo axis of 30,000 units as set by parameter 103 a target move of 15,000 units would take 5 motor revolutions CW at a speed determined by parameter 259 velocity and an acceleration and deceleration determined by parameter 260, assuming the position move started from 0. The primary operating mode, parameter 32, must be set to position control using motor feedback. Target position cannot be used if Analog Spindle or Analog Servo are selected in parameter 501			
SCANport Default: 0	**Length** 2 bytes	**SCANport Minimum/ Maximum** Min. ≥ -32768 Max. ≤ +32767	**Analog/SCANport Scaling Resolution** Resolution units as determined by parameter 79	**Units** Param. 79 counts/rev
SERCOS Default: 0	**Length** 4 bytes	**Minimum/Maximum** Min. ≥ -2^{31} Max. ≤ $+2^{31} - 1$	**SERCOS Scaling Resolution** Scaling type IDN 00076 Scaling factor IDN 00077 Scaling exponent IDN 00078 Rotational Position Resolution IDN 00079	**SERCOS Units** IDN 00076 IDN 00077 IDN 00078

IDN: S00259	**Name:** Posn_Velocity		**Data Display:** decimal	R/W
Parameter No. 259 **File:** LInear list **Group:** LInear list	**Description:** Positioning Velocity. The "positioning velocity" is used in the "drive resident position interpolation" operation mode as the positioning velocity during a DPI or SERCOS commanded change in target position, Parameter 258, IDN00258			
Analog/ SCANport Default: 1000	**Length** 2 bytes	**Analog/SCANport Minimum/Maximum** Min. ≥ 0 Max. ≤ +30,000	**Analog/SCANport Scaling Resolution** 1 rev/min, 0 to +30,000	**Units** RPM
SERCOS Default: 1000	**Length** 4 bytes	**Minimum/Maximum** Min. ≥ 0 Max. ≤ $+2^{31}$ - 1	**SERCOS Scaling Resolution** Scaling type IDN 00160 Scaling factor IDN 00161 Scaling exponent IDN 00162	**SERCOS Units** IDN 00160

IDN: S00260	**Name:** Posn_Accel_Rate		**Data Display:** decimal	R/W
Parameter No. 260 **File:** Control, Procedure **Group:** Acceleration, Orient	**Description:** Positioning acceleration. The "positioning acceleration" is used in the "drive resident interpolation" operation mode as the rate to accelerate to and decelerate from the positioning velocity (IDN 00222) during an orient procedure request (IDN 00152, parameter 152). This acceleration rate is also used with SERCOS or DPI initiated positioning moves to "Target Position", parameter 258.			
Analog/ SCANport Default: 100	**Length** 2 bytes	**Analog/SCANport Minimum/Maximum** Min. ≥ 0 Max. ≤ +65535	**Analog/SCANport Scaling Resolution** 1 rad/sec^2	**Units** Rad/Sec^2
SERCOS Default:	**Length** 4 bytes	**Minimum/Maximum** Min. ≥ 0 Max. ≤ $+2^{31}$ - 1	**SERCOS Scaling Resolution** Scaling type IDN 00160 Scaling factor IDN 00161 Scaling exponent IDN 00162	**SERCOS Units** IDN 00160

IDN: S00272	**Name:** Speed_Window_%		**Data Display:** Decimal	R/W
Parameter No. 272 **File:** Status/Faults **Group:** Setup	**Description:** Velocity window percentage. The velocity window percentage refers to a percentage of the "Velocity command value" (IDN 00036). See IDN 330 for additional information. If the velocity feedback value (IDN 00040) is found to be within a window of the velocity command defined by this percentage, the drive will set the status ""$n_{feedback} = n_{command}$" (IDN 00330). This IDN serves the same function as IDN 00157 but is expressed as a % rather than RPM			
Default: 1.00	**Length** 2 bytes	**Minimum/Maximum** Min. ≥ Max. ≤ 655.35	**Scaling Resolution** 0.01	**Units** %

<table>
<tr><td>IDN: S00277</td><td colspan="2">Name: Mtr_Fdbk_Config1</td><td>Data Display: Bit pattern</td><td>R/W</td></tr>
<tr><td>Parameter No.
277
File:
Motor/Drive/
Fdbk
Group:
Motor Feedback</td><td colspan="4">Description: Position feedback 1 type. The position feedback 1 type parameter refers only to a motor feedback device. This parameter is programmed to define the corresponding conditions which apply to reading the motor feedback device.
Enumerated Bit Pattern:
Structure of Position Feedback 1 Type:
Bit 0: Feedback type
0 – rotational feedback (IDN 00116)
1 – linear feedback (not defined)
Bit 1: Distance coded feedback
0 – no distance coded reference marks
1 – distance coded reference marks (IDNs 00165, 00166)
Bit 2: Feedback resolution (IDN 00118 - linear) or (IDN 00116 - rotary)
0 – resolution = metric or 0 - resolution = degree
1 – resolution = inches or 1 - resolution = (reserved)
Bit 3: Direction polarity
0 – not inverted
1 – inverted
Bit 4: marker pulse quantity
0 – only one reference marker pulse
1 – multiple cyclic reference marker pulses
Bit 5: Structure of distance coded feedback
0 – counting positive with positive direction
1 – counting negative with positive direction
Bit 6: Type of measuring system
0 - relative (incremental) measuring system
1 - absolute measuring system
Bit 7: Usage
0 - absolute measurements with an absolute measuring system
1 - relative (incremental) measurements with an absolute measuring system
Bits 15-8 (reserved)</td></tr>
<tr><td>Default:
xxxx0000</td><td>Length
2 bytes</td><td>Minimum/Maximum
NA</td><td>Scaling Resolution
NA</td><td>Units
NA</td></tr>
</table>

<table>
<tr><td>IDN: S00296</td><td colspan="2">Name: Vel_Fdfwd_Gain_0</td><td>Data Display: decimal</td><td>R/W</td></tr>
<tr><td>Parameter No.
296
File:
Servo Loop
Group:
Group 0</td><td colspan="4">Description: Velocity feed forward gain. This IDN is one of the 8 sets of servo parameters. The velocity feed forward parameter is effective in the operation mode “Position control without following error (lag-less)”, and serves to reduce the velocity-dependent following error.</td></tr>
<tr><td>Default:
0.00</td><td>Length
2 bytes</td><td>Minimum/Maximum
Minimum Input: ≥ 0
Maximum Input: ≤100.00</td><td>Scaling Resolution
1 = .01%</td><td>Units
%</td></tr>
</table>

IDN: S00330	**Name:** At_Prog_Speed		**Data Display:** Bit	R,Link
Parameter No. 330 **File:** I/O Interface **Group:** Event Links	**Description:** Status '$n_{feedback} = n_{command}$'. This parameter is used to define an IDN for the status ''$n_{feedback} = n_{command}$'' In the SERCOS configuration this allows the status '$n_{feedback} = n_{command}$' to be assigned to a real-time status bit (see IDN 00305). The status ' $n_{feedback} = n_{command}$' is defined as a C3D bit (IDN 00013) and is set when the velocity feedback value (IDN 00040) lies within the calculated command value for the velocity window (IDN 00157 and / or IDN 00272) which is based upon the velocity command value (see IDN 00036). Bit 0 is defined for operation data only. This parameter can be linked to the digital I/O or the SCANport logic word. Calculation of $n_{feedback} = n_{command}$': $\lvert n_{feedback} - n_{command} \rvert \leq \lvert n_{command} \rvert$ * IDN 00272 + IDN 00157 **Bit Pattern:** Structure of status '$n_{feedback} = n_{command}$' Bit 0 = 0: $n_{feedback} \neq n_{command}$ 1: $n_{feedback} = n_{command}$			
Default: NA	**Length** 2 bytes	**Minimum/Maximum** NA	**Scaling Resolution** NA	**Units** NA

IDN: S00331	**Name:** Zero_Speed		**Data Display:** Bit	R, Link
Parameter No. 331 **File:** I/O Interface **Group:** Event Links	**Description:** Status '$n_{feedback} = 0$'. This parameter is used to define an IDN for the status '$n_{feedback} = 0$'. In the SERCOS configuration this allows the status '$n_{feedback} = 0$' to be assigned to a real-time status bit (see IDN 00305). The status '$n_{feedback} = 0$' is defined as a C3D bit (IDN 00013) and is set when the velocity feedback value (IDN 00040) is within the standstill window (see IDN 00124). Bit 0 is defined for operation data only. This parameter can be linked to the digital I/O or the SCANport logic word. **Bit Pattern:** Structure of status '$n_{feedback} = 0$': Bit 0 = 0: $n_{feedback} \neq 0$ 1: $n_{feedback} = 0$			
Default: NA	**Length** 2 bytes	**Minimum/Maximum** NA	**Scaling Resolution** NA	**Units** NA

IDN: S00332	**Name:** Vel_Below_Thresh		**Data Display:** Bit	R, Link
Parameter No. 332 **File:** I/O Interface **Group:** Event Links	**Description:** Status '$n_{feedback} < n_x$'(n_x = velocity threshold). This parameter is used to define an IDN for the status '$n_{feedback} < n_x$'. In the SERCOS configuration this allows the status '$n_{feedback} < n_x$' to be assigned to a real-time status bit (see IDN 00305). The status '$n_{feedback} < n_x$' is defined as a C3D bit (IDN 00013) and is set when the velocity feedback value (see IDN 00040) is smaller than the velocity threshold n_x (see IDN 00125). Bit 0 is defined for operation data only. This parameter can be linked to the digital I/O or the SCANport logic word. **Enumerated Bit Pattern:** Structure of status $n_{feedback}<n_x$: Bit 0 = 0 : $\|n_{feedback}\| \geq \|n_x\|$ 1: $\|n_{feedback}\| < \|n_x\|$			
Default: NA	**Length** 2 bytes	**Minimum/Maximum** NA	**Scaling Resolution** NA	**Units** NA

IDN: S00334	**Name:** Torq_Above_Limit		**Data Display:** Bit	R, Link
Parameter No. 334 **File:** I/O Interface **Group:** Event Links	**Description:** Status '$T \geq T_{limit}$'. This parameter is used to define an IDN for the status '$T \geq T_{limit}$'. In the SERCOS configuration this allows this allows the status '$T \geq T_{limit}$' to be assigned to a real-time status bit (see IDN 00305). The status '$T \geq T_{limit}$' is defined as a C3D bit (IDN 00013) and is set when the torque feedback value (see IDN 00084) lies beyond the programmed torque limits (see IDN 00082 and IDN 00083). Bit 0 is defined for operation data only. This parameter can be linked to the digital I/O or the SCANport logic word. **Bit Pattern:** Structure of status '$T \geq T_{limit}$': Bit 0 = 0: $\|T\| < \|T_{limit}\|$ 1: $\|T\| \geq \|T_{limit}\|$			
Default: NA	**Length** 2 bytes	**Minimum/Maximum** NA	**Scaling Resolution** NA	**Units** NA

IDN: S00335	**Name:** Vel_Above_Limit		**Data Display:** Bit	R, Link
Parameter No. 335 **File:** I/O Interface **Group:** Event Links	**Description:** Status '$n_{command} > n_{limit}$'. This parameter is used to define an IDN for the status '$n_{command} > n_{limit}$'.' In the SERCOS configuration this allows the status '$n_{command} > n_{limit}$' to be assigned to a real-time status bit (see IDN 00305). The status '$n_{command} > n_{limit}$' is defined as a C3D bit (IDN 00013) and is set when the velocity command value (see IDN 00036) is greater than the velocity limit value (see IDN 00038 and IDN 00039). Bit 0 is defined for operation data only. This parameter can be linked to the digital I/O or the SCANport logic word. **Bit Pattern:** Structure of status $n_{command} > n_{limit}$': Bit 0 = 0 : $\|n_{command}\| \leq \|n_{limit}\|$ 1 : $\|n_{command}\| > \|n_{limit}\|$			
Default: NA	**Length** 2 bytes	**Minimum/Maximum** NA	**Scaling Resolution** NA	**Units** NA

<table>
<tr><td>IDN: S00336</td><td colspan="2">Name: In_Position</td><td>Data Display: Bit</td><td>R/Link</td></tr>
<tr><td>Parameter No.
336
File:
I/O Interface
Group:
Event Links</td><td colspan="4">Description: Status ’In position’. In the SERCOS configuration this parameter is used to define an IDN for the status ’in position’. This allows ’In position’ to be assigned to a real-time status bit (see IDN 305). The status ’in position’ is defined as a C3D bit (IDN 00013) and is set when the position feedback value falls within the position window (see IDN 00057) relative to the position command value (see IDN 00047). Bit 0 is defined for operation data only. This parameter can be linked to the digital I/O or the SCANport logic word.

Bit Pattern:
Structure of status ’in position’:
Bit 0 = 0: outside of position window
1: within position window</td></tr>
<tr><td>Default:
NA</td><td>Length
2 bytes</td><td>Minimum/Maximum
NA</td><td>Scaling Resolution
NA</td><td>Units
NA</td></tr>
</table>

<table>
<tr><td>IDN: S00339</td><td colspan="2">Name: Spd_Below_Min</td><td>Data Display: Bit</td><td>R/Link</td></tr>
<tr><td>Parameter No.
339
File:
I/O Interface
Group:
Event Links</td><td colspan="4">Description: Status ’$n_{feedback}$ ≤ minimum spindle speed’. In the SERCOS configuration this parameter is used to define an IDN for the status ’$n_{feedback}$ ≤ minimum spindle speed’. This allows the status ’$n_{feedback}$ ≤ minimum spindle speed’ to be assigned to a real-time status bit (see IDN 00305). The status ’$n_{feedback}$ ≤ minimum spindle speed’ is defined as a C3D bit (IDN 00013) and is set when the velocity feedback value (IDN 00040) is lower than or equal to the programmed minimum spindle speed (IDN 00220).
Bit 0 is defined for operation data only.

Bit Pattern:
Structure of ’$n_{feedback}$ ≤ minimum spindle speed’:
Bit 0 = 0 – $\vert$'$n_{feedback}$$\vert$ < minimum spindle speed'
1– $\vert$'$n_{feedback}$$\vert$ ≤ minimum spindle speed'</td></tr>
<tr><td>Default:
NA</td><td>Length
2 bytes</td><td>Minimum/Maximum
NA</td><td>Scaling Resolution
NA</td><td>Units
NA</td></tr>
</table>

IDN: S00340	**Name:** Spd_Above_max		**Data Display:** Bit	R, Link
Parameter No. 340 **File:** I/O Interface **Group:** Event Links	**Description:** Status '$n_{feedback}$ ≥ maximum spindle speed'. In the SERCOS configuration this parameter is used to define an IDN for the status '$n_{feedback}$ ≥ maximum spindle speed'. This allows the status '$n_{feedback}$ ≥ maximum spindle speed' to be assigned to a real–time status bit (see IDN 00305). The status '$n_{feedback}$ ≥ maximum spindle speed' is defined as a C3D bit (IDN 00013) and is set when the velocity feedback value (IDN 00040) is greater than or equal to the programmed maximum spindle speed (IDN 00221). Bit 0 is defined for operation data only. **Enumerated Bit Pattern:** Structure of $n_{feedback}$ ≥ maximum spindle speed': Bit 0 = 0 – | $n_{feedback}$ | < maximum spindle speed 1 – | '$n_{feedback}$ ≥ maximum spindle speed'			
Default: NA	**Length** 2 bytes	**Minimum/Maximum** NA	**Scaling Resolution** NA	**Units** NA

IDN: S00347	**Name:** Velocity_Error		**Data Display:** Decimal	R, Link
Parameter No. 347 **File:** Control **Group:** Velocity	**Description:** Velocity error. The current difference between the commanded velocity and actual velocity is placed in this parameter			
Analog/ SCANport Default: 0	**Length** 2 bytes	**Analog/SCANport Minimum/Maximum** Min. ≥ -30,000 Max. ≤ +30,000	**Analog/SCANport Scaling Resolution** 1 = 1 RPM	**Units** RPM
Default:	**Length** 4 bytes	**Minimum/Maximum** Minimum Input: ≥ -2^{31} Maximum Input: ≤ $+2^{31}-1$	**Scaling Resolution** Scaling type IDN 00044 Scaling factor IDN 00045 Scaling exponent IDN 00046 (see 8.6.2)	**Units** IDN 00044

IDN: S00348	**Name:** Acc_Fdfwd_Gain_0		**Data Display:** Decimal	R/W
Parameter No. 348 **File:** Servo Loop **Group:** Group 0	**Description:** Acceleration feed forward gain. This IDN is one of the 8 sets of servo loop parameters. Acceleration feed forward is when minimum following error is desired and serves to reduce acceleration / deceleration-dependent following error.			
Default: 0.00	**Length** 2 bytes	**Minimum/Maximum** Minimum Input: ≥ 0 Maximum Input: ≤ +100.00	**Scaling Resolution** 1 = .01%	**Units** **%**

IDN: S00380	**Name:** DC_Bus_Voltage		**Data Display:** Decimal	R, Link
Parameter No. 380 **File:** Status/Faults **Group:** Drive Status	**Description:** DC bus voltage. The drive's DC (intermediate) bus voltage value is placed in this parameter.			
Default: From RPS	**Length** 2 bytes	**Minimum/Maximum** Minimum Input: ≥ 0 Maximum Input: ≤ +1000	**Scaling Resolution** 1 = 1 volt	**Units** Volt

IDN: S00386	**Name:** Mtr_Shaft_Power		**Data Display:** Decimal	R, Link
Parameter No. 386 **File:** Status/Faults **Group:** Drive Status	**Description:** Motor shaft power. The drive places the estimated motor shaft power in this parameter.			
Default:	**Length** 2 bytes	**Minimum/Maximum** Minimum Input: ≥ 0 Maximum Input: ≤ +655.35	**Scaling Resolution** 1 = .01 kw	**Units** kw

A-B (P) Parameters in Numerical Order

SERCOS IDN No.	8720MC Param No.	DESCRIPTION	16 Character Name	File	Group
P00001	501	A-B Drive Type/Application	A-B_Application	Motor/Drive/Fdbk	Drive Data
P00002	502	A-B Motor/feedback Configuration Extensions	Mtr_Fbck_Type	Motor/Drive/Fdbk	Motor Feedback
P00003	503	A-B Aux Position Feedback "2 type" Extensions	Aux_Fbck_Type	Motor/Drive/Fdbk	Aux Feedback
P00020	520	Current Limit Source	Cur_Limit_Source	Status/Faults	Drive Status
P00022	522	PWM Frequency	PWM_Frequency	Motor/Drive/Fdbk	Drive Data
P00023	523	System acceleration	System_Accel_0	Servo Loop	Group 0
P00026	526	Enable the High Winding - disable the low	HI_Wind_enable	I/O Interface	Event Links
P00027	527	Enable the Low Winding - disable the High	Lo_Wind_Enable	I/O Interface	Event Links
P00028	528	Enable/Disable Brake	Enable_Brake_Sol	I/O Interface	Event Links
P00029	529	Drive is capable of following the auto reference	Auto_Ref_Enabled	I/O Interface	Event Links
P00030	530	Drive is in manual mode	Manual_Mode_On	I/O Interface	Event Links
P00041	541	System Auto Tune Select	ATune _Select	Procedure	Auto Tune
P00042	542	Auto Tune Torque Limit	ATune_Torq_Limit	Procedure	Auto Tune
P00043	543	Auto Tune Velocity Limit	ATune_Vel_Limit	Procedure	Auto Tune
P00044	544	Auto Tune Position Limit	ATune_Posn_Limit	Procedure	Auto Tune
P00046	546	Auto Tune Configuration Setup	ATune_Config	Procedure	Auto Tune
P00047	547	Auto Tune Status	ATune_Status	Procedure	Auto Tune
P00061	561	Torque Reference Notch Filter Frequency	Torq_Notch_Freq0	Servo Loop	Group 0
P00062	562	Torque Reference Low Pass Filter Bandwidth	Torq_Lowpas_Frq0	Servo Loop	Group 0
P00063	563	Regenerative Energy Capacity	Regen_Energy_Val	Motor/Drive/Fdbk	Drive Data
P00071	571	Stopping Torque	Stopping_ Torque	Control	Torque
P00072	572	Stopping time limit	Stop_Time_Limit	Control	Torque
P00081	581	Homing Strategy	Homing_Strategy	Procedure	Homing
P00082	582	Orient Strategy	Auto_Home	Procedure	Orient
P00083	583	Orient Complete	Orient_Complete	I/O Interface	Event Links
P00110	610	Drive is capable of running - no faults	Drive_OK	I/O Interface	Event Links
P00115	615	A Shut Down Error has occurred	Shut_down_Error	I/O Interface	Event Links
P00117	617	Regenerative Power Supply Fault	Power_Supply_OK	I/O Interface	Event Links
P00161	661	Digital Output Status	Output_Image	I/O Interface	Digital Outputs
P00162	662	Digital Output 1 - Source	Output_01_Source	I/O Interface	Digital Outputs
P00163	663	Digital Output 2 - Source	Output_02_Source	I/O Interface	Digital Outputs
P00164	664	Digital Output 3 - Source	Output_03_Source	I/O Interface	Digital Outputs
P00165	665	Digital Output 4 - Source	Output_04_Source	I/O Interface	Digital Outputs
P00166	666	Digital Output 5 - Source	Output_05_Source	I/O Interface	Digital Outputs
P00167	667	Digital Output 6 - Source	Output_06_Source	I/O Interface	Digital Outputs
P00168	668	Digital Output 7 - Source	Output_07_Source	I/O Interface	Digital Outputs

