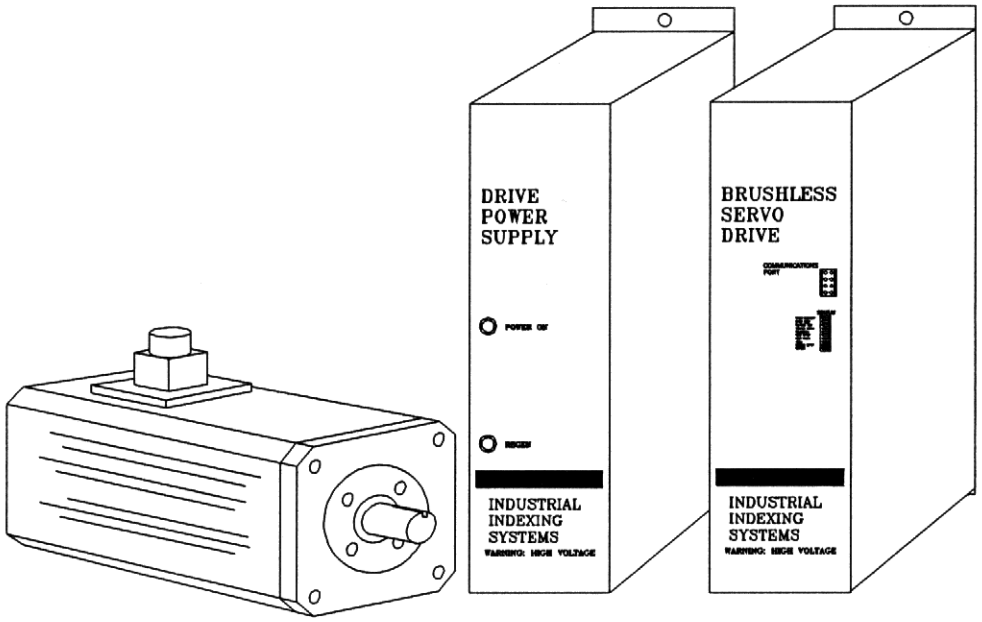
IB-14B004

SERIES 4 MOTION DEVICES JULY 1992

SERIES 4 MOTION DEVICES



USER'S GUIDE

INDUSTRIAL INDEXING SYSTEMS, Inc. Instruction Book

Revision - A
Approved By: 8/14/92

ER-6004

ERRATA SHEET, IB-14B004 — JUNE 1993

Date	Rev.	ECN No.	DR	CHK	CHK
11/12/92	H	ECN-92-303 (See Note 1)	MFE		
2/2/93	K	ECN-93-023 (See Note 2)	MFE		
6/11/93	L	ECN-93-156 (See Note 3)	EB	EB	AKS

Notes:

1) Section 2, page 2-7, dated NOVEMBER 1992, supersedes SEPTEMBER 1992. Page 2-16 is added to Section 2. Added drawing C-220YYY to Appendix K.

2) Section 1, pages 8 & 10, and Section 4, page 4, dated JULY 1992, supersedes FEBRUARY 1993.

3) Section 1, pages 11, 12 and 14 dated JUNE 1993, supersedes JULY 1992. Added alternate fuse part numbers.

INDUSTRIAL INDEXING SYSTEMS, Inc.
626 Fishers Run
Victor, New York 14564
Tel: (585) 924-9181
Fax: (585) 924-2169

TABLE OF CONTENTS

SECTION 3 - CONTROLS AND OPERATION

SECTION 4 - MAINTENANCE

SECTION 5 - APPENDICES

LIST OF ILLUSTRATIONS

SECTION 1 - DESCRIPTION

SECTION 2 - INSTALLATION

SECTION 3 - CONTROLS AND OPERATION

SECTION 4 - MAINTENANCE

SECTION 5 - APPENDICES

INTRODUCTION

The Industrial Indexing Systems Series 4 Motion Devices are a group of brushless motor/drive packages, and power supply packages especially suited for indexing and positioning applications in which high torque-to-inertia ratios, high peak horsepower, and rapid acceleration/ deceleration rates are required.

This manual describes proper installation, operation, and troubleshooting procedures for the Series 4 Motion Devices. These devices include the motors and drives which make up the Motor/Drive Packages and the power supplies, transformer, and regeneration resistors which make up the Power Supply Packages.

The manual assumes no prior knowledge of Industrial Indexing System equipment. It does assume knowledge of proper mechanical, electrical, and electronic maintenance and safety procedures. Sections dealing with serial communications assume knowledge of ASCII code and binary coded decimal programming and communications. Information in this manual is subject to change without prior notification.

The manual uses a variety of highlighted blocks to emphasize important information. Always pay careful attention to this information. The types of highlighted blocks used are:

WARNING

USED TO ALERT THE READER TO ACTIONS OR CONDITIONS WHICH MIGHT PRESENT HAZARDS OR CAUSE INJURY TO PERSONNEL.

CAUTION

USED TO ALERT THE READER TO ACTIONS WHICH MIGHT CAUSE LOSS OF MATERIALS OR DAMAGE TO EQUIPMENT.

NOTE

Used to identify unusual or unexpected conditions or to point out the need for alternate procedures. It is also used for emphasis when a CAUTION or WARNING is not required.

Industrial Indexing Systems fully supports all equipment it manufactures and supplies. If there are any problems with this equipment or if assistance is required for installation or operation, contact our Integrated Technical Services Department.

Assistance and training is available in our factory, for a fee. In addition, Industrial Indexing Systems can custom configure Series 4 Motion Devices for O.E.M. applications.

SECTION 1 – DESCRIPTION

The Industrial Indexing Systems Series 4 Motion Devices are a group of brushless motor assemblies, drive packages, and power supply packages especially suited for indexing and positioning applications in which high torque-to-inertia ratios, high peak horsepower, and rapid acceleration/ deceleration rates are required. The drives include a microprocessor with nonvolatile memory to store parameters for up to 30 motors. The motors and drives are used in conjunction with a closed-loop controller to accurately control the position of the motor shaft.

1.1. INDEXING DRIVE SYSTEM OVERVIEW

An indexing drive system (or indexing system) may be used in a variety of applications where accurate movement or positioning is required. A basic system consists of the main components illustrated in **Figure 1.1**.

1) Input Device: The input device provides data to the controller. It is the interface between the operator (or system computer or programmable logic controller) and the indexing system. In a given system, there may be several input devices.

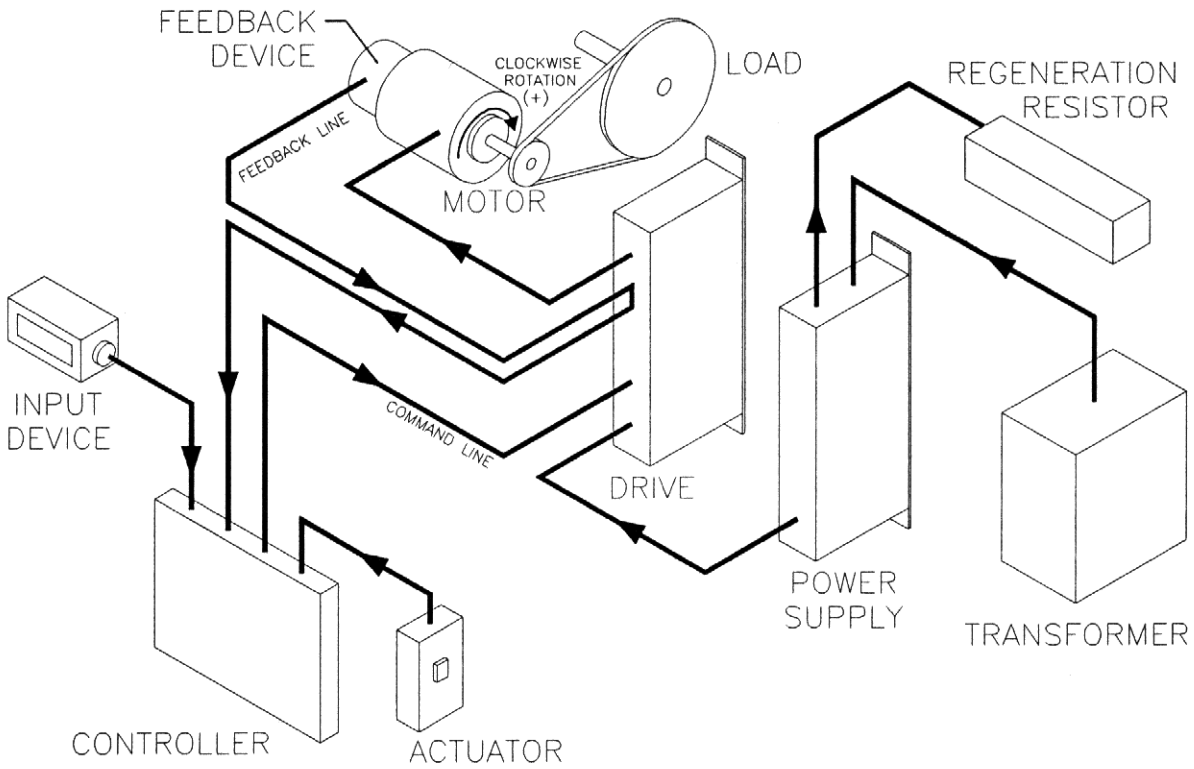


Figure 1.1 - Basic Indexing System

2) Controller: The controller receives data from the input device and issues commands to the drive. It also accepts information from the feedback device. The programming and settings of the controller determine what types of commands are issued to the drive in response to the data inputs and feedback.

3) Actuator: The actuator supplies the signal which causes the controller to initiate the specified operations.

4) Power Supply: The power supply bus converts AC input power from the transformer into DC power and conditions this secondary power so it can be used by the drive.

5) Drive: The drive (also called a servo-amplifier) amplifies a low voltage velocity command signal from the controller into the necessary voltage and current to cause the motor shaft to rotate. The amount of power and polarity (positive or negative) of the voltage supplied to the motor is determined by the command signals from the controller.

6) Transformer: The transformer converts prime supply voltage into the required input voltage for the power supply.

7) Regeneration Resistor: The regeneration resistor dissipates excess energy from the indexing drive system during deceleration sequences where required.

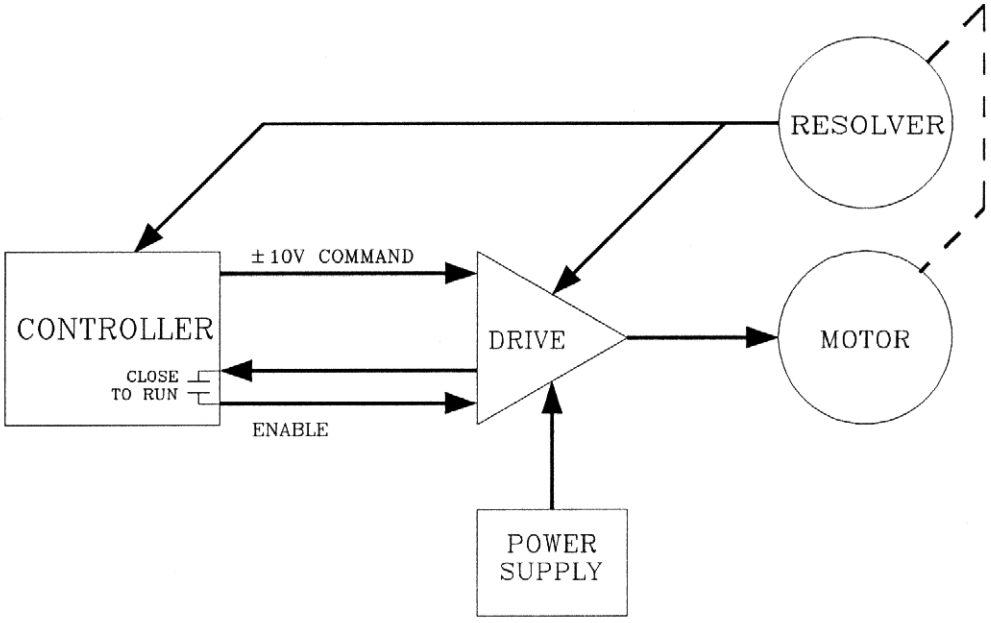


Figure 1.2 - Position Loop

8) Motor: The motor is the device being controlled by the indexing system. The system controls the position and speed of motor shaft rotation.

9) Load: The load is the object of the motion. It absorbs the work energy of the motor.

10) Feedback Device: The feedback device (usually a resolver) monitors the position of the motor shaft and sends this information to the controller.

The components of the basic indexing drive system form two information loops. The position loop is a closed-loop which consists of the controller, drive, motor, and feedback device. (The Series 4 motion devices use a resolver as the feedback device. Its signal is shared by the controller and drive.) The controller, after receiving data from the input device, sends a command to the drive, which causes the motor shaft to move, which is monitored by the feedback device, which sends data to the controller, which sends a command to the drive, etc.

The velocity loop is also a closed-loop system. An input voltage to this loop changes the voltage applied to the motor (the drive output), which changes the speed of the motor-shaft rotation, which changes the speed of the resolver, which changes the signal to the drive, which influences the drive output, etc.

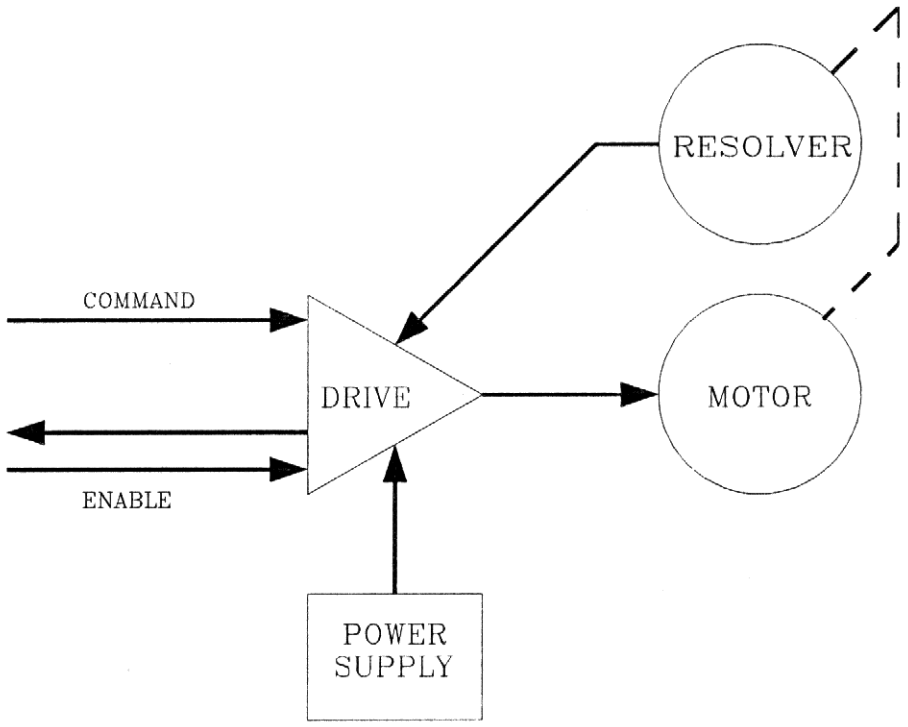


Figure 1.3 - Velocity Loop

NOTE

For Series 4 motion devices with the shared resolver, the resolver position signal is monitored for change and serves as the tachometer. There is no separate tachometer on these systems.

The position loop and velocity loop are independent loops, but the controller uses the velocity loop to achieve movement to the desired position. When data is received by the controller specifying a movement, the controller calculates the time required to accelerate to maximum speed and to decelerate from maximum speed. It then calculates the time at maximum speed necessary to complete the movement. This information is then transmitted to the drive by the controller.

1.2. MOTION DEVICES

The motion device components of the indexing drive system discussed in this manual include the drives, motors, power supplies, transformers, and regeneration resistors.

1.2.1. PRE-ENGINEERED MOTOR/DRIVE PACKAGES

The combination of a specific drive and motor assembly (motor plus feedback device) is designated as a Motor/Drive Package (MDPAK™). The combination of a specific power supply, transformer, and regeneration resistor is designated as a Power Supply Package (PWRPAK™). Each of these packages has been pre-engineered and pre-tested to offer system-level performances. The components of each package are selected to work properly with each other at the rated performance levels and the Motor/Drive Packages and Power Supply Packages of a specific series are selected to work properly with each other.

NOTE

Each motor/drive package in this manual belongs to the MDPAK4 series. Each power supply package belongs to the PWRPAK4 series.

Selection of a PWRPAK or MDPAK depends on the system requirements of speed, torque, peak torque, horsepower, and physical size. The specifications for all Series 4 motion devices are contained in the appendices to this manual. Refer to **Paragraph 1.2.2** and **Section 1.4** for details on reading these specifications.

1.2.2. ORDER/SHIPPING CORRELATION

When an order is placed with Industrial Indexing Systems, Inc., the motion devices are specified as a MDPAK and a PWRPAK, with the appropriate numerical designations. However, when the units are shipped, the individual components are specified — rather than the package designations — to make sure that all items are supplied properly. If several MDPAKs and PWRPAKs are ordered, there will be similar components in the shipment with no cross reference as to which Motor/Drive Package or Power Supply Package they belong to. To avoid confusion and potential error when the units are assembled by the customer, **Appendix C** and **Appendix G** of this manual include Bills of Materials and specifications for all Series 4 Motor/Drive Packages and Power Supply Packages currently supplied by Industrial Indexing Systems, Inc. Similarly, the appendices for each of the other motion devices series manuals contain complete Bills of Materials and specifications for those series.

LIST OF MATERIALS		
DESCRIPTION	PART NUMBER	QTY
POWER SUPPLY	IPS-300/50-ER	1
TRANSFORMER	TE-300/15-3	1
RESISTOR KIT	AC-100024	1
MANUAL	IB-14B004	1

Figure 1.5
Sample PWRPAK™ Bill of Materials

Figure 1.4 shows a sample Bill of Material for a Series 4 MDPAK. It includes the motor assembly part number and the drive part number for that MDPAK™. It also shows the instruction manual number for the motion devices series.

Figure 1.5 shows a sample bill of material for a Series 4 PWRPAK™. It shows the part numbers for the power supply, transformer, and regeneration resistor which make up that PWRPAK and the instruction manual number for the motion devices series.

NOTE

When a shipment is received, the components should be identified according to the appropriate MDPAK or PWRPAK before they are installed.

LIST OF MATERIALS		
DESCRIPTION	PART NUMBER	QTY
MOTOR ASSEMBLY	BLM-1013	1
DRIVE	BSD-300/30	1
MANUAL	IB-14B004	1

Figure 1.4
Sample MDPAK™ Bill of Materials

1.3. COMPONENTS

The Series 4 Motor/Drive Packages and Power Supply Packages are based on the use of brushless motors with resolvers as feedback devices. Each drive is matched to the motor for the specific MDPAK™ application. Similarly, the transformer and regeneration resistor are matched to the power supply for a specific PWRPAK™. Each drive is used with only one motor assembly. Each power supply can be used with one or more drives, depending on the load requirements of the drives and the maximum allowable axes for the power supply. The power supply is physically and electrically connected to the drive by a 300 VDC power bus and a control signal bus.

1.3.1. MOTOR/DRIVE PACKAGE (MDPAK™)

The Motor/Drive Package consists of the motor assembly and drive. Dimensions and specifications for each of the Series 4 motor assemblies and drives are contained in **Appendix D** and **Appendix E** respectively. The resolvers — used as feedback devices — are an integral part of the motor assembly.

1.3.1.1. Motor Assemblies

There are several different motor assemblies used in the Series 4 MDPAKs. **Appendix D** contains the drawings, with dimensions and wiring connections, for each of the motor assemblies used in the Series 4 Motor/Drive Packages. **Figure 1.6** shows a representative illustration and the typical location of the components which will need to be accessed during installation or operation of the motor assembly.

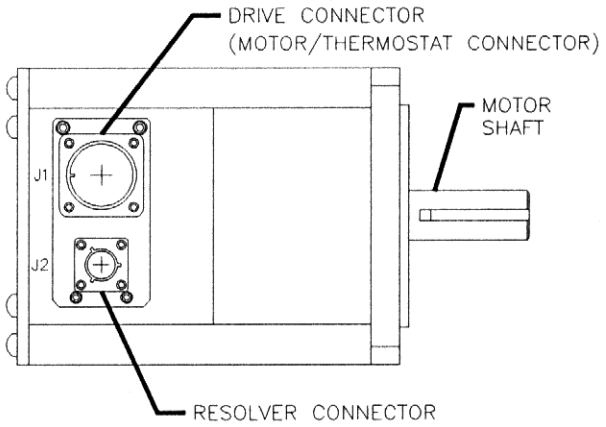


Figure 1.6
Motor Assembly

Drive Connector: The drive connector is used for the power cable from the drive to the motor. Two of the pins in this connector also provide the circuit from the internal motor overload thermostat to the drive. This thermostat should be wired in series with the drive system safety circuit to shut down the system in the event of an over-temperature condition.

Resolver Connector: This connector is used for the resolver cable from the drive. In Series 4 Motor/Drive packages, the resolver is shared by the controller and drive. All resolver connections from the controller are connected to terminals on the drive and are then connected in parallel to the resolver by a second cable.

1.3.1.2. Drives

The drive converts the signals from the controller and the power from the power supply into useable energy to rotate the motor shaft. The drive is designed around a microprocessor-based circuit board (refer to **Figure 1.7**). Some of the necessary components can be accessed from the exterior of the drive, but access to many components requires removal of the cover. **Figure 1.8** shows both a front view and cutaway front view of a typical drive. **Appendix E** contains the drawings for each of the drives used with Series 4 Motor/Drive Packages.

WARNING

HIGH VOLTAGES MAY BE PRESENT IN THE DRIVE EVEN WITH THE POWER DISCONNECTED. USE EXTREME CAUTION WHEN ACCESSING THE INTERIOR OF THE DRIVE.

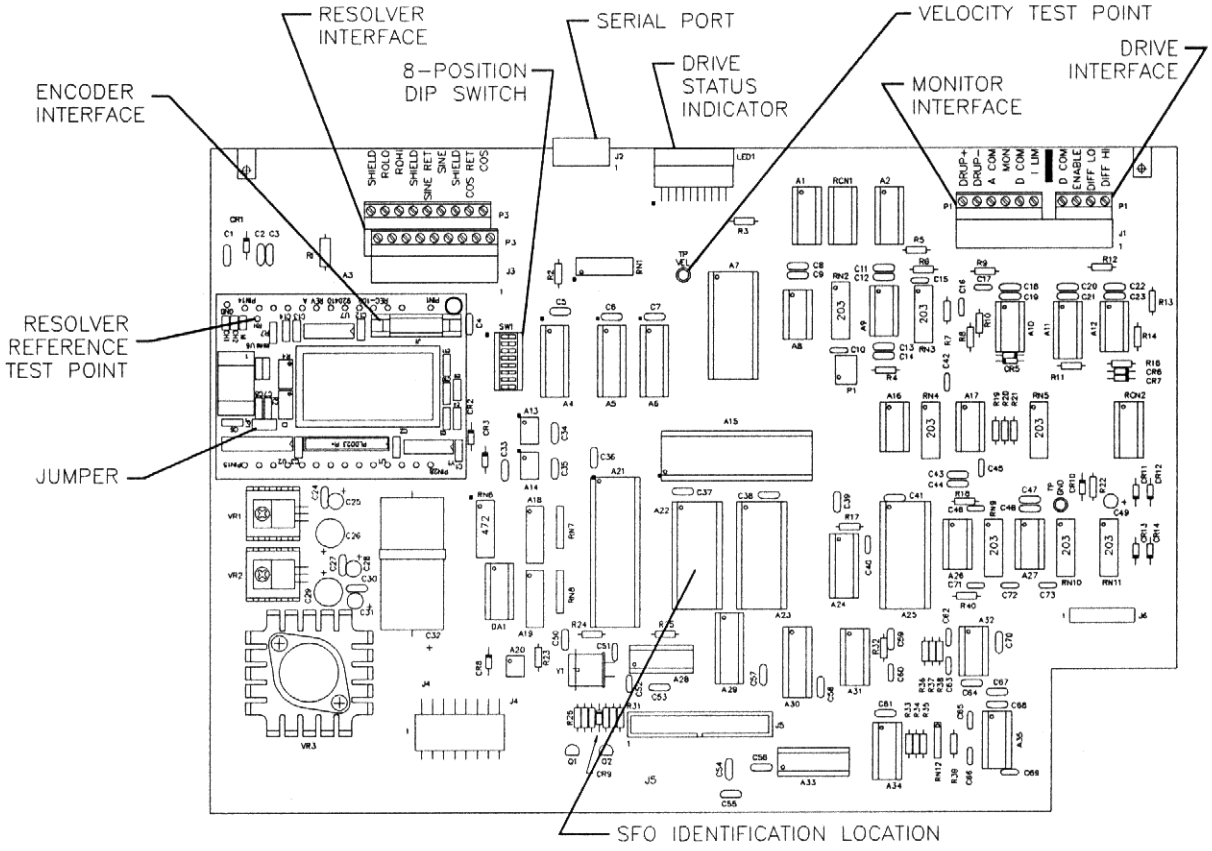


Figure 1.7 - Drive Control Board Assembly

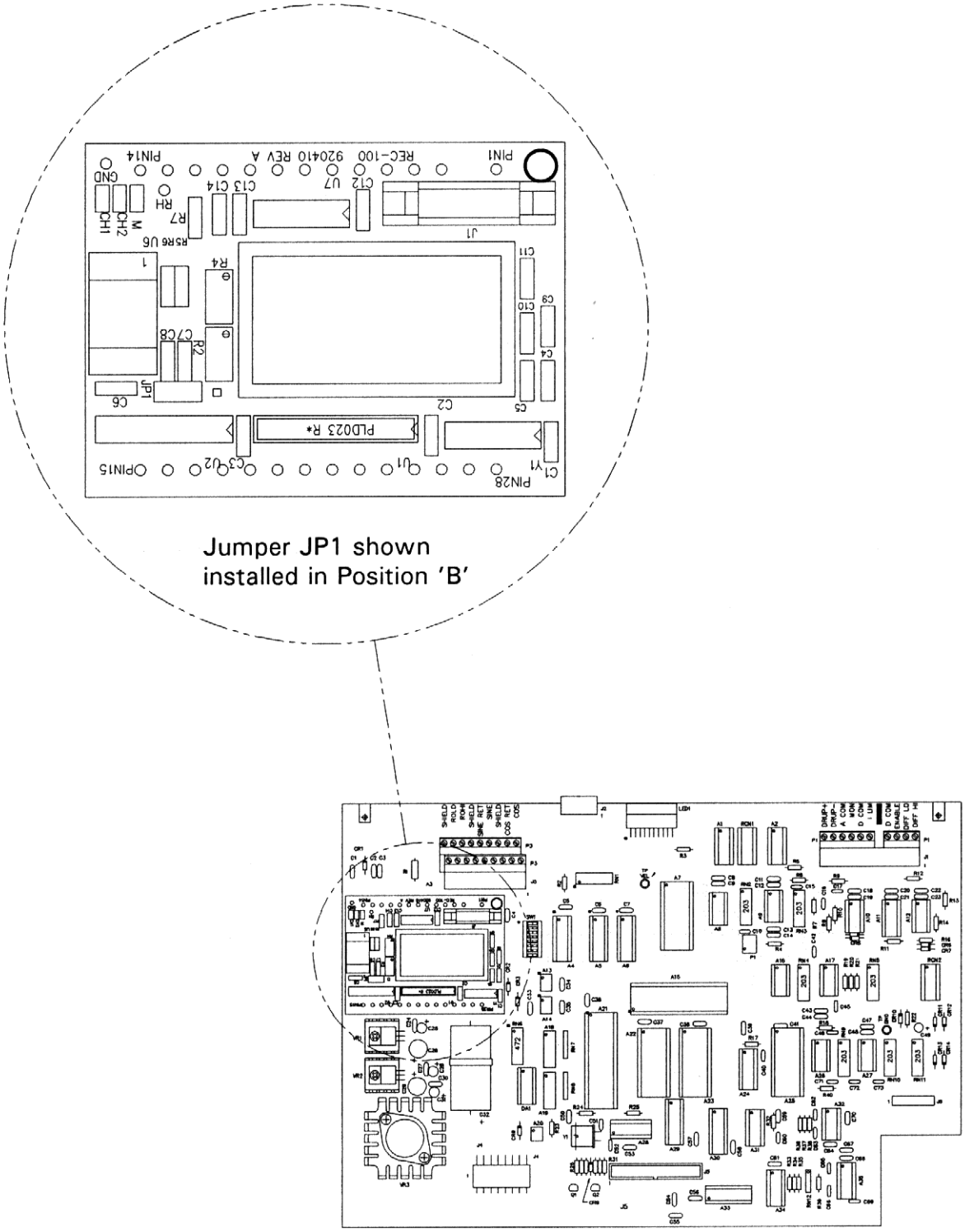


Figure 1.7a REC-100 location on Drive Control Board Assembly

Resolver Interface: The resolver interface is the connection point for both the resolver cable from the system controller and the cable to the resolver from the drive. Since the resolver is shared by the controller and the drive, both cables are connected in parallel at this interface. All of the connector terminals are used by both the drive and the controller.

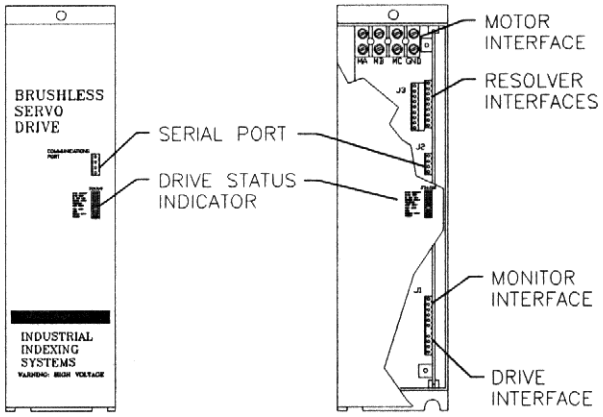


Figure 1.8
Drive Components

8-Position Dip Switch: This set of switches provides setup information to the drive. Refer to **"Section 3 - Controls and Operation"** for proper settings of these switches.

Serial Port: This connector is used for serial communications when setup is being controlled from a serial device such as a Programmable Logic Controller (PLC) or host computer. Refer to **"Section 3 - Controls and Operation"** for communication protocol and commands when using the serial port.

Drive Status Indicator: The drive status indicator is a 10-segment LED (Light-Emitting Diode) which displays operating and error conditions of the drive (refer to **Figure 1.9**). Fault or error indicators latch ON and must be reset by cycling the system power. Refer to **"Section 3 - Controls and Operation"** for details on the various indicating LEDs.

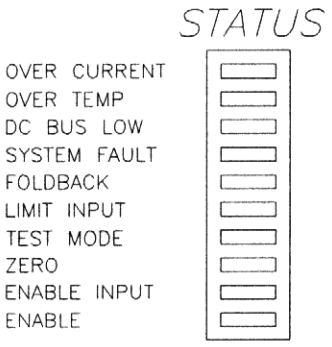


Figure 1.9
Status Indicator

Velocity Test Point: This terminal is provided as a means of checking motor shaft velocity during troubleshooting procedures. The voltage will change relative to the motor velocity. Refer to **"Section 4 - Maintenance"** for Velocity Test Point measurement procedures.

Monitor Interface: The monitor interface provides a variety of contact points for system functions. These include a current monitor function, a current limiting function, and a drive enabled signal. Refer to **"Section 3 - Controls and Operation"** for detailed explanations of these functions.

Drive Interface: The drive interface provides the connection point for the cable which carries signals between the controller and drive.

Motor Interface: The motor interface provides the connection point for the cable which carries the power and ground connections to the motor. The cable between this connector and the motor also includes two wires which connect to the thermal overload in the motor. These wires should be connected to the system safety circuit to shut down the system in the event of excessive heat.

DC Bus Bars (Not Shown): There are two 300 VDC bus bars — the main and common busses — connected between the bottom of the drive and power supply. They carry unregulated DC power from the power supply to the drive. (Refer to Drawing Number IM-0006 or IM-0008 in **Appendix E**.)

115 VAC and Bus Status Cable (Not Shown): This cable, connected to the drive and located next to the 300 VDC bus bars carries 115 VAC control voltage and DC bus status from the power supply to the drive. (Refer to Drawing Number IM-0006 or IM-0008 in **Appendix E**.) There is also an additional connector on the drive for connection of this cable from the drive for the next axes. In this way, the cables for several drives can be daisy-chained together.

Fan (Not Shown): The fan supplies a cooling air flow over the drive electronic components. (Refer to Drawing Number IM-0006 or IM-0008 in **Appendix E**.)

Jumper: This jumper selects the origin of the resolver reference signal. While in position B, the on-board reference is being used; and in position A, the reference is supplied externally (see figure 1.7a).

Resolver Reference Test Point: This terminal is provided as a means of measing the resolver reference generator. The nominal reading is 8V RMS @2600Hz.

Encoder Interface: The encoder interface is the connection point for an encoder based system controller.

1.3.2. POWER SUPPLY PACKAGE (PWRPAK™)

The Power Supply Package consists of a power supply, transformer, and regeneration resistor. The Series 4 PWRPAKs use a 50-amp and a 75-amp power supply. These serve identical purposes, but have slightly different components and layouts. The power supply converts the 208 VAC input power from the transformer to 300 VDC unregulated output power for use by the drive (refer to **Paragraph 1.3.2.3**).