A-B (P) Parameters in Numerical Order

SERCOS IDN No.	8720MC Param No.	DESCRIPTION	16 Character Name	File	Group
P00169	669	Digital Output 8 - Source	Output_08_Source	I/O Interface	Digital Outputs
P00170	670	Digital Output 9 - Source	Output_09_Source	I/O Interface	Digital Outputs
P00171	671	Digital Output 10 - Source	Output_10_Source	I/O Interface	Digital Outputs
P00181	681	Analog Output 1 - Source	AnagOut1_Source	I/O Interface	Analog Outputs
P00182	682	Analog Output 1 Scale Factor	AnagOut1_Gain	I/O Interface	Analog Outputs
P00183	683	Analog Output 2 - Source	AnagOut2_Source	I/O Interface	Analog Outputs
P00184	684	Analog Output 2 Scale Factor	AnagOut2_Gain	I/O Interface	Analog Outputs
P00190	690	Digital Input Status	Input_Image	I/O Interface	Digital Inputs
P00191	691	Analog Input 1- Auto Reference	Ana_In1_Value	I/O Interface	Analog Inputs
P00192	692	Analog Input 2 - Manual Reference	Ana_In2_Value	I/O Interface	Analog Inputs
P00193	693	Analog Input 1 Auto Reference Offset	Ana_In1_Offset	I/O Interface	Analog Inputs
P00194	694	Analog Input 2 Manual Reference Offset	Ana_In2_Offset	I/O Interface	Analog Inputs
P00195	695	Analog Input 1 Auto Scale Factor	Analog_Vel_Scale	I/O Interface	Analog Inputs
P00196	696	Analog Input 2 Manual Scale Factor	Manual_Vel_Scale	I/O Interface	Analog Inputs
P00213	713	The value in SCANport Analog Input 1	SCANp_An1_Value	Communication	SCANp_Ref/fdback
P00215	715	Analog output shared by all SCANports	Analog_Out_Param	Communication	SCANp_Ref/fdback
P00216	716	SCANport Logic Mask	Sp_Logic_Mask	Communication	SCANp_Data_In
P00217	717	SCANport Logic Command	Logic_Command	Communication	SCANp_Data_In
P00218	718	SCANport Logic Status	SP_Logic_Status	Communication	SCANp_Data_Out
P00225	725	SCANport In Channel A1	SP_Data_Input_A1	Communication	SCANp_Data_In
P00226	726	SCANport In Channel A2	SP_Data_Input_A2	Communication	SCANp_Data_In
P00227	727	SCANport In Channel B1	SP_Data_Input_B1	Communication	SCANp_Data_In
P00228	728	SCANport In Channel B2	SP_Data_Input_B2	Communication	SCANp_Data_In
P00229	729	SCANport In Channel C1	SP_Data_Input_C1	Communication	SCANp_Data_In
P00230	730	SCANport In Channel C2	SP_Data_Input_C2	Communication	SCANp_Data_In
P00231	731	SCANport In Channel D1	SP_Data_Input_D1	Communication	SCANp_Data_In
P00232	732	SCANport In Channel D2	SP_Data_Input_D2	Communication	SCANp_Data_In
P00233	733	SCANport Out Channel A1	SP_Data_Out_A1	Communication	SCANp_Data_Out
P00234	734	SCANport Out Channel A2	SP_Data_Out_A2	Communication	SCANp_Data_Out
P00235	735	SCANport Out Channel B1	SP_Data_Out_B1	Communication	SCANp_Data_Out
P00236	736	SCANport Out Channel B2	SP_Data_Out_B2	Communication	SCANp_Data_Out
P00237	737	SCANport Out Channel C1	SP_Data_Out_C1	Communication	SCANp_Data_Out
P00238	738	SCANport Out Channel C2	SP_Data_Out_C2	Communication	SCANp_Data_Out
P00239	739	SCANport Out Channel D1	SP_Data_Out_D1	Communication	SCANp_Data_Out
P00240	740	SCANport Out Channel D2	SP_Data_Out_D2	Communication	SCANp_Data_Out
P00241	741	Encoder Memory Map Revision	Enc_Mem_Map_Rev	Mtr/Drive/Fdbk	Motor Data

A-B (P) Parameters in Numerical Order

SERCOS IDN No.	8720MC Param No.	DESCRIPTION	16 Character Name	File	Group
P00242	742	Motor Parameter Revision	Motor_Param_Rev	Mtr/Drive/Fdbk	Motor Data
P00277	777	Motor Catalog Number	Motor_Select	Mtr/Drive/Fdbk	Motor Data
P00278	778	Allen Bradley Motor Type Selection	Motor_Type	Mtr/Drive/Fdbk	Motor Data
P00279	779	Motor Pole Count/Linear Motor Pole Pitch	Motor_Poles_Count	Mtr/Drive/Fdbk	Motor Data
P00280	780	Motor Rated Acceleration	Mtr_Acceleration	Mtr/Drive/Fdbk	Motor Data
P00281	781	Motor Base Speed	Base_Speed	Mtr/Drive/Fdbk	Motor Data
P00282	782	Motor Rated Continuous Power	Motor_Rated_Power	Mtr/Drive/Fdbk	Motor Data
P00283	783	Motor Maximum Voltage	Motor_Max_Volts	Mtr/Drive/Fdbk	Motor Data
P00284	784	Motor - Voltage at base Speed	Motor_Base_Volts	Mtr/Drive/Fdbk	Motor Data
P00285	785	Motor rated Continuous Torque	Rated_Torque	Mtr/Drive/Fdbk	Motor Data
P00286	786	Motor - Back Emf Constant	Motor_Back_EMF	Mtr/Drive/Fdbk	Motor Data
P00287	787	Motor - Stator Resistance R1/Rs	R1_Motor_Stator	Mtr/Drive/Fdbk	Motor Data
P00288	788	Motor - Rotor Resistance R2	R2_Motor_Rotor	Mtr/Drive/Fdbk	Motor Data
P00289	789	Motor - Stator Self/Leakage Inductance	X1_Stat_Self/Lk	Mtr/Drive/Fdbk	Motor Data
P00290	790	Motor - Stator Magnetizing Inductance	XM_Stator_Mutual	Mtr/Drive/Fdbk	Motor Data
P00291	791	Motor - Rotor leakage Inductance	X2_Rotor_Leakage	Mtr/Drive/Fdbk	Motor Data
P00292	792	Motor - Magetizing Current	Mtr_Mag_Current	Mtr/Drive/Fdbk	Motor Data
P00293	793	Motor - Slip Constant	Mtr_Slip_Freq	Mtr/Drive/Fdbk	Motor Data
S10032	811	Primary Operating Mode (n=1)	Primary_Op_Mode1	Servo Loop	Group 1
S10038	812	Positive velocity limit value (n=1)	+Vel_Limit_1	Servo Loop	Group 1
S10039	813	Negative velocity limit value (n=1)	-Vel_Limit_1	Servo Loop	Group 1
S10082	814	Positive torque limit value (n=1)	+Torque_Limit_1	Servo Loop	Group 1
S10083	815	Negative torque limit value (n=1)	-Torque_Limit_1	Servo Loop	Group 1
S10100	816	Velocity loop proportional gain	Vel_Prop_Gain_1	Servo Loop	Group 1
S10101	817	Velocity loop integral action time	Vel_Integ_Time_1	Servo Loop	Group 1
S10104	818	Position loop K_V-factor	Pos_Loop_Gain_1	Servo Loop	Group 1
S10105	819	Position loop integral action time	Pos_Int_Time_1	Servo Loop	Group 1
S10296	820	Velocity feed forward gain	Vel_Fdfwd_Gain_1	Servo Loop	Group 1
S10384	821	Acceleration Feed Forward Gain	Acc_Fdfwd_Gain_1	Servo Loop	Group 1
P00322	822	System Acceleration	System_Accel_1	Servo Loop	Group 1
P00323	823	Torque Reference Notch Filter Frequency	Torq_Notch_Freq1	Servo Loop	Group 1
P00324	824	Torque Reference Low Pass Filter Bandwidth	Torq_Lowpas_Frq1	Servo Loop	Group 1
S10136	825	Acceleration limit parameter group 1	Accel_Limit_1	Servo Loop	Group 1
S10137	826	Deceleration limit parameter group 1	Decel_Limit_1	Servo Loop	Group 1
S20032	831	Primary Operating Mode	Primary_Op_Mode2	Servo Loop	Group 2
S20038	832	Positive velocity limit value (n=2)	+Vel_Limit_2	Servo Loop	Group 2

A-B (P) Parameters in Numerical Order

SERCOS IDN No.	8720MC Param No.	DESCRIPTION	16 Character Name	File	Group
S20039	833	Negative velocity limit value (n=2)	-Vel_Limit_2	Servo Loop	Group 2
S20082	834	Positive torque limit value (n=2)	+Torque_Limit_2	Servo Loop	Group 2
S20083	835	Negative torque limit value (n=2)	-Torque_Limit_2	Servo Loop	Group 2
S20100	836	Velocity loop proportional gain	Vel_Prop_Gain_2	Servo Loop	Group 2
S20101	837	Velocity loop integral action time	Vel_Integ_Time_2	Servo Loop	Group 2
S20104	838	Position loop K_v-factor	Pos_Loop_Gain_2	Servo Loop	Group 2
S20105	839	Position loop integral action time	Pos_Int_Time_2	Servo Loop	Group 2
S20296	840	Velocity feed forward gain	Vel_Fdfwd_Gain_2	Servo Loop	Group 2
S20384	841	Acceleration Feed Forward Gain	Acc_Fdfwd_Gain_2	Servo Loop	Group 2
P00342	842	System Acceleration	System_Accel_2	Servo Loop	Group 2
P00343	843	Torque Reference Notch Filter Frequency	Torq_Notch_Freq2	Servo Loop	Group 2
P00344	844	Torque Reference Low Pass Filter Bandwidth	Torq_Lowpas_Frq2	Servo Loop	Group 2
S20136	845	Acceleration limit parameter group 2	Accel_Limit_2	Servo Loop	Group 2
S20137	846	Deceleration limit parameter group 2	Decel_Limit_2	Servo Loop	Group 2
S30032	851	Primary Operating Mode	Primary_Op_Mode3	Servo Loop	Group 3
S30038	852	Positive velocity limit value (n=3)	+Vel_Limit_3	Servo Loop	Group 3
S30039	853	Negative velocity limit value (n=3)	-Vel_Limit_3	Servo Loop	Group 3
S30082	854	Positive torque limit value (n=3)	+Torque_Limit_3	Servo Loop	Group 3
S30083	855	Negative torque limit value (n=3)	-Torque_Limit_3	Servo Loop	Group 3
S30100	856	Velocity loop proportional gain	Vel_Prop_Gain_3	Servo Loop	Group 3
S30101	857	Velocity loop integral action time	Vel_Integ_Time_3	Servo Loop	Group 3
S30104	858	Position loop K_v-factor	Pos_Loop_Gain_3	Servo Loop	Group 3
S30105	859	Position loop integral action time	Pos_Int_Time_3	Servo Loop	Group 3
S30296	860	Velocity feed forward gain	Vel_Fdfwd_Gain_3	Servo Loop	Group 3
S30384	861	Acceleration Feed Forward Gain	Acc_Fdfwd_Gain_3	Servo Loop	Group 3
P00362	862	System Acceleration	System_Accel_3	Servo Loop	Group 3
P00363	863	Torque Reference Notch Filter Frequency	Torq_Notch_Freq3	Servo Loop	Group 3
P00364	864	Torque Reference Low Pass Filter Bandwidth	Torq_Lowpas_Frq3	Servo Loop	Group 3
S30136	865	Acceleration limit parameter group 3	Accel_Limit_3	Servo Loop	Group 3
S30137	866	Deceleration limit parameter group 3	Decel_Limit_3	Servo Loop	Group 3
S40032	871	Primary Operating Mode	Primary_Op_Mode4	Servo Loop	Group 4
S40038	872	Positive velocity limit value (n=4)	+Vel_Limit_4	Servo Loop	Group 4
S40039	873	Negative velocity limit value (n=4)	-Vel_Limit_4	Servo Loop	Group 4
S40082	874	Positive torque limit value (n=4)	+Torque_Limit_4	Servo Loop	Group 4
S40083	875	Negative torque limit value (n=4)	-Torque_Limit_4	Servo Loop	Group 4
S40100	876	Velocity loop proportional gain	Vel_Prop_Gain_4	Servo Loop	Group 4

A-B (P) Parameters in Numerical Order

SERCOS IDN No.	8720MC Param No.	DESCRIPTION	16 Character Name	File	Group
S40101	877	Velocity loop integral action time	Vel_Integ_Time_4	Servo Loop	Group 4
S40104	878	Position loop K_v-factor	Pos_Loop_Gain_4	Servo Loop	Group 4
S40105	879	Position loop integral action time	Pos_Int_Time_4	Servo Loop	Group 4
S40296	880	Velocity feed forward gain	Vel_Fdfwd_Gain_4	Servo Loop	Group 4
S40384	881	Acceleration Feed Forward Gain	Acc_Fdfwd_Gain_4	Servo Loop	Group 4
P00382	882	System Acceleration	System_Accel_4	Servo Loop	Group 4
P00383	883	Torque Reference Notch Filter Frequency	Torq_Notch_Freq4	Servo Loop	Group 4
P00384	884	Torque Reference Low Pass Filter Bandwidth	Torq_Lowpas_Frq4	Servo Loop	Group 4
S40136	885	Acceleration limit parameter group 4	Accel_Limit_4	Servo Loop	Group 4
S40137	886	Deceleration limit parameter group 4	Decel_Limit_4	Servo Loop	Group 4
S50032	891	Primary Operating Mode	Primary_Op_Mode5	Servo Loop	Group 5
S50038	892	Positive velocity limit value (n=5)	+Vel_Limit_5	Servo Loop	Group 5
S50039	893	Negative velocity limit value (n=5)	-Vel_Limit_5	Servo Loop	Group 5
S50082	894	Positive torque limit value (n=5)	+Torque_Limit_5	Servo Loop	Group 5
S50083	895	Negative torque limit value (n=5)	-Torque_Limit_5	Servo Loop	Group 5
S50100	896	Velocity loop proportional gain	Vel_Prop_Gain_5	Servo Loop	Group 5
S50101	897	Velocity loop integral action time	Vel_Integ_Time_5	Servo Loop	Group 5
S50104	898	Position loop K_v-factor	Pos_Loop_Gain_5	Servo Loop	Group 5
S50105	899	Position loop integral action time	Pos_Int_Time_5	Servo Loop	Group 5
S50296	900	Velocity feed forward gain	Vel_Fdfwd_Gain_5	Servo Loop	Group 5
S50384	901	Acceleration Feed Forward Gain	Acc_Fdfwd_Gain_5	Servo Loop	Group 5
P00402	902	System Acceleration	System_Accel_5	Servo Loop	Group 5
P00403	903	Torque Reference Notch Filter Frequency	Torq_Notch_Freq5	Servo Loop	Group 5
P00404	904	Torque Reference Low Pass Filter Bandwidth	Torq_Lowpas_Frq5	Servo Loop	Group 5
S50136	905	Acceleration limit parameter group 5	Accel_Limit_5	Servo Loop	Group 5
S50137	906	Deceleration limit parameter group 5	Decel_Limit_5	Servo Loop	Group 5
S60032	911	Primary Operating Mode	Primary_Op_Mode6	Servo Loop	Group 6
S60038	912	Positive velocity limit value (n=6)	+Vel_Limit_6	Servo Loop	Group 6
S60039	913	Negative velocity limit value (n=6)	-Vel_Limit_6	Servo Loop	Group 6
S60082	914	Positive torque limit value (n=6)	+Torque_Limit_6	Servo Loop	Group 6
S60083	915	Negative torque limit value (n=6)	-Torque_Limit_6	Servo Loop	Group 6
S60100	916	Velocity loop proportional gain	Vel_Prop_Gain_6	Servo Loop	Group 6
S60101	917	Velocity loop integral action time	Vel_Integ_Time_6	Servo Loop	Group 6
S60104	918	Position loop K_v-factor	Pos_Loop_Gain_6	Servo Loop	Group 6
S60105	919	Position loop integral action time	Pos_Int_Time_6	Servo Loop	Group 6
S60296	920	Velocity feed forward gain	Vel_Fdfwd_Gain_6	Servo Loop	Group 6

A-B (P) Parameters in Numerical Order

SERCOS IDN No.	8720MC Param No.	DESCRIPTION	16 Character Name	File	Group
S60384	921	Acceleration Feed Forward Gain	Acc_Fdfwd_Gain_6	Servo Loop	Group 6
P00422	922	System Acceleration	System_Accel_6	Servo Loop	Group 6
P00423	923	Torque Reference Notch Filter Frequency	Torq_Notch_Freq6	Servo Loop	Group 6
P00424	924	Torque Reference Low Pass Filter Bandwidth	Torq_Lowpas_Frq6	Servo Loop	Group 6
S60136	925	Acceleration limit parameter group 6	Accel_Limit_6	Servo Loop	Group 6
S60137	926	Deceleration limit parameter group 6	Decel_Limit_6	Servo Loop	Group 6
S70032	931	Primary Operating Mode	Primary_Op_Mode7	Servo Loop	Group 7
S70038	932	Positive velocity limit value (n=7)	+Vel_Limit_7	Servo Loop	Group 7
S70039	933	Negative velocity limit value (n=7)	-Vel_Limit_7	Servo Loop	Group 7
S70082	934	Positive torque limit value (n=7)	+Torque_Limit_7	Servo Loop	Group 7
S70083	935	Negative torque limit value (n=7)	-Torque_Limit_7	Servo Loop	Group 7
S70100	936	Velocity loop proportional gain	Vel_Prop_Gain_7	Servo Loop	Group 7
S70101	937	Velocity loop integral action time	Vel_Integ_Time_7	Servo Loop	Group 7
S70104	938	Position loop K_v-factor	Pos_Loop_Gain_7	Servo Loop	Group 7
S70105	939	Position loop integral action time	Pos_Int_Time_7	Servo Loop	Group 7
S70296	940	Velocity feed forward gain	Vel_Fdfwd_Gain_7	Servo Loop	Group 7
S70384	941	Acceleration Feed Forward Gain	Acc_Fdfwd_Gain_7	Servo Loop	Group 7
P00442	942	System Acceleration	System_Accel_7	Servo Loop	Group 7
P00443	943	Torque Reference Notch Filter Frequency	Torq_Notch_Freq7	Servo Loop	Group 7
P00444	944	Torque Reference Low Pass Filter Bandwidth	Torq_Lowpas_Frq7	Servo Loop	Group 7
S70136	945	Acceleration limit parameter group 7	Accel_Limit_7	Servo Loop	Group 7
S70137	946	Deceleration limit parameter group 7	Decel_Limit_7	Servo Loop	Group 7

A-B (P) Parameter Descriptions

The remainder of this chapter describes the A-B specific programming parameters available to the 8720MC Drive. These parameters are required to extend the drive functionality beyond what the IEC 61491 Standard supports. IEC 61491 defines all special parameters as “P” parameters. For example: special parameter 105 is typically represented as SERCOS parameter P00105. Standard parameter 105 is represented as SERCOS parameter S00105. To simplify the 8720MC displays and data base the standard SERCOS parameters are found in 8720MC parameters 1 to 500. The special SERCOS parameters are found in 8720MC parameters 501 to 999. The range of 8720MC parameters is therefore 1 to 999, decimal. Each parameter explaination gives a reference to both the SERCOS parameter number and the 8720MC parameter number.

<table>
<tr><td>IDN: P00001</td><td colspan="2">Name: A-B_Application</td><td>Data Type: Ascii characters</td><td>R/W</td></tr>
<tr><td>Parameter No.
501
File:
Motor/Drive/
Fdbk
Group:
Drive Data</td><td colspan="4">Description: This IDN is used to provide A-B drive application configuration choices which otherwise do not appear in the SERCOS Standard. These choices are used to identify the I/O faults, the data scaling and the reference source for automatic operation. The choices available are:
* 000 - Analog Spindle - “Ana Spindle”
* 001 - Analog power servo - “Ana Servo”
* 010 - SERCOS spindle - “SERCOS Spindle”
* 011 - SERCOS power servo - “SERCOS Servo”
* 100 - SCANport Digital Peripheral Interface spindle - “DPI Spindle”
* 101- SCANport Digital Peripheral Interface power servo - “DPI Servo”

When choosing Analog Spindle or Analog Servo make sure parameter 503 is set to “Analog_Ref”</td></tr>
<tr><td>Default:
Analog Spindle</td><td>Length
2 bytes</td><td>Minimum/Maximum
NA</td><td>Scaling Resolution
NA</td><td>Units
NA</td></tr>
</table>

<table>
<tr><td>IDN: P00002</td><td colspan="2">Name: Mtr_Fbck_Type</td><td>Data Type: Ascii characters</td><td>R/W</td></tr>
<tr><td>Parameter No.
502
File:
Motor/Drive/
Fdbk
Group:
Motor Feedback</td><td colspan="4">Description: This IDN is used to provide A-B drive configuration choices which otherwise do not appear in the SERCOS Standard. The feedback type of the motor mounted feedback device is found in IDN S00277. The resolution for rotary devices is found in IDNS00116 and IDN S00118 for linear devices. IDN P00002 is used to provide additional motor feedback information in support of the information found in the standard SERCOS IDN's.

Structure of motor feedback type: * = Auto detected Hiperface Stegmann Device
Bits: 3-0: 0000 = No Feedback
0001 = SRS_60 Single turn absolute 1024 S/C per rev
0010 = SRM_60 Multi-turn absolute 1024 S/C per rev
0011 = SCS_60 Single turn absolute 512 S/C per rev
0100 = SCM_60 Multi-turn absolute 512 S/C per rev
0101 = SNS_60 High resolution incremental 1024 S/C per rev
0110 = MHG_90 Single turn absolute magnetic encoder 512 S/C per rev
0111 = Resolver Transmitter type; 0.25 TR
1000 = Analog Reference +/- 10 vdc differential
1001 = Sin/Cos Generic linear or rotary S/C device w/index
1010 = TTL Generic linear or rotary TTL A quad B device w/index
1011 = UVW Differential hall effect commutation signals
1100 = unknown Stegmann Unrecognized Stegmann device
1101 = Endat Heidenhain Endat SSI S/C feedback device</td></tr>
<tr><td>Default:
SRS_60</td><td>Length
2 bytes</td><td>Minimum/Maximum
NA</td><td>Scaling Resolution
NA</td><td>Units
NA</td></tr>
</table>

IDN: P00003	**Name:** Aux_Fbck_Type		**Data Type:** Ascii characters	R/W
Parameter No. 503 **File:** Motor/Drive/ Fdbk **Group:** Aux Feedback	**Description:** This IDN is used to provide A-B drive configuration choices which otherwise do not appear in the SERCOS Standard. The feedback type for a machine mounted feedback device is found in IDN S00115. The resolution of the machine mounted feedback device is found in IDN S00117 for both rotary and linear devices. IDN P00003 is used to provide additional motor feedback information in support of the information found in the standard SERCOS IDN's. Structure of motor feedback type: * = *Auto detected Hiperface Stegmann Device* Bits: 3-0: 0000 = No Feedback 0001 = SRS_60 Single turn absolute 1024 S/C per rev 0010 = SRM_60 Multi-turn absolute 1024 S/C per rev 0011 = SCS_60 Single turn absolute 512 S/C per rev 0100 = SCM_60 Multi-turn absolute 512 S/C per rev 0101 = SNS_60 High resolution incremental 1024 S/C per rev 0110 = MHG_90 Single turn absolute magnetic encoder 512 S/C per rev 0111 = Resolver Transmitter type; 0.25 TR 1000 = Analog Reference +/- 10 vdc differential 1001 = Sin/Cos Generic linear or rotary S/C device w/index 1010 = TTL Generic linear or rotary TTL A quad B device w/index 1011 = UVW Differential hall effect commutation signals 1100 = unknown Stegmann Unrecognized Stegmann device 1101 = Endat Heidenhain Endat SSI S/C feedback device Analog reference must be chosen whenever the drive is configured for an analog command reference. See parameter 500			
Default: Analog Ref	**Length** 2 bytes	**Minimum/Maximum** NA	**Scaling Resolution** NA	**Units** NA

IDN: P00020	**Name:** Cur_Limit_Source		**Data Type:** ascii representation of enumeration	R
Parameter No. 520 **File:** Status/Faults **Group:** Drive Status	**Description:** This parameter displays the present source, if any, of an 8720MC Drive.current limit request. Structure of the current limit source: Bits 2 - 0 000 = Not limited 001 = Negative current limit 010 = Positive current limit 011 = Bridge current limit 100 = I(t) limit (current vs time before foldback) 101 = Dynamic motor limit This parameter is not available in the analog version of the 8720MC			
Default: 0	**Length** 2 bytes	**Minimum/Maximum** NA	**Scaling Resolution** NA%	**Units** NA

IDN: P00022	**Name:** PWM_Frequency		**Data Type:** Integer	R
Parameter No. 522 **File:** Motor/Drive/ Fdbk **Group:** Drive Data	**Description:** The 8720MC supports a programmable PWM frequency for the power IGBT's. Parameter 522 is matched to the connected motor to minimize the audible noise without reducing the motor and amplifier thermal capacities. This parameter should not be changed for any standard 8720SM motors.			
Default: 4000 hz	**Length** 2 bytes	**Minimum/Maximum** 1000 to 30,000	**Scaling Resolution** 1 = 1hz	**Units** hz

IDN: P00023	**Name:** System_Accel_0		**Data Type:** Integer	R/W
Parameter No. 523 **File:** Servo Loop **Group:** Group 0	**Description:** The 8720MC supports 8 sets of Servo Parameters (0-7). The SERCOS link, the I/O interface or SCANport can select which set of parameters is to be enabled. Group 0 is the default group. IDN P00023 is used to provide the drive with the required motor acceleration that will produce 100% torque for Servo group 0. This value should be derived by the drive via auto tuning with the desired load connected. It will effect the stability of the velocity loop. This parameter is used by the drive to translate acceleration commands (output of the velocity regulator) to torque commands. The data is represented by an unsigned integer.			
Default: 65535	**Length** 2 bytes	**Minimum/Maximum** Minimum Input: ≥ 0 Maximum Input: ≤65535	**Scaling Resolution** 1 = 1 rad/sec^2	**Units** rad/sec^2

IDN: P00026	**Name:** Hi_Wind_Enable		**Data Display:** bit flag	R, Link
Parameter No. 526 **File:** I/O Interface **Group:** Event Link	**Description:** The 8720MC drive support dual (wye - Delta) wound motors. The motor is connected wye for low speed and delta for high speed. These motors require switching via external contactors. Parameter 526 (P00026) can be linked to a digital output relay contact by writing it's parameter number into a digital relay output word. When this I/O link is created the relay output contact will close whenever the high winding is selected. Also the low winding output will be disabled since both cannot be on concurrently.			
Default: 0	**Length** 2 bytes	**Minimum/Maximum** NA	**Scaling Resolution** NA	**Units** NA

IDN: P00027	**Name:** Lo_Wind_Enable		**Data Display:** bit flag	R, Link
Parameter No. 527 **File:** I/O Interface **Group:** Event Link	**Description:** The 8720MC drive support dual (wye - Delta) wound motors. The motor is connected wye for low speed and delta for high speed. These motors require switching via external contactors. Parameter 527 (P00027) can be linked to a digital output relay contact by writing it's parameter number into a digital relay output word. When this I/O link is created the relay output contact will close whenever the low winding is selected. Also the high winding output will be disabled since both cannot be on concurrently. .			
Default: 0	**Length** 2 bytes	**Minimum/Maximum** NA	**Scaling Resolution** NA	**Units** NA

<table>
<tr><td>IDN: P00028</td><td colspan="2">Name: Enable_Brake_SOL</td><td>Data Type: bit flag</td><td>R, Link</td></tr>
<tr><td>Parameter No.
528
File:
I/O Interface
Group:
Event Links</td><td colspan="4">Description: The 8720MC digital I/O can be linked to events within the drive. One of the 8720MC relay contact outputs can be linked to IDN P00028. IDN P00028 is true whenever the drive is enabled and the brake delay constants (parameters 206 and 207) are satisfied. Entering 528 into digital outputs 2, 3, or 4 will link the “Enable Brake Solenoid” event to one of the relay contact outputs.</td></tr>
<tr><td>Default:
0</td><td>Length
2 bytes</td><td>Minimum/Maximum
NA</td><td>Scaling Resolution
NA</td><td>Units
N/A</td></tr>
</table>

<table>
<tr><td>IDN: P00029</td><td colspan="2">Name: Auto_Ref_Enabled</td><td>Data Type: bit flag</td><td>R, Link</td></tr>
<tr><td>Parameter No.
529
File:
I/O Interface
Group:
Event Links</td><td colspan="4">Description: Parameter 529 (P00029) can be linked to a digital output and is provided in the SCANport logic status word. It is used to identify when the 8720MC is capable of following the auto reference from the primary source identified in parameter 501. If the drive enable input is true and the auto mode of operation is active and there are no drive faults, parameter 565 will be true.</td></tr>
<tr><td>Default:
0</td><td>Length
2 bytes</td><td>Minimum/Maximum
NA</td><td>Scaling Resolution
NA</td><td>Units
NA</td></tr>
</table>

<table>
<tr><td>IDN: P00030</td><td colspan="2">Name: Manual_Mode_On</td><td>Data Type: bit flag</td><td>R, Link</td></tr>
<tr><td>Parameter No.
530
File:
I/O Interface
Group:
Event Links</td><td colspan="4">Description: Parameter 530 (P00030) can be linked to a digital output and is used by the system to indicate that the manual mode of operation is selected. The manual mode of operation can be established from the HIM by depressing the stop button. It can also be requested from the digital I/O and the SCANport command word. When parameter 530 is true manual mode is selected. In manual mode the drive can be jogged by the HIM, the digital I/O or SCANportat at the jog reference speed established by the requesting device. When switching from manual mode back to auto it is necessary to auto enable the drive by dropping the drive enable input low and returning it back to the true (+24 vdc) state. This prevents an auto ref start when selecting auto mode.</td></tr>
<tr><td>Default:
0</td><td>Length
2 bytes</td><td>Minimum/Maximum
NA</td><td>Scaling Resolution
NA</td><td>Units
NA</td></tr>
</table>

IDN: P00041	Name: ATune_Select		Data Type: bit pattern	R/W
Parameter No. 541 **File:** Procedure **Group:** Auto Tune	**Description:** The 8720MC supports auto tuning. IDN P00041 initiates the auto tune cycle procedure command. This cycle measures the auto tune inertia and auto tune friction by accelerating the motor up to the auto tune velocity at the auto tune current. The gains are also calculated based on the auto tune information. For the servo loop parameter set selected auto tuning will calculate: "Vel_Prop_Gain_n", "Vel_Int_Time_n", "System_Accel_n" and "Torq_Lowpas_Frqn". It will also calculate parameter 693, "Auto_Ref_Offset" to zero the analog command reference. The structure of Auto tune Select is: Bits 1-0 00 = Idle - The auto tune system can be used 01 = Axis tune - Initiates the auto tune process.			
Default: 0	**Length** 2 bytes	**Minimum/Maximum** NA	**Scaling Resolution** NA	**Units** N/A

IDN: P00042	Name: ATune_Torq_Limit		Data Type: Decimal	R/W
Parameter No. 542 **File:** Procedure **Group:** Auto Tune	**Description:** IDN 00042, parameter 542, specifies the motor torque used while an auto tuning cycle is executed			
Default: 100%	**Length** 2 bytes	**Minimum/Maximum** Minimum Input: ≥ 0 Maximum Input: ≤ +100.0	**Scaling Resolution** 1 = .1% motor current	**Units** **%**

IDN: P00043	Name: ATune_Vel-Limit		Data Type: decimal	R/W
Parameter No. 543 **File:** Procedure **Group:** Auto Tune	**Description:** IDN 00043, parameter 543, specifies the maximum motor velocity the motor may attain when an auto tuning cycle is executed.			
Default: 1000	**Length** 2 bytes	**Analog/SCANport Min/Max** Min. ≥ -0 Max. ≤ 10,000	**Analog/SCANport Scaling Resolution** 1 = 1RPM	**Units** RPM
Default: 0	**Length** 4 bytes	**SERCOS Min/Max** Min. ≥ -2^{31} Max. ≤ $+2^{31} - 1$	**SERCOS Scaling Resolution** Scaling type: IDN 00044 Scaling factor: IDN 00045 Scaling exponent: IDN 00046	**Units** IDN 00044

IDN: P00044	**Name:** ATune_Posn_Limit		**Data Type:** decimal	R/W
Parameter No. 544 **File:** Procedure **Group:** Auto Tune	**Description:** IDN P00044, parameter 544, specifies the maximum position the motor shaft may attain during execution of an auto tuning cycle.			
Default: 65535	**Length** 2 bytes	**Analog/SCANport Min/Max** Min. ≥ -0 Max. ≤ 65535	**Analog/SCANport Scaling Resolution** 1 = 1 resolution unit as defined by IDN 00079.	**Units** IDN 00079 counts/rev

IDN: P00046	**Name:** ATune_Config		**Data Type:** Bit Pattern	R/W
Parameter No. 546 File: Procedure **Group:** Auto Tune	**Description:** IDN P00046, parameter 546 is used to allow the user a means of configuring the auto tune procedure execution. Structure of the auto tune selections: Bits 3-0: Bit 0 = Auto Save- If selected, the calculated auto tune parameters are saved after completion of the auto tune cycle Bit 1 = Calculate Gains - If selected, the loop gains will be calculated. Bit 2 = Inertia - If selected, the auto tune procedure performs an inertial tune. Bit 3 = Analog Offset - If selected, the auto tune procedure calculates the auto zero speed A/D offset, Parameter 693, “AnaInput 1 Offse”.			
Default: 1111	**Length** 2 bytes	**Analog/SCANport Min/Max** NA	**Analog/SCANport Scaling Resolution** NA	**Units** NA

IDN: P00047	**Name:** ATune_Status		**Data Type:** Ascii representation of enumeration	R
Parameter No. 547 File: Procedure **Group:** Auto Tune	**Description:** IDN P00047, parameter 547 indicates the status of the auto tune procedure. Structure of the auto tune status: Bits 2-0: 000 = Successful - The auto tune process was successful 001 = In process - Auto tuning is active. 010 = Tune aborted - Auto tuning was cancelled by user. 011 = Tune Timeout - Auto tuning timed out 100 = Drive Fault - Auto tuning did not complete due to drive fault. 101 = Travel limit - Travel Limit was exceeded during auto tune 111 = Polarity fault - The feedback polarity was incorrect.			
Default: 000	**Length** 2 bytes	**Analog/SCANport Min/Max** NA	**Analog/SCANport Scaling Resolution** NA	**Units** NA

IDN: P00061	Name: Torq_Notch_Freq0		Data Type: Integer	R/W
Parameter No. 561 **File:** Servo Loop **Group:** Group 0	**Description:** The 8720MC supports 8 sets of Servo Parameters (0-7). The SERCOS link, the I/O interface or SCANport can select which set of parameters is to be enabled. Group 0 is the default group. IDNP00061,parameter 561, is used to provide the drive with the Torque reference notch filter frequency for Servo group 0. This parameter is used to minimize resonances in the mechanical system. It's value defines a notch filter frequency at which the torque command is attenuated. The data is represented by an unsigned integer. This parameter is not implemented in the first analog release.			
Default: 0	**Length** 2 bytes	**Minimum/Maximum** Min. ≥ 0 Max. ≤ 10,000	**Scaling Resolution** 1	**Units** rad/sec

IDN: P00062	Name: Torq_Lowpas_Frq0		Data Type: Integer	R/W
Parameter No. 562 **File:** Servo Loop **Group:** Group 0	**Description:** The 8720MC supports 8 sets of Servo Parameters (0-7). The SERCOS link, the I/O interface or SCANport can select which set of parameters is to be enabled. Group 0 is the default group. IDNP00062 is used to provide the drive with the Torque reference low pass filter frequency for Servo group 0. This value should initially be derived by the drive via auto tuning with the load connected. The parameter establishes the 3db point of the low pass filter applied to the torque commands. The data is represented by an unsigned integer.			
Default: 2000	**Length** 2 bytes	**Minimum/Maximum** Min. ≥ 0 Max. ≤ 10000	**Scaling Resolution** 1	**Units** rad/sec

IDN: P00063	Name: Regen_Energy_Val		Data Type: Decimal	R/W
Parameter No. 563 **File:** Motor/Drive/ Fdbk **Group:** Drive Data	**Description:** IDN 00063, parameter 563, specifies the amount regenerative energy capacity available to the 8720MC Drive. This parameter is useful in AC input applications where the supplied regenerative capacity is less than 100% of the motor current. Parameter 563, Regen_Energy_Val, is used to limit the regeneration current above base speed. It is expressed as a percentage of continuous current at base speed. Reducing this value will reduce the deceleration rate and therefore the regenerative current supplied by the motor to the brake chopper module or the regenerative converter. It can be used to eliminate over voltage trips during rapid motor deceleration.			
Default: 1000.0%	**Length** 2 bytes	**Minimum/Maximum** Min. ≥ 0 Max. ≤ 1000.0	**Scaling Resolution** 10^{-1}	**Units** %

IDN: P00071	**Name:** Stopping_Torque		**Data Type:** Decimal	R/W
Parameter No. 571File: Control **Group:** Torque	**Description:** IDN 00071, parameter 571, specifies the maximum amount of torque available to stop the motor when the drive enable signal is removed from the drive interface. This parameter is expressed as a percentage of rated motor continuous torque. Reducing this value will reduce the amount of stopping torque and therefore limit the current produced by the motor when the drive is disabled while it is running.			
Analog/ SCANport Default: 1000.0	**Length** 2 bytes	**Analog/SCANport Minimum/Maximum** Min. ≥ 0.0 Max. ≤ +1000.0	**Analog/SCANport Scaling Resolution** 1=.1%	**Units** %
Default: 1000.0%	**Length** 2 bytes	**SERCOS Min/Max** Min. ≥ -2^{15} Max. ≤ $+2^{15} - 1$	**SERCOS Scaling Resolution** Scaling type: IDN 00086 Scaling factor: IDN 00093 Scaling exponent: IDN 00094	**Units** IDN 00086

IDN: P00072	**Name:** Stop_Time_Limit		**Data Type:** Decimal	R/W
Parameter No. 572 **File:** Control **Group:** Torque	**Description:** IDN 00072, parameter 572, specifies the maximum amount of time that the module will remain enabled while stopping the motor. This is useful for applications where the deceleration rate is very slow.			
Default: 10	**Length** 2 bytes	**Minimum/Maximum** Min. ≥ 0 Max. ≤ +1000	**Scaling Resolution** 1	**Units** sec

IDN: P00081	**Name:** Homing_Strategy		**Data Type:** Ascii representation of enumeration	R/W
Parameter No. 581 **File:** Procedure **Group:** Homing	**Description:** When the 8720MC is configured for power servo and single-turn absolute or incremental feedback is selected homing is required. Parameter 582 (IDN P00082) determines what homing strategy will be used. The possible choices are: (00) next marker - Proceed to the next marker after the home limit switch is detected (01) previous marker - Stop and return to the last marker after the home limit switch is detected. This parameter is not available for the 8720MC analog version.			
Default: 00	**Length** 2bytes	**Minimum/Maximum** NA	**Scaling Resolution** NA	**Units** NA

IDN: P00082	**Name:** Auto_Home		**Data Display:** ascii representation of enumeration	R/W
Parameter No. 582 **File:** Procedure **Group:** Orient	**Description:** When the 8720MC is configured for spindle operation, typically it is required to orient the spindle to a specific tool change location. Parameter 582 (IDN P00082) determines what orient strategy will be used. The possible choices are: 00 **=** Disabled 01 = "Index" - Orient to the motor encoder marker or absolute zero, if single turn absolute feedback is used. Parameter 154 is used to determine if the motor encoder or the spindle encoder is the assigned feedback orient device. 02 = "Reg 0 Rise" - Orient to a spindle mounted registration sensor using the rising edge of the +24 vdc registration input. 03 = "Reg 0 Fall" - Orient to a spindle mounted registration sensor using the falling edge of the +24 vdc registration input. 04 = "Reg 1 Rise" - Orient to a spindle mounted registration sensor using the rising edge of the +5 vdc registration input. 05 = "Reg 1 Fall" - Orient to a spindle mounted registration sensor using the falling edge of the +5 vdc registration input. In most applications it is required to orient to the 8720SM motor encoder marker. In this case "Index" must be selected.			
Default: 00	**Length** 2bytes	**Minimum/Maximum** NA	**Scaling Resolution** NA	**Units** NA

IDN: P00083	**Name:** Orient_Complete		**Data Type:** bit flag	R, Link
Parameter No. 583 **File:** I/O Interface **Group:** Event Links	**Description:** With the 8720MC drive analog configuration a drive orient can be initiated via Digital Input 2. +24vdc on Digital Input 2 causes parameter 152 (IDN S000152) "Spin_Orient_Req" to become true. Parameter 583 (IDN P00083) can be linked to a digital output by entering 583 into one of the digital output words. In so doing when the spindle orient procedure is complete the digital output will become true. Accordingly in the analog spindle configuration a spindle orient can be requested and acknowledged to be complete via the digital I/O. In the SERCOS spindle configuration the orient is handled as a drive orient procedure initiated by the master via the SERCOS link.			
Default: 0	**Length** 2 bytes	**Minimum/Maximum** NA	**Scaling Resolution** NA	**Units** NA

IDN: P00110	**Name:** Drive_Ok		**Data Type:** bit flag	R, Link
Parameter No. 610 **File:** I/O Interface **Group:** Event Link	**Description:** The 8720MC drive parameter 610 (IDN P00110) , "Drive OK", is permanently linked to digital output 1, Parameter 661, the drive OK output relay contact. This is provided as a motion controller output to indicate that there are no major faults and that the drive can be enabled.			
Default: 0	**Length** 2 bytes	**Minimum/Maximum** NA	**Scaling Resolution** NA	**Units** NA

IDN: P00115	Name: Shut_Down_Error		Data Display: bit flag	R/Link
Parameter No. 615 **File:** I/O Interface **Group:** Event Link	**Description:** The 8720MC drive parameter 11 (IDN S00011) defines 14 different types of shut down errors which can occur. Parameter 615 becomes true if any of these shut down errors occur. Parameter 615 remains true until the fault is removed and its is cleared by the Drive Error Reset input or the SERCOS master. Parameter 615 can be linked to a digital output by writing its parameter number into an output source word. In so doing if a shut down error occurs the digital output will become true.			
Default: 0	**Length** 2 bytes	**Minimum/Maximum** NA	**Scaling Resolution** NA	**Units** NA

IDN: P00117	Name: Power_Supply_OK		Data Type: bit flag	R/link
Parameter No. 617 **File:** I/O Interface **Group:** Event Links	**Description:** The standard 8720MC-RPS has a regenerative power supply fault relay contact output. If this fault is connected to terminal P5-36, Digital Input 10, an interlock to “Power Supply OK” is created. When 8720MC-RPS Fault contact is closed an RPS fault condition does not exist. Therefore, a high input to the 8720MC digital I/O is interpreted as “Power Supply OK” when it is linked to parameter 617. If the 8720MC digital input goes low, “Power Supply OK” will become false and an 8720MC shut down error (IDN S00011, bit 9) will occur. After the fault is removed a Drive Error Reset is necessary to clear this error. Parameter 617 can be linked to an digital output.			
Default: 0	**Length** 2 bytes	**Minimum/Maximum** NA	**Scaling Resolution** NA	**Units** NA

IDN: P00161	Name: Output_Image		Data Type: - bit pattern	R
Parameter No. 661 **File:** Status/Faults or I/O Interface **Group:** Drive Status or event Links	**Description:** The standard 8720MC has 10 digital inputs and 10 digital outputs. Parameter 661 (IDN P00161) provides a means of monitoring the status of the 10 digital outputs. The status of each of the 10 outputs appears in one of the bits (0 to 9) in the Output Image word. The output status can be displayed on the HIM or Drive Explorer$_{TM}$ via SCANport as a bit pattern. Structure of the digital output word: Bit 0 = Digital Output 1 (P 00162) Bit 1 = Digital Output 2 (P 00163) Bit 2 = Digital Output 3 (P 00164) Bit 3 = Digital Output 4 (P 00165) Bit 4 = Digital Output 5 (P 00166) Bit 5 = Digital Output 6 (P 00167) Bit 6 = Digital Output 7 (P 00168) Bit 7 = Digital Output 8 (P 00169) Bit 8 = Digital Output 9 (P 00170) Bit 9 = Digital Output 10 (P 00171)			
Default: 0	**Length** 2bytes	**Minimum/Maximum** NA	**Scaling Resolution** NA	**Units** NA

IDN: P00162 to **IDN:** P00171	**Name:** Output n Source (n = 1 to 10)		**Data Type:** Unsigned Integer	R/W
Parameter No. 662 to 671 **File:** I/O Interface **Group:** Digital Outputs	**Description:** Parameters 662 to 671 (IDN's P00162 to P00171) contain the linkable parameter number for the 8720MC digital outputs. For example if it is desired to support an output that indicates that the 8720SM motor high winding output is enabled, via digital relay contact output 3, then this can be accomplished by entering parameter number 526, "Hi_Wind_Enable" into parameter 664. Entry can be made via the HIM or Drive Explorer$_{TM.}$ Parameter 610, "Drive_OK", is permanently assigned to parameter 662. All other outputs have default assignments based on the application as determined by parameter 501. Parameters 663 to 671 can be modified by the user if the default settings are not appropriate for the intended application. For the 8720MC outputs 1 to 4 are relay contacts while 5 to 10 are solid state 24vdc drivers.			
Default: See Chapter 6	**Length** 2 bytes	**Minimum/Maximum** 0/10,000	**Scaling Resolution** 1	**Units** param no.