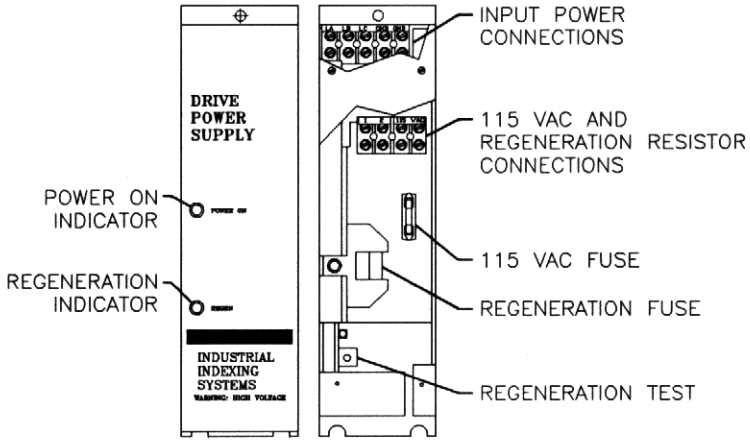


Figure 1.10 - 50-Amp Power Supply

1.3.2.1. 50-Amp Power Supply

POWER ON Indicator: This amber indicating lamp illuminates whenever power is present on the 300 VDC bus. This will be true whenever input power is applied to the power supply. It will also remain on for a minute or two after input power is removed while the capacitors used to filter the voltage are discharged.

REGENeration Indicator: This small red indicating LED illuminates whenever the regeneration resistor circuit is active, indicating that the power supply is draining excess energy from system through the regeneration resistor.

Input Power Connections: These terminals provide the connection point for the input power from the transformer.

115 VAC Connections: These terminals provide the connection point for the 115 VAC input voltage which is used for low-level control voltage used by the power supply and drive.

Regeneration Resistor Connections: These terminals provide the connection point for the external regeneration resistor used to dissipate excess system energy.

115 VAC Fuse: This 5 Amp, 250 V, Fast Blow fuse (part number MDL-5 or 312005) protects the control-voltage circuit.

CAUTION

IF THE 115 VAC FUSE BURNS OUT, IT MUST BE REPLACED WITH THE IDENTICAL — OR EQUIVALENT — 5 AMP, 250 V, FAST BLOW FUSE TO PREVENT SYSTEM DAMAGE.

Regeneration Fuse: This 30 Amp fuse (part number XL50F30 or A50P30) protects the regeneration resistor and power supply from excessive currents during regeneration (energy dissipation) cycles.

Regeneration Test: The regeneration test button is a test button for the regeneration circuit. When pressed, the REGENeration indicator will illuminate for approximately a half second and then go out again, indicating that the regeneration circuit is working properly to dissipate excess energy.

DC Bus Bars (Not Shown): There are two 300 VDC bus bars — the main and common busses — which are connected between the bottom of the drive and power supply. They carry unregulated DC power from the power supply to the drive. (Refer to Drawing Number IM-0009 in **Appendix H.**)

Fan (Not Shown): The fan supplies a cooling air flow over the drive electronic components. (Refer to Drawing Number IM-0009 in **Appendix H.**)

1.3.2.2. 75-Amp Power Supply

POWER ON Indicator: This amber indicating lamp illuminates whenever power is applied to the 300 VDC bus. This will be true whenever input power is applied to the power supply. It will also remain on for a minute or two after input power is removed while the capacitors used to filter the voltage are discharged.

REGENeration Indicator: This small red indicating LED illuminates whenever the regeneration resistor circuit is active, indicating that the power supply is draining excess energy from the system through the regeneration resistor.

Input Power Connections: These terminals provide the connection point for the input power from the transformer.

Regeneration Resistor Connections: These terminals provide the connection point for the external regeneration resistor used to dissipate excess system energy.

115 VAC Connections: These terminals provide the connection point for the 115 VAC input voltage which is used for low-level control voltage used by the power supply.

Regeneration Overload Relay Connections: These terminals provide the internal attachment points for connecting the regeneration overload relay to the system safety circuit.

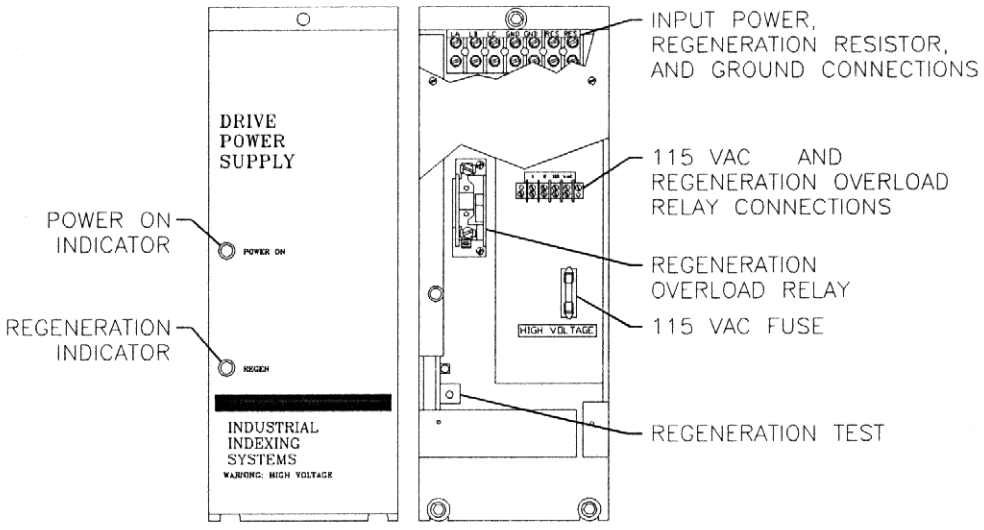


Figure 1.11 - 75-Amp Power Supply

Regeneration Overload Relay: This overload relay protects the power supply from excessive thermal load on the regeneration circuits during regeneration (energy dissipation) cycles. The normally closed contacts of the relay will open in case of overload to break the safety circuit.

115 VAC Fuse: This 5 Amp, 250 V, Fast Blow fuse (part number MDL-5 or 312005) protects the control-voltage circuit.

CAUTION

IF THE 115 VAC FUSE BURNS OUT, IT MUST BE REPLACED WITH THE IDENTICAL — OR EQUIVALENT — 5 AMP, 250 V, FAST BLOW FUSE TO PREVENT SYSTEM DAMAGE.

Regeneration Test: The regeneration test button is a test button for the regeneration circuit. When pressed, the REGENeration indicator will illuminate for approximately a half second and then go out again, indicating that the regeneration circuit is working properly to dissipate excess energy.

DC Bus Bars (Not Shown): There are two 300 VDC bus bars — the main and common busses — which are connected between the bottom of the drive and power supply. They carry unregulated DC power from the power supply to the drive. (Refer to drawing number IM-0010 in **Appendix H.**)

Fan (Not Shown): The fan supplies a cooling air flow over the drive electronic components. (Refer to Drawing Number IM-0010 in **Appendix H.**)

1.3.2.3. Transformer

The Series 4 PWRPAK™s use a variety of isolation transformers to match the load requirements of the various package configurations and available primary supply voltages. Each of the transformers supplies 230 VAC output to the power supply. They also have additional taps for 207 VAC and 253 VAC outputs (±10%) which can be used when the voltage on the 300 VDC bus bars is too high or too low. (The voltage on the 300 VDC bus should be 290 VDC when the system is fully loaded and 325 VDC when there is no load on the system.) Refer to **Appendix I** for dimensions, specifications, and wiring configurations for the transformers.

1.3.2.4. Regeneration Resistor

All Series 4 Power Supply Packages use the same regeneration resistor kit. This is an external, 4.5 ohm, 29 Amp (Max) regeneration resistor — kit number is AC-100024. Refer to **Appendix J** for dimensions and kit components.

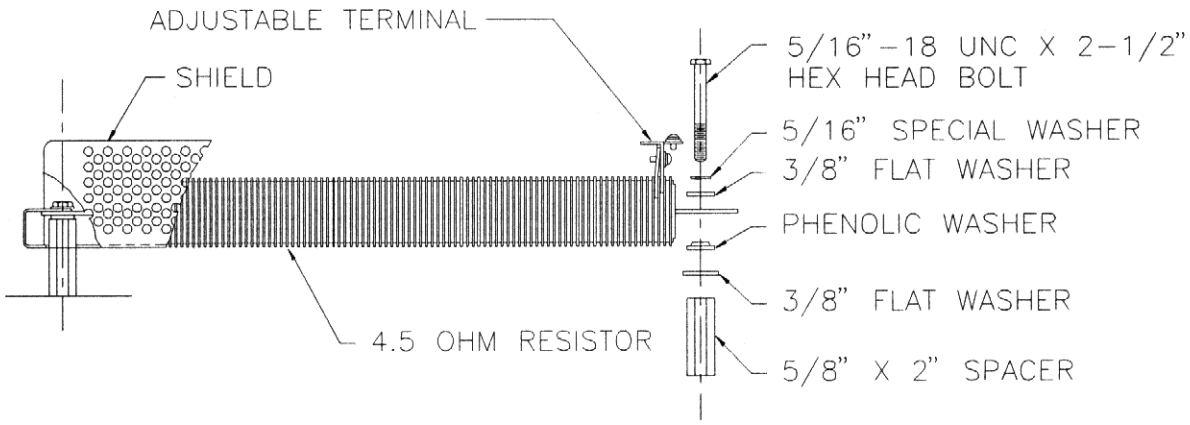


Figure 1.12 - Regeneration Resistor Kit

WARNING

THE REGENERATION RESISTOR IS ELECTRICALLY CHARGED AND THERMALLY HOT. DO NOT TOUCH THE RESISTOR. DO NOT REMOVE THE SHIELD FROM THE RESISTOR.

1.4. SPECIFICATIONS

Most specifications for the various motion devices are contained in the appropriate appendices at the end of this manual. This section includes some general information and an explanation of how to read the MDPAK™ and PWRPAK™ specifications in the appendices.

NOTE

Any MDPAK™ or PWRPAK™ specification data shown in this section should be considered as reference only. Refer to Appendix C and Appendix G for current information specifications on each of the Motor/Drive packages and Power Supply Packages respectively.

1.4.1. GENERAL

AMBIENT OPERATING TEMPERATURE: 0-60°C

SWITCHING FREQUENCY: 4 KHz

WEIGHT:	BSD-300/30	Drive	20 lbs.
	BSD-300/40	Drive	20 lbs.
	BSD-300/55	Drive	25 lbs.
	IPS-300/50-ER	Power Supply	21 lbs.
	IPS-300/75-ER	Power Supply	27 lbs.

DRIVE CURRENT RATINGS:	BSD-300/30	Continuous:	30A rms/phase
		Peak:	53A rms/phase
	BSD-300/40	Continuous:	40A rms/phase
		Peak:	70A rms/phase
	BSD-300/55	Continuous:	55A rms/phase
		Peak:	96A rms/phase

POWER SUPPLY INPUT POWER: 208 VAC rms (L-L) 3-Phase (±10%)
120 VAC rms Control Voltage (±10%)

POWER SUPPLY OUTPUT POWER:

IPS-300/50-ER	300 VDC unregulated 50A power supply bus
IPS-300/75-ER	300 VDC unregulated 75A power supply bus

1.4.2. MDPAK™ SPECIFICATIONS

Figure 1.13 shows a sample specification drawing for a Series 4 Motor/Drive Package. For ease of recognition and understanding, all specification drawings for the series have an identical layout. All specification drawings for Series 4 MDPAKs are included in **Appendix C**.

1) The Motor/Drive Package identification number is given in the lower right-hand corner of the title block. For this illustration, it is MDPAK4-2350.

2) The List of Materials (refer to **Figure 1.14**) lists the components which make up the Motor/Drive Package. The first item in the list of materials is the motor assembly

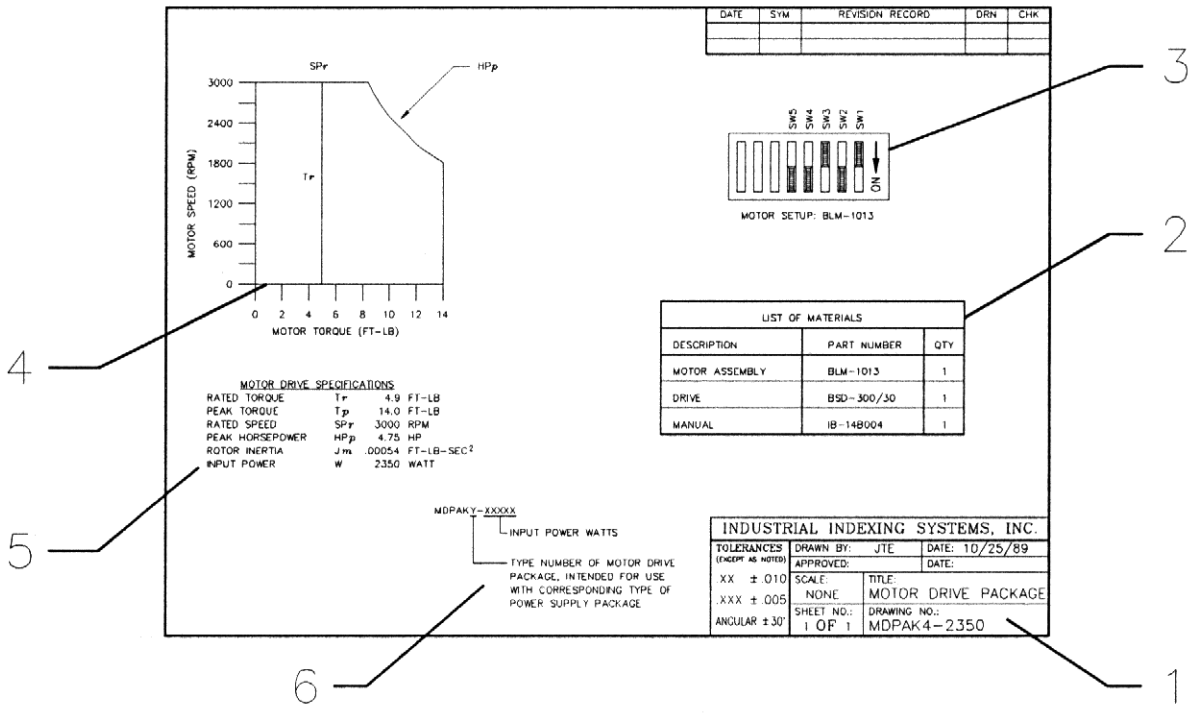


Figure 1.13 - Sample MDPAK™ Specification Drawing

part number. Motor Dimensions and Connections are contained in the drawings in **Appendix D**. Read the motor assembly number from the list of materials and refer to the drawing with that number in **Appendix D**.

The second item on the list of materials is the drive part number. There are 3 different drives used with the Series 4 Motor/Drive Packages. The Drive Dimensions and Connections drawings are in **Appendix E**. Refer to the drawing

LIST OF MATERIALS		
DESCRIPTION	PART NUMBER	QTY
MOTOR ASSEMBLY	BLM-1013	1
DRIVE	BSD-300/30	1
MANUAL	IB-14B004	1

Figure 1.14
MDPAK™ List of Materials

with the proper part number. The last item in the list of materials is the instruction manual number.

NOTE

All Series 4 MDPAK™s motor assemblies — plus some other motor assemblies not associated with Series 4 MDPAKs — use setup SU-039001. The motor setup drawing SU-0390001 is included in Appendix F. Also refer to "Section 3 - Controls and Operation" for instructions on setting the DIP switches.

3) The DIP switch settings (refer to **Figure 1.15**) duplicate the motor setup information on drawing SU-0390001 for the motor assembly used in this Motor/Drive package. It is included on the MDPAK drawing for convenience. Load and Monitor setup information is not shown as any of the available settings can be used with the MDPAK.

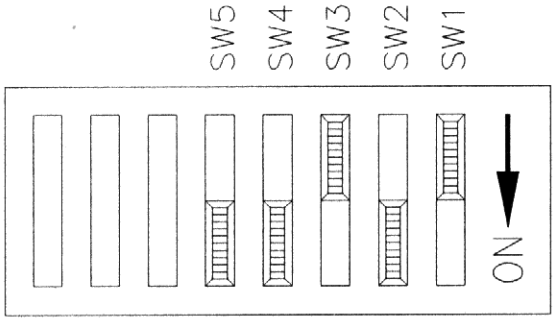


Figure 1.15
MDPAK™ Motor Setup

4) The Speed/Torque curve (refer to **Figure 1.16**) shows the performance characteristics of the Motor/Drive Package (as opposed to just the motor or just the drive). The package will operate within the limits of this curve to prevent possible damage to the motor or drive. In addition, the rms torque value for the various motor accelerations, decelerations, and steady states will be limited to the T_r value on the curve.

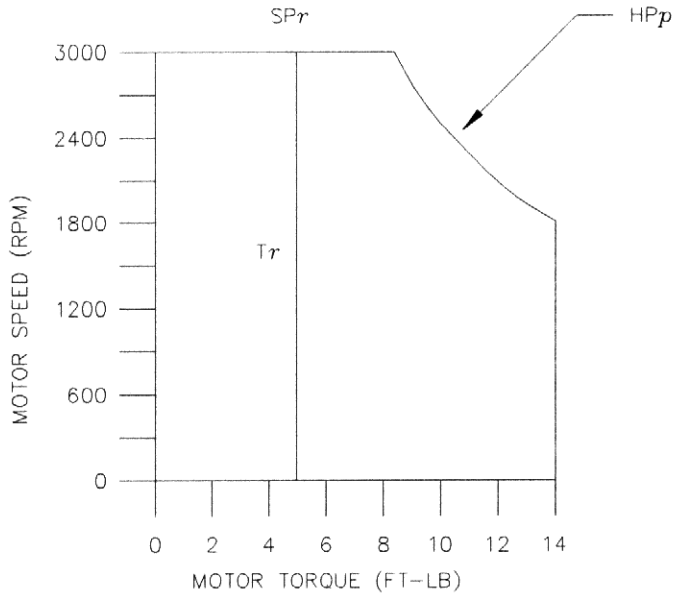


Figure 1.16 - MDPAK™ Speed/Torque Curve

5) The Specification Table (refer to **Figure 1.17**) lists the key Motor/Drive Package specifications as derived from the Speed/Torque curve. This tabulated format minimizes errors associated with misreading the curve.

MOTOR DRIVE SPECIFICATIONS			
RATED TORQUE	Tr	4.9	FT-LB
PEAK TORQUE	Tp	14.0	FT-LB
RATED SPEED	SPr	3000	RPM
PEAK HORSEPOWER	HPp	4.75	HP
ROTOR INERTIA	Jm	.00054	FT-LB-SEC^2
INPUT POWER	W	2350	WATT

Figure 1.17
MDPAK™ Specifications Table

6) The identification number translator is included on the drawing for reference in determining the meaning of the Motor/Drive Package identification number.

1.4.3. PWRPAK™ Specifications

Figure 1.18 shows a sample specification drawing for a Series 4 Power Supply Package. For ease of recognition and understanding, all specification drawings for the series have an identical layout. All specification drawings for Series 4 PWRPAKs are included in **Appendix G**.

1) The Power Supply Package identification number is given in the lower right-hand corner of the title block. For this illustration, it is PWRPAK4-4500/3.

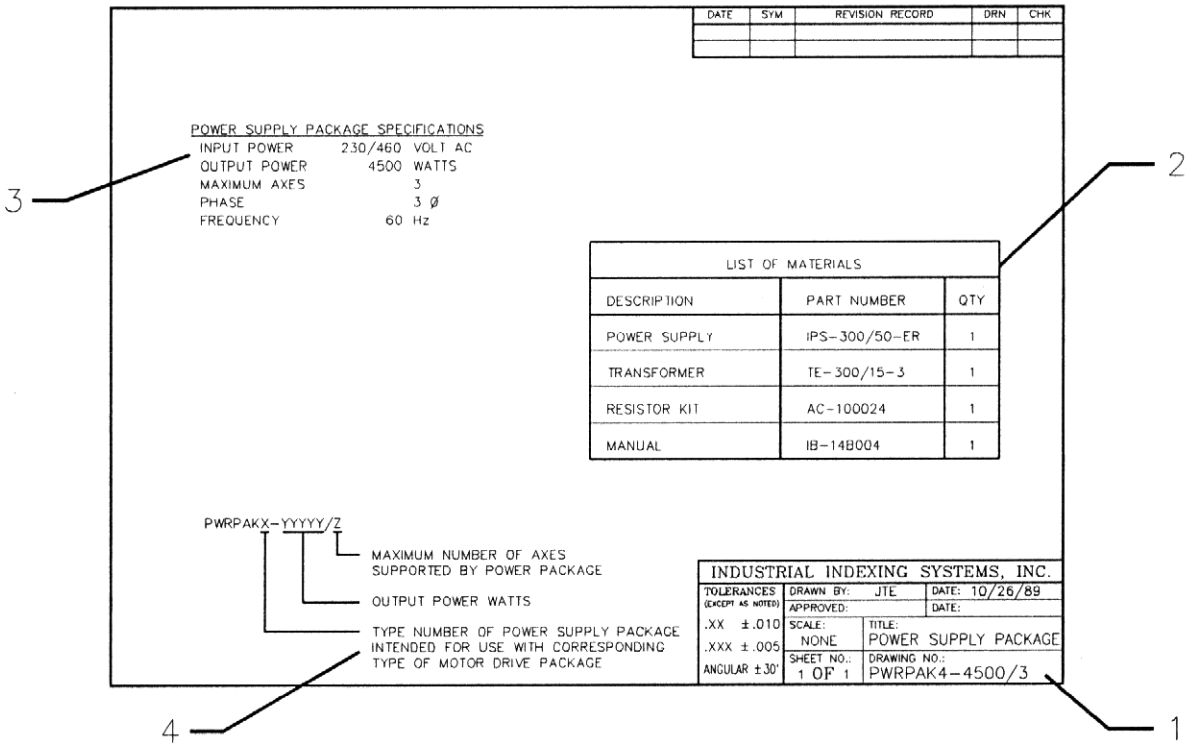


Figure 1.18 - Sample PWRPAK™ Specification Drawing

2) The List of Materials (refer to **Figure 1.19**) lists the components which make up the Power Supply Package. The first item in the list of materials is the power supply part number. Dimensions and Connections for the power supplies are contained in the drawings in **Appendix H**. Read the power supply number from the list of materials and refer to the drawing with that number in **Appendix H**.

LIST OF MATERIALS		
DESCRIPTION	PART NUMBER	QTY
POWER SUPPLY	IPS-300/50-ER	1
TRANSFORMER	TE-300/15-3	1
RESISTOR KIT	AC-100024	1
MANUAL	IB-14B004	1

Figure 1.19
PWRPAK™ List of Materials

The second item on the list of materials is the transformer part number. The Dimensions and Connections drawings are in **Appendix I**. Refer to the drawing with the proper part number.

The third item in the list of materials is the regeneration resistor kit number. All Series 4 Power Supply Packages use regeneration resistor kit AC-100024 (refer to **Appendix J**). The last item in the list of materials is the instruction manual number.

3) The Specification Table (refer to **Figure 1.20**) lists the key Power Supply Package specifications. These specifications apply to the package rather than the individual components.

POWER SUPPLY PACKAGE SPECIFICATIONS		
INPUT POWER	230/460	VOLT AC
OUTPUT POWER	4500	WATTS
MAXIMUM AXES	3	
PHASE	3 Ø	
FREQUENCY	60	Hz

Figure 1.20
PWRPAK™ Specifications Table

4) The identification number translator is included on the drawing for reference in determining the meaning of the Power Supply Package identification number.

NOTE

50 Hz Power Supply Packages are available from Industrial Indexing Systems by special request.

NOTES

SECTION 2 – INSTALLATION

The various components which make up the Series 4 Motor/Drive Packages and Power Supply Packages may be supplied as loose components, as assembled systems, or as a combination of each. This manual assumes that all components have been supplied as individual, unmounted components.

2.1. MOUNTING

CAUTION

ALL MDPAK™ AND PWRPAK™ COMPONENTS MUST BE MOUNTED IN NEMA ENCLOSURES WHICH ARE SUITABLE TO PROTECT THE COMPONENTS FROM THE SURROUNDING ENVIRONMENT. THERE MUST BE ADEQUATE VOLUME TO PREVENT OVERHEATING.

2.1.1. POWER SUPPLY AND DRIVES

Any drives used in the system are physically and electrically connected to the power supply. Therefore, the mounting will depend on the number of drives which connect to the power supply. Mounting dimensions for the drives are shown in **Appendix E;** mounting dimensions for the power supplies are shown in **Appendix H.** Each drive or

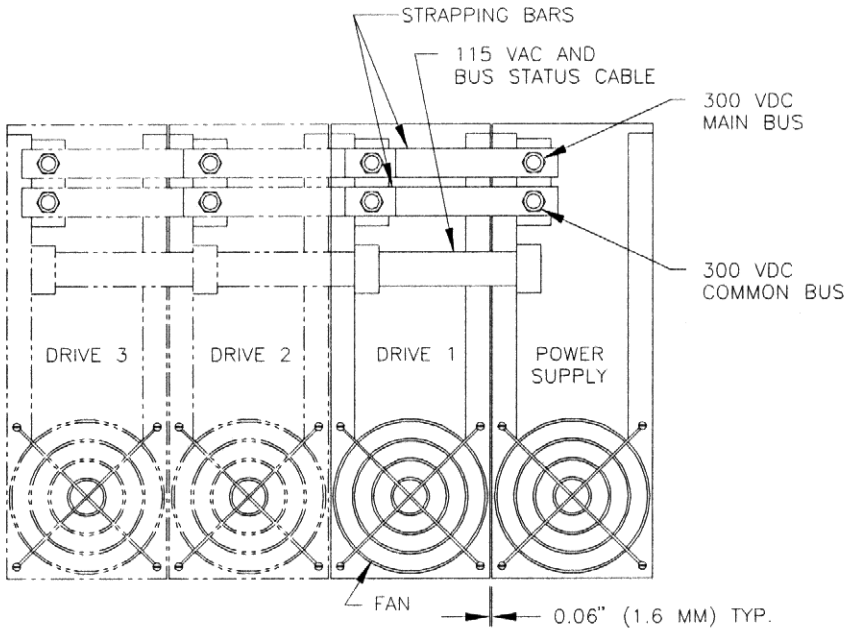


Figure 2.1 - Power Supply and Drives: Relative Positions (Bottom View)

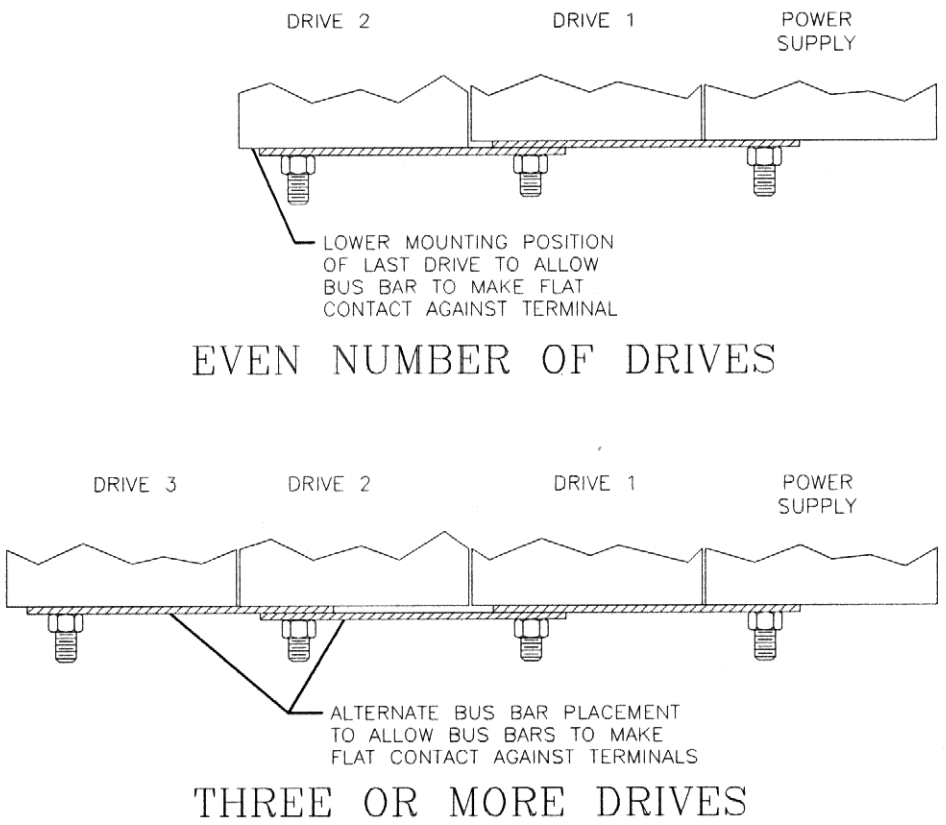


Figure 2.2 - Bus Bar Connections

power supply must by separated from any adjoining units by a space of 1/16" (1.6 mm) (refer to **Figure 2.1**). Allow at least 2" (50.8 mm) clearance above and below the unit for air flow and wiring.

Each drive or power supply is designed to be mounted to a flat surface or enclosure by three 5/16" or 8 mm bolts. In addition, each drive is connected to the power supply or the preceding drive by two bus bars which carry the 300 VDC power to the drive. When an even number of drives is connected to a single power supply, the last drive must be vertically offset downward by the thickness of the bus bar, to make sure there is a proper electrical connection (refer to **Figure 2.2**).

1) Determine the mounting dimensions for each power supply and drive. (Refer to **Appendix E** for mounting dimensions of Series 4 drives. Refer to **Appendix H** for mounting dimensions of Series 4 power supplies.)

NOTE

All drives must be located in a single line with the power supply. As viewed from the front, the power supply must be mounted to the right of all drives.

2) Determine the vertical offset for the left-most drive, if necessary.

3) Lay out the mounting locations of the power supply and all drives.

4) Provide the appropriate holes and hardware to mount the drives and power supply. Make sure the support is adequate for the total weight of the cabinets.

WARNING

IF A DRIVE WAS PREVIOUSLY ENERGIZED, IT IS POSSIBLE THAT THERE IS HIGH VOLTAGE PRESENT AT THE BUS BAR TERMINALS, EVEN WITH THE DRIVE DISCONNECTED. USE CAUTION WHEN HANDLING THE DRIVES.

5) Mount the power supply and each of the drives. Make sure each unit is securely attached and adequately supported.

CAUTION

BUS BARS MUST BE MOUNTED FLAT AGAINST THE TERMINALS OR OTHER BUS BARS. IF THREE OR MORE DRIVES ARE BEING USED WITH A POWER SUPPLY, STAGGER THE MOUNTING OF THE BARS AS SHOWN IN FIGURE 2.2.

CAUTION

DO NOT USE EXCESSIVE TORQUE WHEN TIGHTENING THE NUTS ON THE BUS BAR CONNECTING TERMINALS. THE TERMINALS MAY SNAP OFF IF OVER TIGHTENED.

6) Attach the bus bars to the terminals provided on the bottom of the power supply and drives. Tighten all terminals. **DO NOT OVER TIGHTEN!**

7) Double check all connections to make sure they are tight.

8) Check all bus bars to make sure they are not contacting any other bus bars or any other items in the control enclosure.

2.1.2. TRANSFORMER

Mounting dimensions for the transformers used with Series 4 PWRPAK™s are shown in **Appendix I**. A typical mounting pattern is shown in **Figure 2.3**.

1) Lay out the mounting location for the transformer.

2) Provide the appropriate holes and hardware to mount the transformer. Make sure the support is adequate for the weight of the transformer.

2.1.3. REGENERATION RESISTOR

WARNING

THE REGENERATION RESISTOR IS ELECTRICALLY CHARGED WITH POSSIBLY LETHAL VOLTAGES AND IS THERMALLY HOT. DO NOT TOUCH THE RESISTOR. DO NOT REMOVE THE SHIELD FROM THE RESISTOR.

The regeneration resistor is external to the power supply and is separately mounted. However, it will be electrically connected to the power supply and should be located reasonably close to the power supply.

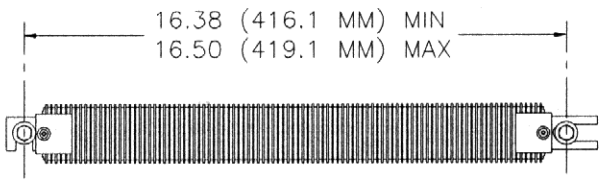


Figure 2.4
Regeneration Resistor Mounting

A detailed assembly and installation drawing for the regeneration resistor is shown in **Appendix J**. (The mounting dimension shown in **Figure 2.4** should be considered reference only. Refer to the drawing in **Appendix J** for the values to use.) The regeneration resistor kit includes all mounting hardware required to attach the resistor to a panel.

CAUTION

THE REGENERATION RESISTOR DISSIPATES LARGE QUANTITIES OF HEAT WHICH COULD MELT COMPONENTS LOCATED ABOVE THE RESISTOR.

1) Layout the mounting location for the regeneration resistor.

2) Drill and tap two 5/16"-18 UNC mounting holes.

3) Assemble each bolt through the special washer, flat washer, phenolic washer, flat washer, and spacer as shown in **Figure 2.5**.