IDN: P00181	**Name:** AnaOut_Ch1_Selec		**Data Type:** integer	R/W
Parameter No. 681 **File:** I/O Interface **Group:** Analog outputs	**Description:** The 8720MC Drive supports two +/-11 bit analog outputs. Parameter 681 (P00181) provides a means of linking the 8720MC physical address of: connector P4, row 1, terminal 1 and row 2, terminal 6 (analog output 1) to a variable within the drive. This allows the user to link an external analog output to a linkable variable within the 8720MC Drive. A +/- 10 vdc analog voltage can be provided at analog output 1 which represents the value of an 8720MC parameter such as % rated torque value or velocity feedback value or % power. Analog output 1, parameter 681 contains the parameter number of the linked variable. If a +/- 10 vdc analog output representing actual velocity is desired at analog output 1 then parameter number 40, velocity feedback, must be entered into parameter 681. The analog output value can be modified by multiplying the source variable by the scaling factor stored in parameter 682 (P00182). D/A output = (Variable * scaling factor), D/A range +/- 2048 = +/- 10 vdc)			
Default: 40	**Length** 2 bytes	**Minimum/Maximum** Min. ≥ 0 Max. $\leq +65535$	**Scaling Resolution** 1	**Units** param number

IDN: P00182	**Name:** AnaOut_Ch1_Gain		**Data Type:** Integer	R/W
Parameter No. 682 **File:** I/O Interface **Group:** Analog outputs	**Description:** Parameter 682 (P00182) provides a means of scaling analog output 1. This parameter is used to assign a scale factor to Analog Output 1 which is the analog output tied to the 8720MC physical address of: connector P4, row 1, terminals 1 and row 2 terminal 6. This allows the user to apply a scale factor to an external analog output which is linked to a variable within the 8720MC Drive. The value of the source variable linked by parameter 681 (IDN P00181) is multiplied by the scale factor stored in parameter 682 in order to produce the value delivered to the digital to analog converter. For example, with a scale factor of 1, a variable with a value of 100% will produce a D/A output of 10 vdc.			
Default: 1.0	**Length** 2 bytes	**Minimum/Maximum** Min. ≥ -3.0000 Max. $\leq +3.0000$	**Scaling Resolution** 10^{-4}	**Units**

IDN: P00183	**Name:** AnaOut_Ch2_Selec		**Data Type:** integer	R/W
Parameter No. 683 **File:** I/O Interface **Group:** Analog outputs	**Description:** The 8720MC Drive supports two +/-11 bit analog outputs. Parameter 683 (P00183) provides a means of linking the 8720MC physical address of: connector P4, row 2, terminal 5 and row 2, terminal 6 (analog output 2) to a variable within the drive. This allows the user to link an external analog output to a linkable variable within the 8720MC Drive. A +/- 10 vdc analog voltage can be provided at analog output 2 which represents the value of an 8720MC parameter such as % rated torque value or velocity feedback value or % power. Analog output 2, parameter 683 contains the parameter number of the linked variable. If a +/- 10 vdc analog output representing torque is desired at analog output 2 then parameter number 84, torque feedback, must be entered into parameter 683. The analog output value can be modified by multiplying the source variable by the scaling factor stored in parameter 684 (P00184). D/A output = (Variable * scaling factor), D/A range +/- 2048 = +/- 10 vdc)			
Default: 84 (IDN 00084)	**Length** 2 byte	**Minimum/Maximum** 0/10,000	**Scaling Resolution** 1	**Units** param no.

IDN: P00184	**Name:** AnaOut_Ch2_Gain		**Data Type:** Integer	R/W
Parameter No. 684 **File:** I/O Interface **Group:** Analog outputs	**Description:** Parameter 684 (P00184) provides a means of scaling analog output 2. This parameter is used to assign a scale factor to Analog Output 2 which is the analog output tied to the 8720MC physical address of: connector P4, row 2, terminal 5 and row 2, terminal 6. This allows the user to apply a scale factor to an external analog output which is linked to a variable within the 8720MC Drive. The value of the source variable linked by parameter 683 (IDN P00183) is multiplied by the scale factor stored in parameter 684 in order to produce the value delivered to the digital to analog converter. For example, with a scale factor of 1, a variable with a value of 100% will produce a D/A output of 10 vdc.			
Default: 1.0	**Length** 2 bytes	**Minimum/Maximum** Min. ≥ -3.000 Max. ≤ +3.000	**Scaling Resolution** 10^{-4}	**Units**

IDN: P00190	**Name:** Input_Image		**Data Type:** - bit pattern	R
Parameter No. 690 **File:** Fault/Status or I/O Interface **Group:** Drive Status or Digital Inputs	**Description:** The standard 8720MC has 10 digital inputs and 10 digital outputs. Parameter 690 (IDN P00190) provides a means of monitoring the digital input status. The status of each of the 10 inputs plus the 2 registration inputs appears in one of the bits (0 to 11) in the Input Image status word. The input status can be displayed on the HIM or Drive Explorer$_{TM}$ via SCANport as a bit pattern. Structure of the digital output word: Bit 0 = Digital Input 1 Bit 1 = Digital Input 2 Bit 2 = Digital Input 3 Bit 3 = Digital Input 4 Bit 4 = Digital Input 5 Bit 5 = Digital Input 6 Bit 6 = Digital Input 7 Bit 7 = Digital Input 8 Bit 8 = Digital Input 9 Bit 9 = Digital Input 10 Bit 10 = +24v registration Bit 11 = +5 v registration			
Default: 0	**Length** 2bytes	**Minimum/Maximum** NA	**Scaling Resolution** NA	**Units** NA

IDN: P00191	**Name:** AnaInput1_Value		**Data Type:** decimal	R
Parameter No. 691 **File:** I/O Interface **Group:** Analog inputs	**Description:** The 8720MC Drive analog configuration supports two +/-13 bit analog inputs. Analog input 1, the auto analog reference, is connected to the 8720MC physical address of: connector P1, row 2, terminals 14 and 15. Parameter 691 (P00191) "AnaInput1_Value" the digital representation of +/- 10 vdc analog voltage. Analog Input 1 is defined in the 8720MC as the analog auto reference command. After scaling, parameter 691 is permanently linked to parameter 36, the velocity command variable within the 8720MC Drive. This value may be modified by the scaling factor stored in parameter 695 (P00195), the analog velocity scale factor. For auto mode, param. 691 % * param 695 rpm/100% = Param 36 analog auto velocity reference command in rpm. Parameter 691 is automatically offset to zero during auto tuning.			
Default: 0	**Length** 2 bytes	**Minimum/Maximum** Min. ≥ -100.00 Max. ≤ +100.00	**Scaling Resolution** $1 = 10^{-2}$	**Units** %

IDN: P00192	**Name:** AnaInput2_Value		**Data Type:** integer	R/Link
Parameter No. 692 **File:** I/O Interface **Group:** Analog inputs	**Description:** The 8720MC Drive analog configuration supports two +/-13 bit analog inputs. Analog input 2 the manual analog reference, is connected to the 8720MC physical address of: connector P1, row 2, terminals 16 and 17. Parameter 692 (P00192) "AnaInput2_Value" stores the digital representation of +/- 10 vdc analog voltage. Analog Input 2 is defined in the 8720MC as the analog manual reference command. Parameter 692 is permanently linked to parameter 36, the velocity command variable within the 8720MC Drive. This value may be modified by the scaling factor stored in parameter 696 (P00196), the manual velocity reference scale factor. For manual mode, param. 692 % * param 696 rpm/100% = Param 36 analog velocity reference command in rpm.			
Default: 0	**Length** 2 bytes	**Minimum/Maximum** Min. ≥ -100.00 Max. ≤ +100.00	**Scaling Resolution** $1 = 10^{-2}$	**Units** %

IDN: P00193	**Name:** AnaInput 1 Offse		**Data Type:** signed Integer	R/W
Parameter No. 693 **File:** I/O Interface **Group:** Analog inputs	**Description:** Parameter 693 (P00193) provides a means of offsetting analog input 1. This parameter is used to assign an A/D offset to "AnaInput1_Value", parameter 691, which is the analog input tied to the 8720MC physical address of: connector P1, row 2, terminals 16 and 17. This allows the user to apply an offset to an external analog input which is linked to a variable within the 8720MC Drive. Analog Input 1 is used as the motion controller reference command. Parameter 693 contains an offset variable in % which may be used to adjust the drive for zero speed or zero torque when the motion controllers reference is 0 volts. This offset may be auto tuned if "auto Offset" is selected in parameter 546			
Default: 0.00	**Length** 2 bytes	**Minimum/Maximum** Min. ≥ -100.00 Max. ≤ +100.00	**Scaling Resolution** 1=.01%	**Units** %

IDN: P00194	**Name:** AnaInput 2 Offse		**Data Type:** signed Integer	R/W
Parameter No. 694 **File:** I/O Interface **Group:** Analog inputs	**Description:** Parameter 694 (P00194) provides a means of offsetting analog input 2. This parameter is used to assign an A/D offset to "AnaInput1_Value", parameter 692, which is the analog input tied to the 8720MC physical address of: connector P1, row 2, terminals 16 and 17. This allows the user to apply an offset to an external analog input which is linked to a variable within the 8720MC Drive. Analog Input 2 is only used as the manual analog velocity reference. Parameter 694 contains offset factor in % which may be used to adjust the drive for zero speed when the manual analog reference is at 0 volts.			
Default: 0.00	**Length** 2 bytes	**Minimum/Maximum** Min. ≥ -100.00 Max. ≤ +100.00	**Scaling Resolution** 1=.01%	**Units** %

IDN: P00195	**Name:** Analog_Vel_Scale		**Data Type:** signed Integer	R/W
Parameter No. 695 **File:** I/O Interface **Group:** Analog inputs	**Description:** Parameter 695 (P00195) provides a means of scaling analog input 1. This parameter is used to assign a scale factor to "AnaInput1_Value" which is the analog input tied to the 8720MC physical address of: connector P1, row 2, terminals 14 and 15. This allows the user to apply a scale factor to an external analog input which is linked to a variable within the 8720MC Drive. When the drive is configured for velocity mode, parameter 32 for parameter set 0, parameter 695 parameter contains the velocity scale factor in rpm/10 volt. For example, if the incoming analog voltage full scale range is +/- 8 volts and the desired max rpm range is +/- 6000 rpm, then the scale factor would be 6000 *10/8 or 7500 rpm/10 volts. This parameter should not generate a speed requirement greater than the maximum speed of the motor, parameter 113. For applications were torque mode is used, parameter 695, Analog Input 1 is always scaled to 25% (2.5 volts) = 100% rated torque. See parameter 32 for mode setting.			
Default: 1000	**Length** 2 bytes	**Minimum/Maximum** Min. ≥ -30000 Max. ≤ +30000	**Scaling Resolution** 1	**Units** rpm/100%

IDN: P00196	**Name:** Manual_Vel_Scale		**Data Type:** signed Integer	R/W
Parameter No. 696 **File:** I/O Interface **Group:** Analog inputs	**Description:** Parameter 696 (P00196) provides a means of scaling analog input 2. This parameter is used to assign a scale factor to “AnaInput2_Value” which is the analog input tied to the 8720MC physical address of: connector P1, row 2, terminals 16 and 17. This allows the user to apply a scale factor to an external analog input which is linked to a variable within the 8720MC Drive. Analog Input 2 is only used in manual velocity mode. Parameter 696 contains the velocity scale factor in rpm/100%. For example, if the incoming analog voltage full scale range is +/- 9 volts and the desired max rpm range is +/- 3000 rpm, then the scale factor would be 3000 *10/9 or 3333 rpm/100%. This parameter should not generate a speed requirement greater than the maximum speed of the motor, parameter 113. Analog Input 2 supports only velocity scaling.			
Default: 1000	**Length** 2 bytes	**Minimum/Maximum** Min. ≥ -30,000 Max. ≤ +30,000	**Scaling Resolution** 1	**Units** rpm/100%

IDN: P00213	**Name:** SCANp_AN1_Value		**Data Type:** integer	R/W
Parameter No. 713 **File:** Communication **Group:** SCANp_Ref/ fdback	**Description:** Parameter 713 (P000213) contains the value of the reference as provided by a SCANport connected PLC. Parameter 713 (P00213) is linked to the velocity reference command 36 or the torque reference command, parameter 80, by the 8720MC drive software as determined by the velocity/torque mode parameter IDN Sn0032. The value of parameter 713, as provided by the plc, should be scaled to motor rpm when in velocity mode and % rated torque when in torque mode. See IDN Sn0032 “Primary Operating Mode” for an explanation of the 8720MC operating modes.			
Default: 0	**Length** 2 bytes	**Minimum/Maximum** Min. ≥ -32768 Max. ≤ +32767	**Scaling Resolution** 1 = 1 rpm or 1 = .1% rated torque	**Units** rpm or % rated torq

IDN: P00215	**Name:** Analog_Out _Parm		**Data Type:** Integer	R/W
Parameter No. 715 **File:** Communication **Group:** SCANp_Ref/ fdback	**Description:** Parameter 715 (P000215) contains the linkable parameter number for the SCANport analog output. The value transferred is a 16 bit integer variable within the 8720MC. Examples of common links are: parameter 40, velocity feedback, parameter 84, torque feedback, parameter 347, velocity error, parameter 386, motor shaft power etc. See chapter 6, Table 6.7, for a description of the potential links. Parameter 715 contains theparameter number of a linkable variable. This output is available to a SCANport connected communication gateway as the reference feedback.			
Default: 36	**Length** 2bytes	**Minimum/Maximum** Min. ≥ 0 Max. ≤ +1000	**Scaling Resolution** see IDN definition for the linked variable. For velocity: 1 = 1 rpm, for torque 1 = .1 %	**Units** Param. address

<table>
<tr><td>IDN: P00216</td><td colspan="2">Name: SP_Logic_Mask</td><td>Data Type: 16 bit word, bit pattern</td><td>R/W</td></tr>
<tr><td>Parameter No.
716
File:
Communication
Group:
SCANp Data In</td><td colspan="4">Description: The 8720MC drive can be operated by an A-B PLC via a SCANport gateway. Parameter 716, (IDN P00216) is used to set the SCANport logic mask bits. This function may be used to enable or prevent some of the SCANport nodes from controlling the 8720MC. This is a 16 bit word with a bit pattern which the 8720MC defines as follows:
If a bit is set true (1) the function is enabled.
Bit 0: Digital I/O Tables 6.1 and 6.2
Bit 1: Port control 1
Bit 2: Port control 2
Bit 3: Port control 3
Bit 4: Port control 4
Bit 5: Port control 5
Bit 6: Port control 6 Embedded HIM Module</td></tr>
<tr><td>Default:
x1111111</td><td>Length
2 bytes</td><td>Minimum/Maximum
NA</td><td>Scaling Resolution
NA</td><td>Units
NA</td></tr>
</table>

<table>
<tr><td>IDN: P00217</td><td colspan="2">Name: Logic_Command</td><td>Data Type: 16 bit word, bit pattern</td><td>R</td></tr>
<tr><td>Parameter No.
717
File:
Communication
Group:
SCANp Data In</td><td colspan="4">Description: The 8720MC drive can be operated by an A-B PLC via a SCANport gateway. Parameter 717, (IDN P00217) contains the “Logic Command” word coming from the gateway product. This is a 16 bit word with a bit pattern which the 8720MC defines as follows:
If a bit is set true (1) the function is enabled.
Bit 0: Regenerative stop request
Bit 1: Start request
Bit 2: Jog request
Bit 3: Drive Error Reset request
Bit 4: Coast stop request
Bit 5: Parameter Set Select bit 0
Bit 6: Parameter Set Select bit 1
Bit 7: Parameter Set Select bit 2
Bit 8: Parameter Set Change
Bit 9: Orient Request,
Bit 10: Reserved
Bit 11: Manual/Auto request, 1 = manual
Bits 12 to 15 are reserved:
The Scanport Logic command word is used by the 8720MC when it is configured for SCANport PLC operation as determined by parameter 501</td></tr>
<tr><td>Default:
00</td><td>Length
2 bytes</td><td>Minimum/Maximum
NA</td><td>Scaling Resolution
NA</td><td>Units
NA</td></tr>
</table>

IDN: P00218	**Name:** SP_Logic_Status		**Data Type:** 16 bit word, bit pattern	R
Parameter No. 718 **File:** Communication **Group:** SCANp Data Out	**Description:** The 8720MC drive can be operated by an A-B PLC via a SCANport gateway. Parameter 718, (IDN P00218) contains the "Logic Status" word going to the gateway communication product. This is a 16 bit word which the 8720MC defines as follows: If a bit is set true (1) the function is enabled. Bit 0: Drive enabled Bit 1: Drive auto reference enabled Bit 2: Rotation direction Bit 3: Drive O.k. Bit 4: Zero Speed Bit 5: At reference speed Bit 6: Orient complete Bit 7 Reserved Bit 8 Brake solenoid enabled Bit 9: Torque >/= Torque limit Bit 10: High Winding Selected Bit 11: Low winding Selected Bit 12: Shut down fault Bit 13: Reserved Bit 14: Reserved Bit 15: Manual mode selected The Scanport Logic Status word is Provided by the 8720MC to a gateway communication module when it is configured for SCANport PLC operation as determined by parameter 501			
Default: 00	**Length** 2 bytes	**Minimum/Maximum** NA	**Scaling Resolution** NA	**Units** NA

IDN: P00225 to P00232	**Name:** SP_Data_Input_xx xx=A1, A2, B1, B2, C1, C2, D1 or D2		**Data Type:** integer	R, Link
Parameter No. 725 to 732 **File:** SCANport **Group:** Gateway Data In	**Description:** The 8720MC drive can be operated by an A-B PLC via a SCANport DeviceNet, Remote I/O or ControlNet gateway communication adapter. It is possible to connect the PLC to port 2 or ports 2, 3, 4 or 5 using a SCANport expander. Parameters 725 to 732 are a group of eight 16 bit PLC words which have fixed input links to internal 8720 variables or flags. This provides a means of passing one to eight 16 bit PLC variables to the 8720MC Drive. See chapter 6, Table 6.10, for the definition of the input links. These parameters can be used as bit flags as well as signed or unsigned 16 bit integers. The data type is determined by the PLC and the 8720 variables they are linked to. The relationship to the gateway variable descriptions are as follows: 725 = P00225 = SCANport Data Input A1 726 = P00226 = SCANport Data Input A2 727 = P00227 = SCANport Data Input B1 728 = P00228 = SCANport Data Input B2 729 = P00229 = SCANport Data Input C1 730 = P00230 = SCANport Data Input C2 731 = P00231 = SCANport Data Input D1 732 = P00232 = SCANport Data Input D2 See Table 6.10 for the default assignments			
Default: 00	**Length** 2 bytes	**Minimum/Maximum** +/- 32768 or 0 to 65535	**Scaling Resolution** NA	**Units** NA

<table>
<tr><td>IDN: P00233
to P00240</td><td colspan="2">Name: SP_Data_Outputxx
xx=A1, A2, B1, B2, C1, C2, D1 or D2</td><td>Data Type: integer</td><td>R/W</td></tr>
<tr><td>Parameter No.
733 to 740
File:
SCANport
Group:
Gateway Data Out</td><td colspan="4">Description: The 8720MC drive can be operated by an A-B PLC via a SCANport DeviceNet, Remote I/O or ControlNet gateway communication adapter. It is possible to connect the PLC to port 2 or ports 2, 3, 4 or 5 using a SCANport expander. Parameters 733 to 740 are a group of eight 16 bit words which can be linked to internal 8720 variables or flags. These variables are then made available via the SCANport gateway as output words to be used by an A-B PLC interfaced to the SCANport gateway product.
See chapter 6, Table 6.1, for the default output links and the linking methodology. These parameters can be used as bit flags as well as signed or unsigned 16 bit integers. The data type is determined by the PLC and the 8720 variables they are linked to.
The relationship to the gateway variable descriptions are as follows:
733 = P00233 = SCANport Data Output A1
734 = P00234 = SCANport Data Output A2
735 = P00235 = SCANport Data Output B1
736 = P00236 = SCANport Data Output B2
737 = P00237 = SCANport Data Output C1
738 = P00238 = SCANport Data Output C2
739 = P00239 = SCANport Data Output D1
740 = P00240 = SCANport Data Output D2
See Table 6.10 for the default assignments</td></tr>
<tr><td>Default:
00</td><td>Length
2 bytes</td><td>Minimum/Maximum
+/- 32768 or 0 to 65535</td><td>Scaling Resolution
NA</td><td>Units
NA</td></tr>
</table>

Parameters 741 (P00241) thru 793 (P00293) represent the 8720MC image of the Allen-Bradley motor and encoder parameters stored in the motor encoder memory at manufacture. Under normal circumstances when using a 8720SM motor, the user should never have to modify these parameters. Any of the encoder stored parameters may be read from the 8720MC memory image via the HIM or Drive Explorer$_{TM}$.

<table>
<tr><td>IDN: P00241</td><td colspan="2">Name: Enc_Mem_Map_Rev</td><td>Data Type: Integer</td><td>R</td></tr>
<tr><td>Parameter No.
741
File:
Motor/Drive
Group:
Motor data</td><td colspan="4">Description: The 8720MC Drive supports an intelligent feedback device which stores all motor and feedback specific parameters for standard A-B Motors. At power up these parameters are available to the drive to configure it's operation. Parameter 741 (IDN P00241) identifies the revision of the memory map to the drive.</td></tr>
<tr><td>Default:</td><td>Length
1 byte</td><td>Minimum/Maximum
Min. ≥ 0
Max. ≤ +255</td><td>Scaling Resolution
NA.</td><td>Units
NA</td></tr>
</table>

IDN: P00242	**Name:** Motor_Param_Rev		**Data Type:** Integer	R
Parameter No. 742 **File:** Motor/Drive **Group:** Motor data	**Description:** The 8720SM Motor parameters are subject to revision over time. Parameter 742 (P00242) is used to identify the revision number of the motor parameters			
Default:	**Length** 1 byte	**Minimum/Maximum** Min. ≥ 0 Max. ≤ +255	**Scaling Resolution** 1	**Units** NA

IDN: P00277	**Name:** Motor_Select		**Data Type:** Ascii enumeration of motor catalog numbers	R/W
Parameter No. 777 **File:** Motor/Drive **Group:** Motor data	**Description:** The standard 8720SM Motors have assigned 8720SM catalog numbers. Parameter 777 provides a list of the available standard 8720 motors. If the motor catalog number does not appear on the list “custom” must be entered and all motor specific parameters must be entered individually. For standard 8720SM motors this parameter is set by the data stored in the encoder and cannot be changed unless the feedback is disconnected and power recycled.			
Default: custom	**Length** 2 bytes	**Minimum/Maximum** 0 to 65535	**Scaling Resolution** NA	**Units** NA

IDN: P00278	**Name:** Motor_Type		**Data Type:** binary	R/W
Parameter No. 778 **File:** Motor/Drive **Group:** Motor data	**Description:** The 8720MC can be used with several different types of motors. Parameter 778 (P00278) identifies the type of motor the 8720MC is connected to. The possible enumerations are: * 000 - Rotary PM Brushless * 001 - Rotary Induction * 010 - Rotary Induction Dual Winding * 011 - Linear PM Brushless * 100 - Linear PM Brushless AC Ironless			
Default: 001	**Length** 1byte	**Minimum/Maximum** 0 to 255	**Scaling Resolution** NA	**Units** NA

IDN: P00279	**Name:** Motor_Pole_Count		**Data Type:** unsigned integer	R/W
Parameter No. 779 **File:** Motor/Drive **Group:** Motor data	**Description:** The standard 8720SM Motors have 4 poles. Parameter 779 (P00279) provides the drive with the number of motor poles. If the motor is a linear motor this parameter provides the linear motor pole pitch in millimeters			
Default: 4	**Length** 1 byte	**Minimum/Maximum** 2/255	**Scaling Resolution** NA	**Units:** poles/rev poles/mm

IDN: P00280	**Name:** Mtr_Acceleration		**Data Type:** Unsigned Integer	R/W
Parameter No. 780 **File:** Motor/Drive **Group:** Motor data	**Description:** Parameter 780 (P00280) is defined as the continuous force/torque (in newtons /newton-meters) at rated base speed divided by the rotor mass/inertia in (Kg/ Kg-m^2)			
Default: NA	**Length** 4 bytes	**Minimum/Maximum** Min. ≥ 0 Max. ≤ +65535	**Scaling Resolution** 1	**Units:** Rad/sec^2 m/sec^2

IDN: P00281	**Name:** Base_Speed		**Data Type:** Unsigned Integer	R/W
Parameter No. 781 **File:** Motor/Drive **Group:** Motor data	**Description:** The standard 8720SM motors are rated at 1500 rpm base speed. Parameter 781 (P00281) defines the base speed, the speed at which the motor continuous power and torque are rated.			
Default: 1500	**Length** 2bytes	**Minimum/Maximum** Min. ≥ 0 Max. ≤ +30000	**Scaling Resolution** 1	**Units** rpm

IDN: P00282	**Name:** Mtr_Rated_Power		**Data Type:** Unsigned Integer	R/W
Parameter No. 782 **File:** Motor/Drive **Group:** Motor data	**Description:** The standard 8720SM motors are rated from 5.5 to 93 kw at 1500 rpm base speed. Parameter 533 (P00033) identifies the motor power in kilowatts The possible enumerations are: 5.5, 7.5, 11, 15, 18.5, 22, 30, 37, 45, 55, 63, 75, 93 kw			
Default: NA	**Length** 2bytes	**Minimum/Maximum** Min. ≥ 0 Max. ≤ +6553.5	**Scaling Resolution** 10^{-1}	**Units** kw

IDN: P00283	Name: Motor_Max_Volts		Data Type: unsigned integer	R/W
Parameter No. 783 **File:** Motor/Drive **Group:** Motor data	**Description:** This parameter defines the maximum DC bus voltage required in the constant power region. For most 8720SM motors this will produce 505 vac RMS at maximum speed.			
Default: Motor Specific	**Length** 2 byte2	**Minimum/Maximum** Min. ≥ 0 Max. ≤ +6553.5	**Scaling Resolution** .1	**Units** volts

IDN: P00284	Name: Mtr_Rated_Volts		Data Type: Unsigned Integer	R/W
Parameter No. 784 **File:** Motor/Drive **Group:** Motor data	**Description:** This parameter defines the nominal DC bus voltage required to acheive base speed and rated torque. For most standard 8720SM motors this will produce approximately 350 vac RMS at base speed.			
Default: Motor Specific	**Length** 2 bytes	**Minimum/Maximum** Min. ≥ 0 Max. ≤ +6553.5	**Scaling Resolution** .1	**Units** volts

IDN: P00285	Name: Rated_Torque		Data Type: Unsigned Integer	R/W
Parameter No. 785 **File:** Motor/Drive **Group:** Motor data	**Description:** This fparameter defines the continuous torque rating of the of the motor at base speed and 40 ° C			
Default:	**Length** 2bytes	**Minimum/Maximum** Min. ≥ 0 Max. ≤ +6553.5	**Scaling Resolution** 10^{-1}	**Units** newton-meters or newtons

IDN: P00286	**Name:** Motor_Back_EMF		**Data Type:** Unsigned Integer	R/W
Parameter No. 786 **File:** Motor/Drive **Group:** Motor data	**Description:** This parameter defines the synchronous motor back emf phase to phase constant at 25 degrees C. This is set to zero for asynchronous motors and therefore should be set to zero for 8720SM motors.			
Default: 0	**Length** 2bytes	**Minimum/Maximum** Min. ≥ 0 Max. ≤ +655.35	**Scaling Resolution** 10^{-2}	**Units** volts rms

IDN: P00287	**Name:** R1_Motor_Stator		**Data Type:** unsigned integer	R/W
Parameter No. 787 **File:** Motor/Drive **Group:** Motor data	**Description:** This parameter defines the per unit stator phase to neutral resistance R_1 @ 25 ° C in %. This parameter is set to zero for synchronous motors.			
Default: per motor	**Length** 2 byte	**Minimum/Maximum** Min. ≥ 0 Max. ≤ +30.000	**Scaling Resolution** 10^{-3}	**Units** %

IDN: P00288	**Name:** R2_Motor_Rotor		**Data Type:** Unsigned Integer	R/W
Parameter No. 788 **File:** Motor/Drive **Group:** Motor data	**Description:** This parameter defines the per unit rotor phase to neutral resistance as referred to the stator @ 25 ° C in %. This parameter is set to zero for synchronous motors.			
Default: per motor	**Length** 2 bytes	**Minimum/Maximum** Min. ≥ 0 Max. ≤ +30.000	**Scaling Resolution** 10^{-3}	**Units** %

IDN: P00289	**Name:** X1_Stat_Self/Lk		**Data Type:** Unsigned Integer	R/W
Parameter No. 789 **File:** Motor/Drive **Group:** Motor data	**Description:** This parameter defines the per unit motor stator leakage reactance at base frequency for synchronous motors.			
Default: per motor	**Length** 2bytes	**Minimum/Maximum** Min. ≥ 0 Max. ≤ +30.000	**Scaling Resolution** 10^{-3}	**Units** %

IDN: P00290	**Name:** XM_Stator Mutual		**Data Type:** unsigned integer	R/W
Parameter No. 790 **File:** Motor/Drive **Group:** Motor data	**Description:** This parameter defines the per unit asynchronous motor stator magnetizing reactance @ base frequency, phase to neutral. This is also the per unit synchronous motor stator magnetizing reactance at 1000 rpm (phase to neutral)			
Default: per motor	**Length** 2 byte	**Minimum/Maximum** Min. ≥ 0 Max. ≤ +300.00	**Scaling Resolution** 10^{-2}	**Units** %

IDN: P00291	**Name:** X2_Rotor_Leakage		**Data Type:** Unsigned Integer	R/W
Parameter No. 791 **File:** Motor/Drive **Group:** Motor data	**Description:** This IDN defines the per unit asynchronous motor rotor leakage reactance @ base frequency, phase to neutral. This is set to zero for synchronous motors.			
Default: per motor	**Length** 2 bytes	**Minimum/Maximum** Min. ≥ 0 Max. ≤ +30.000	**Scaling Resolution** 10^{-3}	**Units** %

IDN: P00292	Name: Mtr_Mag_Current		Data Type: Unsigned Integer	R/W
Parameter No. 792 **File:** Motor/Drive **Group:** Motor data	**Description:** This parameter defines the per unit asynchronous motor magnetizing current as a ratio to the continuous current. This is set to zero for synchronous motors.			
Default: per motor	**Length** 2bytes	**Minimum/Maximum** Min. ≥ 0 Max. ≤ +100.0	**Scaling Resolution** 10^{-1}	**Units** %

IDN: P00293	Name: Mtr_Slip_Freq		Data Type: Unsigned Integer	R/W
Parameter No. 793 **File:** Motor/Drive **Group:** Motor data	**Description:** This IDN parameter asynchronous motor slip frequency.This is set to zero for synchronous motors.			
Default:	**Length** 2bytes	**Minimum/Maximum** Min. ≥ 0 Max. ≤ +100.00	**Scaling Resolution** 10^{-2}	**Units** rad/sec

The remaining P parameters are 7 sets of servo loop parameters found in **File:** Servo Loop, **Groups:** 1 to 7. The 14 elements in groups 1 to 7 are the same as those found in parameter group 0. The element definitions for Servo Loop: Group 0 are found the following parameter descriptions:

- •Parameter 32 *Primary_Op_Mode0*
- •Parameter 38 +*Velocity_Limit_0*
- •Parameter 39 -*Velocity_Limit_0*
- •Parameter 82 +*Torque_Limit_0*
- •Parameter 83 -*Torque_Limit_0*
- •Parameter 100 *Vel_Prop_Gain_0*
- •Parameter 101 *Vel_Integ_Time_0*
- •Parameter 104 *Pos_Loop Gain_0*
- •Parameter 105 *Pos_Integ_Time_0*
- •Parameter 136 *Accel_Limit__0*
- •Parameter 137 *Decel_Limit__0*
- •Parameter 296 *Vel_Fdfwd_Gain_0*
- •Parameter 348 *Acc_Fdfwd_Gain_0*

•Parameter 523 *System_Accel_0*

•Parameter 561 *Cur_Notch_Freq0*

•Parameter 562 *Cur_Lowpas_Frq0*

The following table is presented to illustrate the relationship between the servo loop parameter groups:

Servo Loop Parameter numbers: Groups 0 to 7

Parameter Name	Param. No Group 0	Param. No Group 1	Param. No Group 2	Param. No Group 3	Param. No Group 4	Param. No Group 5	Param. No Group 6	Param. No Group 7
Primary_Op_Mode_n	32	811	831	851	871	891	911	931
+Velocity_Limit_n	38	812	832	852	872	892	912	932
-Velocity_Limit_n	39	813	833	853	873	893	913	933
+Torque_Limit_n	82	814	834	854	874	894	914	934
-Torque_Limit_n	83	815	835	855	875	895	915	935
Vel_Prop_Gain_n	100	816	836	856	876	896	916	936
Vel_Integ_Time_n	101	817	837	857	877	897	917	937
Pos_Loop_Gain_n	104	818	838	858	878	898	918	938
Pos_Integ_Time_n	105	819	839	859	879	899	919	939
Accel_Limit__0	136	825	845	865	885	905	925	945
Decel_Limit_0	137	826	846	866	886	906	926	946
Vel_Fdfwd_Gain_n	296	820	840	860	880	900	920	940
Acc_Fdfwd_Gain_n	348	821	841	861	881	901	921	941
System_Accel_n	523	822	842	862	882	902	922	942
Torq_Notch_Freq_n	561	823	843	863	883	903	923	943
Torq_Lowpas_Freq_n	562	824	844	864	884	904	924	944

Starting Up Your 8720MC

Chapter Objectives

This chapter provides you with the information to start up and tune your 8720MC System.This chapter includes:

- General startup precautions
- Setup and tuning procedures for the 8720MC drive
- Procedure for running the drive in manual mode

Before you begin the startup procedures, be sure to read and understand the information in the previous chapters of this manual.

Note: The procedures in this chapter do not include information regarding integration with other products.

General Startup Precautions

The following precautions pertain to all of the procedures in this chapter. Be sure to read and thoroughly understand them before proceeding.

ATTENTION: You need to apply power to the drive to perform many of the adjustments specified in this chapter. Voltages behind the drive front cover are at incoming line potential. To avoid injury to personnel and/or damage to equipment, you should only perform these startup procedures if you are a qualified service person. Thoroughly read and understand the procedure before beginning. If an expected event does not occur while performing this procedure, do not proceed. Remove power by opening the branch circuit disconnect device and correct the malfunction before continuing.

ATTENTION: This product contains stored energy devices. To avoid hazard of electrical shock, verify that all voltages on the system bus network have been discharged before attempting to service, repair or remove this unit. Only qualified personnel familiar with solid state control equipment and safety procedures in publication NFPA 70E or applicable local codes should attempt this procedure.

ATTENTION: This drive contains ESD (Electrostatic Discharge) sensitive parts and assemblies. You are required to follow static control precautions when you install, test, service, or repair this assembly. If you do not follow ESD control procedures, components can be damaged. If you are not familiar with static control procedures, refer to Allen-Bradley publication 8000-4.5.2, Guarding Against Electrostatic Damage or any other applicable ESD Protection Handbook.

Note: The following procedures only apply to the drive component of the 8720MC product line. For details on starting up the 8720MC-RPS Regenerative Power Supply, refer to Chapters 5, 6, and 7 of publication 8720-RM001B, the *8720MC Regenerative Power Supply User Manual*.

Setting Up Your 8720MC Drive

This section provides the following to help you set up and tune the 8720MC drive:

- Information you need before you begin
- Setup procedures

The instructions in this chapter assume that you are using a HIM Series A 3.0 or greater or a HIM Series B. Refer to *HIM Programming* for general HIM programming information.

Note: The start-up procedure can also be performed on a desktop, lap top or hand-held personal computer using Allen-Bradley's DriveExplorer™, WindowsNT™, Windows95™ and CE™ compatible drive configuration utility. This method greatly enhances the ability to navigate through and display or modify parameters. For more information on DriveExplorer™, see publication 9306-5.0, the *DriveExplorer User Manual*. When using DriveExplorer™ with the 8720MC you must use the cat. no.1203-SSS series B or later "Anaconda" SCANport to RS-232 serial port adaptor to interface your PC to the SCANport connector on the drive.

In most cases, the default values in the startup procedure will work very well; however, you can modify the values, as needed, for your application.

Before You Begin

In an initial start-up it is always good practice to check the motor windings before you apply power to the drive. This is done by first disconnecting the motor leads from the drive, terminals T1, T2 and T3. Using a multi-meter check continuity between the motor leads. There should be very low resistance between T1 and T2, T2 and T3 and T3 and T1. Make sure there is no continuity between any of the motor leads and the motor case ground.

Before reconnecting the motor leads make sure there is no continuity between the motor leads and the temperature switch leads. Connect a multi-meter between terminal P1-12 and each of the motor leads. There should be almost infinite resistance. Also make sure there is no continuity between terminal P1-13 and each of the motor leads. Examine the drive input wiring carefully and make sure that there are no shorts to ground on the incoming leads. Before you begin the startup procedure, verify that the system has been wired correctly per the drawings in Chapter 4 and that you have a good quality digital multi-meter available for troubleshooting. In complicated systems it may be best to remove all fuses and bring up the system gradually by installing the device fuses as needed to bring on line additional equipment.

Exiting Before You're Finished

If you need to exit the start-up procedures before you are finished, you should always save your parameters to EEprom memory. If you fail to do this before removing power any changes made after the last save to EEprom will be lost. The procedure for saving parameters to EEprom is discussed in Chapter 7.

Applying Power

This procedure assumes that you have wired your 8720MC System and verified the wiring.

1. Apply 380/460V AC input power to the 8720MC-RPS or

2. Apply 380/460V AC input power to the drive. The Status LED on the Control PCB flashes green. In addition, the HIM becomes active and a message similar to the following appears:

```
System Ready
```

Note: When you apply power to the HIM, a series of messages appears before the final *System Ready* message appears.

3.

If the drive LED:	Then:
Flashes green and the following appears on the HIM: *System Ready*	The control and bus power is active, but the drive is not enabled. Refer to *Defining Drive Application Type*.
Flashes red	You may have a wiring or power problem. Refer to *Troubleshooting*.
Remains solid red	
Does not illuminate	

Key Set-up Parameters

The 8720MC Drive can be controlled from analog inputs or the SCANport or SERCOS in a future revision. It also can be used as an spindle or a power servo. Parameter 501, “A-B Application”, is used to identify the specific application use of the 8720MC Drive. You must select one of the 7 application choices provided in parameter 501:

- Analog spindle
- Analog power servo
- SERCOS spindle
- SERCOS power servo
- Scanport, Digital Peripheral Interface, spindle
- Scanport, Digital Peripheral Interface, power servo
- Custom

When you choose “Analog Spind” or “Analog Pwr S” parameter 503, “Aux_Fbck_Type must be set to “analog ref”. For analog input applications make sure parameter 503 is set to “Analog Ref”.

For analog spindle applications make sure that “Position Scaling”, parameter 76, bit 7 is set to “modulo”. When modulo is selected the “Motor Posn Fdbk”, parameter 51 will display actual motor position to whatever resolution is selected in “Rot Posn Resolut”, parameter 79. For example if Parameter 79 and parameter 103 are set for 30,000 resolution counts/rev, the motor position, parameter 51, will count from 0 to 29,999 and back to 0 as it is rotated clockwise when viewed from the drive end.

Also for analog spindle or power servo applications where the A quad B simulated digital encoder output is used, parameter 582 must be set to “Index” to assure that the encoder marker is available at the motion controller interface on terminals P5-3 and P5-21

Initial Checks

With power on the drive, the drive disabled and the load disconnected display parameter 51 “Motor_Pos_Fdbk”, found in file: Control, group: Position. Rotate the motor shaft cw and the display should increase as the shaft rotates. Turning the shaft ccw should decrease the position display. This confirms that the feedback device and wiring are performing properly.

After enabling the drive by applying +24vdc to input 1 “Drive Enable” on the digital I/O interface, the module status LED should illuminate steady green and the motor drive shaft should be very stiff. Usually the motor will slowly rotate since it is in velocity mode with the position loop open.

If the motor is erratic and uncontrollable it is probably improperly phased. Refer to chapter 5 under “Motor Direction” to correct the phasing. With the load unconnected press the stop button on the HIM module. This will tell the drive that the HIM module is the controlling input. Press the green start button on the HIM and increase the speed command with the speed pot (HAS1 option) or up/down arrows (HAS2 option).The motor should rotate faster or slower based on the HIM speed selected. The direction key should reverse the motor direction. Depress the stop button to stop the motor and remove the +24vdc from the drive enable. The drive should be disabled with the module status LED flashing green and the motor shaft will freely rotate by hand. If these initial checks are successful and there are no error messages on the HIM you are ready to connect the load and tune the drive.

Servo Loop Parameters

This section explains the importance of adjusting servo loop parameters:

One of the most important tasks to be performed during startup is the adjustment of the servo loop parameters. Adjustment of these parameters is essential to get the maximum performance from a drive application. The 8720MC is supplied with a set of default parameters which are intended to provide a good starting point. In addition all the motor-specific parameters are stored in the motor encoder.

As a consequence, only a few key servo loop parameters require tuning to the specific load and application.

The traditional method of tuning the servo loop parameters is performed by a process of trial and error adjustment. The 8720MC Drive provides an auto tuning procedure which greatly simplifies this task. The “Parameter Groups, Files and Elements” charts presented in *Programming Parameters* show that there are 8 sets of servo loop parameters. Each group has 16 servo loop parameters or “elements” of which 4 are set by the auto tuning procedure. The 8 groups of servo loop parameters are provided to support multiple gear ranges, high / low winding motors and multiple operating modes. Each unique gear range, winding or operating mode requires a separates set of servo loop parameters and each should be separately auto tuned. Auto tuning compensates for the changes in the reflected inertia and changes in the motor operating characteristics caused by gear changes or switching the high/low winding.

Selecting a Servo Loop Parameter Group

This section provides the information you will need to select a servo loop parameter group:

Before beginning auto tuning it will be necessary to select the servo loop parameter group that you wish to auto tune. This may be done from the HIM, Drive Explorer or the digital I/O. Assuming you wish to select parameter group 4, the HIM procedure for changing the active parameter group is explained below:

1. At the HIM, press **ENTER**. A message similar to the following appears:

```
Choose Mode
Display
```

2. Press either the up or down arrow key until the following appears:

```
Choose Mode
Program
```

3. Press **ENTER**. Press either the up or down arrow key until the following appears:

```
Choose File
Procedure
```

4. Press **ENTER**. Press either the up or down arrow key until the following appears:

```
Choose Group
Parameter Switch
```

5. Press **ENTER**. Press either the up or down arrow key until you have located "*Select Param Set*", parameter 217.
6. Press **SEL** and the number on the bottom line will flash. Use the up or down arrow key to change the number to 4 and press **ENTER**.
7. To activate parameter group 4, press the up or down arrow key until you find "*Param Set Switch*", parameter 216.
8. Press the **SEL** and the number on the bottom line will flash. Use the up or down arrow key to change the number to 1, and then press **ENTER**.

Parameter group 4 is now the active parameter group.

9. To confirm that parameter group 4 is the active parameter group, view parameter 254, "*Actual Param Set*", by pressing the up or down arrow key until the top line displays "*Actual Param Set*". The bottom line should display a value of 4, confirming that parameter group 4 is active.

Note: The procedure for changing parameter groups described above can also be performed with Drive Explorer$_{TM}$ in much the same way. In addition the parameter groups may be changed via the digital I/O by selecting the proper binary bit pattern at the interface. Each servo loop parameter group which your application requires will require setting and tuning of the servo parameters.

Setting the Servo Loop Parameters

This section provides the information you need to set a group's servo loop parameters:

Each group of servo loop parameters can have its own set of values for mode of operation, velocity limits and torque limits. In the analog version of the 8720MC drive, the mode of operation can be set for either velocity or torque modes. The parameter for making this selection for group 0 is Parameter 32, "*Primary Op Mode0*". The parameter numbers are different for each of the 8 servo loop parameter groups as described in *Programming Parameters*. The default mode for Parameter 32 and all 7 of the other primary operation mode parameters is "*Velocity*". If torque mode is required use the techniques described in *Using the Human Interface Module (HIM)* to modify this parameter. The velocity limits should be modified to suit the application. Parameters 38 and 39, "+*Velocity Limit 0*" and "-*Velocity Limit 0*" are the velocity limit parameters for servo loop parameter group 0.

The parameter numbers are different for each of the 8 servo loop parameter groups as described in *Programming Parameters*. Locate these parameters and change their values to the maximum motor speed in rpm, as desired for the application.

The torque limits should also be modified to suit the application. Parameters 82 and 83, "+*Torque Limit 0*" and "-*Torque Limit 0*" are the torque limit parameters for servo loop parameter group 0. The parameter numbers are different for each of the 8 servo loop parameter groups as described in *Programming Parameters*. Locate these parameters and change their values to the maximum allowable motor torque for the application as a percentage of full-rated continuous motor torque, as desired for the application. The drive is now ready to auto tune the remaining servo loop parameters.

Acc/Dec Parameters

Each parameter set has an acceleration parameter and a deceleration parameter. For parameter group 0 the acceleration parameter number is 136 and the deceleration parameter is 137. These parameters are used to select the maximum acceleration and deceleration rates in radians per second squared for a given parameter set. The acceleration and deceleration parameters are used to limit the rate of change of velocity of the motor to a level that can be supported with load connected. With high inertia loads it is often necessary to limit the deceleration to prevent bus over voltage or over current trips caused by over running loads. The values for acceleration and deceleration are adjusted by trial and error to suit the application.