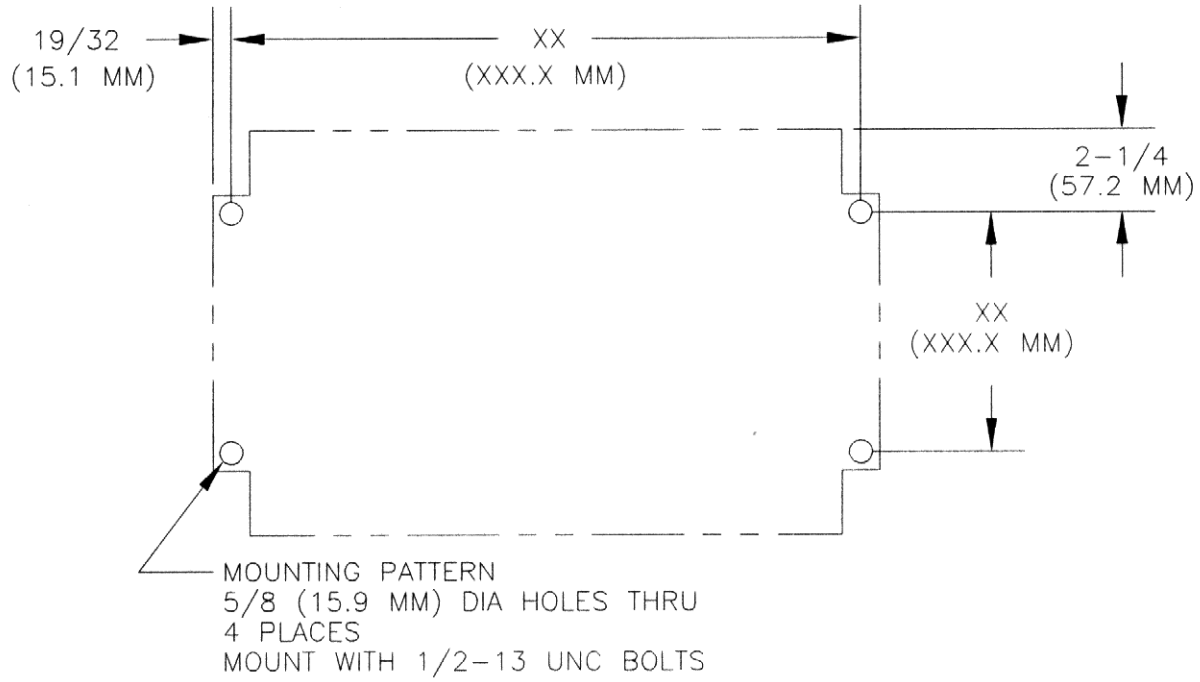


Figure 2.3 - Typical Transformer Mounting Pattern

4) Start the bolts into the tapped holes provided but do not tighten.

5) Slide the straight mounting end of the regeneration resistor between the upper flat washer and the phenolic washer on one of the mounting bolts.

6) Pivot the resistor and position the hooked mounting end between the upper flat washer and the phenolic washer on the second mounting bolt.

7) Make sure both adjustable terminals are positioned where the wires can be easily attached and where they will not contact any other items.

8) Connect two #10 blue wires to the terminals. (These will be connected later to the power supply terminals — refer to **Paragraph 2.2.1**.) Make sure the terminals on the resistor are placed for a resistance of 4.5 ohms.

9) Slide the shield mounts between the resistor mount ends and the flat washers at each end.

10) Tighten both mounting bolts.

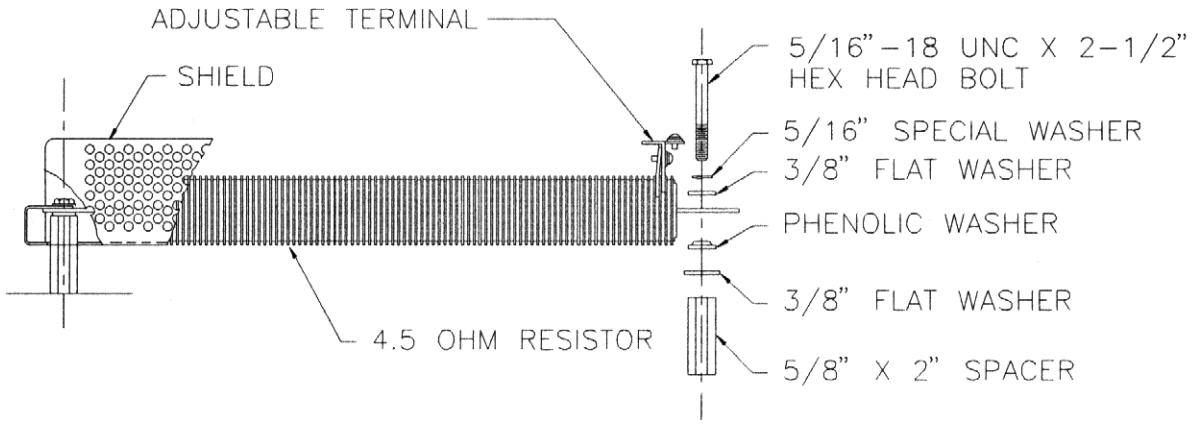


Figure 2.5 - Regeneration Resistor Mounting Hardware

2.1.4. MOTOR

Motor mounting will depend on the application and the system being indexed. All Series 4 brushless motors are designed for front face mounting. Mounting dimensions are given in **Appendix D**.

CAUTION

WHEN MOUNTING MOTORS, MAKE SURE THE MOTOR IS PROPERLY ALIGNED. IT MUST BE MOUNTED SQUARELY SO THE FACE IS FLUSH AGAINST THE MOUNTING SURFACE. THE SHAFT MUST NOT BE TWISTED OR BOUND IN ANY WAY. THE SYSTEM MUST NOT SUBJECT THE MOTOR TO IMPACT LOADS. COMPLETE SYSTEM INSTALLATION, WIRING, AND TESTING BEFORE THE LOAD IS ATTACHED TO THE MOTOR SHAFT.

1) Lay out the mounting holes for the motor.

2) Attach the motor to the desired mount.

3) Attach the load to the motor shaft.

2.2. ELECTRICAL CONNECTIONS

WARNING

DO NOT TURN ON ANY POWER TO THE SYSTEM UNTIL ALL ELECTRICAL CONNECTIONS HAVE BEEN COMPLETED.

The Series 4 Motor/Drive Packages and Power Supply Packages are frequently installed as a part of a larger electrical control system. The indexing system may utilize a variety of controllers. Therefore, the electrical connections discussed in this section cannot cover all possible variations of system wiring and will be restricted to the electrical connections between the MDPAK™ and PWRPAK™. Pertinent information for other necessary connections is provided, but specific connections are not shown. Refer to the individual controller instruction manuals for additional information.

Figure 2.6 and Figure 2.6a show typical system component interconnections. Terminal identities are given where they tend to be the same on all Series 4 components. They are blank where the terminal identity varies from component to component. In all cases, terminal identities included on any system drawings or documentation supersede any terminal identities included in this manual.

The cable numbers on **Figure 2.6 and Figure 2.6a** are for specific Industrial Indexing Systems' cables used with Series 4 components. (The 'yyy' which makes up the last three places of the cable number is the length of the cable in feet.) Drawings for each of these cables are contained in **Appendix K**. Please note when C-303YYY (see Appendix K) exceeds 5 feet in length, use alternate cable configuration in Figure 2.16.

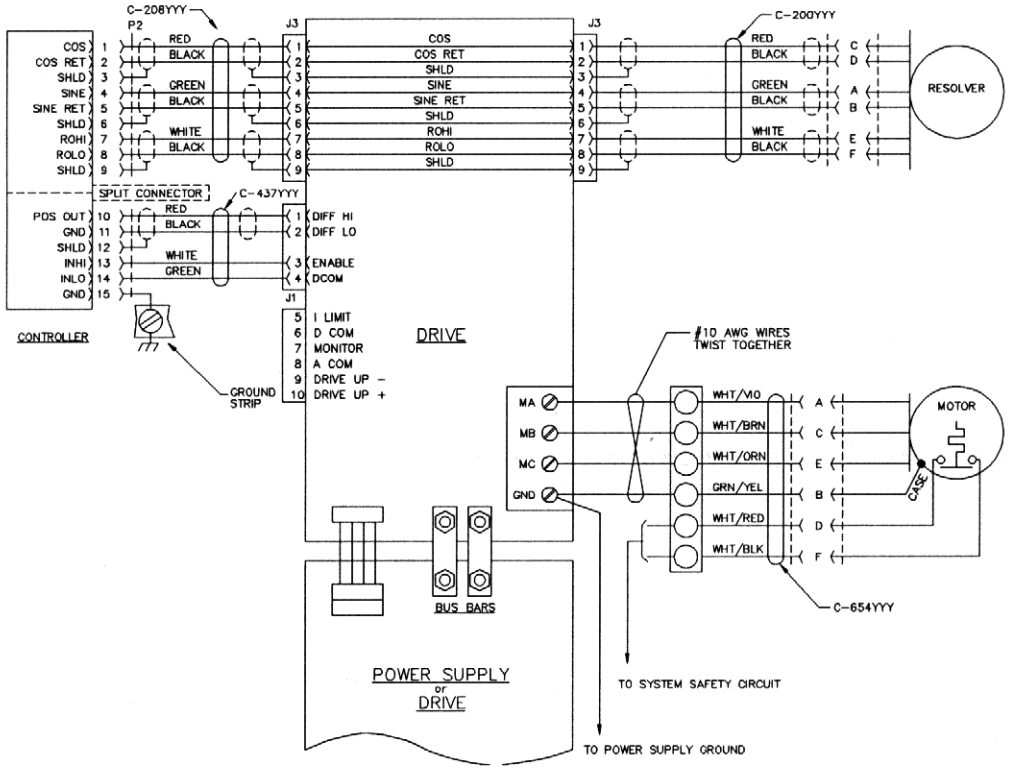


Figure 2.6 - Indexing System Interconnections

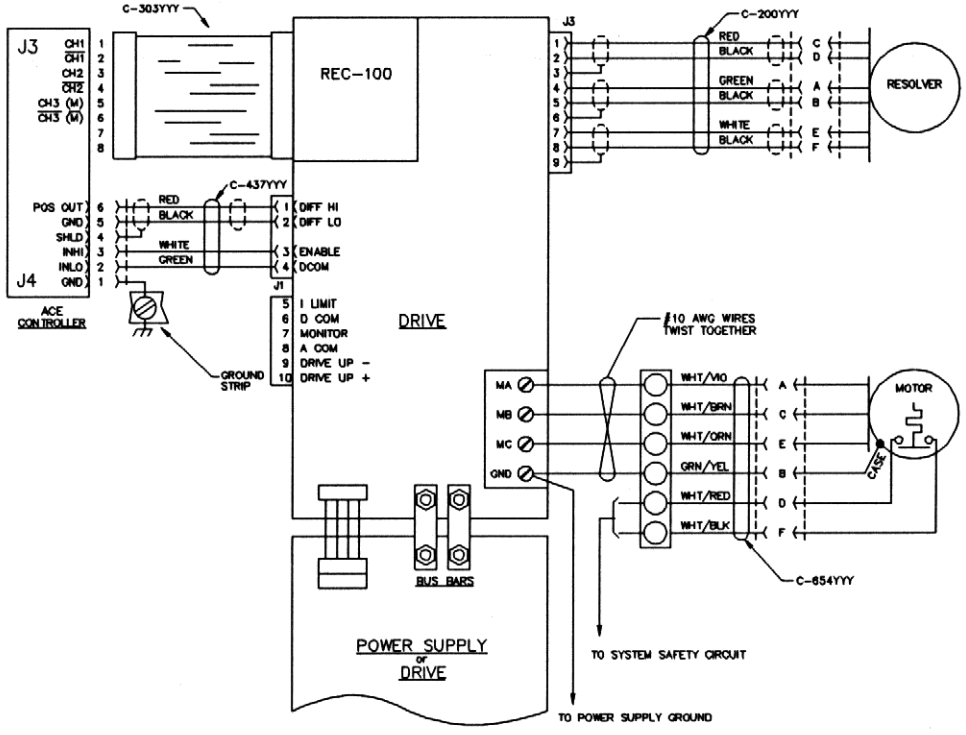


Figure 2.6a - Indexing System Interconnections

2.2.1. POWER SUPPLY CONNECTIONS

CAUTION

THE BUS BARS FORM BOTH A MECHANICAL AND ELECTRICAL CONNECTION BETWEEN THE POWER SUPPLY AND ANY DRIVES. MAKE SURE ALL BUS BAR CONNECTIONS ARE TIGHT AND FLUSH TO PROVIDE PROPER ELECTRICAL CONTACT WITH NO CHANCE OF ARCING.

The 115 VAC and regeneration cable is connected to the bottom of each drive. There is also a connector on the bottom of the drive for attaching additional drives in parallel with the initial drive.

NOTE

Refer to Figure 2.9 for the electrical connections for power supply IPS-300/50-ER. Refer to Figure 2.10 for the electrical connections for power supply IPS-300/75-ER. Refer to Figure 2.7 and Figure 2.8 for physical locations of the connection points.

1) Connect the 115 VAC and regeneration cable from the first drive to the connector on the bottom of the power supply.

2) Connect the 115 VAC and regeneration cable from each successive drive to the connector on the bottom of the preceding drive to the right.

3) Connect the hot and neutral wires for 115 VAC control voltage to the 115 VAC terminals on the power supply. Use #16 or larger wire. Twist the two wires together before connecting to minimize the chance for electronic interference. **DO NOT ENERGIZE THE 115 VAC CIRCUIT UNTIL ALL OTHER ELECTRICAL CONNECTIONS HAVE BEEN COMPLETED.**

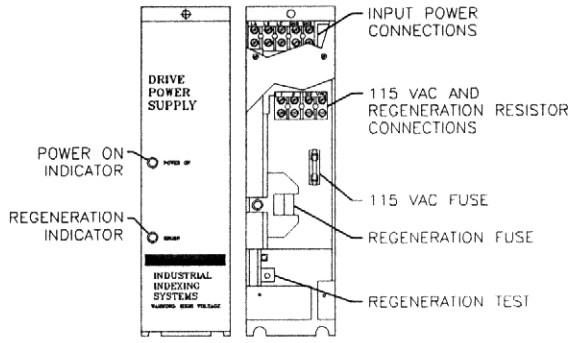


Figure 2.7
IPS-300/50-ER Power Supply

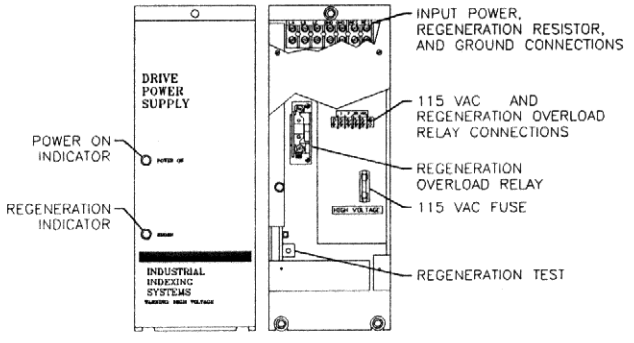


Figure 2.8
IPS-300/75-ER Power Supply

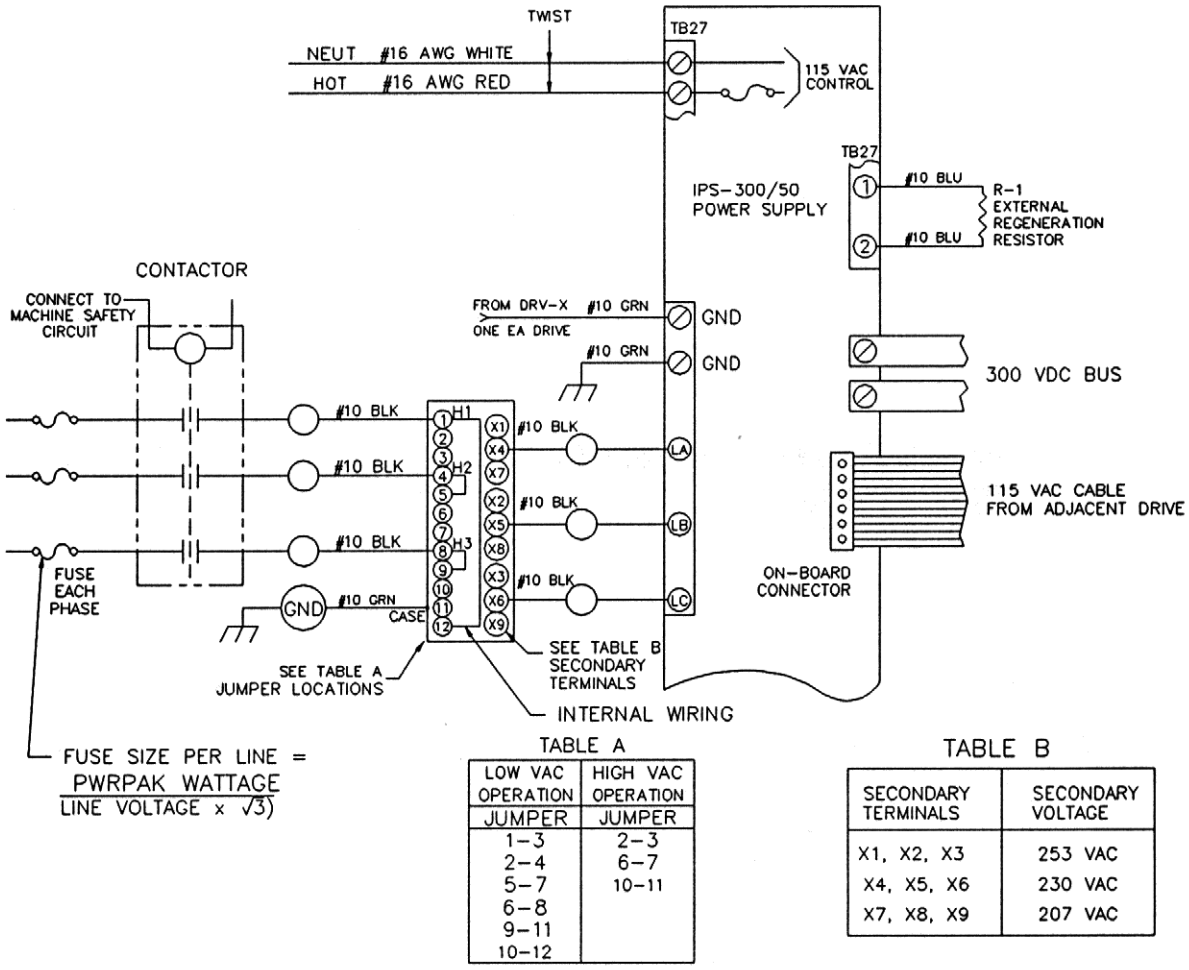


TABLE A

LOW VAC OPERATION	HIGH VAC OPERATION
JUMPER	JUMPER
1–3	2–3
2–4	6–7
5–7	10–11
6–8	
9–11	
10–12	

TABLE B

SECONDARY TERMINALS	SECONDARY VOLTAGE
X1, X2, X3	253 VAC
X4, X5, X6	230 VAC
X7, X8, X9	207 VAC

Figure 2.9 - IPS-300/50-ER Power Supply Electrical Connection

4) Connect the adjustable terminals on the regeneration resistor to the terminals in the power supply using #10 blue wires. Make sure the terminals on the resistor are placed for a resistance of 4.5 ohms.

5) On power supply IPS-300/75-ER (75 Amp), connect the regeneration overload relay contacts in series with the system safety circuit. (Refer to **"Section 3 - Controls and Operation"** for additional information on the overload functions.)

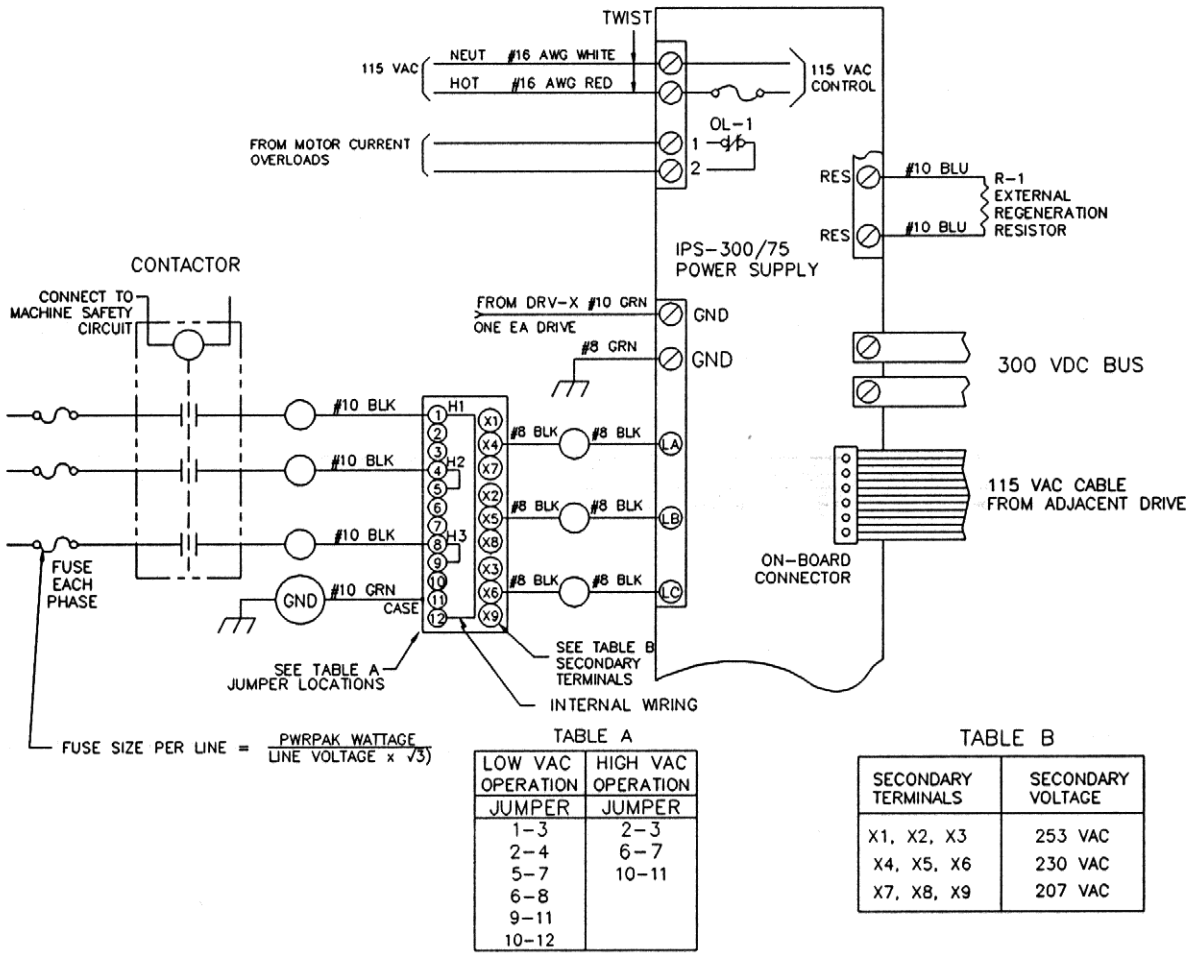


TABLE A

LOW VAC OPERATION	HIGH VAC OPERATION
JUMPER	JUMPER
1-3	2-3
2-4	6-7
5-7	10-11
6-8	
9-11	
10-12	

TABLE B

SECONDARY TERMINALS	SECONDARY VOLTAGE
X1, X2, X3	253 VAC
X4, X5, X6	230 VAC
X7, X8, X9	207 VAC

Figure 2.10 - IPS-300/75-ER Power Supply Electrical Connection

2.2.2. DRIVE CONNECTIONS

1) Attach the resolver cable (C-208yyy) from the controller to the drive. Make sure both connectors are properly seated.

2) Attach the command cable (C-437yyy) from the controller to the drive. Make sure both connectors are properly seated.

> **NOTE**
> **The drive must be located within 100' (30 M) of the motor.**

3) Attach the resolver cable (C-200yyy) from the drive to the motor resolver connector. Make sure both connectors are properly seated.

NOTE

Motor cable C-654yyy is a specially twisted cable specific to Industrial Indexing Systems MDPAK™s and should not be replaced with anything other than this specific cable.

Motor cable C-654yyy has a connector at the motor end only. The other end should be wired to a terminal strip to allow the proper distribution of the wires from the motor. Four of the wires carry the three-phase power and ground from the drive to the motor. The other two wires are for the connection of the motor thermal overload to the system safety circuit.

4) Provide a six-terminal terminal strip for connection of the motor cable.

5) Connect terminals MA, MB, and MC on the drive to the terminal strip using #10 blue wires. Twist the wires with the ground wire which will be connected to the power supply (refer to **Paragraph 2.2.4**).

6) Attach the six wires from the non-connector end of the motor cable (C-654yyy) to the terminal strip. Make sure they are attached to the proper terminals (refer to **Figure 2.6**).

7) Attach the connector-end of the motor cable (C-654yyy) to the motor connector.

8) Connect the terminals from the motor over-temperature switch to the system safety circuit (refer to **Figure 2.12**).

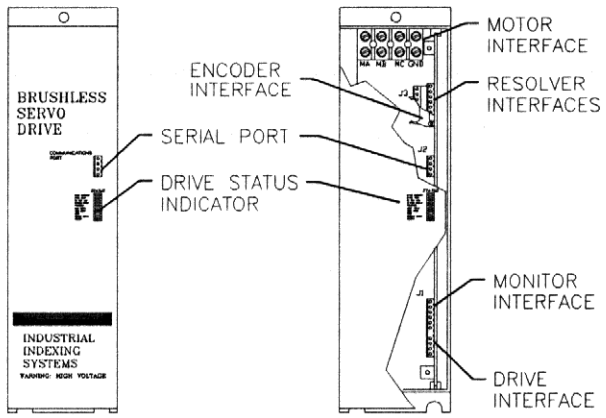


Figure 2.11 - Drive

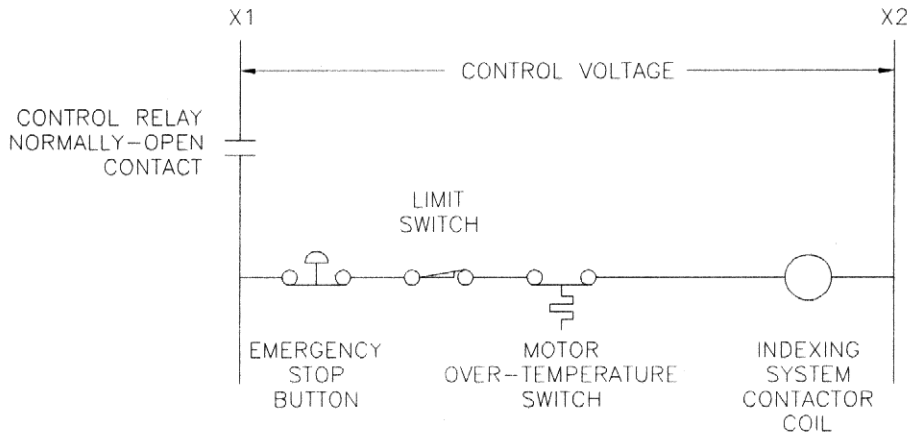


Figure 2.12 - Typical System Safety Circuit

2.2.3. TRANSFORMER CONNECTIONS

The transformers used with Series 4 Power Supply Packages are special heavy-duty isolation transformers designed not to lower the output voltage under high load conditions. They will accept 230 VAC/3ϕ/60 Hz or 460 VAC/3ϕ/60 Hz , delta-connected, primary input power.

CAUTION

THE SERIES 4 POWER SUPPLY IS DESIGNED FOR 208 VAC INPUT VOLTAGE (WHICH IS TAKEN FROM THE 230 VAC SECONDARY TAPS ON THE TRANSFORMER). CONTACT THE INDUSTRIAL INDEXING SYSTEMS INTEGRATED TECHNICAL SERVICES DEPARTMENT FOR ADVICE BEFORE USING THE 207 VAC OR 253 VAC SECONDARY TAPS ON THE TRANSFORMER.

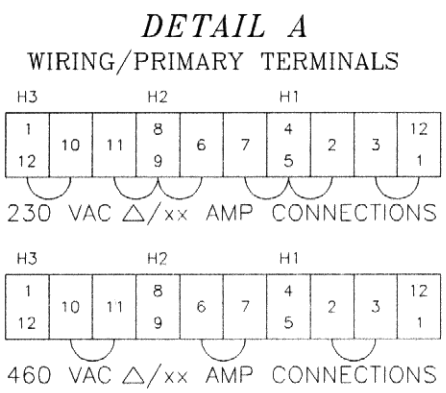


Figure 2.13
Transformer Primary Connections

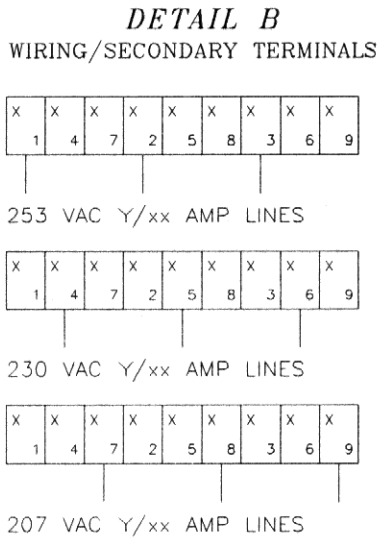


Figure 2.14
Transformer Secondary Connections

The transformers have three sets of wye-connected, secondary output power taps — 207 VAC, 230 VAC, and 253 VAC (230 VAC ±10%). These taps allow modification of the voltage input to the bus bars to maintain a 300 VDC power supply to the drives. The 253 VAC taps would be used when low plant distribution voltage or excessive power drain

WARNING

OBSERVE ALL FEDERAL, STATE, AND LOCAL ELECTRICAL CODES WHEN INSTALLING THE PRIME SUPPLY POWER TO THE TRANSFORMER. DO NOT TURN ON THE ELECTRICAL DISCONNECT UNTIL ALL WIRING IS COMPLETE.

from the drives causes the bus bars to constantly fall below 300 VDC. 207 VAC taps are used when the bus bar voltage is constantly in excess of 300 VDC.

1) Connect the 230 VAC secondary terminals from the transformer to the "Input Power Connections" (LA, LB, LC) on the power supply using #10 black wires. Twist the wires together.

2) Connect the input power from the panel distribution system to the transformer primary connections using #10 black wires. Provide a separate fused contactor for the supply voltage.

WARNING

THE CONTACTOR COIL SHOULD BE SUPPLIED THROUGH THE SYSTEM SAFETY CIRCUIT (REFER TO FIGURE 2.12) SO THE INDEXING SYSTEM POWER IS TOTALLY REMOVED WHEN THE SAFETY CIRCUIT IS INTERRUPTED.

2.2.4. GROUND CONNECTIONS

CAUTION

THE SERIES 4 MOTION DEVICES REQUIRE VERY SPECIFIC GROUNDING CONNECTIONS. CAREFULLY FOLLOW ALL PROCEDURES IN THIS SECTION BEFORE ATTEMPTING TO OPERATE THE INDEXING SYSTEM.

NOTE

Refer to Figure 2.6 and Figure 2.9 or Figure 2.10 for wiring details of the grounding connections.

1) Connect the GND terminal on the drive to the terminal strip used for the drive end of motor cable C-654yyy (refer to **Paragraph 2.2.2**) using #10 green wire.

CAUTION

EACH DRIVE MUST BE INDIVIDUALLY GROUNDED TO A SEPARATE TERMINAL ON THE POWER SUPPLY.

2) Connect the GND terminal of each drive to a separate ground terminal in the power supply using #10 or larger green wire.

3) Provide an electrical-ground terminal strip for grounding of all related systems.

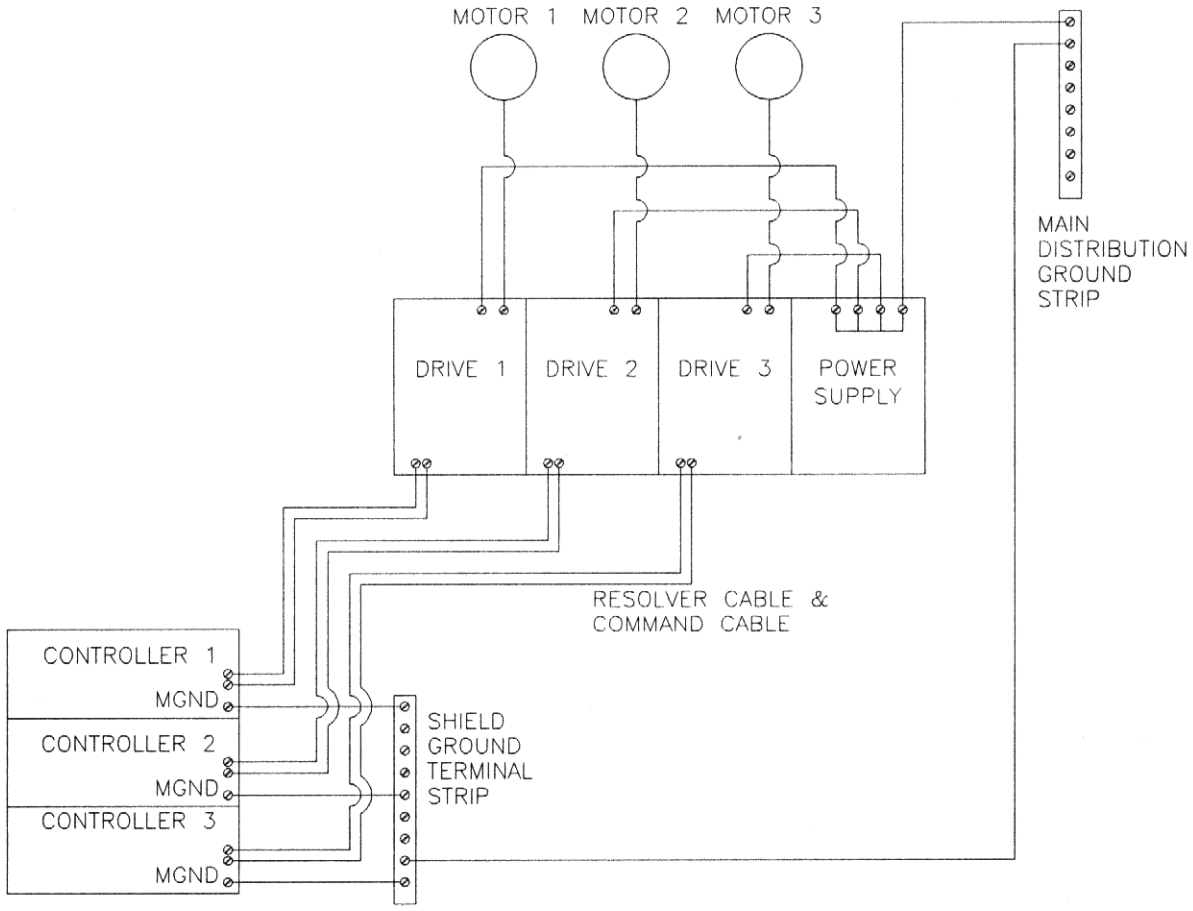


Figure 2.15 - Typical System Ground Connections

4) Connect the electrical-ground terminal strip to electrical ground using cable sized for the entire load.