AutoTuning

This section provides the information you need to auto tune your 8720MC drive:

This procedure assumes that you have wired your 8720MC drive and have completed the procedures already covered in this chapter.

Before You Perform an Auto Tune

Before you perform an auto tune, look at the status LED on the system module.

Note: Auto tune default parameter values are normally adequate. To change them, refer to *Programming Parameters*.

Performing the Auto Tune

1. Before initiating the auto tuning of the motor make sure the desired application load for this group of servo loop parameters is connected to the motor.

2. For the analog input command configuration, set Parameter 501, the application parameter, to either "*Analog Spind*" or "*Analog Pwr S*" as required by the application.

3. Set Parameter 503, "*Aux Fdbk Type*", to "*Analog Ref*" to ensure the drive is prepared to accept an analog command reference via the auxiliary feedback port. This is a general requirement for any analog input application and not specifically for auto tuning.

Note: Auto tuning will initiate a fast rotation in one direction of the motor shaft followed by a fast rotation in the opposite direction.

ATTENTION: Auto tuning will cause rapid motion of the motor and the connected load. Make sure all mechanical connections are securely fastened and that nothing is in the path of the load. Failure to observe this precaution could result in bodily injury.

With the load connected, you are ready to tune the servo loop parameters.

4. For the analog configuration, auto tuning will automatically calculate the following Group 0 Servo Loop parameters: Parameter 100, "*Vel Prop Gain 0*"; Parameter 101, "*Vel Integ Time 0*"; Parameter 523, "*System Accel 0*"; Parameter 562, "*Torq Lowpas Frq0*" and "*Pos Loop Gain 0*".

5. Before initiating the auto tune procedure, ensure that the Parameter 546, "*Atune Config*", has the four lowest significant bits set to one. This means that:

- bit 0 - "*Auto Save*" is on and the calculated parameters will be automatically saved
- bit 1 - "*Calc Gains*" is on and the proportional and integral gains for the selected servo loop parameter group will be calculated
- bit 2 - "*Inertia*" is on and the system acceleration for the selected servo loop parameter group will be calculated

- bit 3 - "*Auto Offset*" is on and the system calculates the analog auto reference offset, parameter 693.

Note: The speed for the auto tune procedure as well as the torque and the maximum distance for the auto tune moves can be modified. Parameter 543, "*ATune Vel Limit*"; Parameter 542, "*ATune Torq Limit*" and Parameter 544, "*ATune Posn Limit*" serve this purpose. The default values are 1000 RPM, 100% rated continuous torque and 65,535 counts, respectively. Changing these values will change the calculated values of the servo loop parameters. The default values represent a good compromise and should be used unless the application does not support the default values. For example: if you know the torque will be limited to 75% of rated motor torque, Parameter 542 should be set to 75%.

6. With the drive disabled set parameter 541 to "Auto tune".

7. Making sure the motor and load are safe to operate, enable the drive. The motor will quickly rotate clockwise and counter-clockwise indicating that the auto tune procedure has executed. Parameter 547 will indicate "successful" if the auto tune procedure executed properly

Scaling of Auto Velocity Analog Reference

This section provides the information you need to scale an auto velocity analog reference:

Note: Default setting is 1000 rpm/10V

To change the scale factor for the auto velocity analog reference, perform the following procedure:

1. At the HIM, press the escape key get to the top level display then depress **ENTER**. A message similar to the following appears:

```
Choose Mode
Display
```

2. Press either the up or down arrow key until the following appears:

```
Choose Mode
Program
```

3. Press **ENTER**. Press either the up or down arrow key until the following appears:

```
Choose File
I/O Interface
```

4. Press enter. Press either the up or down arrow key until the following appears

```
Choose Group
Analog Inputs
```

5. Press enter. Use the up and down arrow keys to find Parameter 695, "*Auto Vel Scale*".

6. Press **SEL** to select the numerical value.

7. Use the up and down arrow keys to change the numerical value.
8. To change the motor direction for a given analog voltage input, press **SEL** to highlight the sign character.
9. Use the up and down arrow keys to change the sign.
   Press **ENTER**.

Note: Remember to save any changed values to nonvolatile EEPROM memory. Refer to *Using the Human Interface Module (HIM),* Chapter *7.*

In velocity mode with 0 volts at the auto analog reference input the drive may still slowly rotate cw or ccw. To minimize this parameter 693, “Auto_Ref_Offset”, is provided. Values ranging from +/-.01% to +/-100% can be entered. A + value is used to offset in the cw direction and a **-** value is used to offset in the ccw direction.

Scaling of Manual Velocity Analog Reference

This section provides the information you need to scale a manual velocity analog reference:

Note: Default scaling is 1000 rpm/10 volts.

To scale motor jog speed:

1. At the HIM, press **ENTER**. A message similar to the following appears:

```
Choose Mode
Display
```

2. Press either the up or down arrow key until the following appears:

```
Choose Mode
Program
```

3. Press **ENTER**. Press either the up or down arrow key until the following appears:

```
Choose File
I/O Interface
```

4. Press **ENTER**. Press either the up or down arrow key until the following appears:

```
Choose Group
Analog Inputs
```

5. Press enter. Use the up and down arrow keys to find Parameter 696, “*Manual Vel Scale*”.
6. Press **ENTER**. The following message appears:

```
Manual Vel Scale
+ 1000 RPM
```

7. Press **SEL**. The cursor moves to the bottom line. Continue pressing **SEL** until the cursor moves to the digits that you need to change.

8. Press the up and down arrows to change the scale value.

9. To change the shaft direction from positive to negative, press **SEL** until the cursor is on the plus sign and press the up or down arrow key.

Note: Default shaft direction is positive (clockwise while looking at the shaft).

10. Press **ENTER**.

In velocity mode with 0 volts at the manual analog reference input the drive may still slowly rotate cw or ccw. To minimize this parameter 694 “Man_Ref_Offset” is provided. Values ranging from +/-.01% to +/-100% can be entered. A + value is used to offset in the cw direction and a - value is used to offset in the ccw direction.

Operating in Manual Mode Using Digital I/O Interface

This section provides the information you need to operate your 8720MC drive in manual mode using a digital I/O interface:

Note: Before beginning this procedure, scale the manual velocity analog reference for the desire speed range and shaft direction. Refer to *Scaling of Motor Speed.*

To operate the 8720MC drive in manual mode using digital I/O interface:

1. Using your voltmeter, verify that all analog reference signals connected to analog inputs are set to zero.

2. Set the Auto/Manual Select digital input 4 high.

3. Enable the drive by setting the Drive Enable, digital input 1, high.

Note: Upon completion of the next step, your drive will be ready to jog in manual mode.

4. Set the digital input 6 to high in order to jog the motor.

The drive will follow the reference signal voltage and polarity provided to analog input 2. Refer to *Programming Parameters.*

Disabling the drive will stop the motor.

Operating in Manual Mode with an Internal or External HIM

This section provides the information you need to operate your 8720MC drive with an internal or external HIM:

Note: Before beginning this procedure, scale the manual velocity analog reference for the desired motor speed range and shaft direction. Refer to *Scaling of Manual Velocity Reference.*

To operate the 8720MC drive in manual mode using an internal or external HIM:

1. Enable the drive by setting the Drive Enable digital input 1 high.

2. Depress the red stop button on the HIM module. Use the speed potentiometer or speed arrows on the HIM to set the speed reference to zero.

Note: Refer to *HIM Programming.*

3. Push the start or green HIM button to run the motor, or the jog button to jog the motor.

4. Use the speed potentiometer or speed arrows to increase your speed reference to a desired level.

Disabling the drive, pressing the HIM red stop button, or releasing the jog button will stop the motor.

Start-up of Motor Orient

This section provides the information you will need to orient your motor:

The motor orient procedure provides a means of positioning the motor to a precise location regardless of whether the motor is starting from standstill or rotating at high speed. The procedure that follows assumes that the motor feedback device is an SNS-60 Sincoder.

Note: To understand the drive controlled motor orient feature refer to Parameter 152, "*Spin Orient Req*"; Parameter 150, "*Mtr Marker Ofset*"; Parameter 153, "*Orient Angle*"; Parameter154 "*Orient Options"*; Parameter 157, *"At Spd Window"*; Parameter 222, "*Spin Orient Spd"*; Parameter 260, "*Pos Accel Rate*"; Parameter 582, "*Auto Home*", Parameter 76, "*Position Scaling"* Parameter 79, *"Rot Posn Resolut"* and parameter 103, *"Modulo Value"* in Chapter 8, Programming Parameters.

1. As an initial check, make sure that Parameter 582 "*Auto Home"* is set for "*Index*" and Parameter 76, *"Position Scaling"*, has *modulo* checked.

2. Verify that Parameter 79, *"Rot Posn Resolut"* = 3600 counts/revolution. Increase the resolution if higher resolution than 3600 counts per revolution is desired. This can be increased to 32,767 counts.

3. Verify that the following parameters are set to the described values:

- Parameter 150, "*Mtr Marker Ofset*" = 0 counts
- Parameter 153, "*Orient Angle*" = 0 counts
- Parameter 222, "*Spin Orient Spd"* = 100 rpm.

Note: Reduce the speed if it is too high for the application.

- Parameter 260, "*Pos Accel Rate*" = 100 rad/sec.

Note: Reduce the acceleration if it is too high for the application.

- Parameter 103, "*Modulo Value"* = the value in parameter 79.

4. Navigate to Parameter 154, "*Orient Options*" and select an orient direction. The application will dictate this choice. The available options are *"CW"*, *"CCW"* or "*Shortest Pth"*.

5. Enable the drive.

6. Toggle the orient request input, P5-32, to a true state or navigate to Parameter 152, "*Spin Orient Req*" and select a state of "1" and press enter.

The motor will rotate in velocity mode in the selected direction at the selected orient speed until the encoder marker is detected. The drive will then transfer to positioning mode and calculate the desired end point of zero motor offset angle and zero programmed angle. Regardless of the orient direction chosen, with the end location at zero counts the motor will stop and return via shortest path to the marker and stop.

Note: Because the motor is randomly assembled to the mechanical system this is probably not the actual orient position required for the application.

7. To change the motor position to the desired zero angle Parameter 150, "*Mtr Marker Ofset*", must be modified to reflect the difference between the actual zero angle and the desired zero angle.

8. To determine the motor marker offset first orient the spindle with zero in Parameter 150. Navigate to Parameter 51, "Mtr Posn Fdbk", and the position value displayed will be zero in counts.

9. With the drive disabled, rotate the motor to the desired motor angle and record that position.

The required correction angle is the difference between the marker 0 angle reading and the desired angle 0 reading for the application.

Note: Signs are very important in determining offsets. Make sure to record if the position value increased or decreased. Viewing from the drive end of the motor, for standard configurations, CCW (or -) rotation decreases parameter 51. CW (or +) rotation increases parameter 51. Parameter 150 has the opposite sense since it is subtracted from the position. Therefore if the desired offset direction is CW it should have a minus value. Conversely ccw offset should have a + value.

Note: To prevent reversals in direction during orient it is good practice to make the direction of the offset the same as the direction of the selected orient rotation. That is if the orient direction is CW the offset angle should be CW. If the orient direction is CCW the offset angle should be CCW. Accordingly it may be necessary to calculate the complimentary offset value to assure there are no direction reversals during the orient.

Note: Assuming modulo scaling is selected the complimentary offset value is defined as the number of resolution units set in Parameter 79, minus the modulo position value in parameter 51, "*Motor Posn Fback*". A simple rule of thumb is to use the complimentary offset value if the orient direction is CCW.

For Example: Assume Parameter 79, *"Rot Posn Resolut"* = 10,000 counts/revolution; Parameter 103, *"Modulo Value"* = 10,000 counts/ revolution; Parameter 154, "*Orient Options*" = CW and Servo Loop Parameter Group 0 is selected as determined by Parameter 254, "*Actual Param Set*". Initiate an orient by setting parameter 152, "Orient Request", to a value of 1. Note that after an orient with zero in Parameter 150, "*Mtr Marker Ofset*" and zero also in Parameter 153, "*Orient Angle*" the position display, Parameter 51, "*Mtr Posn Fdbk*" = 0 or 10,000 counts. To determine the required offset correction manually rotate the motor to the desired angle with the drive disabled. Assume after doing this Parameter 51 reads 2,500 counts meaning we rotated cw 2500 counts. For parameter 150 CW offsets have a minus value. We record the difference as -2500 counts CW by setting Parameter 150 to -2500. To prevent orient direction reversals it is always good practice to record the marker offset direction the same as the desired orient direction. In this example since the selected orient direction is CW and we do not desire direction reversal during orient and the orient direction is also clockwise. To achieve the same target orient position with a CCW orient direction we would set Parameter 150, "*Mtr Marker Ofset*" to a complimentary CCW offset. This is done by subtracting the measured offset counts from the number of counts per revolution, Parameter 79. In this case we subtract 2500 from 10,000 and get 7,500 counts, CCW. For parameter 150 CCW offsets have a plus value. We now then enter 7500 in Parameter 150, "*Mtr Marker Ofset*". Assuming a CCW orient direction and the motor standing still, if we request an orient via the digital I/O or Parameter 152, "*Spin Orient Req*", the motor will behave as follows:

- Accelerate to "*Spin Orient Spd"*, Parameter 222, in the CCW direction using the "*Posn Accel Rate"*, Parameter 260, until it is within the velocity speed window, Parameter 157, "*At Spd Window*" or Parameter 272, "*Speed Window %*". The drive will not look for the encoder marker until it determines the motor speed is within the selected velocity window.
- Once achieving the "*At Program Speed*" state, Parameter 330, the drive will find the marker. After detecting the marker it will change to positioning mode and determine the desired end point. In this case it determines it must continue rotating in CCW direction for another 7500 counts.

- At this time the drive will issue the "*Orient Complete*" event, Parameter 583. The motor will be locked in the orient position until the orient request is removed. As long as the orient request is maintained the drive will ignore the analog references. As soon as the orient request is released the drive will follow the analog references based on the current active mode of operation.

It is possible to orient to a specific angle other than zero as well as perform multi-revolution orients. If the application calls for this see the description of parameter 153 "*Orient Angle*" in Chapter 8.

With the SNS-60 encoder marker orient, the drive does not know where the marker is when motor orient is initiated. If the motor is at standstill when the orient request is received and "Shortest Pth" is selected in Parameter 154 "*Orient Options*" the drive will assume a clockwise orient direction. If it is rotating at speed and "Shortest Pth" is selected in Parameter 154 "*Orient Options*" it will assume the orient direction is the same as the direction it is rotating in. If it is rotating at speed and "CW or CCW" is selected in Parameter 154 "*Orient Options*" it will assume the orient direction is as programmed in 154, regardless of the direction that it is currently rotating in. If the orient direction is different from the current motor speed direction it will stop and reverse direction for the orient.

As a final note to the operation of motor orient, the drive will hold the motor locked in the orient position until the orient request from either the digital I/O or SCANport is released. If the drive is enabled and there is a non zero analog reference command on Analog Input 1 in Auto Mode or Analog Input 2 in Manual Mode the drive will immediately respond to the input reference and motor will accelerate to the commanded speed. <u>If this is undesirable make sure the analog references are zero after an orient is complete</u>

ATTENTION: Unexpected motor rotation may occur after a spindle orient request is released from the digital input. If motion is not desired after an orient request is removed from the drive digital input make sure your logic assures that zero speed is commanded or that the drive is disabled.

Optimizing the Motor Orient Procedure

This section provides the information you need to optimize your motor's orientation: Usually motor orient cycle time is a critical issue. It is therefore important to adjust the parameters to get the most out of the drive and motor. The 8720MC is capable of high accelerations, speeds and torques therefore the mechanical systems usually become the limit. To achieve maximum performance it is desirable to get the maximum orient speed and acceleration the mechanical system can support.

The key parameters in achieving this are Parameter 222, "*Spin Orient Spd*"; Parameter 260, *"Posn Accel Rate";* Parameter 157, *"At Spd Window"* or Parameter 272, *"Speed Window%"* and Parameter 100, "*Vel Prop Gain*" assuming Servo Loop Parameter Group 0.

Note: In general the optimizing procedure is to first auto tune the motor with the orient load, such as a spindle or indexing mechanism, connected. Refer to "Performing the Auto Tune."

1. Next gradually increase the orient speed and orient acceleration in unison.

2. After each change in Parameters 222 and 260 execute an orient.

Continue to do this until the desired cycle time is achieved or the maximum capability of the mechanical system is realized.

Note: It may be necessary to increase the "*At Spd Window*" via Parameter 157 or 272 to avoid missing a marker and taking an extra revolution to achieve the orient position. Also, if the motor and load mechanism are overshooting the orient angle, it may help to increase the velocity proportional gain, Parameter 100, "*Vel Prop Gain 0*" assuming Servo Loop Parameter Group 0. It may also be necessary to increase the + and- torque limits via Parameters 82 and 83 assuming Servo Loop Parameter Group 0.

Troubleshooting

Chapter Objectives

Chapter 10 provides information to help you determine the cause of a drive fault or improper 8720MC Drive operation and define possible corrective actions. The subjects discussed include:

- required equipment
- start up troubleshooting procedures
- viewing the fault queues on the HIM
- fault descriptions
- understanding fault parameters
- troubleshooting digital I/O
- troubleshooting SCANport I/O
- troubleshooting 8720MC-RPS Regenerative Power Supply

Required Equipment

The 8720MC can be supplied with a resident HIM display module. If the drive is not equipped with a resident HIM it will be necessary to use a remote Him module or Drive Explorer to troubleshoot the drive. The A-B remote HIM catalog number is 1203-HA2 - Series B or later can be connected to the external SCANport connector. As an alternative to the HIM, a laptop computer running Windows 95$_{TM}$ or Windows NT$_{TM}$ or a handheld running Windows CE$_{TM}$ can be used as a diagnostic tool. The available portable computer should be equipped with A-B's Drive Explorer$_{TM}$ software. If you are not familiar with Drive Explorer a copy of publication 9306 - 5.0 "Drive Explorer User Manual" will be helpful. In addition to these diagnostic tools a volt meter, a battery box and some small hand tools may be necessary. In rare instances an oscilloscope may be necessary to analyze feedback signals.

Start Up Troubleshooting Procedures

Before installing fuses into the AC input lines of the drive or regenerative power supply, if supplied, first check that the incoming AC voltage falls within the range of 324 to 505 Vrms across each of the 3 phases. Make sure the AC or DC power inputs are properly wired per chapter 4 of this manual. Also make sure the motor and feedback devices are wired per Chapter 4 and 5 using the recommended shielded cables. For the feedback cables make sure there is continuity between the motor and drive connectors. Make sure the Weidmueller spring clamps are clamped to the wire and not the insulation.

If you are using an 8720MC Regenerative Power Supply Refer to Publication 8720MC-RM001B-US-P, “8720MC RPS User Manual” for configuration and startup information on this equipment.

After power is applied to the drive the first thing to observe is the status of the control board LEDs and the HIM display on the drive. There are 4 LEDs on the control board. If you have an enclosed 8720MC Drive you must first remove the cover to observe the LEDs. The LED to the far left is used to indicate the status of the drive control board. The LED to the far right indicates the status of the SERCOS ring. The middle 2 LEDs indicate the transmit and receive traffic on the SERCOS ring. Table 10.1 indicates how these LED’s should be interpreted.

Table 10.1:
Control Board LED Fault Diagnostics

LED Name	LED Status	Potential Cause	Possible corrective action
Control Board Status	Not Illuminated	There is no power to the Control Board	Check the incoming AC power for AC input drives or the incoming DC power DC for common bus drives
Control Board Status	Steady Red	Malfunctioning Control Board	Software or hardware failure. Replace the Control Board
Control Board Status	Flashing Red	A fault has occurred in the system	Verify wiring. Use the HIM fault log or Drive Explorer to investigate the fault
Control Board Status	Alternating red and greens	DC bus is not up	Check 3 phase AC incoming or DC incoming power
Control Board Status	Flashing Green	There are no faults and the DC bus is up but the enable input is not being detected. As a consequence no torque is being applied to the motor. The drive may be in manual mode and the jog button has not been depressed.	* Check if +24 vdc is on the enable input * Check the run output from the RPS * Check the enable output from the Motion Controller * Check the enable input wiring. * Recycle the enable * If in manual mode depress jog button.
Control Board Status	Steady Green	Drive is enabled and ready to follow the auto or manual reference.	No corrective action
SERCOS Status	Steady Red	There is a SERCOS ring communication error.	Make sure the fibre optic ring is connected at all nodes on the ring and that power is on all the nodes. Make sure power is on the master.
SERCOS Status	Off	Normal operation	No corrective action
SERCOS RX	Green Flashing	Normal operation	No corrective action
SERCOS TX	Green Flashing	Normal operation	No corrective action

One of the best diagnostic tools available to investigate drive problems is the drive itself. Diagnostic messages can be displayed on the HIM or on a PC running Drive Explorer. When power is first applied the HIM display will illuminate and display the message “HIM Connecting”. If there are no drive, RPS or feedback faults the HIM will display “Sys Ready” on the top line and “0 RPM” on the bottom line. This assumes the HIM has successfully connected to the drive via it’s SCANport connection. If there are no faults and +24 vdc is applied to the enable input the HIM message will change to: “Sys Enabled”.

At this point the drive is capable of following the motion controller reference. If there are any faults, the fault messages will be placed in a fault message queue in the order the faults are detected. The last fault message detected will be displayed on the HIM. A history of up to 8 faults can be displayed on the HIM or Drive Explorer$_{TM}$.

Viewing the Fault Queue

Control Status mode on the HIM or *Explore - Devices Properties - Faults* in Drive Explorer let you view the fault queue.

To view the fault queue on the HIM:

1. Press any key from the status display. “*Choose Mode”* is shown.

2. Press the increment up key or the decrement down key to show “*Control Status”*.

3. Press enter to select Control Status

4. Press the increment up key or the decrement down key until “*Fault Queue*” is displayed.

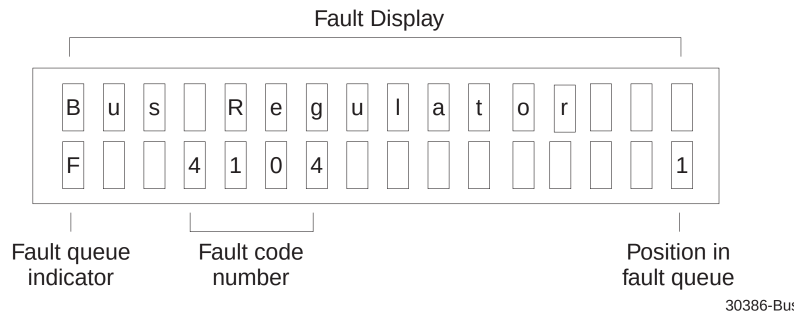
5. Press enter to select “Fault Queue”

6. Press the increment up key or the decrement down key until “*View Queue*” is displayed.

7. Press enter to select “View Queue”

The fault queue can contain up to 8 faults. The 8720MC Drive reports the faults using the following format.

Figure 10.1
Fault queue Format



The number (1) on the display in Fig. 10.1 indicates this faults position within the fault queue.

The regulator fault shown in Figure 10.1 is caused by a loss of the Regen PS OK input, Input 10, P5-36 on the digital I/O connector. This input must be jumpered to +24vdc for AC input drives. For applications using the 8720MC -RPS regenerative power supply P5-36 must be connected to the 8720MC -RPS fault relay contact. See Chapter 4 for proper wiring. For regenerative applications this message signals a regenerative power supply fault.

The 8720MC fault queue can also be monitored with Drive Explorer. The fault queue can be accessed through the *Explore* pull down menu, the *Device Properties* command and the *Faults* tab.

Fault Descriptions

When a fault occurs, the fault is displayed until you initiate a *Drive Error Reset* from the digital I/O or depress the stop button from the HIM module. A *Drive Reset* command from the HIM clears all faults and reboots the drive resident processor software. A *Clear Queue* command from the HIM clears the fault queue. If a fault is not removed it will not be cleared. The *Clear Queue* and *Drive Reset* commands are found under the HIM Control Status mode. Depressing the stop button on the HIM module also clears faults. These operations can be performed with Drive Explorer under the *Explore* pull down menu, the *Device Properties* command and the *Faults* tab.

Table 10.2 provides a list of the faults, their probable causes and the drives response to the faults.

Table 10.2:
8720MC Fault Messages

Fault Message	Probable Cause/Drive Response	Corrective Actions
Axis 1 ATune Flt	Auto Tuning procedure failed to complete successfully	Assure that the drive and motor are functional and repeat the auto tune procedure.
Bus Overvoltage	Bus voltage exceeded 810 vdc. This is usually caused by a high inertia motor load being decelerated very fast. / Disable stop: the drive will disable and the motor will coast to a stop with an error message on the HIM. The control board status LED will be flashing and the drive OK output will be open.	* Monitor the AC line for high voltage or transient conditions. * Decrease the deceleration parameter for the active parameter set, param. 137 for set zero * Decrease the stopping torque, parameter 571. * Increase the dynamic braking capacity by increasing the brake chopper capacity. * Adjust parameter 563 to a lower value. This will limit the motor deceleration rate. * Check for 8720MC-RPS faults. * Reduce the 8720MC-RPS bus voltage
Bus Loss	The DC bus voltaged has dropped below the minimum acceptable level. / Disable stop	* Monitor the AC line for low voltage or power interruption. * Check for 8720MC-RPS faults.
Ground Short	A current path to earth ground in excess of drive rated current has been detected at one of the output terminals. / Disable stop	* Check the motor wiring to the drive output terminals for a grounded condition. * Replace the drive
Bus Regulator	The regenerative power supply has faulted. / Disable stop	Investigate the 8720MC-RPS message display on the unit. Refer to publication 8720MC-RM001 for diagnostic trouble shooting procedures. Check input 10, Regen PS-OK.
Bus Precharge	The precharge time could not complete within 30 seconds.	
A1: Desat	There was to much current in the system. / Disable stop	Check for shorted motor or motor wiring
A1: Follow Error	Excessive following error has been detected. This means that the motor cannot keep up with the position command. / Regen stop	* Investigate motor load for any possible binding. * increase position loop proportional gain * increase the allowable following error, parameter 159
A1: Overcurrent	A drive overcurrent has occurred. The current has exceeded 150% of the inverter rated continuous current. / Disable stop.	* Decrease the deceleration parameter for the active parameter set, param. 137 for set zero The drive is particularly sensitive to this fault at high speeds. * Adjust parameter 563 to a lower value. * Check for a shorted motor or shorted motor wiring. * Replace the drive

Fault Message	Probable Cause/Drive Response	Corrective Actions
A1: Overtemp	A drive heat sink temperature has exceeded the specified limit. / Regen stop	* Check the cabinet filters, drive fans and heat sinks. * Check the thermal sensor and sensor wiring. * Reduce the load or duty cycle.
A1: Fdbk 1 Loss	The motor encoder feedback signal has been lost. / Disable stop: the drive will disable and the motor will coast to a stop with an error message on the HIM. The control board status LED will be flashing and the drive OK output will be open.	* Make sure the feedback wires are firmly crimped on the 8720MC mating feedback connector. * Check the MS motor feedback connector. * Check the encoder connector inside the motor. * Check for wire breaks in the feedback cable. * Make sure encoder power is available on P1-6. * If all connections are verified and encoder power is available and encoder output is still not present - replace motor.
A1: Fdbk 2 Loss	The auxiliary encoder feedback signal has been lost. SERCOS configuration only. / Disable stop	* Make sure the feedback wires are firmly crimped on the 8720MC mating feedback connector. * Check the MS motor feedback connector. * Check the encoder connector inside the motor. * Check for wire breaks in the feedback cable. * Make sure encoder power is available on P1-19 or P1-20. * If all connections are verified and encoder power is available and encoder output is still not present - replace motor.
A1: Fdbk 1 AQB	A feedback counting error has occurred on the motor feedback interface. Electromagnetic interference is the probable cause. / Disable stop	* Check that the feedback cable braided shield is firmly bonded to the drive chassis via the shield clamps. * Make sure the feedback and motor cables recommended in Chapter 4 are being used. * Make sure the shield and drain wire for the motor cable is securely bonded to the drive chassis. Make sure 4 wire shielded motor cable is being used and that the ground wire is connected to drive PE ground. * If the recommended cable is being used and all shields are tied to earth ground replace the motor.
A1: Fdbk 2 AQB	A feedback counting error has occurred on the motor feedback interface. SERCOS configuration only / Disable stop	* Check that the feedback cable braided shield is firmly bonded to the drive chassis via the shield clamps. * Make sure the feedback and motor cables recommended in Chapter 4 are being used. * Make sure the shield and drain wire for the motor cable is securely bonded to the drive chassis. Make sure 4 wire shielded motor cable is being used and that the ground wire is connected to drive PE ground. * If the recommended cable is being used and all shields are tied to earth ground replace the motor.

Fault Message	Probable Cause/Drive Response	Corrective Actions
A1: Overspeed	The maximum commanded motor speed has exceeded the maximum allowable motor speed. / Disable stop	* check the velocity limit parameters for the active parameter set against parameter 113, max motor speed. * Check parameter 695, the analog scale factor
Memory Init	Control board hardware Failure	Fatal error - replace control board
EEprom Init	Control board hardware Failure	Fatal error - replace control board
CPLD Load	Control board hardware Failure	Fatal error - replace control board
IDMA Load	Control board hardware Failure	Fatal error - replace control board
CAN Init	Control board hardware Failure	Fatal error - replace control board
SERCOS Init	Control board hardware Failure	Fatal error - replace control board
Task Init	Control board software error	Fatal error - replace control board
Objects Init	Control board software error	Recall parameters, save to non volatile memory, recycle power or reset the drive. If this fails to produce positive results replace the control board.
NV Mem Init	Control board software error	Recall parameters, save to non volatile memory, recycle power or reset the drive. If this fails to produce positive results replace the control board.
Fdbk Watch dog	The feedback processor has faulted	Fatal error - replace control board
Motor 1 Overtemp	The motor over temperature switch has tripped	Allow motor to cool down and investigate the cause of the motor overload.
SCANport Comm	The controlling HIM has lost communication with the drive.	Investigate the SCANport cable and make sure it is properly connected
No Fault	No fault message appears in the fault que when there are no faults	No action is needed

Understanding the Fault Parameters

Using the HIM module or Drive Explorer$_{TM}$ is an effective way of finding the source of a drive fault. Several of the parameters are specifically designed to annunciate drive status and faults. The following is a description of the fault parameters. The 12 character fault messages are shown in italics.

Parameter 11 - Shutdown Errors - This parameter is a bit pattern that identifies any active major fault within the drive. IDN 00011, parameter 11 is a SERCOS standard variable conforming to IEC Standard 61491. The structure of parameter 11 is as follows:

If any bit is true an error is indicated.

Bit 0 = Overload shut down - *“Drive Ovrld”*

Bit 1 = Amplifier over temperature shut-down - “*Drive Ovrtmp*”

Bit 2 = Motor over temperature shut down - “*Motor Ovrtmp*”

Bit 3 = Reserved

Bit 4 = Reserved

Bit 5 = Feedback error - “*Feedback*”

Bit 6 = Commutation error - “*Commutation”*

Bit 7 = Overcurrent error - “*Overcurrent*”

Bit 8 = Overvoltage error - “*Bus Overvolt*”

Bit 9 = Undervoltage error - “*Bus Undervlt”*

Bit 10 = “*Phase Loss*”

Bit 11 = Excess position error - “*Follow Error*”

Bit 12 = “*Communicate*”

Bit 13 = “*Overtravel*”

Bit 14 = Reserved

Bit 15 = 8720MC Drive Specific error - “*AB Specific*”

See parameter 129

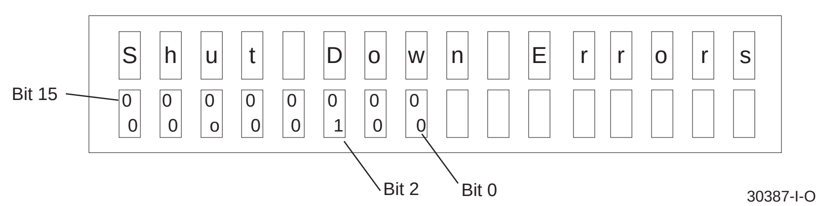
Display mode on the HIM or Drive Explorer allows the user to view the fault message.

To view the fault parameters on the HIM:

1. Press any key from the status display. “*Choose Mode”* is shown.
2. Press the increment up key or the decrement down key to show “*Display”*. Press the enter key to select it.
3. Press the increment or decrement key to find *“Status/Faults”*. Press the enter key to select the file
4. Press the increment up key or the decrement down key until “*Errors”* is displayed.
5. For this example press enter to select the “*Errors*” group
6. Press the increment up key or the decrement down key until “*Shut Down Errors*” is displayed.
7. Press enter to select “*Shut Down Errors*”

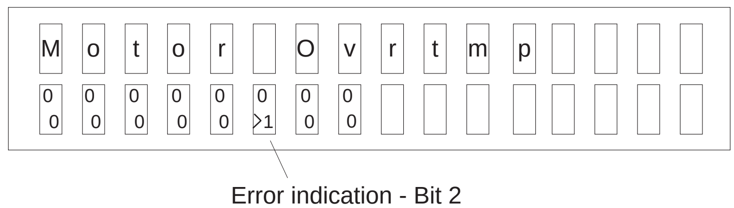
The 8720MC Drive fault parameters are reported using the format shown in Figure 10.2. In this example a “1” in bit 2 indicates a motor over temperature fault.

Figure 10.2
Fault Parameter Format



Depressing the select key allows the user to determine the nature of the fault. Each time the select key is depressed the arrow symbol moves to the next higher bit. The top line provides the message text associated with that fault as shown in Figure 10.3

Figure 10.3
Fault Display



Parameters 13 and 129 are additional parameters that have the same fault display format.

Parameter 13 - Drive Status - This parameter is a bit pattern that identifies the status of the drive the drive. The structure of parameter 13 is as follows:

Bit 0: true = Command speed = motor speed - "*At Speed*"
Event parameter 330, Setup parameter 157 or 272

Bit 1: true = Motor speed = 0 - "*Zero Speed*"
Event parameter 331, Setup parameter 124

Bit 2: true = Motor is below threshold speed - "*Vel Below Th*"
Event parameter 332, Setup parameter 125

Bit 3: true = Torque greater than threshold torque - "Trq above Th"
Event parameter 333, Setup parameter 126

Bit 4: true = Torque greater than torque limit - *"Trq Above Lt"*,
Event parameter 334, Setup parameter 82 or 83

Bit 5: true = Commanded motor velocity is greater than the velocity limit - *"Vel above Lt"*,
Event parameter 335, Setup parameter 38 or 39

Bit 6: true = Motor is in Position - *"In Position"*
Event parameter 336, Setup parameter 57

Bit 7 = Reserved

Bit 8 = Reserved

Bit 9: true = Spindle feedback is less than the minimum spindle speed - "*Spd Below Mn*",
Event parameter 339, Setup parameter 220

Bit 10: true = Spindle feedback is greater than the maximum spindle speed - "*Spd Above Mx*",
Event parameter 340, Setup parameter 221

Bit 11 = Reserved

Bit 12 = Reserved

Bit 13 = Reserved

Bit 14 = Reserved

Bit 15 = AB Specific

Parameter 129 - 8720MC Drive Errors - This parameter is a bit pattern that identifies drive error conditions that are in addition to the shutdown faults in parameter 11. The structure of parameter 129 is as follows:

If any bit is true an error is indicated.

Bit 0 = + Software Overtravel - "*+Sft ovrtrvl*"

Bit 1 = - Software Overtravel - "*-Sft ovrtrvl*"

Bit 2 = + Hardware Overtravel "*+Hrd ovrtrvl*"

Bit 3 = - Hardware Overtravel "*-Hrd ovrtrvl*"

Bit 4 = Motor feedback loss - "*Mtr fdbk los*"

Bit 5 = Motor feedback noise - "*Mtr fdbk nse*"

Bit 6 = Aux feedback loss - "*Aux fdbk los*"

Bit 7 = Aux feedback noise - "*Mtr fdbk nse*"

Bit 8 = Reserved

Bit 9 = Reserved

Bit 10 = Reserved

Bit 11 = Reserved

Bit 12 = Reserved

Bit 13 = Power structure ground short - "*Ground Short*"

Bit 14 = Drive hardware - "*Drv hardware*"

Bit 15 = Motor overspeed - "*Overspeed*"

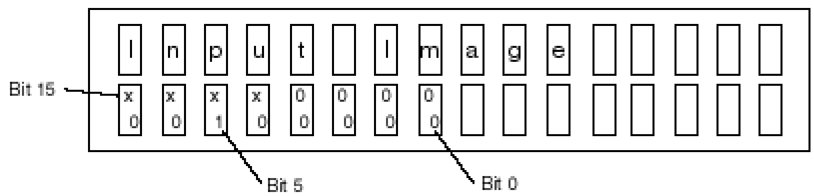
Troubleshooting the Digital I/O

In troubleshooting the digital I/O interface it is often necessary to monitor the status of the digital and analog inputs and outputs to determine the source of the problem. Six parameters can be used for this purpose

Parameter 666 - Digital Output Status - This parameter is also a bit pattern as shown in Figure 7.6. Bit 0 corresponds to Output 1 and bit 9 corresponds to Output 10. All other bits are not used. Bits 0 to 9 will change from 0 to 1 when the linked event variable comes true. Parameters 662 to 671 are used to link the output to an internal event variable. See Chapter 6 for the default links and the assignable event links.

Parameter 690 - Digital Input Status - Figure 10.4 illustrates the digital input image display. Bit 0 corresponds to Input 1 and bit 9 corresponds to Input 10. Bits 10 and 11 are the registration inputs. All other bits are not used. Bits 0 to 11 will change from 0 to 1 when the input comes true. The input variable assignments are discussed in Chapter 6.

Figure 10.4
Input Image Display



Parameters 691 and 692 - Analog Input 1 value and Analog Input 2 value - These parameters may be used to display the analog inputs as the 8720MC sees them. The scaling is .00% to 100.00% where 100% = 10 volts. The displayed values include the associated analog offsets, Parameters 693 and 694.

Troubleshooting SCANport I/O

Two parameters are available to monitor the SCANport command and status information exchange, parameters 717 and 718.

Parameter 717 - SCANport Logic Command - A SCANport peripheral gateway device such as an A-B plc can initiate drive activity via the SCANport Logic Command word. The structure of parameter 717 is as follows. The 12 character command messages are shown in italics.

If any bit is true the function is selected.

Bit 0: Regenerative stop request - “*Regen Stop*”

Bit 1: Start request - “*Start*”

Bit 2: Jog request - “*Jog*”

Bit 3: Clear fault request - “*Fault Clea*r”

Bit 4: Coast stop request - “*Coast Stop*”

Bit 5: Parameter Set Select bit 0 - “*Parmset Bit0*”

Bit 6: Parameter Set Select bit 1 - “*Parmset Bit1”*

Bit 7: Parameter Set Select bit 2 - “*Parmset Bit2”*

Bit 8: Parameter Set Strobe - “*Parmset Chg*”

Bit 9: Orient Request - “*Orient Req*”

Bit 10: Home request - “*Home Req*”

Bit 11: Manual/Auto request - “*Man Mode Req*”

Bits 12 to 15 are reserved:

Display mode on the HIM or Drive Explorer allows the user to view the command bits.

Parameter 718 - SCANport Logic Status - The 8720MC drive sends a status word to any SCANport connected device via a SCANport communication gateway. This may used by an A-B plc to monitor the status of the drive. This may also be used for diagnostic purposes. The structure of parameter 718 is as follows. The 12 character status messages are shown in italics.

If a bit is set true (1) the function is enabled.

Bit 0: Drive enabled - “*Enabled*”

Bit 1: Drive auto enabled - “*Auto Ref Ena*”

Bit 2: Rotation direction - “*Rotate Dir*”

Bit 3: Drive O.k. - “*Drive OK*”

Bit 4: Zero speed - “*Zero Speed*”

Bit 5: At reference speed - “*At Ref Speed*”

Bit 6: Orient complete - “*Orient Done*”

Bit 7 Reserved

Bit 8 Brake solenoid enabled - “*Brake Enable*”

Bit 9: Torque >/= Torque limit - “*Torque Limit*”

Bit 10: High Winding Selected - “*Hi Wind Sel*”

Bit 11: Low winding Selected - “*Lo Wind Sel*”

Bit 12: Shut down fault - “*Shutdn Fault”*

Bit 13: Reserved

Bit 14: Reserved

Bit 15: Manual mode selected - “*Manual Mode*”

Parameter 716 - SCANport Logic Mask - This parameter may be used to prevent any SCANport device from controlling the drive. The structure of parameter 716 is as follows:

If a bit is set true (1) the device interface is enabled.

Bit 0: Digital I/O - “I/O”

Bit 1: Port control 1 - “Port Cntrl 1”

Bit 2: Port control 2 - “Port Cntrl 2”

Bit 3: Port control 3 - “Port Cntrl 3”

Bit 4: Port control 4 - “Port Cntrl 4”

Bit 5: Port control 5 - “Port Cntrl 5”

Bit 6: Port control 6 - “Port Cntrl 6”

Troubleshooting the 8720MC-RPS Regenerative Power Supply

The 8720MC-RPS regenerative power supply is equipped with a 4 character display, 6 LEDs and 5 function keys. The display can be used to monitor incoming AC voltage, outgoing DC bus voltage, input current to the RPS, output power in kw and % RPS load. In addition the display can be used to view the RPS error log which can contain up to 10 error messages in the form of fault codes. The error messages are displayed as a 2 or 3 character flashing display. The last error that occurred is the first one to appear on the screen when accessing the error log. If multiple errors occur at the same time the corresponding error codes are scrolled, flashing one by one. To reset an error code, press the reset, “RST”, key or recycle power after removing the cause of the error.

Chapter 8 of publication 8720MC-RM001B, “8720MC Regenerative Power Supply”, contains a complete listing of all the fault codes along with appropriate corrective measures. Chapter 9 provides troubleshooting procedures as well as a troubleshooting flowchart. Refer to this publication before attempting to resolve 8720MC-RPS problems.

Chapter 4 of this manual shows how to wire the various configurations between the drive and RPS. In general, it is recommended that the run output is connected in series with Input 1, “Drive Enable”, on P5-14. It is required to tie the RPS fault output to input 10 on the drive, P5-36, “Regen PS OK”. Parameter 617 “Regen PS Fault” can be monitored on the HIM or Drive Explorer$_{TM}$ to determine the state of the RPS. This parameter can also be linked to a digital output if the application requires it.

Derating Guidelines

Appendix Objectives

This appendix contains derating guidelines for the 8720MC Drives and 8720SM Motors.

A number of factors can affect drive ratings. If your drive is affected by more than one factor, contact Allen-Bradley, Rockwell Automation.

Table J.1:
Derating Information for User-supplied Enclosures

Catalog Number	Base Derate Amps(1)	Derate Curve(2)(3)
380 - 480V AC Input Drives		
B014	14	Not required
B021	21	Not required
B027	27	Figure A.1
B034	34	Figure A.2
B042	42	Figure A.3
B048	48	Figure A.4
D065	65	Figure A.5
D078	78	Figure A.6
D097	97	Note 3
D120	120	Figure A.7
D149	149	Figure A.8
D180	180	Figure A.9
High altitudes (above 1000 m)	All Drives	Figure A.10

NOTE (1) The drive ambient operating temperature is 50°C with open packaging. If either the operating temperature of the open package exceeds 50°C or the enclosed version is operating between 41 and 50°C, you must use the derating curves in this Appendix

NOTE (2) Drive rating is based on altitudes of 1000 meters (3300 feet) or less. If installed at a higher altitude, derate the drive using Figure A.11 in this Appendix.

NOTE (3) Not available at the time of publication

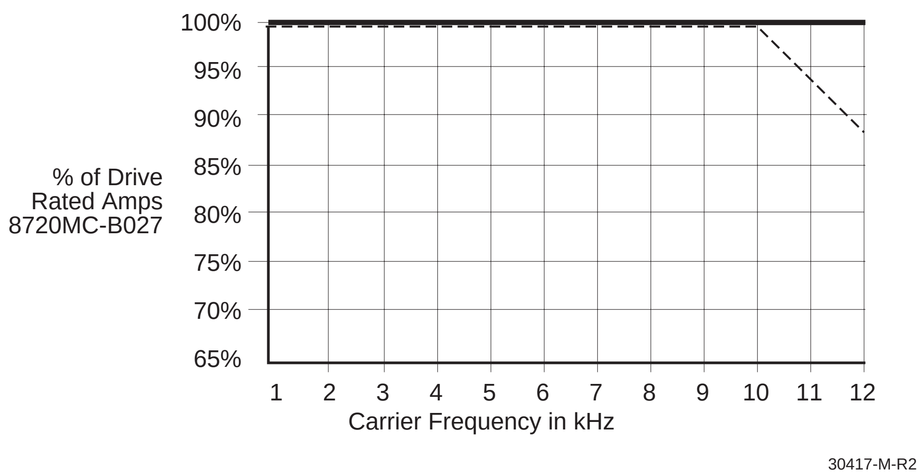
Derating Guidelines

The following 8720MC derating curves are provided to graphically demonstrate the effect of temperature and frequency on the continuous current capacity of the drive. The dark solid line on each graph indicates the current capacity, as a percent of full load current, of either the open drive operating at or below 50 degrees C or the enclosed drive operating at or below 40 degrees C. The dashed line indicates the derating factor which should be applied to the continuous current capability when operating an enclosed drive between 41and 50 degrees C. For example: Figure A.1 demonstrates that if an enclosed B027 drive is operarted at 41 to 50 degrees C and an IGBT switching frequency above 10 khz its continuous current capacity must be derated by the % indicated in the graph. Specifically if the switching frequency is 11 khz then the drive should be derated to 94% of it's rated continuous current capacity.