5) Connect the ground terminals from the power supply to the electrical-ground terminal strip using #8 green wire.

6) Provide a shield ground terminal strip (also called an MSC terminal strip) close to the system controllers. (Refer to the controller instruction manual for additional details.)

> **NOTE**
>
> **All shielding from the resolver and command cables to the controllers are connected to ground through internal connections in the controller. Refer to the appropriate controller instruction manual.**

7) Connect the ground wire from the controller end of command cable C-437yyy to the shield ground terminal strip.

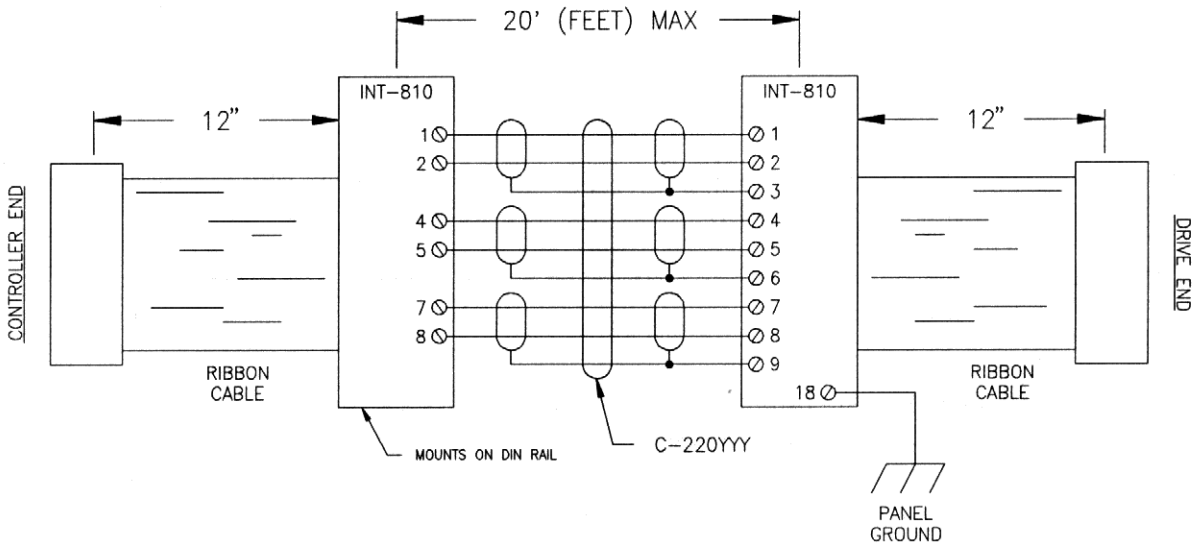
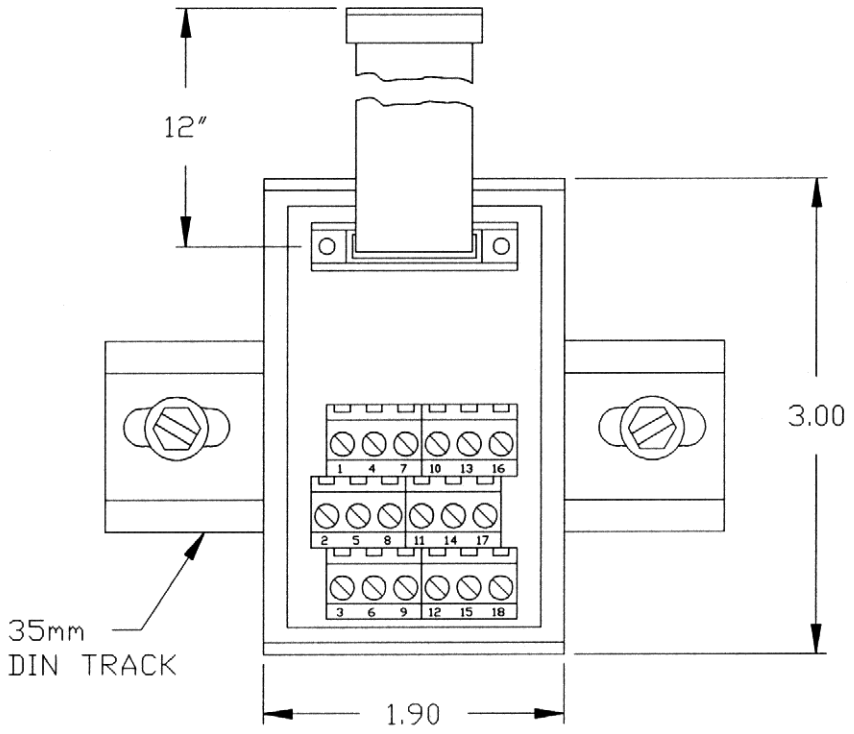


Figure 2.16 - C-220YYY Connections

(Use in place of C-303YYY when C-303YYY exceeds 5 feet in length)



INT-810 Pin Connections and Dimensions

SECTION 3 – CONTROLS AND OPERATION

NOTE

The majority of system controls for an indexing system come from the controller and/or serial communications devices. Refer to the appropriate instruction manual for additional control information relating to the overall indexing system.

3.1. INPUTS AND OUTPUTS

The visual outputs from the drive and power supply, located on the front of the component cabinets, supply operating and troubleshooting status information.

3.1.1. INDICATORS

POWER ON Indicator: This amber indicating lamp on the power supply illuminates whenever power is present to the 300 VDC bus. This will be true whenever input power is applied to the power supply. It will also remain on for a minute or two after input power is removed while the capacitors used to filter the voltage are discharged.

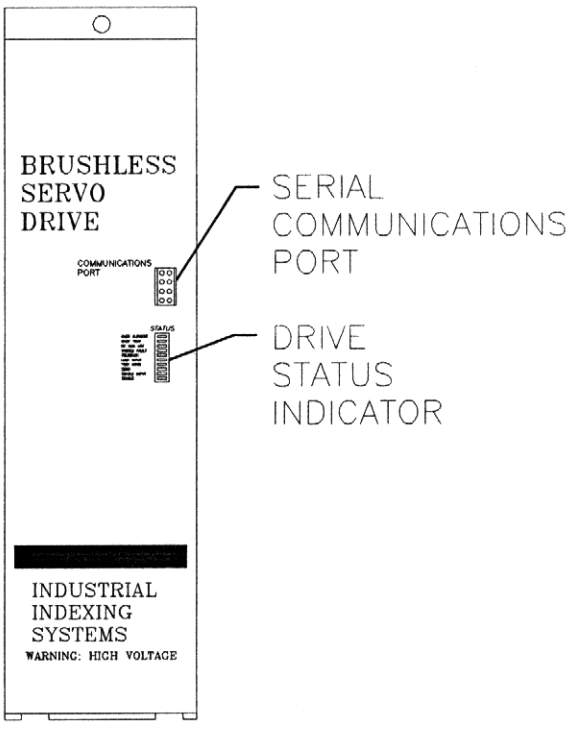


Figure 3.1
Drive Controls

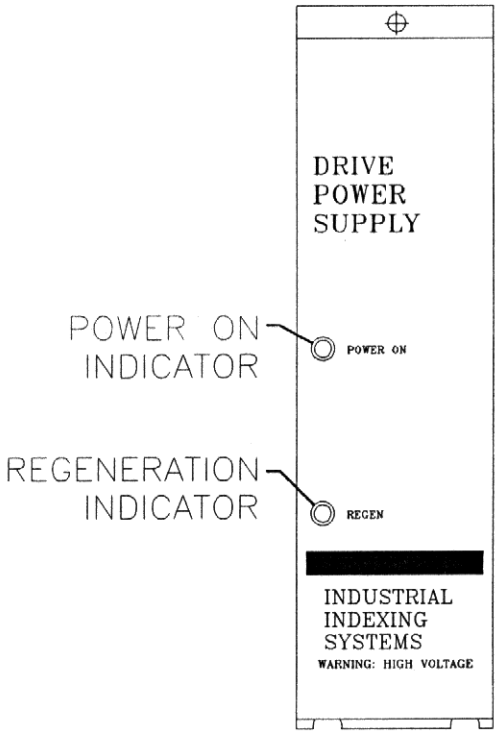


Figure 3.2
Power Supply Controls

WARNING

NEVER TOUCH THE BUS BARS WHEN THE POWER INDICATOR ON THE POWER SUPPLY IS ILLUMINATED.

REGENeration Indicator: This small red indicating LED on the power supply illuminates whenever the regeneration resistor circuit is active, indicating that the power supply is draining excess energy from the system through the regeneration resistor. It will also illuminate for approximately 1/2 second when the regeneration test button is pressed to test the regeneration circuit (refer to **"Section 4 - Maintenance"**).

DRIVE STATUS INDICATOR: The drive status indicator is a 10-segment LED (Light-Emitting Diode) which displays operating and error conditions of the drive (refer to **Figure 3.3**). Fault or error indicators latch ON and must be reset by cycling the system power. To reset, turn system power to OFF, wait 10 seconds, and turn system power ON. If the error persists, refer to **"Section 4 - Maintenance"**. From top to bottom, the LEDs illuminate as follows:

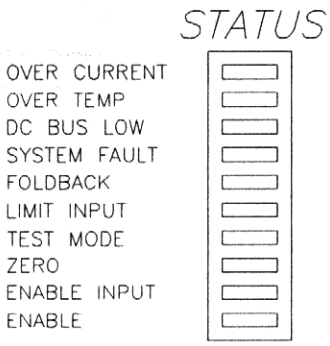


Figure 3.3
Status Indicator

a) OVER CURRENT: (Latching fault indicator) Indicates the system has exceeded its peak current capability. This is usually due to a shorted load (motor) or shorted power transistor.

b) OVER TEMP: Indicates drive heat-sink maximum temperature has been exceeded. (Check the internal fan operation.)

c) DC BUS LOW: Indicates a below normal 300 VDC bus or a blown regeneration fuse.

d) SYSTEM FAULT: (Latching fault indicator) When steady, this LED indicates system memory loss. When flashing, this LED indicates an invalid motor selection through the DIP switches or the serial port.

e) FOLDBACK: Indicates the drive has exceeded the selected motor's RMS (Root Mean Squared) current rating. It is an indication that the motor peak current is remaining at a high level too long or the duty cycle is too severe. If this LED is flashing, the drive has limited the output current to the drive RMS rating. If this condition exists for approximately 20 minutes, the LED will come on

steady and the drive output current will be limited to the RMS rating of the selected motor.

The existence of a foldback condition will be stored in system memory. If the power is turned off, this information is retained and the LED will come on flashing when the power is restored. The LED will be reset when an ENABLE signal is applied to the system.

f) LIMIT INPUT: Indicates the drive has been commanded, through a switch closure on the current limiting (I LIM) input (refer to **"Section 3 - Controls and Operation"**) or serial command, to limit the drive current to a default of 50% of the peak drive rating.

g) TEST MODE: Indicates that the drive has been commanded into a test mode (Refer to **Section 4.2.**)

h) ZERO: Indicates zero degree position of the resolver. This LED will illuminate any time the resolver is at its zero degree position. It will flash quickly during indexing operations each time the zero degree position is passed.

i) ENABLE INPUT: Indicates a switch closure from the controller to enable the drive's output stages. This LED is always illuminated during normal operation.

j) ENABLE: This LED is the drive's response to an enable command. It indicates that the drive is enabled. It is always on during normal operation.

3.1.2. MONITOR CONNECTIONS

The monitor outputs are a series of terminals which provide external information from the drive (refer to **Figure 3.4**). This information can be used by digital or analog monitoring equipment depending on the output terminals used.

NOTE

Industrial Indexing Systems provides a 6-pin mating connector, part number 25.320.3653.1, to facilitate making monitor connections.

Drive Enabled: The outputs labeled "DRIVE UP +" and "DRIVE UP -" are optically-isolated outputs from an open collector contact. This circuit parallels the ENABLE LED in the drive status indicator and closes whenever the drive is enabled and there are no system faults. It can be used to send a feedback signal to a Programmable Logic Controller or host computer to indicate the status of the drive. Maximum 0.7V DC at 10mA closed, 30V DC max open circuit.

Current Limit: When a contact installed between the "I LIM" and "D COM" terminals is closed, the input current to the drive is limited to 50% of the drive's peak current rating. Maximum 1.5V DC at 20mA closed circuit, 12V DC open circuit.

Analog Monitor: Terminals "A COM" and "MONITOR" provide an analog output signal which is proportional to the torque being delivered to the motor by the drive. This signal can be measured on an oscilloscope or similar instrument. It is limited to a maximum of 8 VDC which is equal to the peak torque of the drive, which is also the peak torque of the MDPAK™ specification. (The value of the torque will vary as a result of motor acceleration, motor and load inertia, and system friction.)

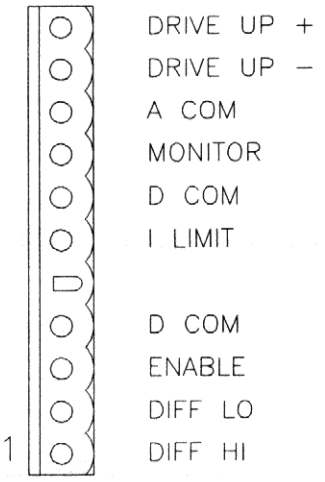


Figure 3.4
Monitor Outputs and Drive Interface

Enable: When a contact installed between the "ENABLE" and "D COM" terminals are closed, the drive will be enabled and current will be provided to the motor in proportion to the voltage applied at the "DIFF HI" and "DIFF LO" terminals. Maximum 1.5V DC at 20mA closed circuit, 12V DC open circuit.

DIFF HI/LO: Differential velocity command input, ±10V DC maximum, 20KΩ minimum input impedence.

The output voltage at the monitor can vary relative to the current or relative to the RMS average torque, depending on the setup DIP switch "Monitor" setting (refer to **Section 3.2.1**).

Figure 3.5 shows a typical velocity curve for an indexing motor. The motor accelerates, travels for a period at a steady speed, decelerates to zero, and remains at rest for a period. This cycle repeats many times.

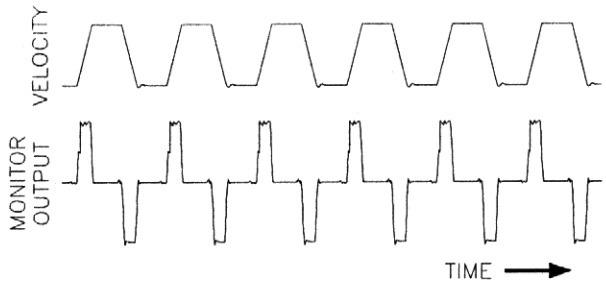


Figure 3.5
Drive Monitor Output

The monitor voltage will follow the velocity. During acceleration periods, the monitor voltage will increase, indicating a greater current demand. During steady state motion and zero-velocity periods, the monitor voltage is at zero, indicating minimal current draw. During deceleration periods, the monitor voltage is negative, indicating that the drive is absorbing excess current from the system.

3.2. DRIVE CONFIGURATION

Before a drive can be used, it must be configured for the motor, inertia load, and type of monitoring. This can be accomplished through an 8-position DIP switch on the drive circuit board or by serial command through the serial communication port.

WARNING

MAKE SURE THE "POWER ON" INDICATOR IS OFF, INDICATING THAT THE CAPACITORS HAVE BEEN DISCHARGED, BEFORE ATTEMPTING TO REMOVE THE DRIVE COVER. AVOID TOUCHING THE 300 VDC BUS BARS.

3.2.1. DIP SWITCH SETTINGS

The 8-position DIP switch is used to configure the drive to the specific motor and motor loading of the indexing system (refer to Drawing Number SU-039001, Sht. 1 in **Appendix F**). The drive is configured by the position of the switches when the drive power is turned on. If the switch settings are changed, the drive power must be turned off and then on again before the new setting will be acknowledged and used by the drive.

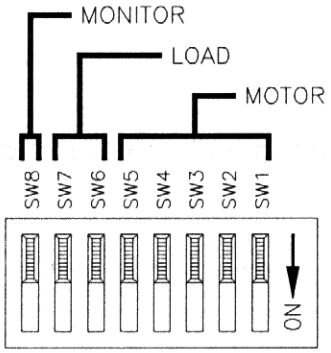


Figure 3.6
Setup DIP Switch

Switch positions 1 through 5 are used to designate the motor being used. There are 30 possible combinations as shown in Drawing Number SU-039001, Sht. 1 in **Appendix F**. The switch combination must be set to MT #0 if the setup is to be done by serial command. The switch combination must be set to MT #31 (Zero Setup) for test purposes. Of the other 30 possible combinations, not all are used at this time and some that are used do not apply to Series 4 Motors.

1) Refer to the appropriate MDPAK™ drawing in **Appendix C** to determine the motor which corresponds to the selected Motor/Drive Package.

2) Move switches SW1, SW2, SW3, SW4, and SW5 to the ON or OFF positions indicated on the specific MDPAK drawing.

CAUTION

MAKE SURE THE SETUP SWITCH MATCHES THE MOTOR BEING OPERATED BY THE DRIVE. VERIFY THE NUMBER ON THE MOTOR NAMEPLATE AS WELL AS FROM THE MOTOR/ DRIVE PACKAGE SPECIFICATIONS.

Switch positions SW6 and SW7 are used to select the load compensation setting of the drive. These can be set to one of four positions. Load 1 is the minimum setting used for light inertia loads. Load 4 is the maximum setting for high inertia loads and provides for loading equal to five times the motor inertia. Load 2 and Load 3 provide proportional compensation between the two extremes. With the proper load compensation setting selected, the drive system will remain stable for inertia loads up to five times the motor inertia.

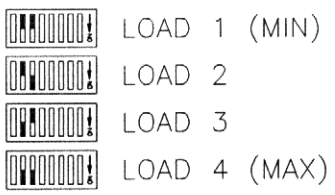


Figure 3.7
Setup Load Settings

> **NOTE**
>
> **For applications which require functioning at inertia loads greater than five times the inertia load of the motor, contact Industrial Indexing Systems Integrated Technical Services Department.**

The ideal system is responsive with little velocity overshoot and a rapid settling time. **Figure 3.8** shows three typical velocity profiles. The first has a load setting which is too low and exhibits large overshoots and erratic speeds. The second has a load setting which is too high which tends to dampen the profile and cause a sluggish reaction. The third profile is an ideal profile.

While the ideal profile may not be attainable, the load setting which exhibits the closest profile to the ideal should be chosen. As with the motor selection settings, the drive power must be turned OFF and ON again before a new setting of the load compensation DIP switches will be recognized.

> **NOTE**
>
> **The load setting is set at Load #3 at the factory before the drive is shipped.**

3) Measure the voltage at the Voltage Test Point as described in "**Section 4 - Maintenance**" and compare the voltage profile to the examples in **Figure 3.8**.

4) If the profile indicates a load setting which is too low, select a higher setting. If it indicates a setting which is too high, select a lower setting.

5) Turn the drive power OFF and then ON again to activate the new setting.

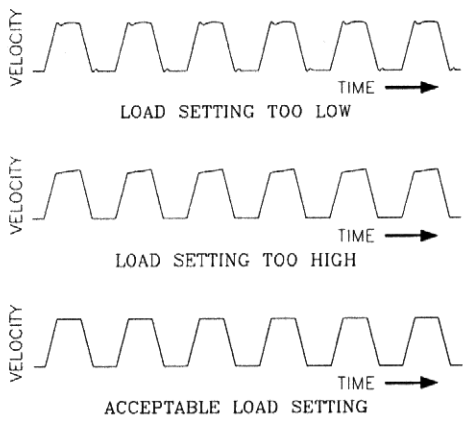


Figure 3.8
Velocity Profiles

6) Repeat steps #3 through #5 until the most ideal profile for the specific motor load is attained.

Figure 3.9
Setup Monitor Settings

Switch position SW8 is used to select whether the MONITOR voltage will be proportional to the actual drive current or to the RMS average current. When it is set to monitor actual current, spikes and other short term changes can be more easily monitored. However, the pattern may change too rapidly to have much significance. When the RMS current is monitored, short-duration changes may be missed, but it is easier to observe the long-term changes of the system.

3.2.2. VELOCITY TESTS

The velocity test point on the drive circuit board provides a location for checking output voltage versus motor speed. This is a non-linear output. As the system controller requests various speeds from the motor, the output voltage at the voltage test point and the motor shaft speed will vary as shown in **Table 3.1** and **Figure 3.10**.

CAUTION

THE VELOCITY TEST POINT IS AN ACTIVE OUTPUT USED BY INTERNAL ELECTRONICS. THIS POINT SHOULD BE PROBED WITH HIGH IMPEDANCE EQUIPMENT ONLY.

Table 3.1
Output Voltages and Speeds

PERCENT OF MAX SPEED	OUTPUT VOLTAGE	MOTOR SPEED
100 %	10.0 V	4980RPM
80 %	7.3 V	3984RPM
60 %	5.3 V	2988RPM
40 %	3.3 V	1992RPM
20 %	1.7 V	996RPM
10 %	0.85 V	498RPM
5 %	0.425V	249 RPM

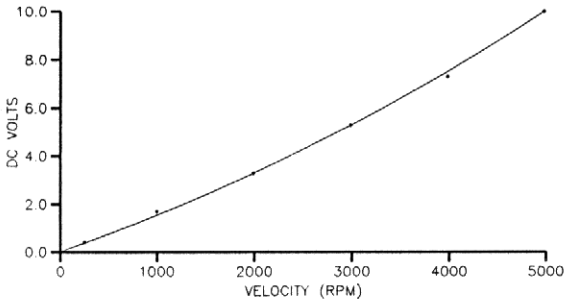


Figure 3.10
Drive Output Voltage

3.2.3. SERIAL COMMUNICATIONS

The serial communications port on the front of the drive can be used in place of the DIP switch to configure the drive for the motor type and load compensation. The serial port

accepts a 20 mA serial ASCII communications loop. Typical connections and serial commands are shown in Drawing Number SU-039001, Sht. 2, in **Appendix F**.

1) Set all switches on the setup DIP switch to the off position.

2) Provide a 20 mA communications source. Connect as shown in Drawing Number SU-039001.

3) Using the serial commands shown in Drawing Number SU-039001, select the motor to be used or set the load compensation setting.

NOTE

Each serial command will be followed by an acknowledgement that the serial command has been received and executed. In addition, each serial command and variable can be recalled by preceding the command with an "R" (for RECALL). The response will be the current motor number, load setting, or monitor output function.

SECTION 4 – MAINTENANCE

The Industrial Indexing Systems Series 4 Motor/Drive Packages and Power Supply Packages are designed to provide reliable service with minimum down time and maintenance. In case of failure, the system is designed for replacement of an entire component. It is recommended that an inventory of spare parts be maintained for the system.

4.1. TROUBLESHOOTING

WARNING

DISCONNECT ALL ELECTRICAL POWER AND FOLLOW PROPER LOCKOUT PROCEDURES BEFORE MAKING ANY ADJUSTMENTS OR REPAIRS.

This section is designed to assist trained personnel in identifying and correcting system malfunctions. A prerequisite to the use of this troubleshooting guide is a thorough knowledge of the motion devices as explained in this manual. When a problem occurs, first read the appropriate sections of this manual to make sure that the components are installed properly and are being operated correctly. Follow the checks included in this manual, in sequence.

NOTE

Any indexing system also involves the system controller and any associated peripheral devices which will also affect the system performance. Refer to the instruction manuals for those components for additional troubleshooting information.

4.1.1. SYSTEM TEST/VELOCITY LOOP

WARNING

THIS TEST CAUSES THE MOTOR TO TURN. MAKE SURE THAT THE MECHANICAL LOAD IS DISCONNECTED, OR WILL ACCEPT MOVEMENT IN BOTH DIRECTIONS WITHOUT DAMAGE TO THE EQUIPMENT, AND THAT ALL PERSONNEL ARE CLEAR BEFORE STARTING THIS TEST.

The velocity loop test removes the controller from the loop for the purpose of testing the motor assembly, drive, and power supply. In this test, the drive is manually enabled and a velocity command voltage is applied to the drive by means of a Volt Ohm Meter (V.O.M.) command input.

1) Remove system power.

2) Remove the 6-pin connector at the controller end of command cable C-437yyy (refer to **Figure 4.1**).

3) Using a short jumper wire, temporarily short together the "INLO" (green wire) and "INHI" (white wire) terminals on the 6-pin connector. This step causes the drive (amplifier) to turn "On" manually.

4) Apply system power. The motor should be stationary and should resist any attempt to turn the motor shaft.

NOTE

Since this is a feedback system, there will always be some slight drift to the motor shaft when it is tested in this manner. However, the motor will not be free to be turned by hand.

5) Set a V.O.M. for use as an ohmmeter using the R × 1 resistance scale.

6) Connect the positive meter lead to the "POS" or "POS OUT" (red wire) connector terminal and the negative meter lead to the "GND" (black wire) connector terminal. This applies voltage (approximately 0.5 volts) into the drive input acting as a velocity command.

RESULT: **The motor should accelerate sharply to a controlled speed in a clockwise direction and decelerate sharply when either meter lead is removed.**

7) Reverse the meter leads to the "POS" and "GND" connector terminals. This changes polarity of the velocity command.

RESULT: **The motor should accelerate sharply to a controlled speed in a counterclockwise direction and decelerate sharply when either meter lead is removed.**

8) If all tests pass, the velocity loop is functioning correctly.

9) Remove all temporary jumpers, replace all disconnected wires, and connect the drive connector to the controller.

Items to check if test fails:

a) Troubleshooting of velocity loop.
b) Power supply voltages.
c) Motor armature wiring and polarity.
d) Reference Voltages (refer to the Controller Instruction Manual).

4.1.2. SUPPLEMENTAL SYSTEM CHECKS

1) If this is an initial installation, check all installation procedures to make sure they have been followed properly.

2) Check to make sure 115 VAC power is being supplied to the system controller and all system power supplies. Check to make sure power plugs, if present, are securely inserted in their respective sockets and electrical disconnects are turned on. Check all fuses.

3) Check the Drive Status Indicators to make sure there are no fault indicators illuminated. Correct any indicated problems and reset the fault by turning the drive power OFF and then ON again and enabling the drive.

4) Check for loose or broken wires.

If the motor is not responding smoothly, the type of problem can indicate the area of the problem. Use the following guides for directing system checks.

MOTOR DOES NOT RUN

a) Check that there is power on the 300 VDC bus bars. (The amber POWER ON lamp on the power supply should be illuminated.)

b) Check the Drive Status Indicators to make sure there are no fault indicators illuminated. Correct any indicated problems and reset the fault by turning the drive power OFF and then ON again and enabling the drive.

c) Check that the fan on the drive and the power supply are running as an indication that the 115 VAC control power is properly connected. If they are not operating properly, locate the 115 VAC and DC bus status cable below the 300 VDC bus bars and check for a secure connection.

d) With all power off, check all fuses and motor over-temperature switch.

e) With all power off, check all resolver, motor, and command cable connections to make sure they are secure.

MOTOR RUNS ERRATICALLY OR IS UNSTABLE

a) Check that proper motor and load settings have been selected, based on the proper MDPAK™ for this drive and motor. If not, change the DIP switch settings and turn power OFF and the ON to initiate change.

b) With all power off, check all resolver, motor, and command cable connections to make sure they are secure.

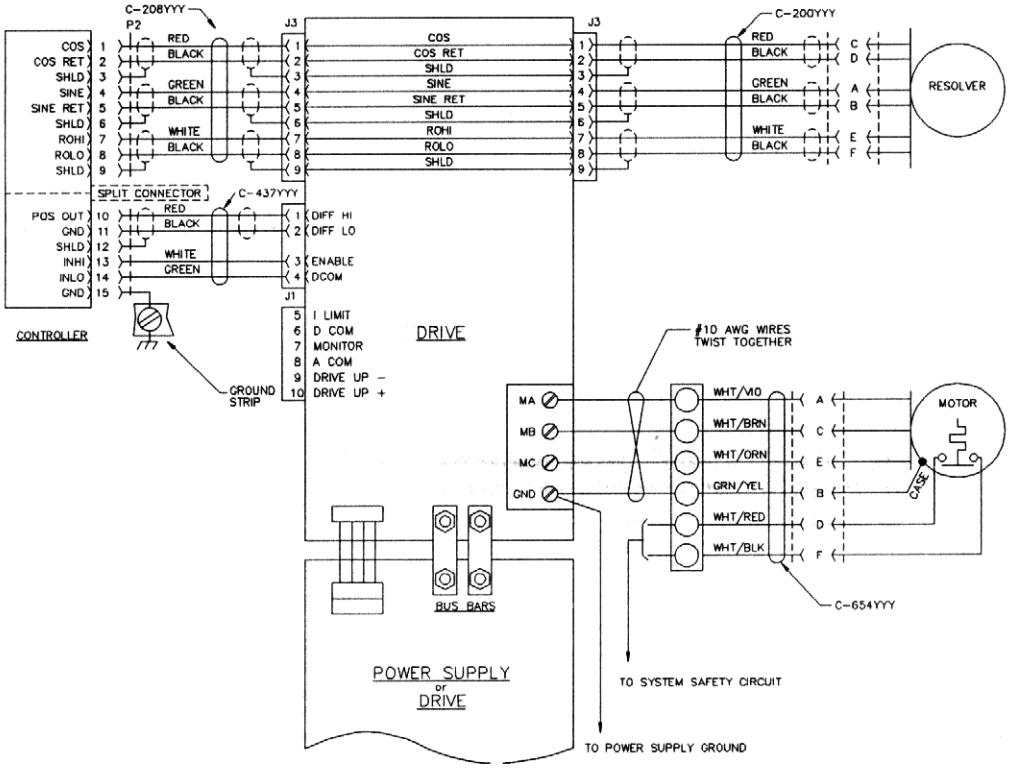


Figure 4.1 - Typical System Electrical Connections
(REC-100 Jumper JP1 installed in Position 'A')

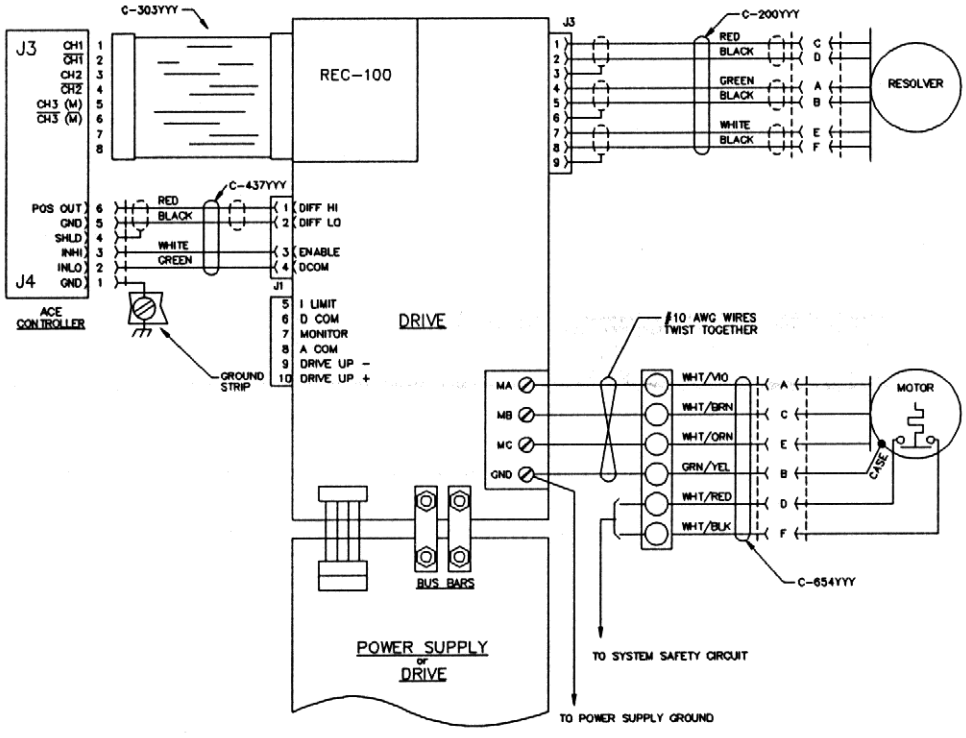


Figure 4.1a - Typical System Electrical Interconnections
(REC-100 Jumper JP1 installed in Position 'B')

c) Check to make sure the brushless motor is correctly phased. (Refer to **"Section 2 - Installation"**.)

d) Check to make sure the motor loading has not changed. Looking for possible binding or jamming in the system.