8720MC - B027 Enclosure

Figure A.1 shows the derating curves for A-B catalog number B027 enclosed and open ventilated drives.

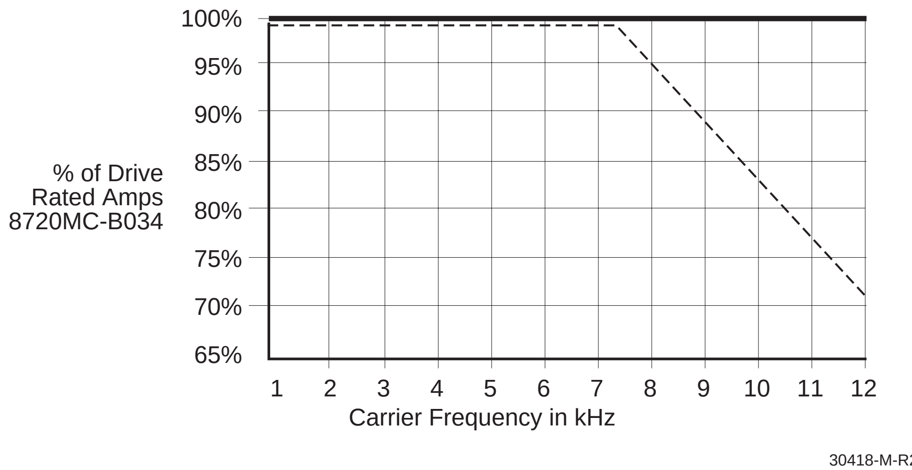
Figure J.5
8720MC - B027



8720MC - B034 Enclosure

Figure A.2 shows the derating curves for A-B catalog number B034enclosed and open ventilated drives.

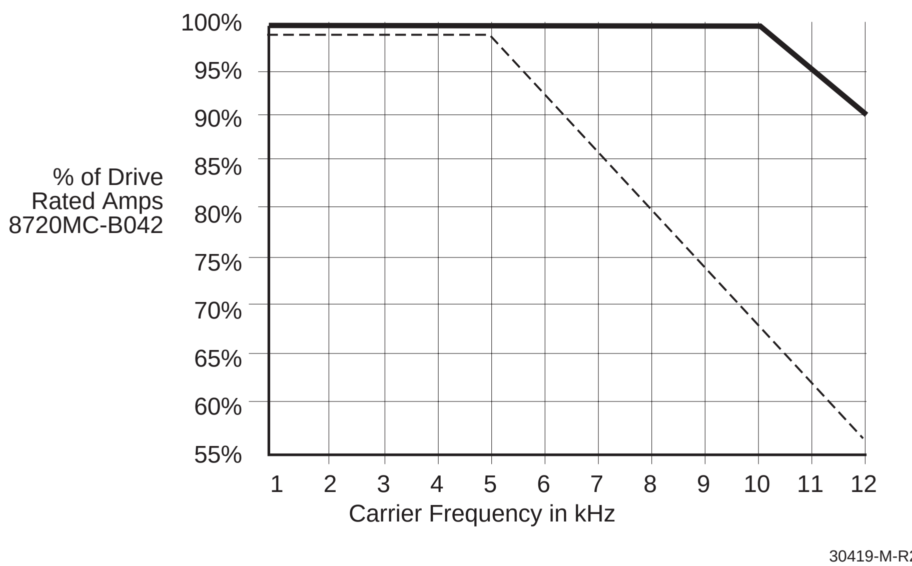
Figure J.6
8720MC - B034



8720MC - B042 Enclosure

Figure A.3 shows the derating curves for A-B catalog number B042enclosed and open ventilated drives.

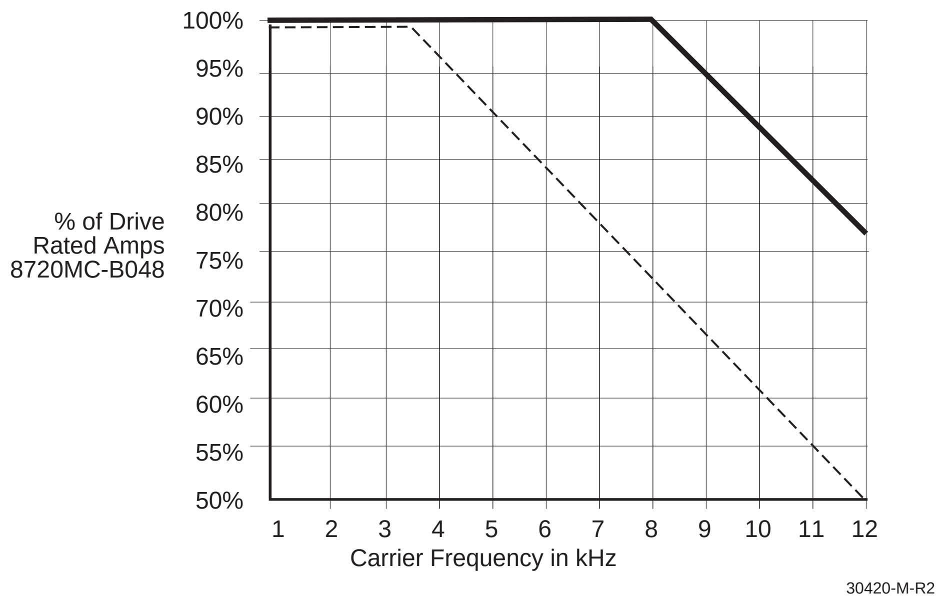
Figure J.7
8720MC - B042



8720MC - B048 Enclosure

Figure A.4 shows the derating curves for A-B catalog number B048 enclosed and open ventilated drives.

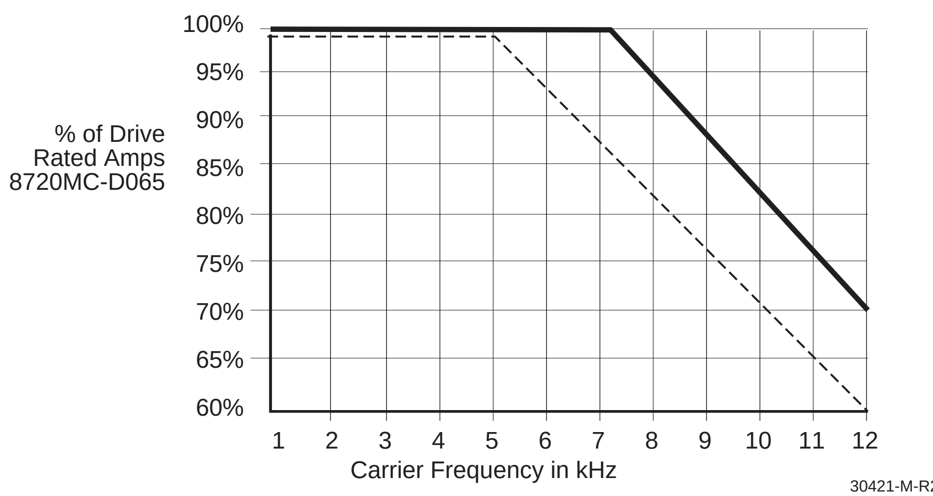
Figure J.8
8720MC - B048



8720MC - D065 Enclosure

Figure A.5 shows the derating curves for A-B catalog number B065 enclosed and open ventilated drives.

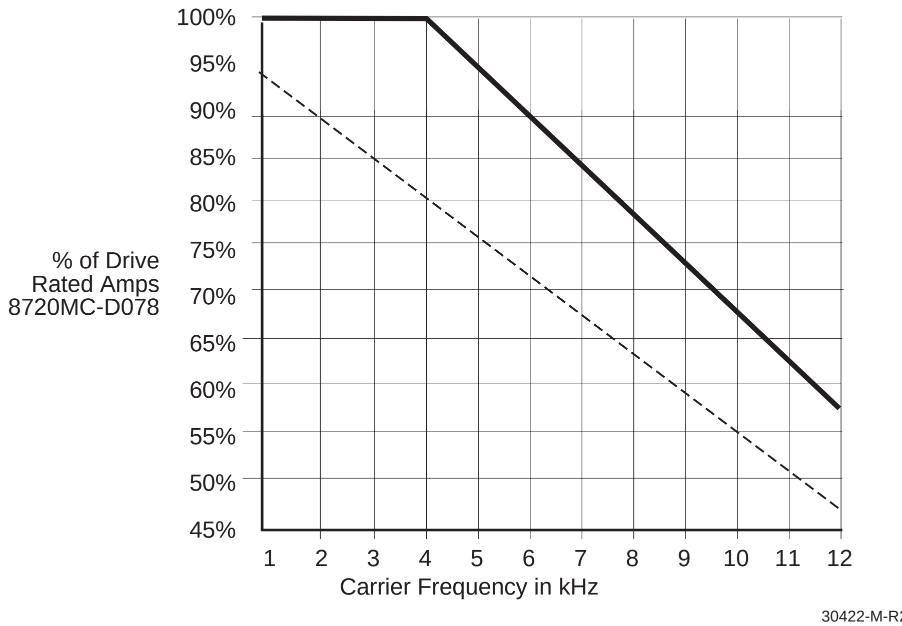
Figure J.9
8720MC - D065



8720MC - D078 Enclosure

Figure A.6 shows the derating curves for A-B catalog number B078 enclosed and open ventilated drives.

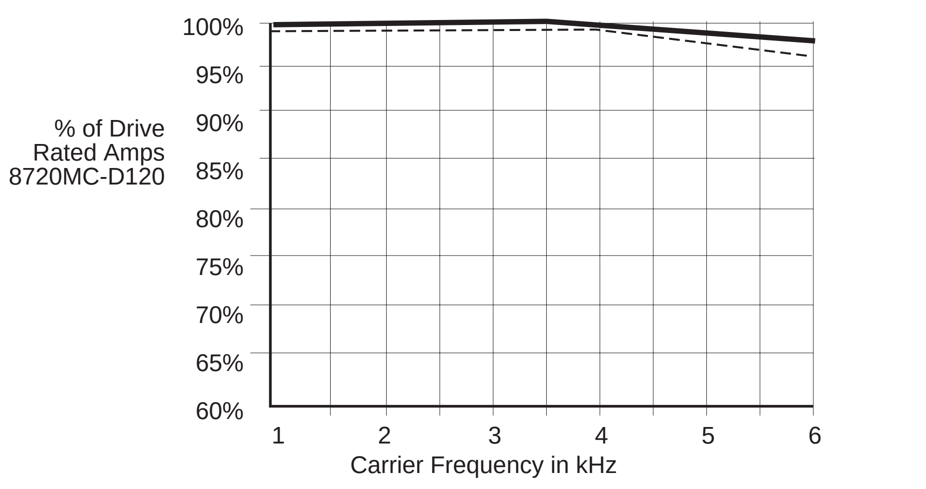
Figure J.10
8720MC - D078



8720MC - D120 Enclosure

FFigure A.7 shows the derating curves for A-B catalog number B120 enclosed and open ventilated drives.

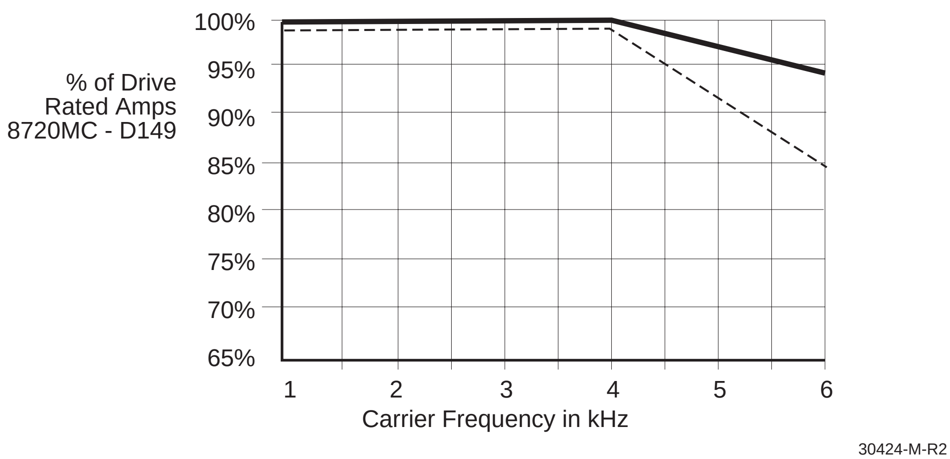
Figure J.11
8720MC - D120



8720MC - D149 Enclosure

Figure A.8 shows the derating curves for A-B catalog number D149 enclosed and open ventilated drives.

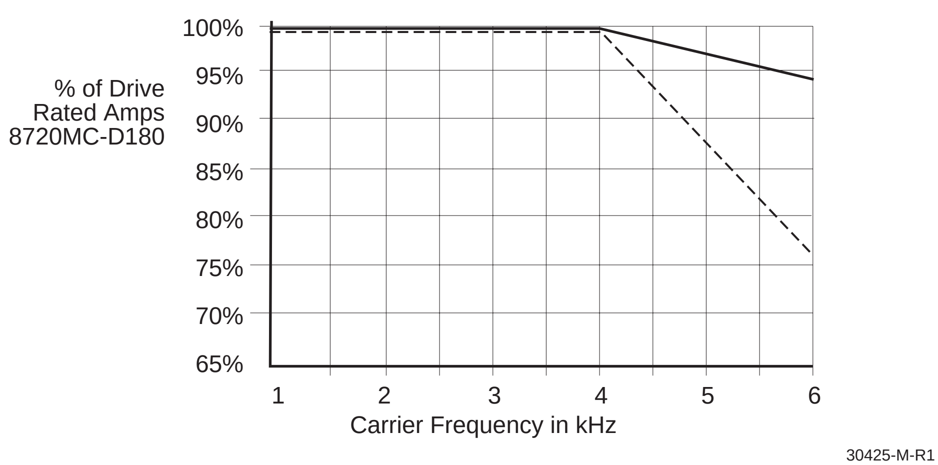
Figure J.12
8720MC - D149



8720MC - D180 Enclosure

Figure A.9 shows the derating curves for A-B catalog number D180 enclosed and open ventilated drives.

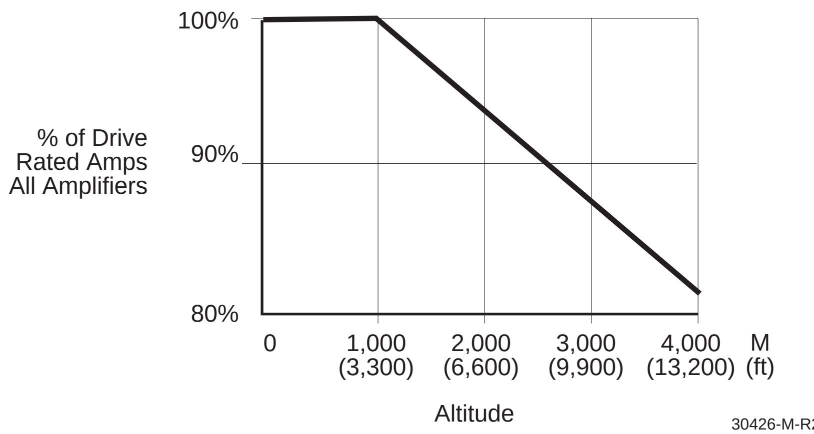
Figure J.13
8720MC - D180



8720MC - All Amplifiers at High Altitudes

Figure A.10 shows the derating curve for all 8720MC drive amplifiers at altitudes above 1000 meters (3300 feet).

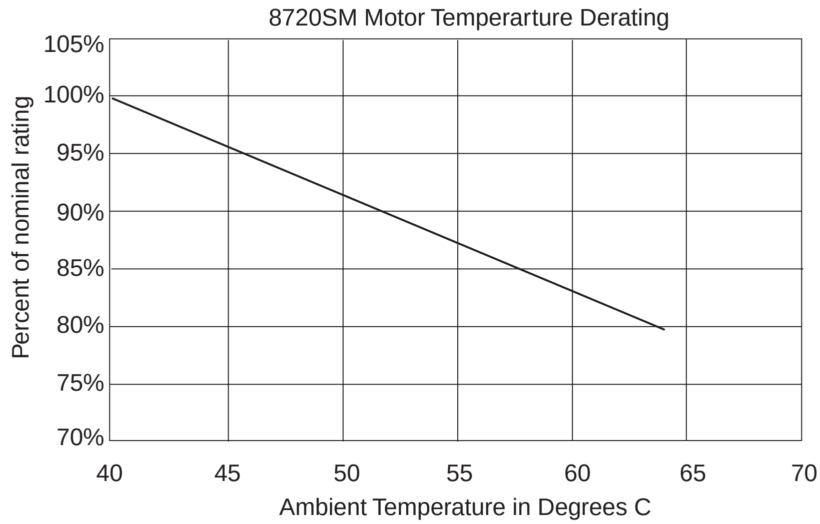
Figure J.14
8720MC - All Amplifiers



8720SM - Motor Temperature Derating Curves

Figure A.11 shows the derating curve for all 8720SM Motors operating at temperatures above the 40 degree C rating temperature

Figure J.15
8720SM - Motors



Replacement Spare Parts

Appendix Objectives

This appendix contains a listing of the recommended spare parts for the 8720MC Drive, the 8720MC Regenerative Power Supply and the 8720SM Motors.To get information about ordering spare parts call the Rockwell Automation Spare Parts Hub toll free at 1-888-360-1515 or 216-266-0700. You will be asked if the part is an Allen-Bradley part or a Reliance part. For drive and regenerative power supply parts specify Allen Bradley. For motors specify Reliance Electric. For telephone technical assistance call 262-512-8176. For questions about all 8720MC products have the catalog numbers ready for reference. For 8720SM motors always have the motor catalog number and motor ID number which can be acquired from the motor name plate.

8720MC Drive Spare Parts

Table B.1: 8720MC Drive Spare Parts

Allen-Bradley Catalog Number	Part Description
8720MC-AQBX5	Stegmann times 5 encoder box for 5120 simulated encoder output
8720MC-CN1	Control Module Mating Connector Kit
8720MC-CNMF	Motor right angle mating connector
8720MC-MCM	Drive Main Control Module - PC Board
1336-FAN-SP1A	Drive fan for the 8720MC B and C frame drives
1336-FAN-SP2A	Drive fan for the 8720MC D frame drives
1336-TR-SP1A	Kit, Thermistor, 8720MC B frame
1336-TR-SP2A	Kit, Thermistor, 8720MC C frame
1336-TR-SP3A	Kit, Thermistor, 8720MC D frame
1336-WB009	Brake chopper module,460 VAC, 9 amp
1336-WB035	Brake chopper module,460 VAC, 35 amp

8720SM Motor Spare Parts

Table B.2:
8720MC Motor Spare Parts

Reliance Catalog Number	Part Description
613450-1G	Blower Motor for DL 1106 to DL 1110
613450-1C	Blower Motor for DL 1307 to DL 1310
613450-2C	Blower Motor for DL 1611 to DL 1613
613450-21A	Blower Motor for DL 1811 to DL 1813
613450-21A	Blower Motor for DL 2010 to DL 2012
607980-112A	Stegmann SNS-60 Encoder

8720MC-RPS Regenerative Power Supply Spare Parts

Table B.3:
8720MC-Regerative Power Supply Spare Parts

Allen-Bradley Catalog Number	Regen Power Supply Part Description
8720MC-RPS027BM	Complete 15KW, 27 amp, Master Regenerative Power Supply
8720MC-RPS065BM	Complete 37KW, 65 amp, Master Regenerative Power Supply
8720MC-RPS065BS	Complete 37KW, 65 amp, Slave Regenerative Power Supply
8720MC-RPS190BM	Complete 125KW, 190 amp, Master Regenerative Power Supply
8720MC-RPS190BM	Complete 125KW, 190 amp, Master Regenerative Power Supply
8720MC-HF-B	460 VAC Harmonic Filter
8720MC-VA-B	460 VAC Varistor
8720MC-LR03-032B	3%, 32 amp, 460 VAC Line Reactor
8720MC-LR05-048B	5%, 48 amp, 460 VAC Line Reactor
8720MC-LR10-062B	10%, 62 amp, 460 VAC Line Reactor

Allen-Bradley Catalog Number	Regen Power Supply Part Description
8720MC-LR14-070B	14%, 70 amp, 460 VAC Line Reactor
8720MC-LR10-100B	10%, 100 amp, 460 VAC Line Reactor
8720MC-RFI80	Schafner FN3100-80/35 Filter for 15 0r 37 kw CE Applications
8720MC-EF190-VB	AC Line Filter for 190 amp CE Applications

Table B.4:
8720MC-8720MC-RPS027 Regerative Power Supply Spare Parts

REJ Part Number	Part Description
826751	S-B0001 Regulator Board, BDSR-1
286040	500VFA16A Ferraz 16 amp Fuse, 16x32 for Fuse1 - Precharge
926024	UOA528500 Cooling Fan
926023	UOA528400 Precharge Resistor

Table B.5:
8720MC-8720MC-RPS065 Regerative Power Supply Spare Parts

REJ Part Number	Part Description
826751	S-B0001 Regulator Board, BDSR-1
286040	500VFA16A Ferraz 16 amp Fuse, 16x32 for Fuse1 - Precharge
926504	MB-B0012 Cooling Fan
926503	MB-B0011 Precharge Resistor
352311	MB-B0013 Master to Slave ribbon cable

Table B.6:
8720MC-8720MC-RPS190 Regerative Power Supply Spare Parts

REJ Part Number	Part Description
826751	S-B0001 Regulator Board, BDSR-1
286005	6JX30 (600V 30 A) Fuse
286007	6JX3 (600V 3 A) Fuse
926524	60-03136-00 for CN26 of APS-011 Cooling Fan
926525	60-03136-01 for CN27 of APS-011 Cooling Fan
926526	60-03137-00 Precharge resistor
926523	60-03170-00 Master to Slave Ribbon Cable

Symbols

Numerics

A

B

E

O

P

R

S

T

U

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