MOTOR HAS LITTLE OR NO TORQUE

a) Check to make sure resolver signals are present. Check reference signals from the controller and return signals. (Refer to test procedures in the controller instruction manual.)

b) Check the Drive Status Indicators to make sure there are no fault indicators illuminated. Correct any indicated problems and reset the fault by turning the drive power OFF and then ON again.

c) Check to make sure all power voltages are present.

d) Check to make sure the resolver is properly zeroed (refer to **Section 4.2**).

4.1.3. POWER CHECKS

1) Check the voltages at the primary input terminals on the power supply. The voltage must be 208 VAC -0/+46 VAC between any two phases. It must not drop below 200 VAC under full load.

2) Check the voltage at the 115 VAC input terminals. It must be 115 VAC ± 10 VAC.

3) With power off, check the 115 VAC fuse.

4) On power supply IPS-300/50-ER, with power off and dissipated, check the regeneration resistor fuse.

OR

4) On power supply IPS-300/75-ER, with power off and dissipated, reset the overload relay.

4.1.4. MOTOR CHECKS

A brushless motor has no brushes or tachometer feedback. It is, therefore, difficult to determine if a motor has failed using only a V.O.M. Use the following checks to verify the motor condition.

1) Remove all system electrical power.

2) Remove the motor connector from the motor.

3) Check the resistance of all connector points. All points — except "D" — should have a resistance to ground greater than 10,000 ohms.

4) Check the motor cable for possible short circuits or broken (open) wires.

5) Check the resistance of terminals MA, MB, and MC on the drive. These points should have a resistance to ground greater than 10,000 ohms. These points should be checked with both polarities of the V.O.M. If the test fails, replace the drive.

6) Short all phases of the winding and rotate the motor shaft by hand. There should be a firm, smooth movement of the shaft. If this test fails, it may indicate a shorted or open winding.

7) Open all phases of the winding and rotate the motor shaft by hand. The movement should be easier than in Step 6, but the motor shaft should still move smoothly. If this test fails, it again may indicate a shorted or open winding.

4.1.5. POSITION LOOP TEST

The position loop test is used to verify that the controller and feedback device (resolver) are functioning properly. The controller and feedback device are placed in a condition where the feedback-device signals are fed back to the controller. As the feedback device is rotated, a corresponding voltage can be measured at the test points on the controller. Refer to the instructions in the controller instruction manual.

4.2. MOTOR RESOLVER ZEROING

The motor resolver coupled to the end of the motor is aligned to a specific angle for the electronic commutation of motor current. It is adjusted at the factory and should not require further adjustment. If adjustment is necessary, follow the procedures in this section. Make sure it is necessary before proceeding with adjustment of the resolver.

WARNING

THE PROCEDURES REQUIRED TO ZERO THE RESOLVER CAUSE THE MOTOR TO MOVE. DISCONNECT THE MOTOR FROM ITS LOAD PRIOR TO STARTING THESE PROCEDURES AND SECURE IT SO THE CASE CANNOT ROTATE. THE MOTOR MUST BE TOTALLY FREE OF ANY LOADING FOR THESE PROCEDURES.

1) Make sure the drive has been setup for the proper motor according to the information in drawing number SU-039001 and that this information has been loaded into the drive memory by turning the drive power off and then on.

2) Remove system power.

3) Remove the rear motor cover to expose the resolver.

WARNING

MAKE SURE THE "POWER ON" INDICATOR IS OFF, INDICATING THAT THE CAPACITORS HAVE BEEN DISCHARGED, BEFORE ATTEMPTING TO REMOVE THE DRIVE COVER. AVOID TOUCHING THE 300 VDC BUS BARS.

4) Turn switch positions SW1, SW2, SW3, SW4, and SW5 on the 8-position DIP switch to ON.

5) Remove the four-pin connector from the drive interface (J1) on the circuit board.

6) Apply system power. The "TEST" LED in the drive status indicator will be illuminated.

FOR DRIVES WITH FIRMWARE NUMBERED EARLIER THAN SFO-6002RX

7) Manually rotate the motor shaft slowly until the "ZERO" LED in the drive status indicator illuminates. This is a very fine adjustment and may require several attempts.

8) Note the location of the motor angle relative to the motor shaft.

WARNING

THE NEXT PROCEDURE WILL CAUSE THE MOTOR TO ROTATE.

9) Disconnect command cable C-437yyy from the drive interface connector (J1).

10) On the drive interface connector (J1), attach a jumper between the "ENABLE" (J1-3) and "D COM" (J1-4) terminals. This will manually enable the drive. The "ENABLE INPUT" and "ENABLE" LEDs on the drive status indicator will be illuminated.

11) Note how far the drive has moved from its position at Step 8.

12) Disable the drive by removing the jumper installed in Step 9.

13) Loosen the resolver mounting screws.

14) Rotate the resolver the same direction and distance that the motor shaft moved in Step 9. The resolver is in the correct position when the "ZERO" LED in the drive status indicator illuminates.

15) Tighten the resolver mounting screws.

16) Repeat Steps 9 through 14 until the "ZERO" LED stays on after the drive is enabled.

FOR DRIVES WITH FIRMWARE NUMBERED SFO-6006RO OR GREATER

7) Manually rotate the motor shaft clockwise slowly until all LEDs in the drive status indicator are illuminated. As the zero point is approached, the first six LEDs will start to illuminate beginning with the OVERCURRENT Led. Additional LEDs illuminate as the zero point is approached until the first six LEDs are all illuminated. When the zero point is reached, the display will go from six LEDs illuminated to all ten LEDs illuminated.

8) Note the location of the motor angle relative to the motor shaft.

WARNING

THE NEXT PROCEDURE WILL CAUSE THE MOTOR TO ROTATE.

9) Disconnect command cable C-437yyy from the drive interface connector (J1).

10) On the drive interface connector (J1), attach a jumper between the "ENABLE" (J1-3) and "D COM" (J1-4) terminals. This will manually enable the drive. The "ENABLE INPUT" and "ENABLE" LEDs on the drive status indicator will be illuminated.

11) Note how far the drive has moved from its position at Step 8.

12) Disable the drive by removing the jumper installed in Step 9.

13) Loosen the resolver mounting screws.

14) Rotate the resolver the same direction and distance that the motor shaft moved in Step 9. As the zero point is approached (with a clockwise rotation), the LEDs will illuminate as explained in Step 7. The resolver is in the correct position when all ten LEDs in the drive status indicator are again illuminated.

15) Tighten the resolver mounting screws.

16) Repeat Steps 9 through 14 until the LEDs stay on after the drive is enabled.

NOTES

APPENDIX A
ASCII CONVERSION TABLE

This appendix lists the ASCII character set and the hexadecimal representation for each character code.

GRAPHIC OR CONTROL	HEX CODE	GRAPHIC OR CONTROL	HEX CODE
NUL	00	&	26
SOH	01	'	27
STX	02	(	28
ETX	03	)	29
EOT	04	*	2A
ENQ	05	+	2B
ACK	06	,	2C
BEL	07	-	2D
BS	08	.	2E
HT	09	/	2F
LF	0A	0	30
VT	0B	1	31
FF	0C	2	32
CR	0D	3	33
SO	0E	4	34
SI	0F	5	35
DLE	10	6	36
DC1	11	7	37
DC2	12	8	38
DC3	13	9	39
DC4	14	:	3A
NAK	15	;	3B
SYN	16	<	3C
ETB	17	=	3D
CAN	18	>	3E
EM	19	?	3F
SUB	1A	@	40
ESC	1B	A	41
FS	1C	B	42
GS	1D	C	43
RS	1E	D	44
US	1F	E	45
[space]	20	F	46
!	21	G	47
"	22	H	48
#	23	I	49
$	24	J	4A
%	25	K	4B

GRAPHIC OR CONTROL	HEX CODE	GRAPHIC OR CONTROL	HEX CODE
L	4C	f	66
M	4D	g	67
N	4E	h	68
O	4F	i	69
P	50	j	6A
Q	51	k	6B
R	52	l	6C
S	53	m	6D
T	54	n	6E
U	55	o	6F
V	56	p	70
W	57	q	71
X	58	r	72
Y	59	s	73
Z	5A	t	74
[	5B	u	75
\	5C	v	76
]	5D	w	77
^	5E	x	78
_	5F	y	79
`	60	z	7A
a	61	{	7B
b	62	|	7C
c	63	}	7D
d	64	~	7E
e	65	DEL	7F

APPENDIX B
GLOSSARY

A COM: Analog Common

ASCII: American Standard Code for Information Interchange

BAUD: The number of bits per second that can be transmitted in computer communications.

Brushless: A type of direct-current-excited synchronous motor that utilizes a field-excitation system which eliminates the need for collector rings and brushes.

Closed Loop: A regulating device in which the actuator position is sensed, and a signal proportional to this position (feedback position) is compared with a signal proportional to the desired actuator position (command position). The difference between these signals is the error signal. The error signal causes a change in the actuator so as to force this difference to be zero.

Communications: The transmission of information from one device to another. The information can take many forms such as command signals, device status and fault conditions.

Controller: The device which receives data from various input devices and issues commands to the drive.

Daisy Chain: A means of connecting devices by buses which transmit in both directions simultaneously.

D COM: Digital Common

Feedback Device: Device which monitors shaft position by sending signals to the controller as the shaft rotates. Series 4 systems use a resolver as a feedback device.

Foldback: A condition where the drive automatically reduces the peak current to the continuous current rating of the drive during excessive current conditions.

Full Duplex: A method of operating a communications circuit so that each end can simultaneously transmit and receive.

Host Computer: A computer system whose function is to monitor and coordinate the processes of other devices. A host computer

will typically coordinate motion control functions as well as their interaction with other machine processes.

I LIM: Current Limit

Index: To move the motor shaft an incremental distance from the current position.

I/O: Input/Output

LED: Light-Emitting Diode. Also known as solid-state lamp. A semiconductor diode that converts electric energy to light.

MDPAK™: Industrial Indexing Systems Motor/Drive Package

Nonvolatile Memory: A computer storage medium that retains information in the absence of power.

Optically Isolated: Indicates an I/O which uses a coupling device in which a light-emitting diode, energized by an input signal, is optically coupled to a photodetector.

Parameters: Predefined data which is used in the execution of instructions.

PLC: Programmable Logic Controller.

Programmable Logic Controller: An electronic device that scans on/off type inputs and controls on/off type outputs. The relationship between the inputs and outputs are programmable by the user.

PWRPAK™: Industrial Indexing Systems Power Supply Package

Regeneration Circuit: The circuit which causes the excess system energy to be directed to the regeneration resistor.

Regeneration Resistor: The external resistor used by the system power supply to dissipate energy when the system motor is decelerating.

Resolver: A type of feedback device which converts mechanical position into an electrical signal. A resolver is a variable transformer that divides the impressed AC signal into a sine and cosine output signal. The phase of these two signals represent the absolute position of the resolver shaft.

Transformer: An electrical component used to convert electrical energy from one or more alternating-currrent circuits to one or more others by magnetic induction.

APPENDIX C
MDPAK™ SPECIFICATIONS

Series 4 Motor/Drive Packages Summary

DRAWING NUMBER	DESCRIPTION
MDPAK4-2350	2350 Watt Motor Drive Package
MDPAK4-3400	3400 Watt Motor Drive Package
MDPAK4-4100	4100 Watt Motor Drive Package
MDPAK4-5700	5700 Watt Motor Drive Package
MDPAK4-5900	5900 Watt Motor Drive Package
MDPAK4-7000	7000 Watt Motor Drive Package
MDPAK4-8500	8500 Watt Motor Drive Package
MDPAK4-8501 †	8500 Watt Motor Drive Package
MDPAK4-8600	8600 Watt Motor Drive Package
MDPAK4-8601	8600 Watt Motor Drive Package
MDPAK4-8900	8900 Watt Motor Drive Package
MDPAK4-8901 †	8900 Watt Motor Drive Package
MDPAK4-9400	9400 Watt Motor Drive Package
MDPAK4-8600A	8600 Watt Motor Drive Package
MDPAK4-5900A	5900 Watt Motor Drive Package
MDPAK4-8500A	8500 Watt Motor Drive Package
MDPAK4-13300	13300 Watt Motor Drive Package
MDPAK4-15000	15000 Watt Motor Drive Package

† *Special customer compensation for high repetition rate indexing drive systems.*

INDUSTRIAL INDEXING SYSTEMS, INC.
SERIES 4 MOTOR/DRIVE PACKAGES SUMMARY

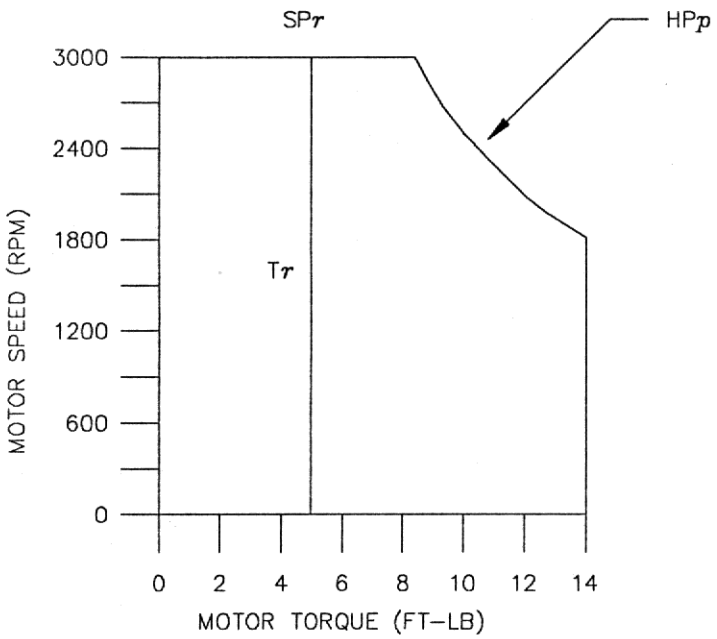
MOTOR DRIVE PART NUMBER	DRIVE NUMBER	MOTOR ASSEMBLY	RATED SPEED (RPM)	RATED TORQUE (LB-FT)	PEAK TORQUE (LB-FT)	ROTOR PEAK HP	INPUT INERTIA (LB-FT-SEC^2)	POWER (WATTS)
MDPAK4-2350	BSD-300/30	BLM-1013	3000	4.9	14.0	4.75	0.00054	2350
MDPAK4-3400	BSD-300/30	BLM-1014	3000	7.9	19.0	9.00	0.00110	3400
MDPAK4-4100	BSD-300/40	BLM-1015	2100	12.5	38.0	15.00	0.00180	4100
MDPAK4-5700	BSD-300/40	BLM-1016	2700	14.5	30.0	12.00	0.00570	5700
MDPAK4-7000	BSD-300/40	BLM-1017	2200	22.9	50.0	15.00	0.00685	7000
MDPAK4-8500	BSD-300/55	BLM-1009-B	1200	50.0	140.0	21.00	0.02530	8500
MDPAK4-8501	BSD-300/55A	BLM-1009-B	1200	50.0	140.0	21.00	0.02530	8500
MDPAK4-8600	BSD-300/40	BLM-1018	2200	27.5	66.0	17.50	0.00224	8600
MDPAK4-8601	BSD-300/55	BLM-1018	2200	27.5	82.0	23.00	0.00224	8600
MDPAK4-8900	BSD-300/40	BLM-1008-B	1500	42.0	110.0	20.00	0.01900	8900
MDPAK4-8901	BSD-300/40A	BLM-1008-B	1500	42.0	110.0	20.00	0.01900	8900
MDPAK4-9400	BSD-300/40	BLM-1019	2750	24.2	55.0	18.20	0.00224	9400
MDPAK4-13300	BSD-300/55	BLM-1020	2000	47.0	105.0	23.30	0.00760	13300
MDPAK4-15000	BSD-300/55A	BLM-1031	1500	68.0	140.0	28.50	0.00930	15000

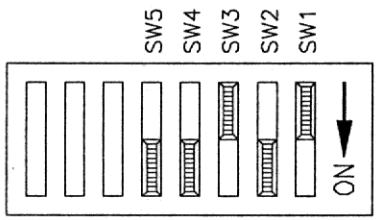
MOTOR DRIVE PART NUMBER	DRIVE SIZE (INCHES) HEIGHT	WIDTH	DEPTH	MOTOR SIZE (INCHES [MM]) LENGTH	DIAMETER	SHAFT LENGTH x DIAMETER		MOTOR WEIGHT (LBS)
MDPAK4-2350	15.38	4.13	11.75	7.00	5.32 SQ.	2.31	x .875	18.20
MDPAK4-3400	15.38	4.13	11.75	8.50	5.32 SQ.	2.31	x .875	25.30
MDPAK4-4100	15.38	4.13	11.75	10.50	5.32 SQ.	2.31	x .875	35.50
MDPAK4-5700	15.38	4.13	11.75	8.95	7.50 SQ.	2.88	x 1.125	49.80
MDPAK4-7000	15.38	4.13	11.75	10.45	7.50 SQ.	2.88	x 1.125	66.00
MDPAK4-8500	16.79	6.10	11.75	19.61	7.56	2.78	x 1.375	130.00
MDPAK4-8501	16.79	6.10	11.75	19.61	7.56	2.78	x 1.375	130.00
MDPAK4-8600	15.38	4.13	11.75	17.00	5.59 SQ.	[50]	x [24]	65.00
MDPAK4-8601	16.79	6.10	11.75	17.00	5.59 SQ.	[50]	x [24]	65.00
MDPAK4-8900	15.38	4.13	11.75	16.81	7.56	2.78	x 1.375	110.00
MDPAK4-8901	15.38	4.13	11.75	16.81	7.56	2.78	x 1.375	110.00
MDPAK4-9400	15.38	4.13	11.75	17.00	5.59 SQ.	[50]	x [24]	65.00
MDPAK4-13300	16.79	6.10	11.75	17.70	7.48 SQ.	2.28	x 1.260	65.00
MDPAK4-15000	16.79	6.10	11.75	23.52	7.48 SQ.	2.28	x 1.260	127.00

INDUSTRIAL INDEXING SYSTEMS, INC.
SERIES 4 POWER SUPPLY PACKAGES SUMMARY

POWER SUPPLY PART NUMBER	OUTPUT POWER (WATTS)	NO. OF AXES	INPUT PHASES	POWER SUPPLY SIZE (INCHES)			TRANSFORMER SIZE (INCHES)			ENCLOSURE	
				HEIGHT	WIDTH	DEPTH	HEIGHT	WIDTH	DEPTH	PANEL MOUNT	FREE STANDING
PWRPAK4-4500/3	4500	3	3	15.38	4.20	11.75	21.00	16.00	8.00		X
PWRPAK4-9000/3	9000	3	3	15.38	4.20	11.75	21.00	20.00	12.00		X
PWRPAK4-15000/4	15000	4	3	15.38	4.20	11.75	27.00	26.00	16.00		X
PWRPAK4-22500/6	22500	6	3	16.79	6.10	11.75	27.00	26.00	16.00		X

DATE	SYM	REVISION RECORD	DRN	CHK





MOTOR SETUP: BLM-1013

MOTOR DRIVE SPECIFICATIONS

RATED TORQUE	Tr	4.9	FT-LB
PEAK TORQUE	Tp	14.0	FT-LB
RATED SPEED	SPr	3000	RPM
PEAK HORSEPOWER	HPp	4.75	HP
ROTOR INERTIA	Jm	.00054	FT-LB-SEC^2
INPUT POWER	W	2350	WATT

LIST OF MATERIALS

DESCRIPTION	PART NUMBER	QTY
MOTOR ASSEMBLY	BLM-1013	1
DRIVE	BSD-300/30	1
MANUAL	IB-14B004	1

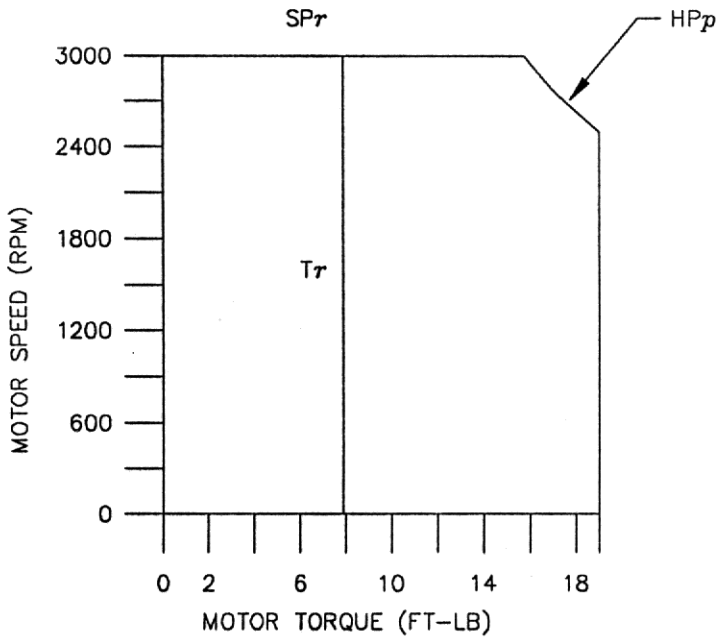
MDPAKY-XXXXX

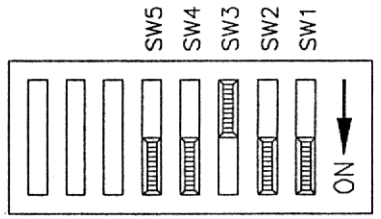
- XXXXX: INPUT POWER WATTS
- Y: TYPE NUMBER OF MOTOR DRIVE PACKAGE, INTENDED FOR USE WITH CORRESPONDING TYPE OF POWER SUPPLY PACKAGE

INDUSTRIAL INDEXING SYSTEMS, INC.

TOLERANCES (EXCEPT AS NOTED) .XX ±.010 .XXX ±.005 ANGULAR ±30'	DRAWN BY: JTE	DATE: 10/25/89
	APPROVED:	DATE:
	SCALE: NONE	TITLE: MOTOR DRIVE PACKAGE
	SHEET NO.: 1 OF 1	DRAWING NO.: MDPAK4-2350

DATE	SYM	REVISION RECORD	DRN	CHK





MOTOR SETUP: BLM-1014

MOTOR DRIVE SPECIFICATIONS

RATED TORQUE	Tr	7.9	FT-LB
PEAK TORQUE	Tp	19.0	FT-LB
RATED SPEED	SPr	3000	RPM
PEAK HORSEPOWER	HPp	9.0	HP
ROTOR INERTIA	Jm	.0011	FT-LB-SEC^2
INPUT POWER	W	3400	WATT

LIST OF MATERIALS

DESCRIPTION	PART NUMBER	QTY
MOTOR ASSEMBLY	BLM-1014	1
DRIVE	BSD-300/30	1
MANUAL	IB-14B004	1

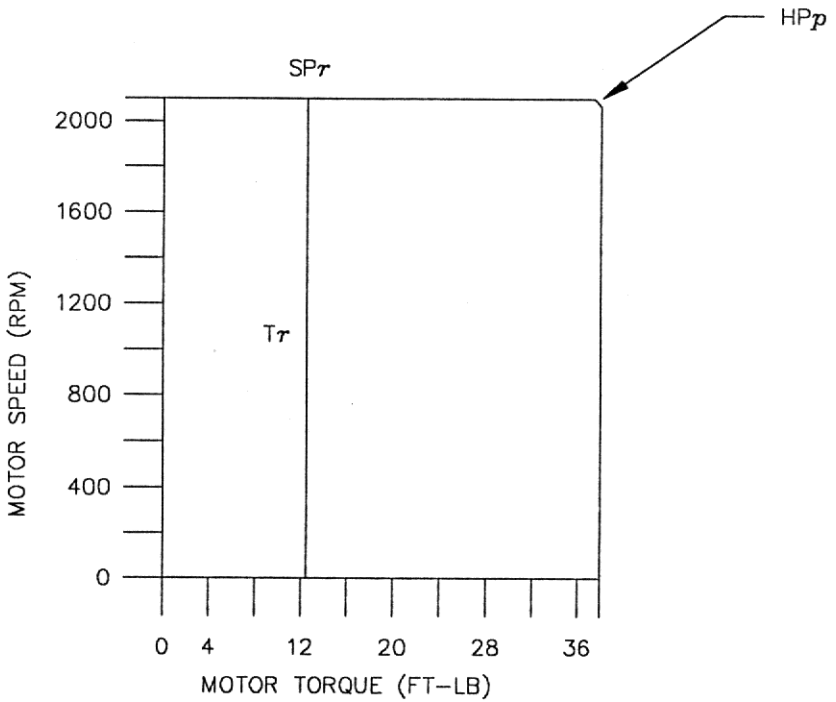
MDPAKY-XXXXX

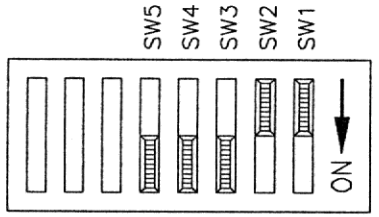
- INPUT POWER WATTS
- TYPE NUMBER OF MOTOR DRIVE PACKAGE, INTENDED FOR USE WITH CORRESPONDING TYPE OF POWER SUPPLY PACKAGE

INDUSTRIAL INDEXING SYSTEMS, INC.

TOLERANCES (EXCEPT AS NOTED) .XX ±.010 .XXX ±.005 ANGULAR ±30'	DRAWN BY: JTE	DATE: 10/25/89
	APPROVED:	DATE:
	SCALE: NONE	TITLE: MOTOR DRIVE PACKAGE
	SHEET NO.: 1 OF 1	DRAWING NO.: MDPAK4-3400

DATE	SYM	REVISION RECORD	DRN	CHK





MOTOR SETUP: BLM-1015

MOTOR DRIVE SPECIFICATIONS

RATED TORQUE	Tr	12.5	FT-LB
PEAK TORQUE	Tp	38.0	FT-LB
RATED SPEED	SPr	2100	RPM
PEAK HORSEPOWER	HPp	15.0	HP
ROTOR INERTIA	Jm	.0018	FT-LB-SEC^2
INPUT POWER	W	4100	WATT

LIST OF MATERIALS

DESCRIPTION	PART NUMBER	QTY
MOTOR ASSEMBLY	BLM-1015	1
DRIVE	BSD-300/40	1
MANUAL	1B-14B004	1

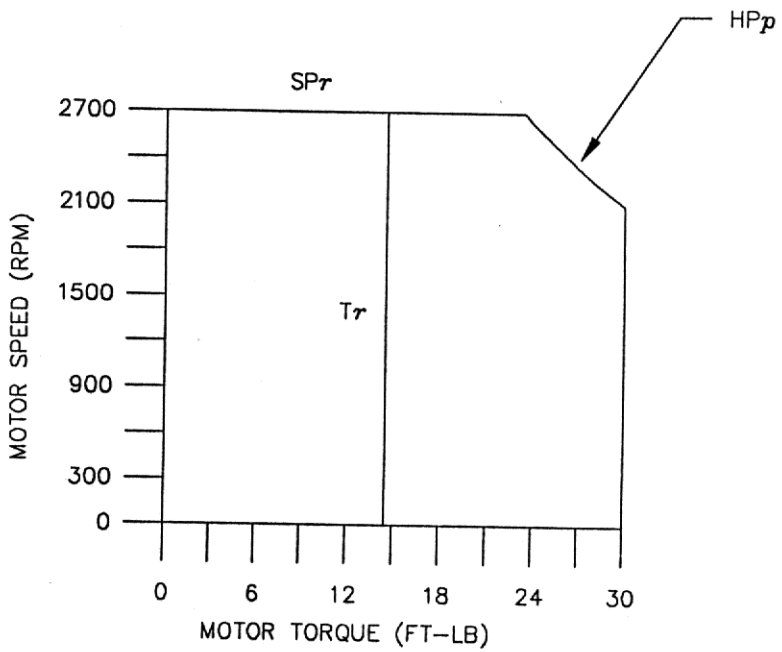
MDPAKY-XXXXX

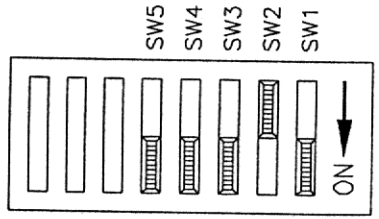
- XXXXX: INPUT POWER WATTS
- Y: TYPE NUMBER OF MOTOR DRIVE PACKAGE, INTENDED FOR USE WITH CORRESPONDING TYPE OF POWER SUPPLY PACKAGE

INDUSTRIAL INDEXING SYSTEMS, INC.

TOLERANCES (EXCEPT AS NOTED) .XX ±.010 .XXX ±.005 ANGULAR ±30'	DRAWN BY: JTE	DATE: 10/25/89
	APPROVED:	DATE:
	SCALE: NONE	TITLE: MOTOR DRIVE PACKAGE
	SHEET NO.: 1 OF 1	DRAWING NO.: MDPAK4-4100

DATE	SYM	REVISION RECORD	DRN	CHK





MOTOR SETUP: BLM-1016

MOTOR DRIVE SPECIFICATIONS

RATED TORQUE	Tr	14.5	FT-LB
PEAK TORQUE	Tp	30	FT-LB
RATED SPEED	SPr	2700	RPM
PEAK HORSEPOWER	HPp	12.0	HP
ROTOR INERTIA	Jm	.0057	FT-LB-SEC^2
INPUT POWER	W	5700	WATT

LIST OF MATERIALS

DESCRIPTION	PART NUMBER	QTY
MOTOR ASSEMBLY	BLM-1016	1
DRIVE	BSD-300/40	1
MANUAL	IB-14B004	1

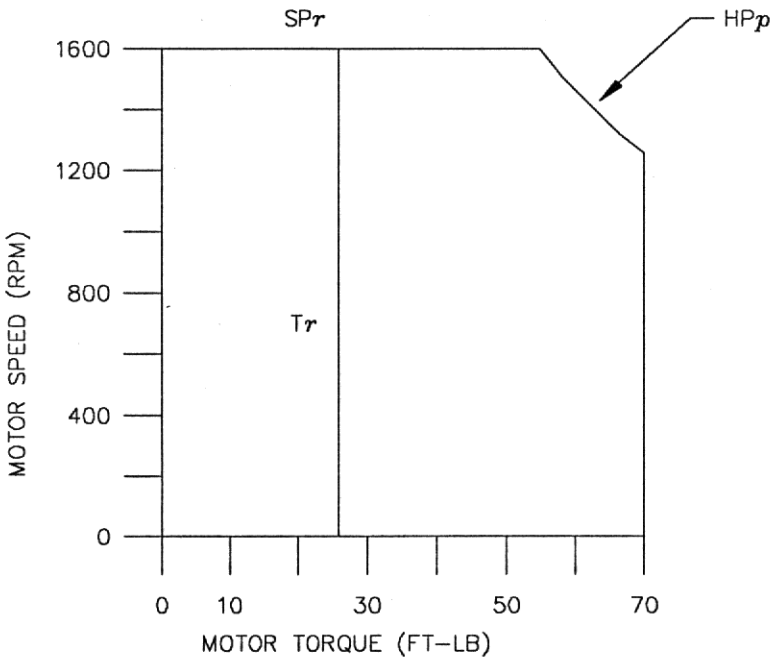
MDPAKY-XXXXX

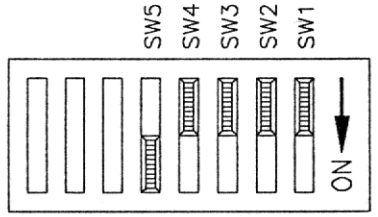
- XXXXX — INPUT POWER WATTS
- Y — TYPE NUMBER OF MOTOR DRIVE PACKAGE, INTENDED FOR USE WITH CORRESPONDING TYPE OF POWER SUPPLY PACKAGE

INDUSTRIAL INDEXING SYSTEMS, INC.

TOLERANCES (EXCEPT AS NOTED) .XX ±.010 .XXX ±.005 ANGULAR ±30'	DRAWN BY: JTE	DATE: 10/25/89
	APPROVED:	DATE:
	SCALE: NONE	TITLE: MOTOR DRIVE PACKAGE
	SHEET NO.: 1 OF 1	DRAWING NO.: MDPAK4-5700

DATE	SYM	REVISION RECORD	DRN	CHK





MOTOR SETUP: BLM-1007-B

MOTOR DRIVE SPECIFICATIONS

RATED TORQUE	Tr	25.9	FT-LB
PEAK TORQUE	Tp	69.8	FT-LB
RATED SPEED	SPr	1600	RPM
PEAK HORSEPOWER	HPp	16.7	HP
ROTOR INERTIA	Jm	.007	FT-LB-SEC^2
INPUT POWER	W	5900	WATT

LIST OF MATERIALS

DESCRIPTION	PART NUMBER	QTY
MOTOR ASSEMBLY	BLM-1007-B	1
DRIVE	BSD-300/40	1
MANUAL	IB-14B004	1

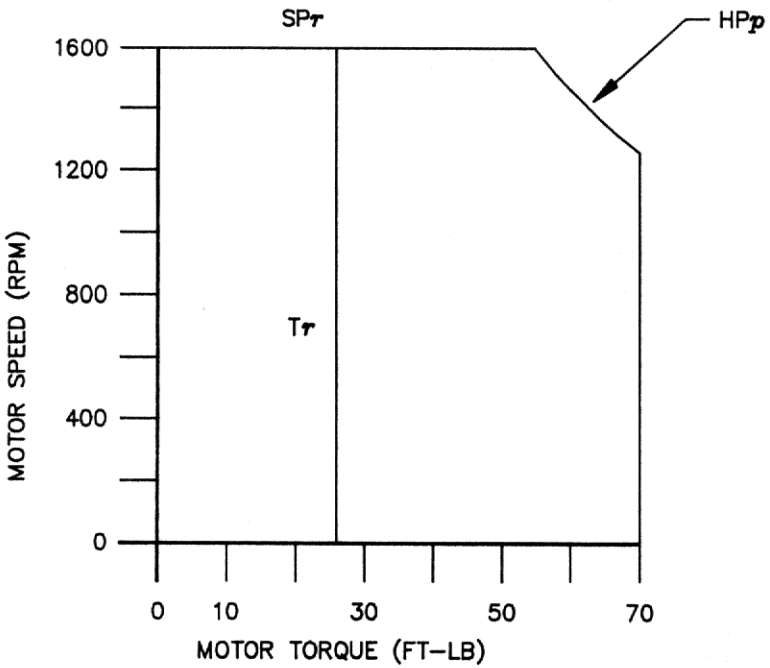
MDPAKY-XXXXX

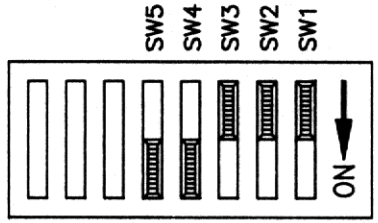
- INPUT POWER WATTS
- TYPE NUMBER OF MOTOR DRIVE PACKAGE, INTENDED FOR USE WITH CORRESPONDING TYPE OF POWER SUPPLY PACKAGE

INDUSTRIAL INDEXING SYSTEMS, INC.

TOLERANCES (EXCEPT AS NOTED) .XX ±.010 .XXX ±.005 ANGULAR ±30'	DRAWN BY: JTE	DATE: 10/25/89
	APPROVED:	DATE:
	SCALE: NONE	TITLE: MOTOR DRIVE PACKAGE
	SHEET NO.: 1 OF 1	DRAWING NO.: MDPAK4-5900

DATE	SYM	REVISION RECORD	DRN	CHK	CHK





MOTOR SETUP: BLM-1007-B (M)

MOTOR DRIVE SPECIFICATIONS

RATED TORQUE	Tr	25.9	FT-LB
PEAK TORQUE	Tp	69.8	FT-LB
RATED SPEED	SPr	1600	RPM
PEAK HORSEPOWER	HPp	16.7	HP
ROTOR INERTIA	Jm	.007	FT-LB-SEC^2
INPUT POWER	W	5900	WATT

LIST OF MATERIALS

DESCRIPTION	PART NUMBER	QTY
MOTOR ASSEMBLY	BLM-1007-B	1
DRIVE	BSD-300/40	1
MANUAL	IB-14B004	1

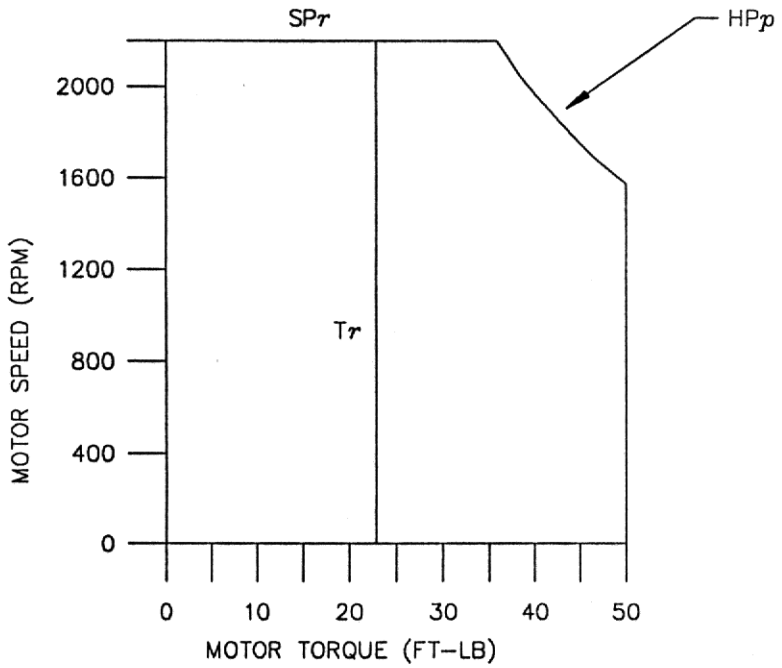
MDPAKY-XXXXX

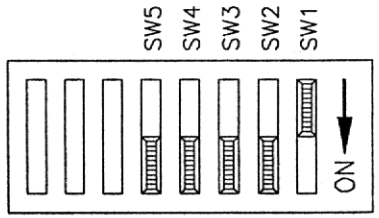
- XXXXX: INPUT POWER WATTS
- Y: TYPE NUMBER OF MOTOR DRIVE PACKAGE, INTENDED FOR USE WITH CORRESPONDING TYPE OF POWER SUPPLY PACKAGE

INDUSTRIAL INDEXING SYSTEMS, INC.

TOLERANCES (EXCEPT AS NOTED) .XX ±.010 .XXX ±.005 ANGULAR ±30'	DRAWN BY: MFE	DATE: 8/29/90
	APPROVED: JTF	DATE:
	SCALE: NONE	TITLE: MOTOR DRIVE PACKAGE
	SHEET NO.: 1 OF 1	DRAWING NO.: MDPAK4-5900A

DATE	SYM	REVISION RECORD	DRN	CHK





MOTOR SETUP: BLM-1017

MOTOR DRIVE SPECIFICATIONS

RATED TORQUE	Tr	22.9	FT-LB
PEAK TORQUE	Tp	50	FT-LB
RATED SPEED	SPr	2200	RPM
PEAK HORSEPOWER	HPp	15.0	HP
ROTOR INERTIA	Jm	.00685	FT-LB-SEC^2
INPUT POWER	W	7000	WATT

LIST OF MATERIALS

DESCRIPTION	PART NUMBER	QTY
MOTOR ASSEMBLY	BLM-1017	1
DRIVE	BSD-300/40	1
MANUAL	IB-14B004	1

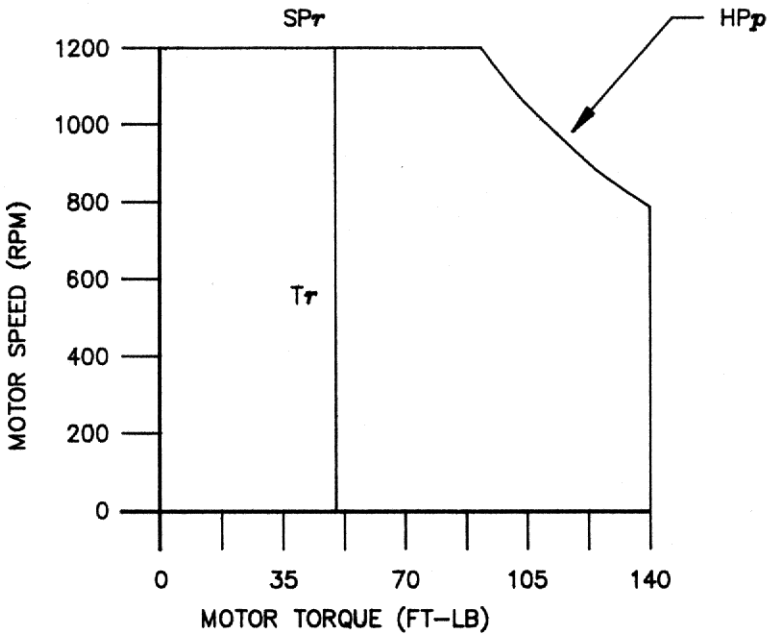
MDPAKY-XXXXX

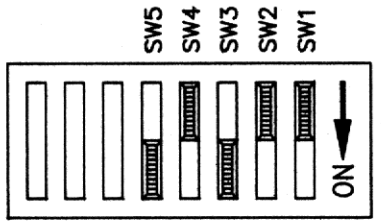
- XXXXX — INPUT POWER WATTS
- Y — TYPE NUMBER OF MOTOR DRIVE PACKAGE, INTENDED FOR USE WITH CORRESPONDING TYPE OF POWER SUPPLY PACKAGE

INDUSTRIAL INDEXING SYSTEMS, INC.

TOLERANCES (EXCEPT AS NOTED) .XX ±.010 .XXX ±.005 ANGULAR ±30'	DRAWN BY: JTE	DATE: 10/25/89
	APPROVED:	DATE:
	SCALE: NONE	TITLE: MOTOR DRIVE PACKAGE
	SHEET NO.: 1 OF 1	DRAWING NO.: MDPAK4-7000

DATE	SYM	REVISION RECORD	DRN	CHK
9/90	A	ECN 90-0172	MFE	JTF





MOTOR SETUP: BLM-1009-B

MOTOR DRIVE SPECIFICATIONS

RATED TORQUE	Tr	50.0	FT-LB
PEAK TORQUE	Tp	140.0	FT-LB
RATED SPEED	SPr	1200	RPM
PEAK HORSEPOWER	HPp	21.0	HP
ROTOR INERTIA	Jm	.0253	FT-LB-SEC^2
INPUT POWER	W	8500	WATT

LIST OF MATERIALS

DESCRIPTION	PART NUMBER	QTY
MOTOR ASSEMBLY	BLM-1009-B	1
DRIVE	BSD-300/55	1
MANUAL	IB-14B004	1

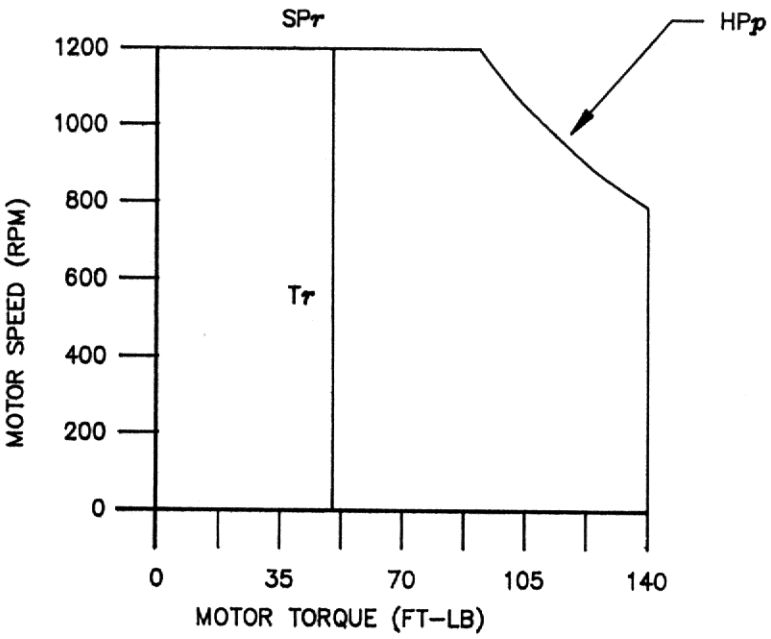
MDPAKY-XXXXX

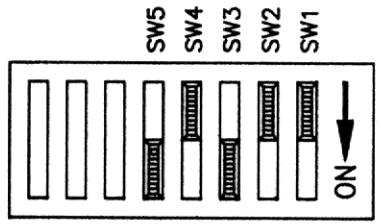
- XXXXX: INPUT POWER WATTS
- Y: TYPE NUMBER OF MOTOR DRIVE PACKAGE, INTENDED FOR USE WITH CORRESPONDING TYPE OF POWER SUPPLY PACKAGE

INDUSTRIAL INDEXING SYSTEMS, INC.

TOLERANCES (EXCEPT AS NOTED) .XX ±.010 .XXX ±.005 ANGULAR ±30'	DRAWN BY: JTE	DATE: 10/25/89
	APPROVED:	DATE:
	SCALE: NONE	TITLE: MOTOR DRIVE PACKAGE
	SHEET NO.: 1 OF 1	DRAWING NO.: MDPAK4-8500

DATE	SYM	REVISION RECORD	DRN	CHK
9-90	A	ECN-90-0172	MFE	JTE





MOTOR SETUP: BLM-1009-B

MOTOR DRIVE SPECIFICATIONS

RATED TORQUE	Tr	50.0	FT-LB
PEAK TORQUE	Tp	140.0	FT-LB
RATED SPEED	SPr	1200	RPM
PEAK HORSEPOWER	HPp	21.0	HP
ROTOR INERTIA	Jm	.0253	FT-LB-SEC^2
INPUT POWER	W	8500	WATT

LIST OF MATERIALS

DESCRIPTION	PART NUMBER	QTY
MOTOR ASSEMBLY	BLM-1009-B	1
DRIVE	BSD-300/55A	1
MANUAL	IB-14B004	1

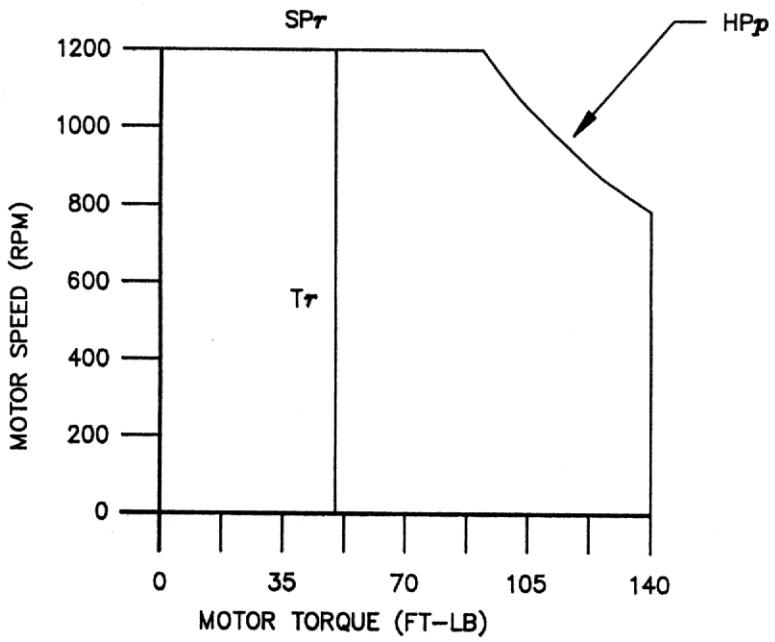
MDPAKY-XXXXX

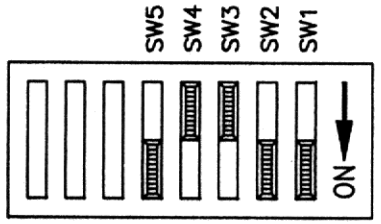
- XXXXX: INPUT POWER WATTS
- Y: TYPE NUMBER OF MOTOR DRIVE PACKAGE, INTENDED FOR USE WITH CORRESPONDING TYPE OF POWER SUPPLY PACKAGE

INDUSTRIAL INDEXING SYSTEMS, INC.

TOLERANCES (EXCEPT AS NOTED) .XX ±.010 .XXX ±.005 ANGULAR ±30'	DRAWN BY: JTE	DATE: 10/25/89
	APPROVED: JTE	DATE:
	SCALE: NONE	TITLE: MOTOR DRIVE PACKAGE
	SHEET NO.: 1 OF 1	DRAWING NO.: MDPAK4-8501

DATE	SYM	REVISION RECORD	DRN	CHK	CHK





MOTOR SETUP: BLM-1009-B(W)

MOTOR DRIVE SPECIFICATIONS

RATED TORQUE	Tr	50.0	FT-LB
PEAK TORQUE	Tp	140.0	FT-LB
RATED SPEED	SPr	1200	RPM
PEAK HORSEPOWER	HPp	21.0	HP
ROTOR INERTIA	Jm	.0253	FT-LB-SEC^2
INPUT POWER	W	8500	WATT

LIST OF MATERIALS

DESCRIPTION	PART NUMBER	QTY
MOTOR ASSEMBLY	BLM-1009-B	1
DRIVE	BSD-300/55	1
MANUAL	IB-14B004	1

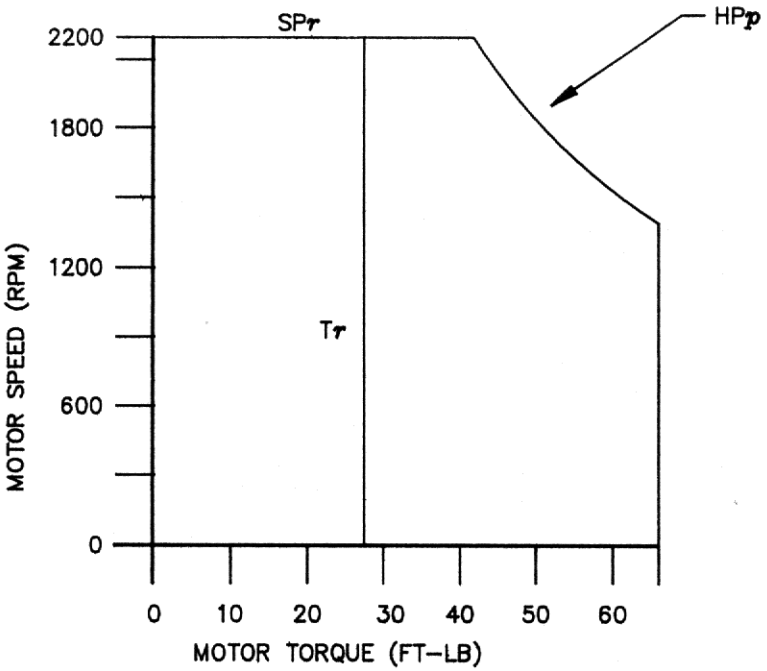
MDPAKY-XXXXX

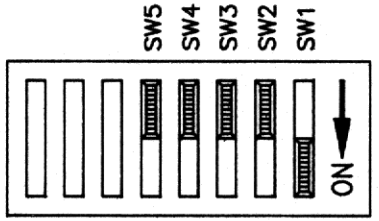
- XXXXX — INPUT POWER WATTS
- Y — TYPE NUMBER OF MOTOR DRIVE PACKAGE, INTENDED FOR USE WITH CORRESPONDING TYPE OF POWER SUPPLY PACKAGE

INDUSTRIAL INDEXING SYSTEMS, INC.

TOLERANCES (EXCEPT AS NOTED) .XX ±.010 .XXX ±.005 ANGULAR ±30'	DRAWN BY: MFE	DATE: 8/29/90
	APPROVED: JTF	DATE:
	SCALE: NONE	TITLE: MOTOR DRIVE PACKAGE
	SHEET NO.: 1 OF 1	DRAWING NO.: MDPAK4-8500A

DATE	SYM	REVISION RECORD	DRN	CHK	CHK
9/90	A	ECN 90-0172	MFE	[illegible]	JTF





MOTOR SETUP: BLM-1018

MOTOR DRIVE SPECIFICATIONS

RATED TORQUE	Tr	27.5	FT-LB
PEAK TORQUE	Tp	66.0	FT-LB
RATED SPEED	SPr	2200	RPM
PEAK HORSEPOWER	HPp	17.5	HP
ROTOR INERTIA	Jm	.002	FT-LB-SEC^2
INPUT POWER	W	8600	WATT

LIST OF MATERIALS

DESCRIPTION	PART NUMBER	QTY
MOTOR ASSEMBLY	BLM-1018	1
DRIVE	BSD-300/40	1
MANUAL	IB-14B004	1

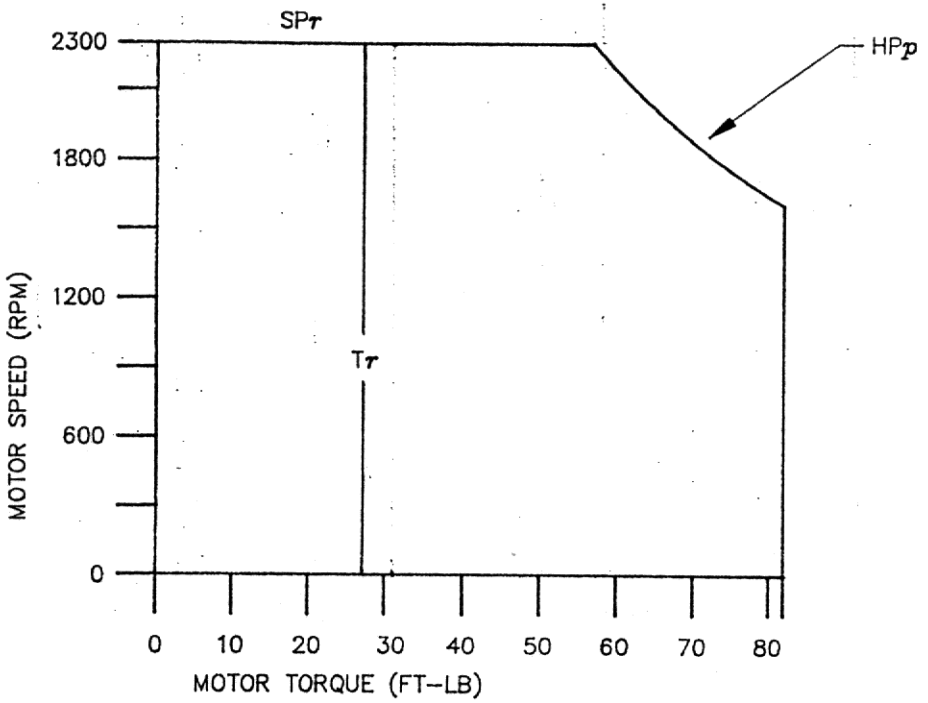
MDPAKY-XXXXX

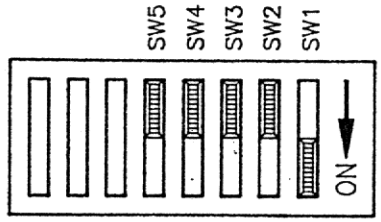
- XXXXX: INPUT POWER WATTS
- Y: TYPE NUMBER OF MOTOR DRIVE PACKAGE, INTENDED FOR USE WITH CORRESPONDING TYPE OF POWER SUPPLY PACKAGE

INDUSTRIAL INDEXING SYSTEMS, INC.

TOLERANCES (EXCEPT AS NOTED) .XX ±.010 .XXX ±.005 ANGULAR ±30'	DRAWN BY: JTE	DATE: 10/25/89
	APPROVED: [signature]	DATE:
	SCALE: NONE	TITLE: MOTOR DRIVE PACKAGE
	SHEET NO.: 1 OF 1	DRAWING NO.: MDPAK4-8600

DATE	SYM	REVISION RECORD	DRN	DRN	CHK
9-90	A	ECN-90-0172	MFE	JC	JTF
12/91	B	ECN-91-0163	MFE	CB	





MOTOR SETUP: BLM-1018

MOTOR DRIVE SPECIFICATIONS

RATED TORQUE	Tr	27.5	FT-LB
PEAK TORQUE	Tp	82.0	FT-LB
RATED SPEED	SPr	2200	RPM
PEAK HORSEPOWER	HPp	23.0	HP
ROTOR INERTIA	Jm	.002	FT-LB-SEC^2
INPUT POWER	W	8600	WATT

LIST OF MATERIALS

DESCRIPTION	PART NUMBER	QTY
MOTOR ASSEMBLY	BLM-1018	1
DRIVE	BSD-300/55	1
MANUAL	IB-14B004	1

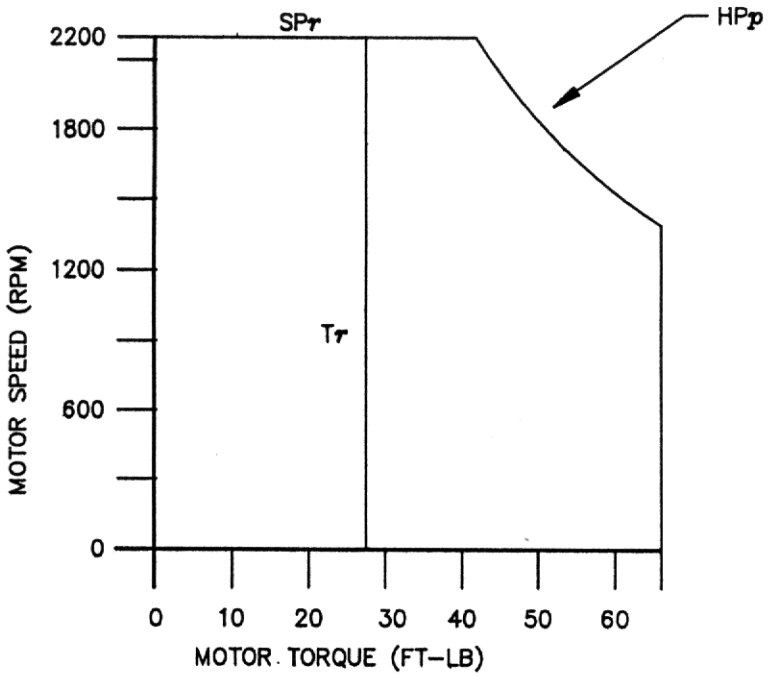
MDPAKY-XXXXX

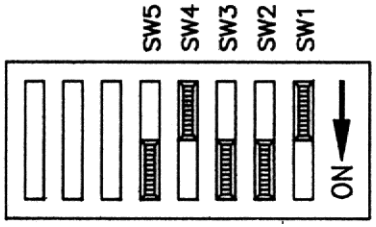
- XXXXX: INPUT POWER WATTS
- Y: TYPE NUMBER OF MOTOR DRIVE PACKAGE, INTENDED FOR USE WITH CORRESPONDING TYPE OF POWER SUPPLY PACKAGE

INDUSTRIAL INDEXING SYSTEMS, INC.

TOLERANCES (EXCEPT AS NOTED) .XX ±.010 .XXX ±.005 ANGULAR ±30'	DRAWN BY: JTE	DATE: 10/25/89
	APPROVED:	DATE:
	SCALE: NONE	TITLE: MOTOR DRIVE PACKAGE
	SHEET NO.: 1 OF 1	DRAWING NO.: MDPAK4-8601

DATE	SYM	REVISION RECORD	DRN	CHK.	CHK





MOTOR SETUP: BLM-1018 (A)

MOTOR DRIVE SPECIFICATIONS

RATED TORQUE	Tr	27.5	FT-LB
PEAK TORQUE	Tp	66.0	FT-LB
RATED SPEED	SPr	2200	RPM
PEAK HORSEPOWER	HPp	17.5	HP
ROTOR INERTIA	Jm	.002	FT-LB-SEC^2
INPUT POWER	W	8600	WATT

LIST OF MATERIALS

DESCRIPTION	PART NUMBER	QTY
MOTOR ASSEMBLY	BLM-1018 (A)	1
DRIVE	BSD-300/40	1
MANUAL	IB-14B004	1

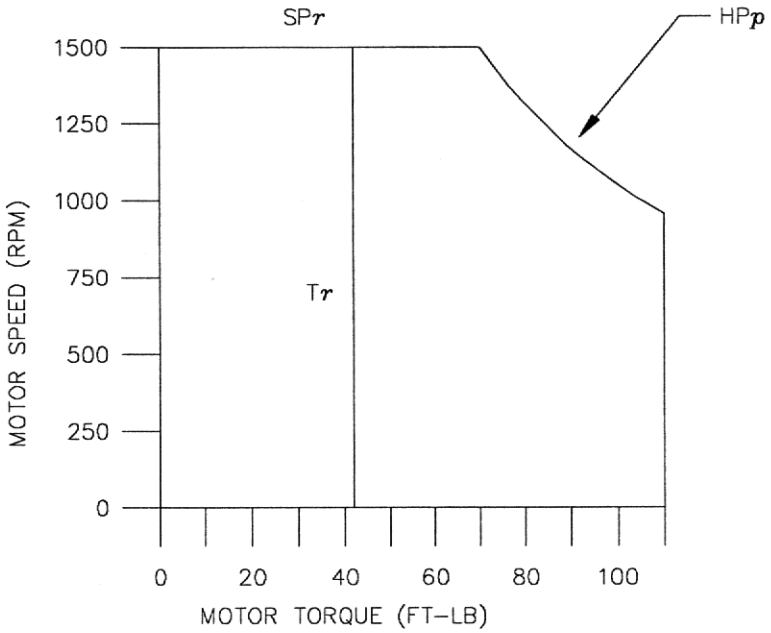
MDPAKY-XXXXX

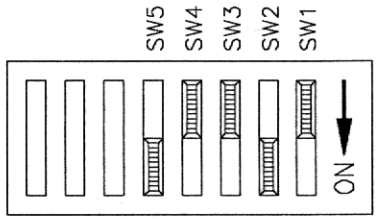
- XXXXX — INPUT POWER WATTS
- Y — TYPE NUMBER OF MOTOR DRIVE PACKAGE, INTENDED FOR USE WITH CORRESPONDING TYPE OF POWER SUPPLY PACKAGE

INDUSTRIAL INDEXING SYSTEMS, INC.

TOLERANCES (EXCEPT AS NOTED) .XX ±.010 .XXX ±.005 ANGULAR ±30'	DRAWN BY: JTE	DATE: 10/25/89
	APPROVED: JTF	DATE:
	SCALE: NONE	TITLE: MOTOR DRIVE PACKAGE
	SHEET NO.: 1 OF 1	DRAWING NO.: MDPAK4-8600A

DATE	SYM	REVISION RECORD	DRN	CHK





MOTOR SETUP: BLM-1008-B

MOTOR DRIVE SPECIFICATIONS

RATED TORQUE	Tr	42.0	FT-LB
PEAK TORQUE	Tp	110.0	FT-LB
RATED SPEED	SPr	1500	RPM
PEAK HORSEPOWER	HPp	20.0	HP
ROTOR INERTIA	Jm	.019	FT-LB-SEC^2
INPUT POWER	W	8900	WATT

LIST OF MATERIALS

DESCRIPTION	PART NUMBER	QTY
MOTOR ASSEMBLY	BLM-1008-B	1
DRIVE	BSD-300/40	1
MANUAL	IB-14B004	1

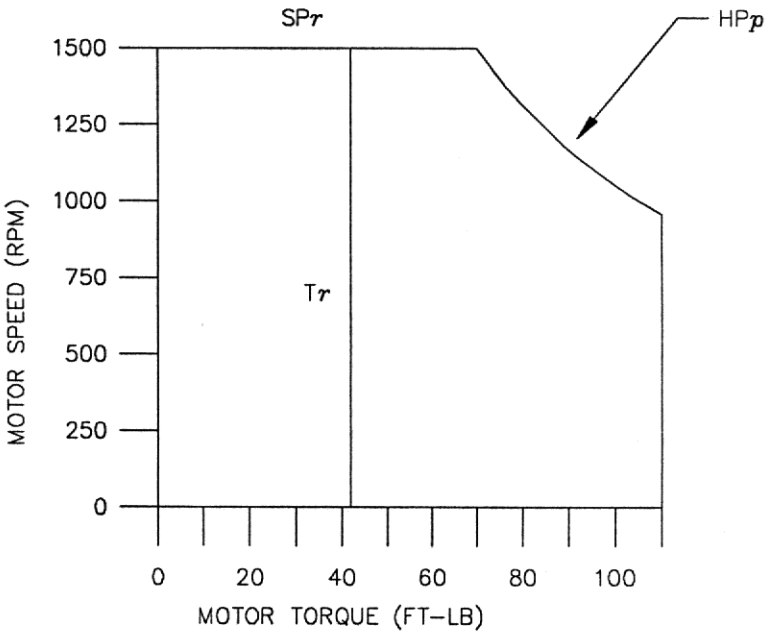
MDPAKY-XXXXX

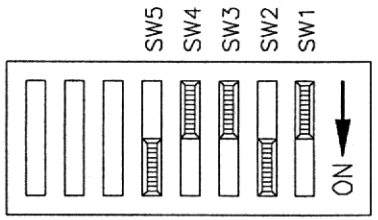
- XXXXX: INPUT POWER WATTS
- Y: TYPE NUMBER OF MOTOR DRIVE PACKAGE, INTENDED FOR USE WITH CORRESPONDING TYPE OF POWER SUPPLY PACKAGE

INDUSTRIAL INDEXING SYSTEMS, INC.

TOLERANCES (EXCEPT AS NOTED) .XX ±.010 .XXX ±.005 ANGULAR ±30'	DRAWN BY: JTE	DATE: 10/25/89
	APPROVED:	DATE:
	SCALE: NONE	TITLE: MOTOR DRIVE PACKAGE
	SHEET NO.: 1 OF 1	DRAWING NO.: MDPAK4-8900

DATE	SYM	REVISION RECORD	DRN	CHK





MOTOR SETUP: BLM-1008-B

MOTOR DRIVE SPECIFICATIONS

RATED TORQUE	Tr	42.0	FT-LB
PEAK TORQUE	Tp	110.0	FT-LB
RATED SPEED	SPr	1500	RPM
PEAK HORSEPOWER	HPp	20.0	HP
ROTOR INERTIA	Jm	.019	FT-LB-SEC^2
INPUT POWER	W	8900	WATT

LIST OF MATERIALS

DESCRIPTION	PART NUMBER	QTY
MOTOR ASSEMBLY	BLM-1008-B	1
DRIVE	BSD-300/40A	1
MANUAL	IB-14B004	1

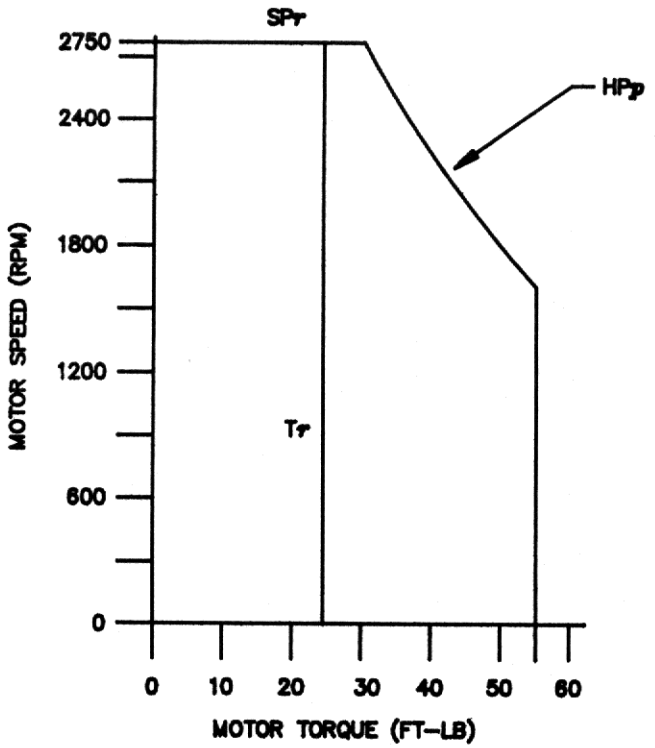
MDPAKY-XXXXX

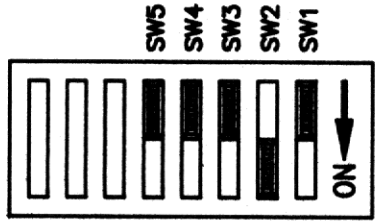
- INPUT POWER WATTS
- TYPE NUMBER OF MOTOR DRIVE PACKAGE, INTENDED FOR USE WITH CORRESPONDING TYPE OF POWER SUPPLY PACKAGE

INDUSTRIAL INDEXING SYSTEMS, INC.

TOLERANCES (EXCEPT AS NOTED) .XX ±.010 .XXX ±.005 ANGULAR ±30'	DRAWN BY: JTE	DATE: 10/25/89
	APPROVED:	DATE:
	SCALE: NONE	TITLE: MOTOR DRIVE PACKAGE
	SHEET NO.: 1 OF 1	DRAWING NO.: MDPAK4-8901

DATE	SYM	REVISION RECORD	DRN	CHK





MOTOR SETUP: BLM-1019

MOTOR DRIVE SPECIFICATIONS

RATED TORQUE	Tr	24.20	FT-LB
PEAK TORQUE	Tp	55.0	FT-LB
RATED SPEED	SPr	2750	RPM
PEAK HORSEPOWER	HPp	18.2	HP
ROTOR INERTIA	Jm	.002	FT-LB-SEC^2
INPUT POWER	W	9400	WATT

LIST OF MATERIALS		
DESCRIPTION	PART NUMBER	QTY
MOTOR ASSEMBLY	BLM-1019	1
DRIVE	BSD-300/40	1
MANUAL	IB-14B004	1

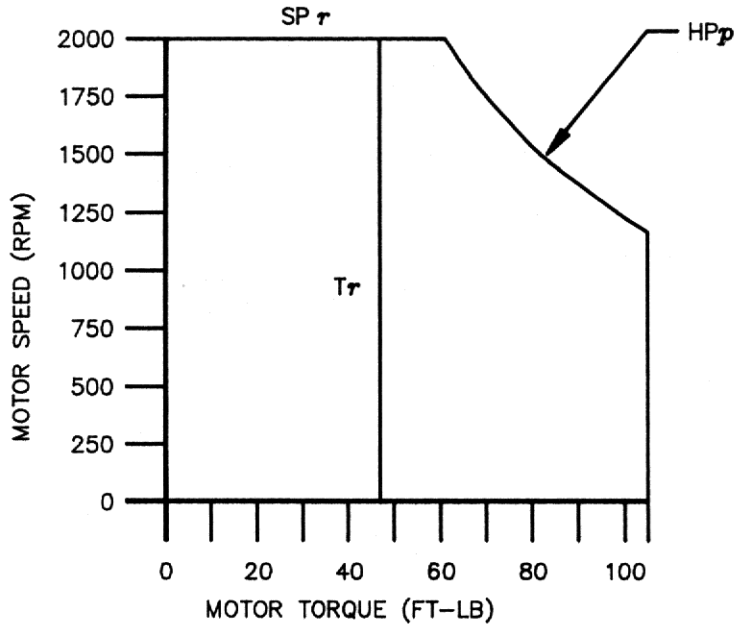
MDPAKY-XXXXX

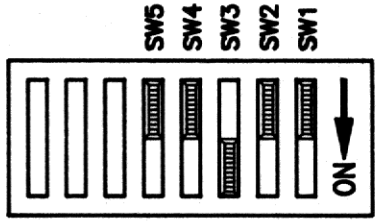
- INPUT POWER WATTS
- TYPE NUMBER OF MOTOR DRIVE PACKAGE, INTENDED FOR USE WITH CORRESPONDING TYPE OF POWER SUPPLY PACKAGE

INDUSTRIAL INDEXING SYSTEMS, INC.

TOLERANCES (EXCEPT AS NOTED) .XX ±.010 .XXX ±.005 ANGULAR ±30'	DRAWN BY: MFE	DATE: 8/29/90
	APPROVED: JTF	DATE:
	SCALE: NONE	TITLE: MOTOR DRIVE PACKAGE
	SHEET NO.: 1 OF 1	DRAWING NO.: MDPAK4-9400

DATE	SYM	REVISION RECORD	DRN	CHK





MOTOR SETUP: BLM-1020

MOTOR DRIVE SPECIFICATIONS

RATED TORQUE	Tr	47.0	FT-LB
PEAK TORQUE	Tp	105.0	FT-LB
RATED SPEED	SPr	2000	RPM
PEAK HORSEPOWER	HPp	23.3	HP
ROTOR INERTIA	Jm	.0076	FT-LB-SEC^2
INPUT POWER	W	13300	WATT

LIST OF MATERIALS

DESCRIPTION	PART NUMBER	QTY
MOTOR ASSEMBLY	BLM-1020	1
DRIVE	BSD-300/55	1
MANUAL	IB-14B004	1

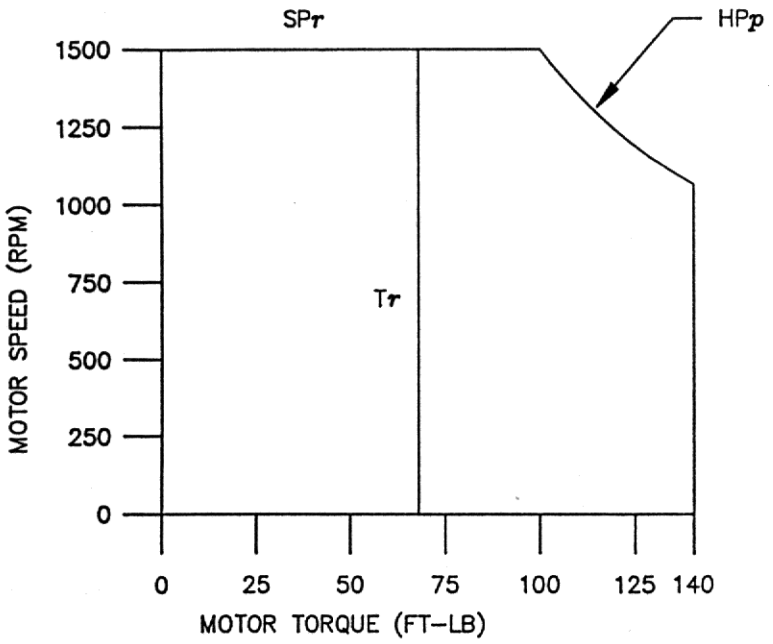
MDPAKY-XXXXX

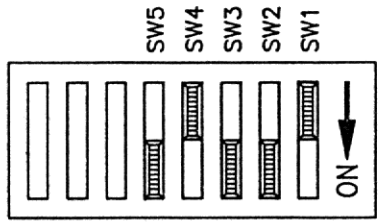
- XXXXX: INPUT POWER WATTS
- Y: TYPE NUMBER OF MOTOR DRIVE PACKAGE, INTENDED FOR USE WITH CORRESPONDING TYPE OF POWER SUPPLY PACKAGE

INDUSTRIAL INDEXING SYSTEMS, INC.

TOLERANCES (EXCEPT AS NOTED) .XX ±.010 .XXX ±.005 ANGULAR ±30'	DRAWN BY: JTE/DAD	DATE: 04JAN91
	APPROVED: EB/ JTF	DATE: 1/5/91
	SCALE: NONE	TITLE: MOTOR DRIVE PACKAGE
	SHEET NO.: 1 OF 1	DRAWING NO.: MDPAK4-13300

DATE	SYM	REVISION RECORD	DRN	CHK





MOTOR SETUP: BLM-1031

MOTOR DRIVE SPECIFICATIONS

RATED TORQUE	Tr	68	FT-LB
PEAK TORQUE	Tp	140.0	FT-LB
RATED SPEED	SPr	1500	RPM
PEAK HORSEPOWER	HPp	28.5	HP
ROTOR INERTIA	Jm	0.0093	FT-LB-SEC^2
INPUT POWER	W	15000	WATT

LIST OF MATERIALS

DESCRIPTION	PART NUMBER	QTY
MOTOR ASSEMBLY	BLM-1031	1
DRIVE	BSD-300/55	1
MANUAL	IB-14B004	1

MDPAKY-XXXXX

- XXXXX: INPUT POWER WATTS
- Y: TYPE NUMBER OF MOTOR DRIVE PACKAGE, INTENDED FOR USE WITH CORRESPONDING TYPE OF POWER SUPPLY PACKAGE

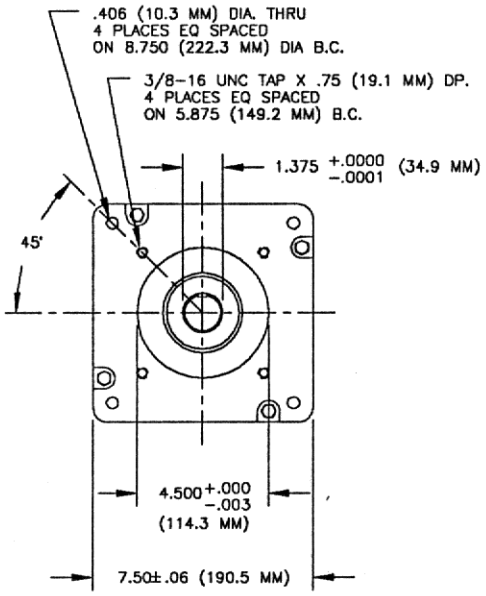
INDUSTRIAL INDEXING SYSTEMS, INC.

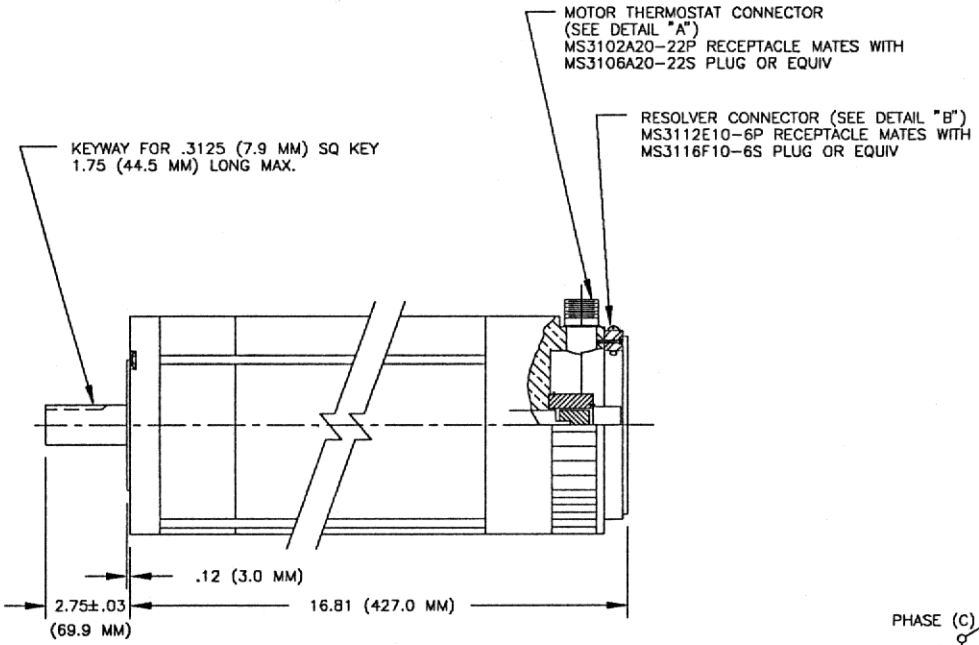
TOLERANCES (EXCEPT AS NOTED) .XX ±.010 .XXX ±.005 ANGULAR ±30'	DRAWN BY: JTE/DAD	DATE: 04/20/92
	APPROVED: EB	DATE:
	SCALE: NONE	TITLE: MOTOR DRIVE PACKAGE
	SHEET NO.: 1 OF 1	DRAWING NO.: MDPAK4-15000

APPENDIX D
MOTOR DIMENSIONS AND CONNECTIONS

DRAWING NUMBER	DESCRIPTION
IM-BLM-1008-B	Brushless Motor Assembly
IM-BLM-1009-B	Brushless Motor Assembly
IM-BLM-1013	Brushless Motor Assembly
IM-BLM-1014	Brushless Motor Assembly
IM-BLM-1015	Brushless Motor Assembly
IM-BLM-1016	Brushless Motor Assembly
IM-BLM-1017	Brushless Motor Assembly
IM-BLM-1018	Brushless Motor Assembly
IM-BLM-1019	Brushless Motor Assembly
IM-BLM-1020	Brushless Motor Assembly

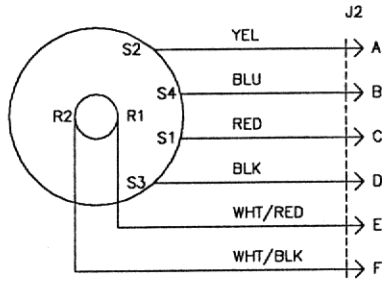
DATE	SYM	REVISION RECORD	DRN	CHK





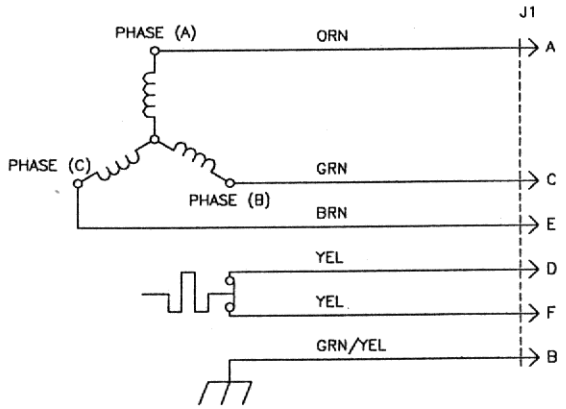
DETAIL "B"

RESOLVER CONNECTOR DIAGRAM



DETAIL "A"

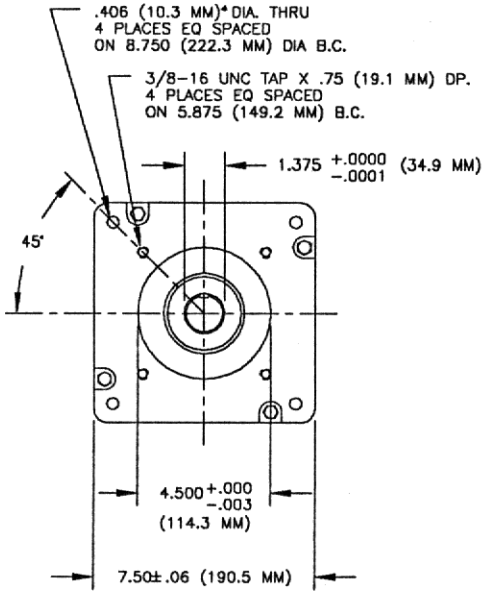
MOTOR/THERMOSTAT CONNECTOR DIAGRAM

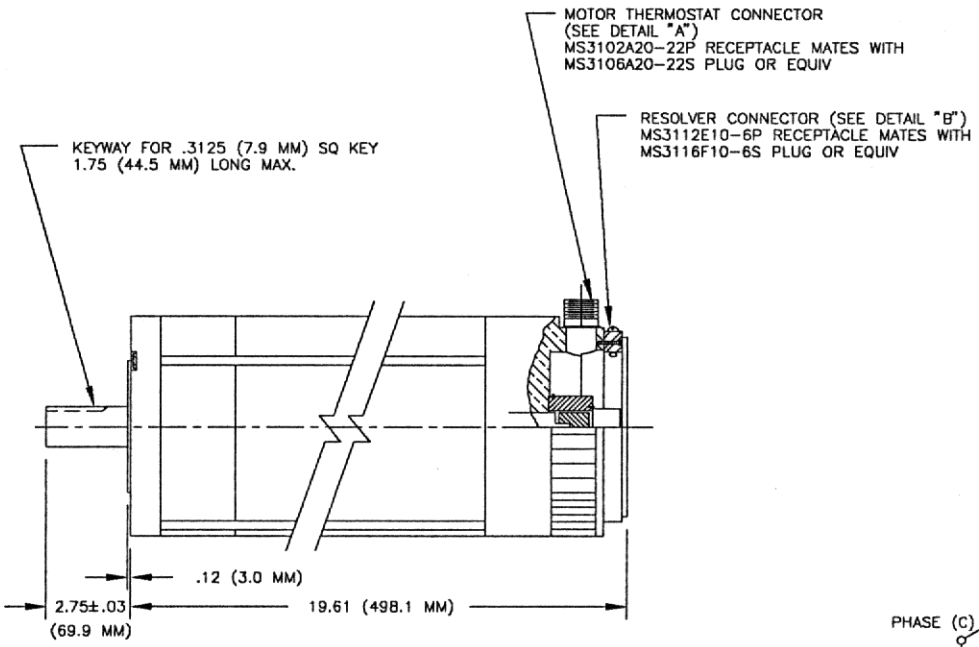


NOTES:
1. MOTOR WEIGHT = 110.0 LBS.

INDUSTRIAL INDEXING SYSTEMS, INC.			
TOLERANCES (EXCEPT AS NOTED)	DRAWN BY: JTE	DATE: 11/10/89	
.XX ±.010	APPROVED:	DATE:	
.XXX ±.005	SCALE: NONE	TITLE: MOTOR ASSEMBLY, BRUSHLESS	
ANGULAR ±30'	SHEET NO.: 1 OF 1	DRAWING NO.: BLM-1008-B	

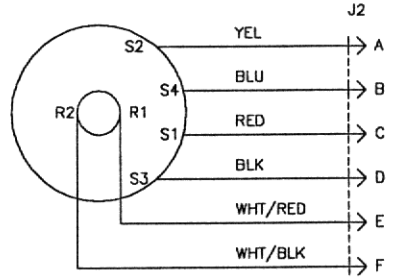
DATE	SYM	REVISION RECORD	DRN	CHK





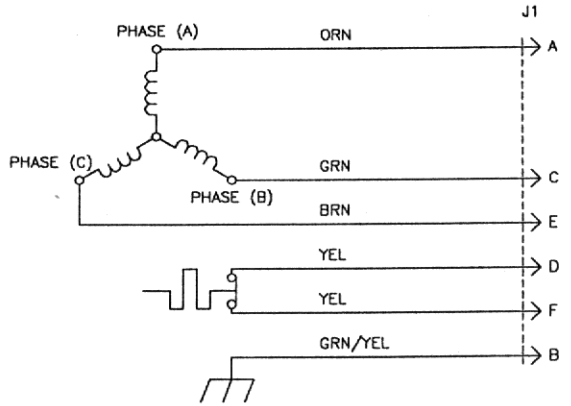
DETAIL "B"

RESOLVER CONNECTOR DIAGRAM



DETAIL "A"

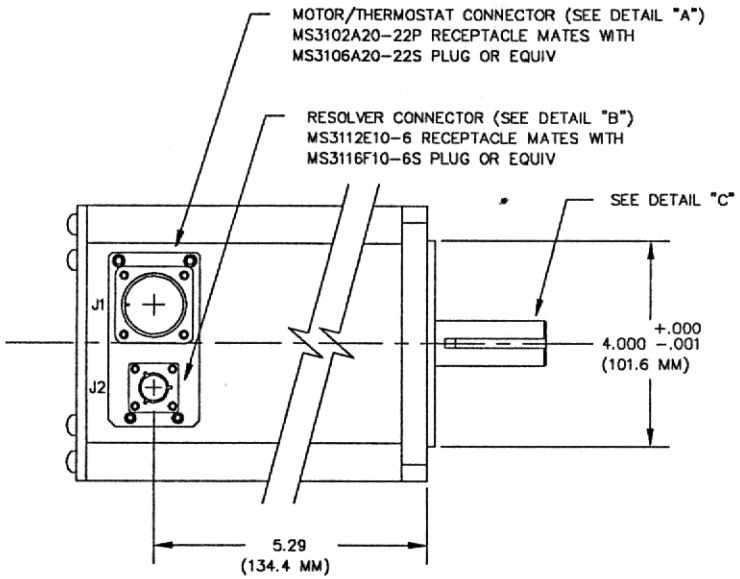
MOTOR/THERMOSTAT CONNECTOR DIAGRAM



NOTES:
1. MOTOR WEIGHT = 130.0 LBS.

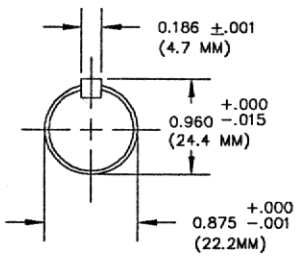
INDUSTRIAL INDEXING SYSTEMS, INC.			
TOLERANCES (EXCEPT AS NOTED)	DRAWN BY: JTE	DATE: 11/10/89	
.XX ±.010	APPROVED:	DATE:	
.XXX ±.005	SCALE: NONE	TITLE: MOTOR ASSEMBLY, BRUSHLESS	
ANGULAR ±30'	SHEET NO.: 1 OF 1	DRAWING NO.: BLM-1009-B	

DATE	SYM	REVISION RECORD	DRN	CHK



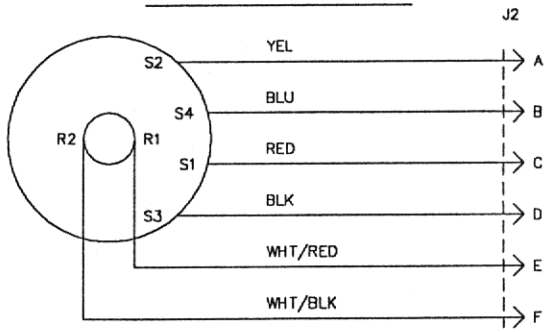
DETAIL "C"

MOTOR SHAFT DIMENSIONS



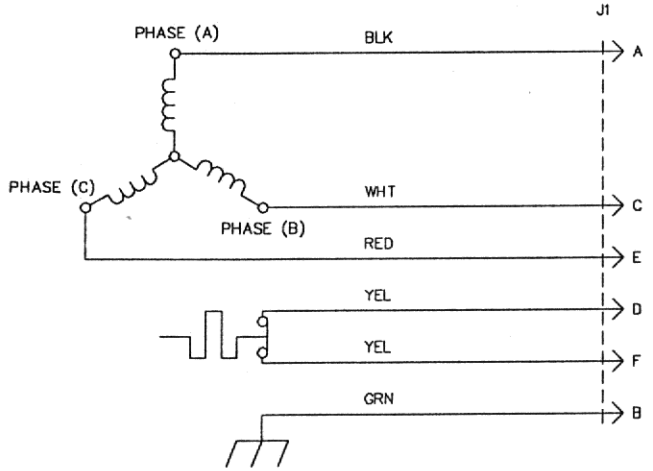
DETAIL "B"

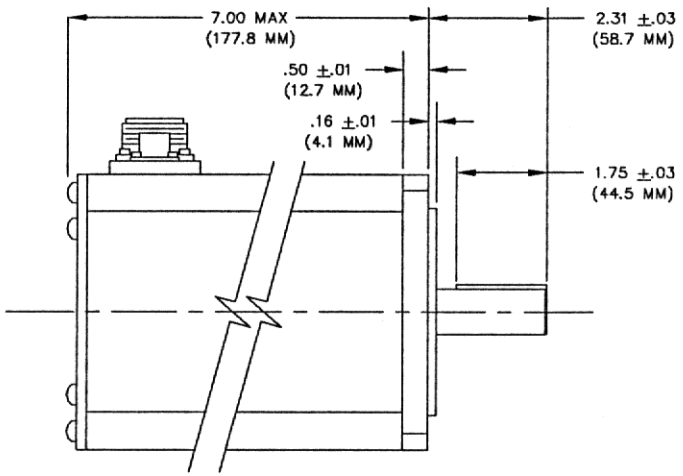
RESOLVER CONNECTOR DIAGRAM

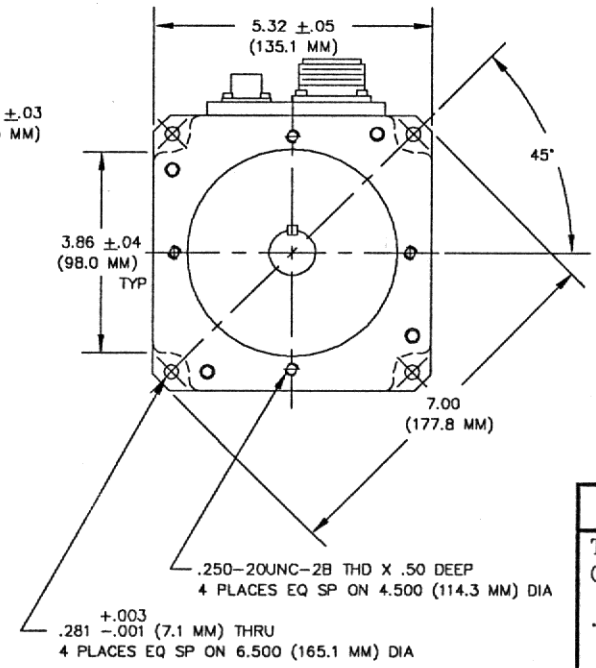


DETAIL "A"

MOTOR/THERMOSTAT CONNECTOR DIAGRAM



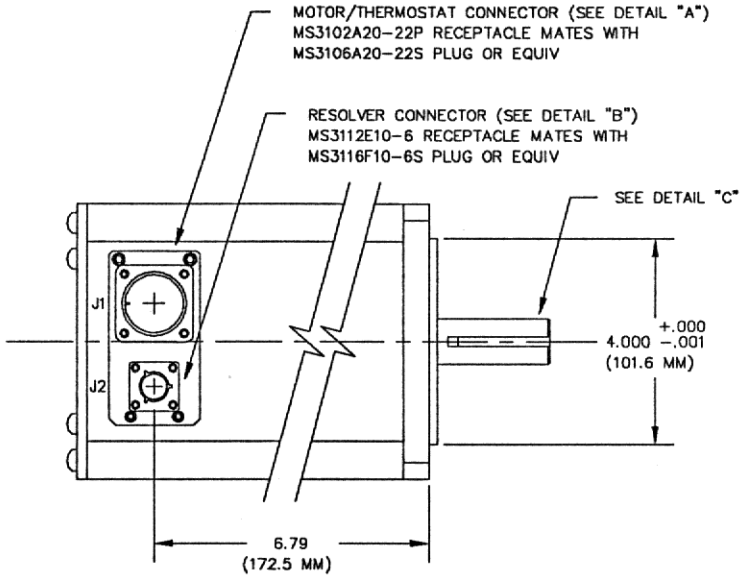




NOTES:
1. MOTOR WEIGHT = 18.2 LBS.

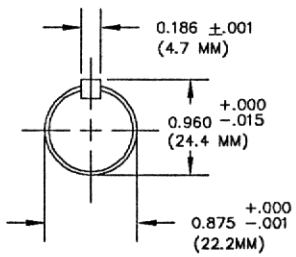
INDUSTRIAL INDEXING SYSTEMS, INC.			
TOLERANCES (EXCEPT AS NOTED)	DRAWN BY: JTE	DATE: 11/6/89	
	APPROVED:	DATE:	
.XX ±.010	SCALE: NONE	TITLE: MOTOR, BRUSHLESS	
.XXX ±.005			
ANGULAR ±30'	SHEET NO.: 1 OF 1	DRAWING NO.: BLM-1013	

DATE	SYM	REVISION RECORD	DRN	CHK



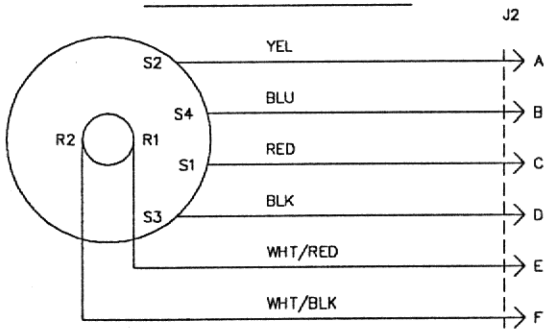
DETAIL "C"

MOTOR SHAFT DIMENSIONS



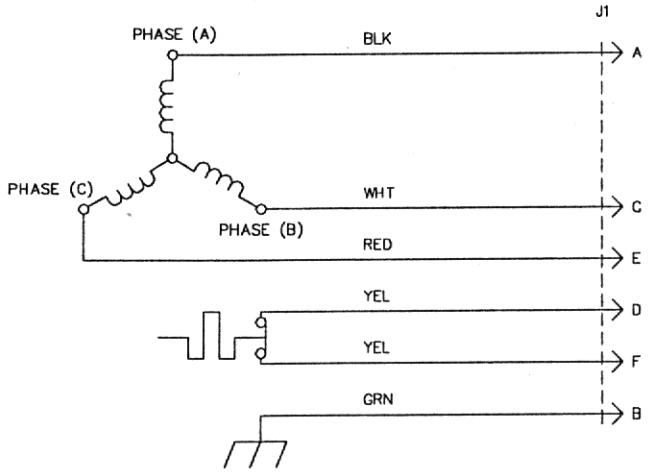
DETAIL "B"

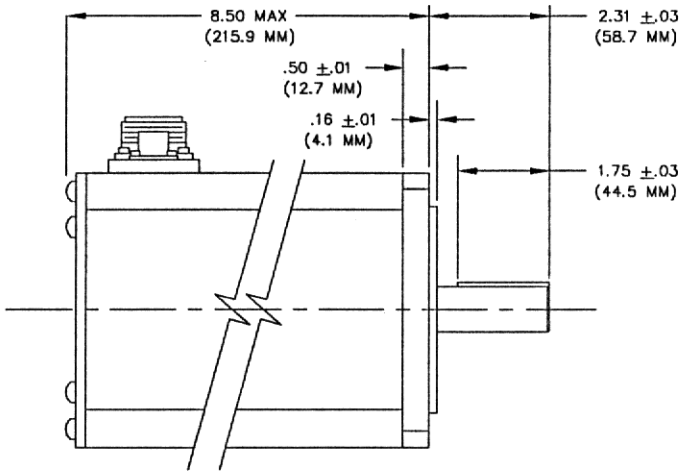
RESOLVER CONNECTOR DIAGRAM

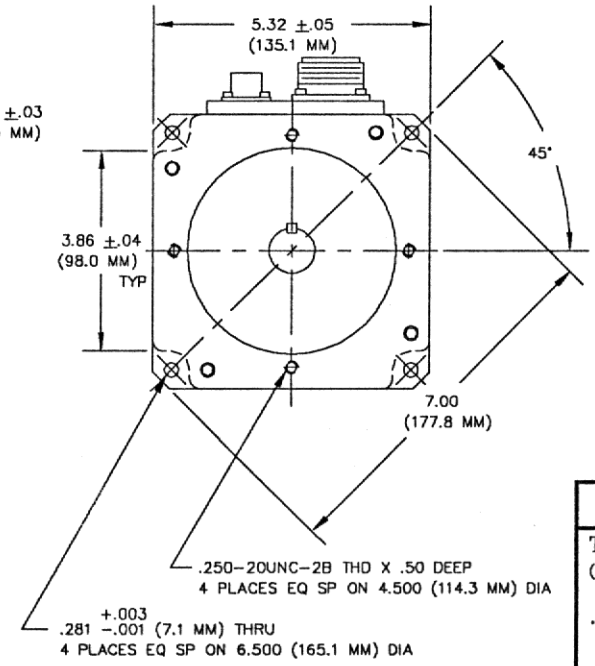


DETAIL "A"

MOTOR/THERMOSTAT CONNECTOR DIAGRAM



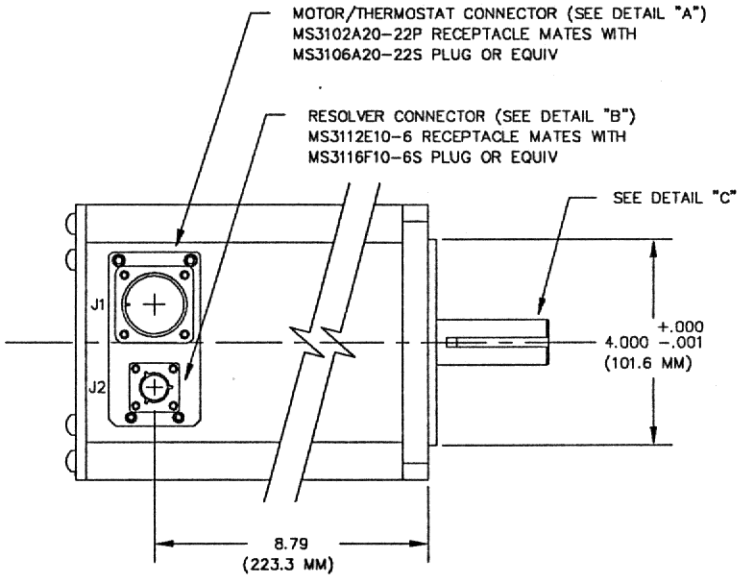




NOTES:
1. MOTOR WEIGHT = 25.3 LBS.

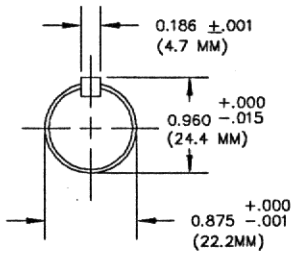
INDUSTRIAL INDEXING SYSTEMS, INC.			
TOLERANCES (EXCEPT AS NOTED)	DRAWN BY: JTE	DATE: 11/6/89	
	APPROVED:	DATE:	
.XX ±.010	SCALE: NONE	TITLE: MOTOR, BRUSHLESS	
.XXX ±.005	SHEET NO.: 1 OF 1	DRAWING NO.: BLM-1014	
ANGULAR ±30'			

DATE	SYM	REVISION RECORD	DRN	CHK



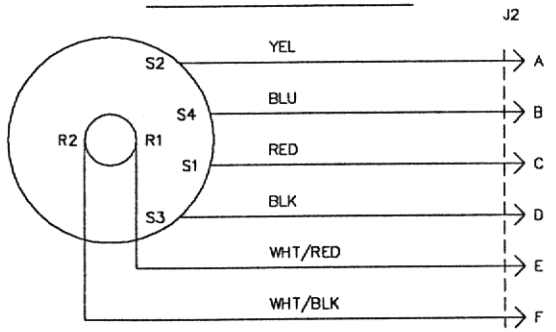
DETAIL "C"

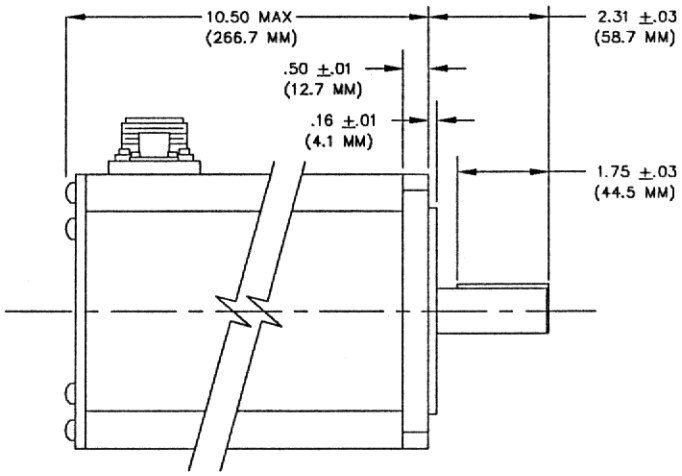
MOTOR SHAFT DIMENSIONS

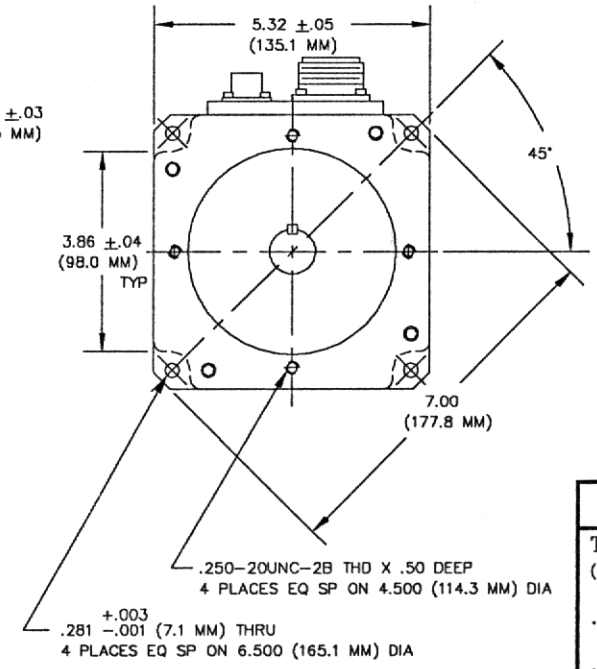


DETAIL "B"

RESOLVER CONNECTOR DIAGRAM

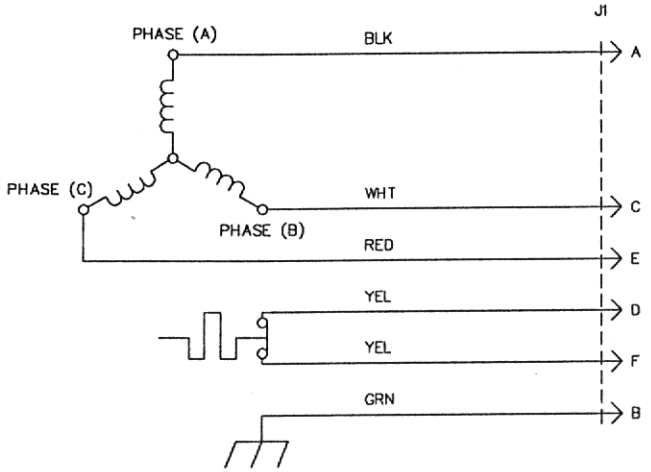






DETAIL "A"

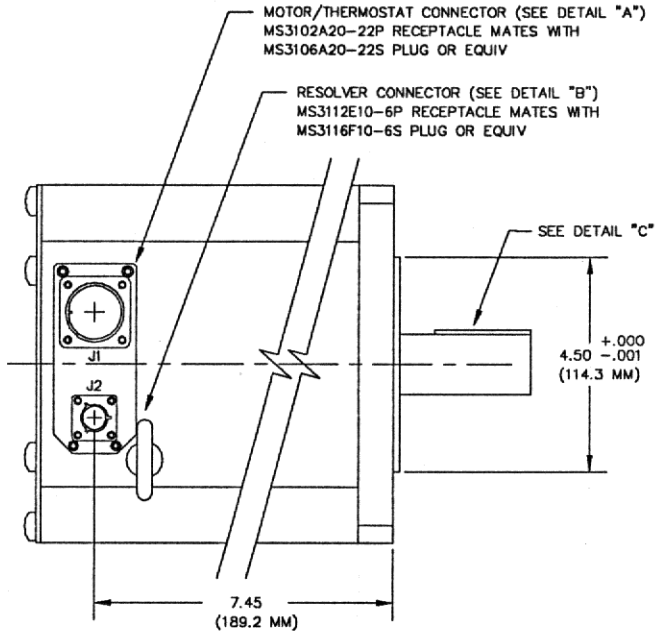
MOTOR/THERMOSTAT CONNECTOR DIAGRAM



NOTES:
1. MOTOR WEIGHT = 35.5 LBS.

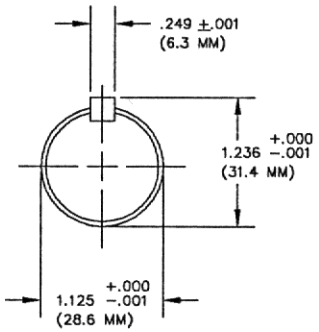
INDUSTRIAL INDEXING SYSTEMS, INC.			
TOLERANCES (EXCEPT AS NOTED)	DRAWN BY: JTE	DATE: 11/6/89	
	APPROVED:	DATE:	
.XX ±.010	SCALE: NONE	TITLE: MOTOR, BRUSHLESS	
.XXX ±.005	SHEET NO.: 1 OF 1	DRAWING NO.: BLM-1015	
ANGULAR ±30'			

DATE	SYM	REVISION RECORD	DRN	CHK



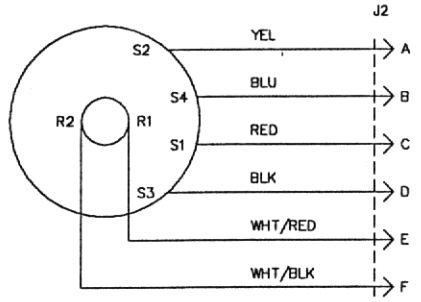
DETAIL "C"

MOTOR SHAFT DIMENSIONS



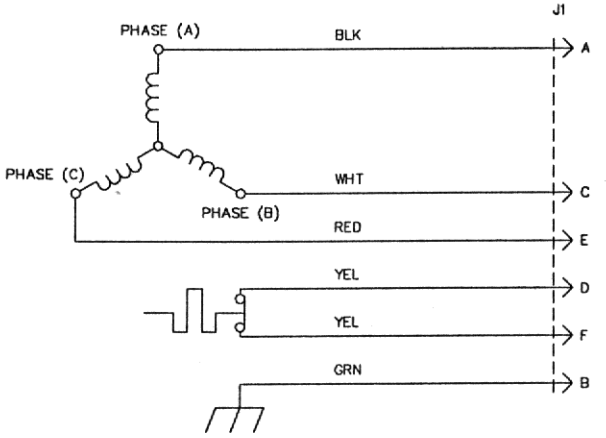
DETAIL "B"

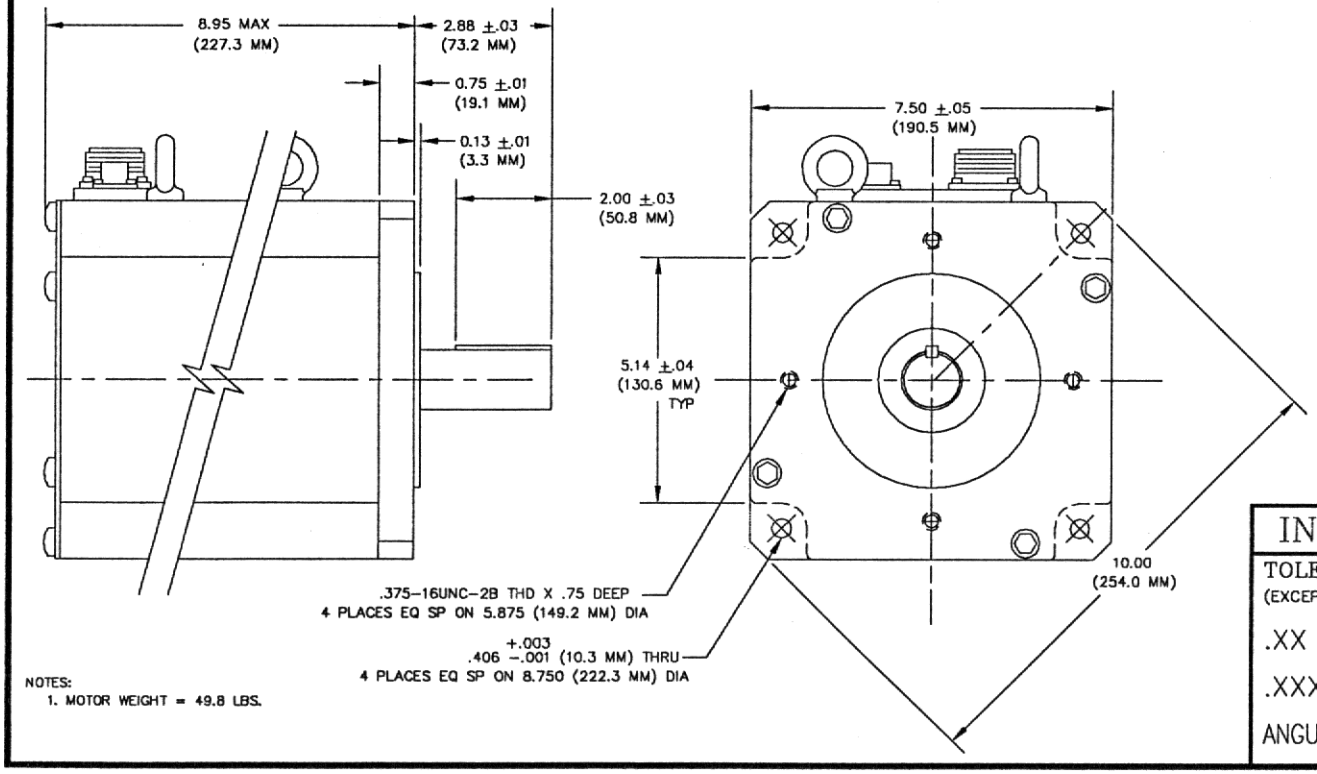
RESOLVER CONNECTOR DIAGRAM



DETAIL "A"

MOTOR/THERMOSTAT CONNECTOR DIAGRAM

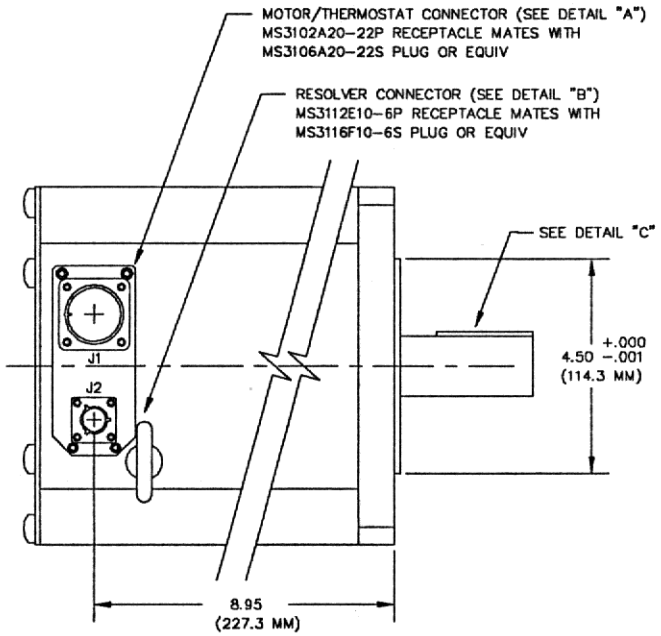




NOTES:
1. MOTOR WEIGHT = 49.8 LBS.

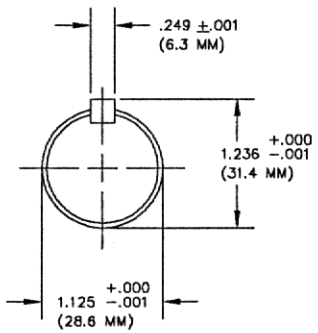
INDUSTRIAL INDEXING SYSTEMS, INC.		
TOLERANCES (EXCEPT AS NOTED)	DRAWN BY: JTE	DATE: 11/6/89
	APPROVED:	DATE:
.XX ±.010	SCALE: NONE	TITLE: MOTOR, BRUSHLESS
.XXX ±.005	SHEET NO.: 1 OF 1	DRAWING NO.: BLM-1016
ANGULAR ±30'		

DATE	SYM	REVISION RECORD	DRN	CHK



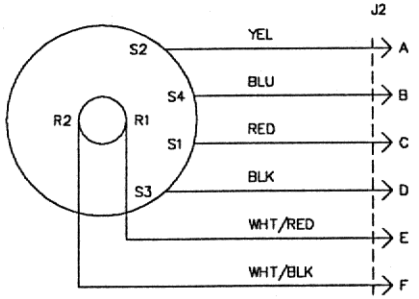
DETAIL "C"

MOTOR SHAFT DIMENSIONS



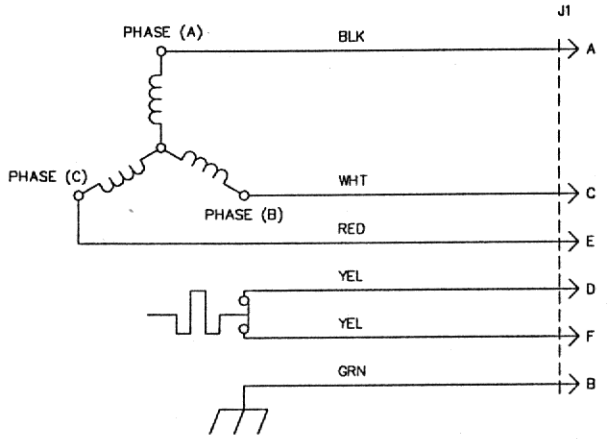
DETAIL "B"

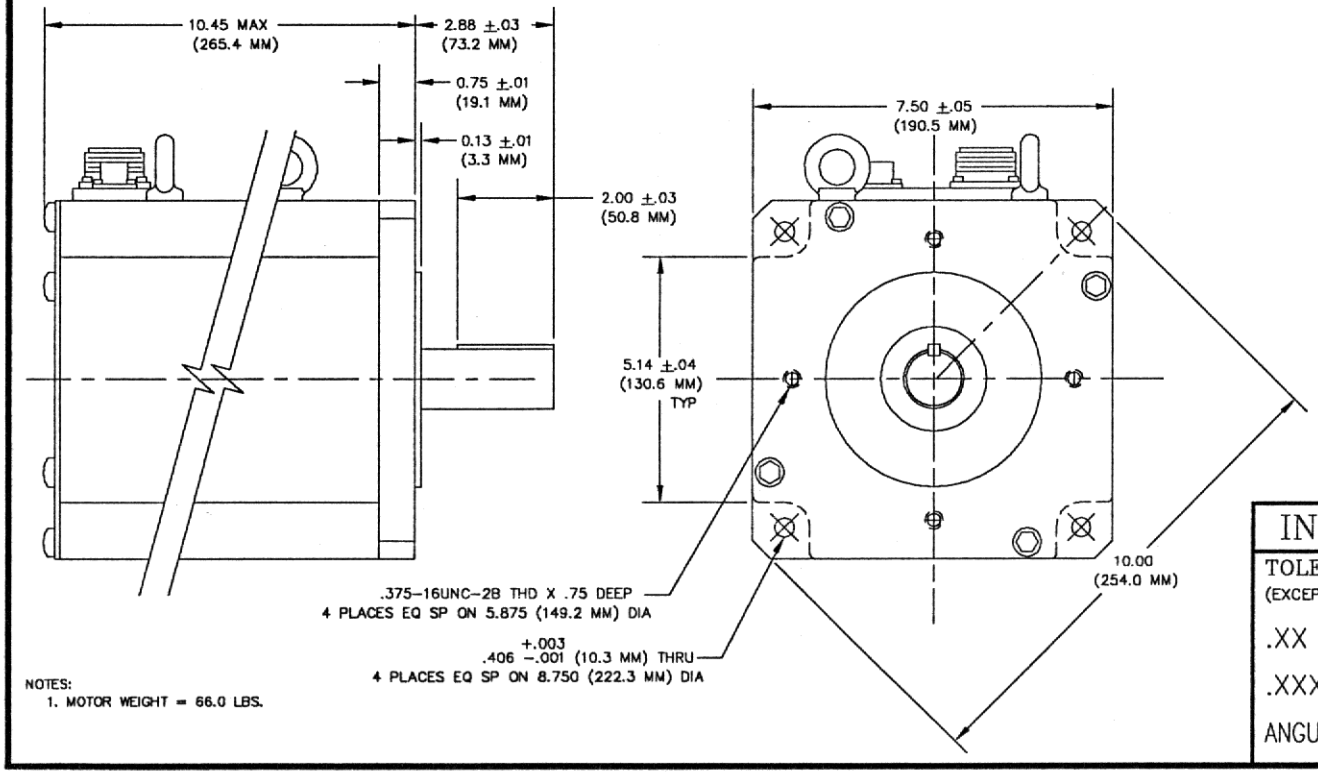
RESOLVER CONNECTOR DIAGRAM



DETAIL "A"

MOTOR/THERMOSTAT CONNECTOR DIAGRAM





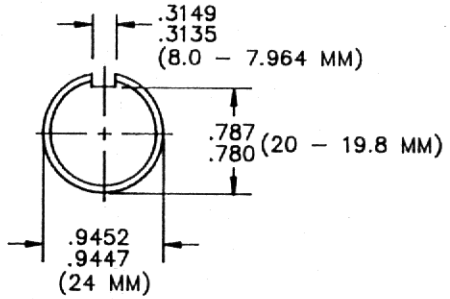
NOTES:
1. MOTOR WEIGHT = 66.0 LBS.

INDUSTRIAL INDEXING SYSTEMS, INC.			
TOLERANCES (EXCEPT AS NOTED)	DRAWN BY: JTE	DATE: 11/6/89	
	APPROVED:	DATE:	
.XX ±.010	SCALE: NONE	TITLE: MOTOR, BRUSHLESS	
.XXX ±.005	SHEET NO.: 1 OF 1	DRAWING NO.: BLM-1017	
ANGULAR ±30'			

DATE	SYM	REVISION RECORD	DR	CK	CK
11/13/90	A	ECN-90-0235	MFE	J.F.	J.C.
1/30/91	B	ECN-91-0019	MFE	[illegible]	EB

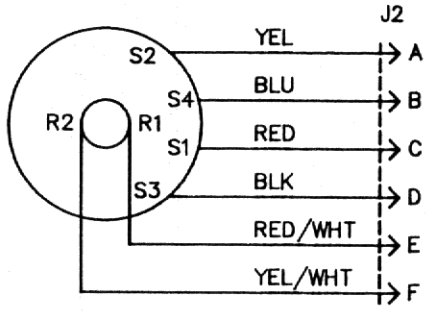
DETAIL "C"

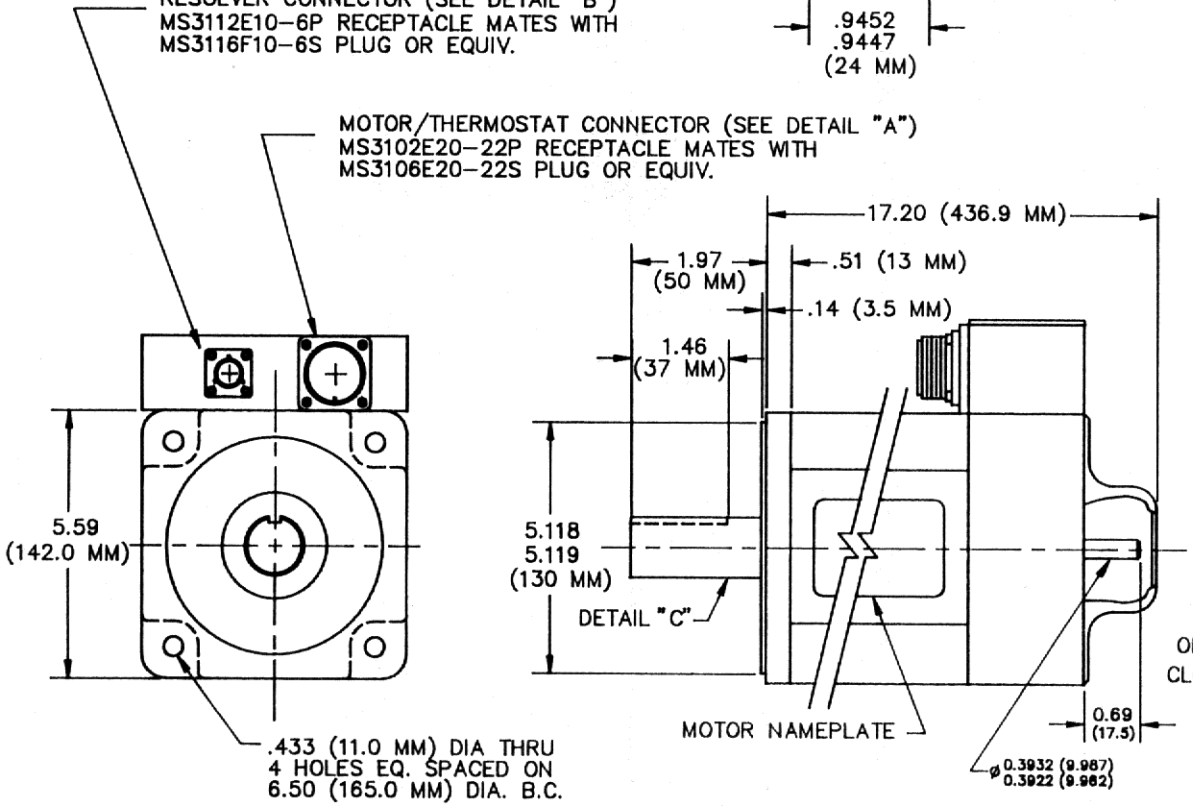
MOTOR SHAFT DIMENSIONS



DETAIL "B"

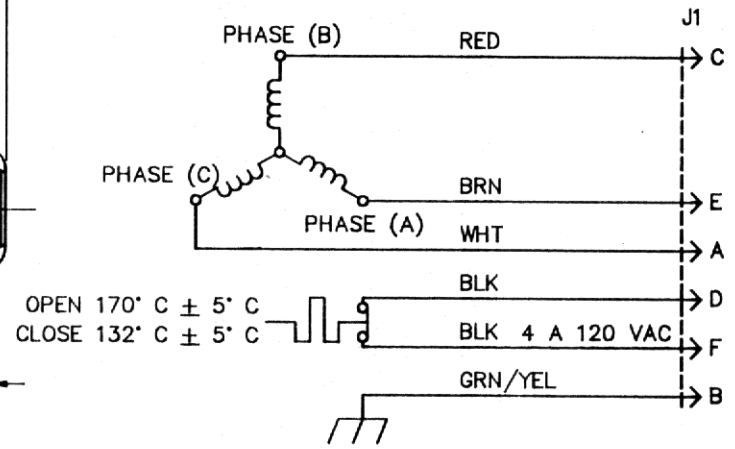
RESOLVER CONNECTOR DIAGRAM





DETAIL "A"

MOTOR/THERMOSTAT CONNECTOR DIAGRAM



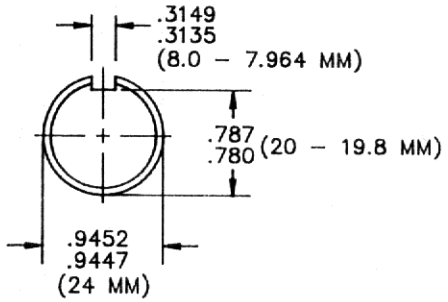
NOTES:

1. WITH PHASE SEQUENCE A–B–C, MOTOR ROTATION WILL BE CLOCKWISE (FACING MOUNTING END)
2. MOTOR CAN BE MOUNTED IN ANY POSITION
3. MOTOR WEIGHT = 65.0 LBS.
4. DIMS ARE INCHES (mm)

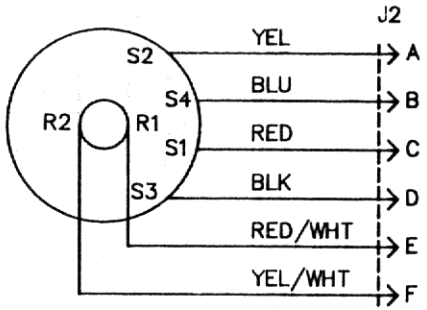
TOLERANCES (EXCEPT AS NOTED)	INDUSTRIAL INDEXING SYSTEMS, Inc.			
XX± 0.01 XXX± 0.005	AutoCAD FILE LOCATION G\CAD\BLOCKS\	SCALE 1:2	DRAWN BY MIKE E. APPROVED BY	
ANGULAR ± ___	TITLE MOTOR, BRUSHLESS			
DATE 1/30/91	SHEET NO. 1 OF 1	DRAWING NUMBER IM-BLM-1018	REVISION B	

DATE	SYM	REVISION RECORD	DR	CK	CK
11/13/90	A	ECN-90-0235	MFE	J.C.	J.F.
1/30/91	B	ECN-91-0019	MFE	[illegible]	[illegible]

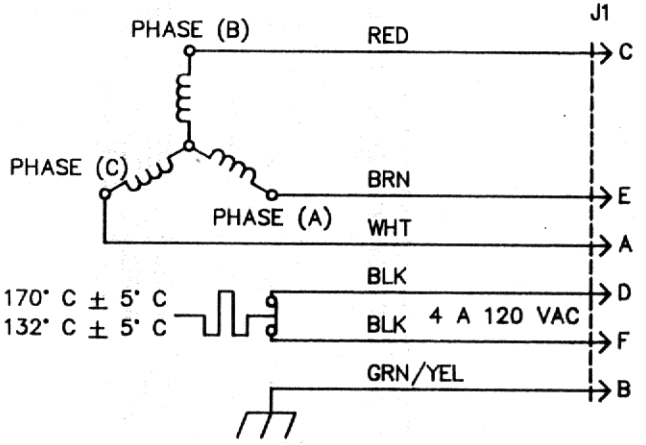
DETAIL "C"
MOTOR SHAFT DIMENSIONS

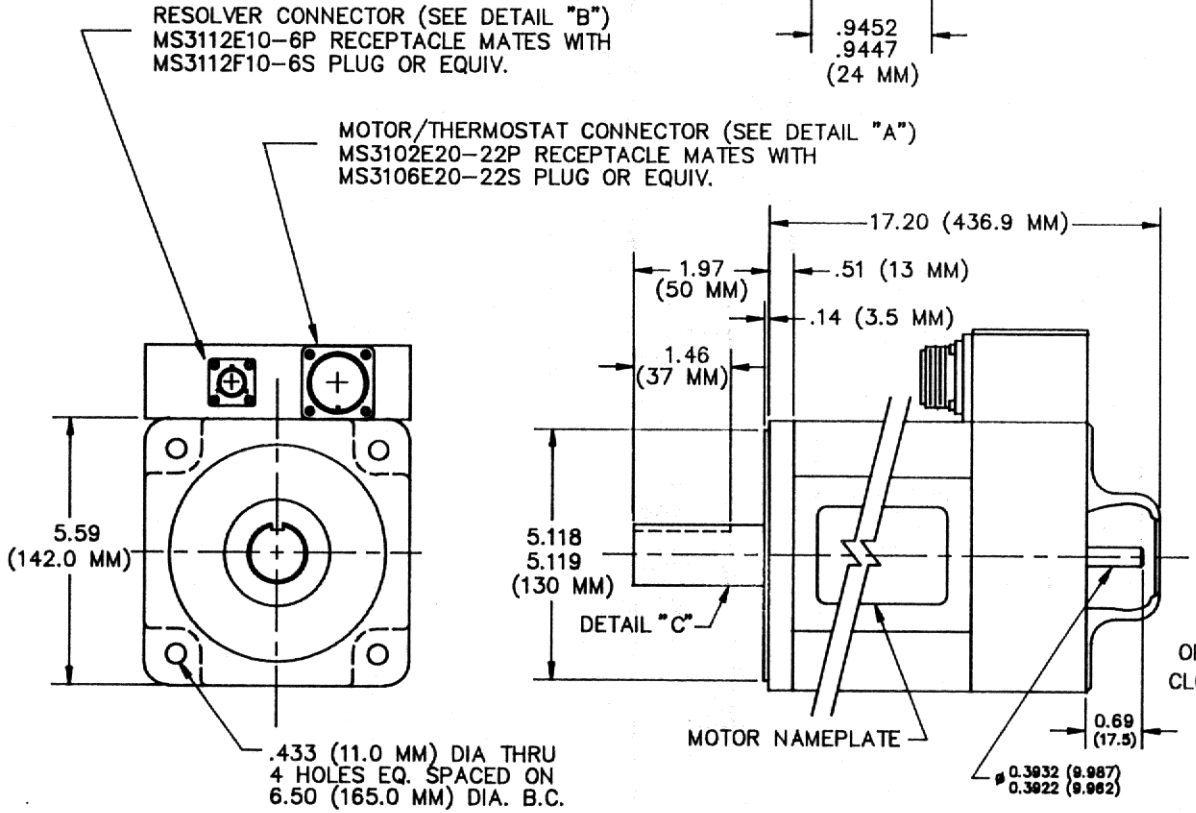


DETAIL "B"
RESOLVER CONNECTOR DIAGRAM



DETAIL "A"
MOTOR/THERMOSTAT CONNECTOR DIAGRAM



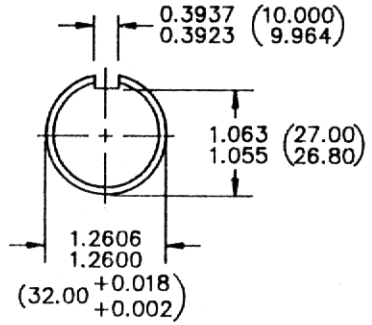


NOTES:
1. WITH PHASE SEQUENCE A–B–C, MOTOR ROTATION WILL BE CLOCKWISE (FACING MOUNTING END)
2. MOTOR CAN BE MOUNTED IN ANY POSITION
3. MOTOR WEIGHT = 65.0 LBS.
4. DIMS ARE INCHES (mm)

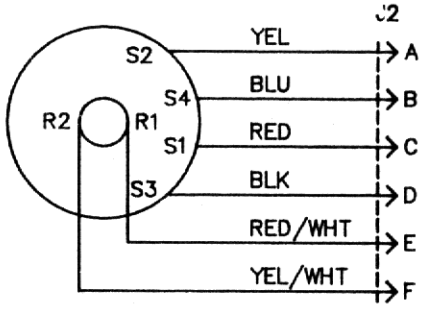
TOLERANCES (EXCEPT AS NOTED)	INDUSTRIAL INDEXING SYSTEMS, Inc.			
XX± 0.01 XXX± 0.005	AutoCAD FILE LOCATION G:\CAD\MOTORS\	SCALE 1:2	DRAWN BY MIKE E. APPROVED BY	
ANGULAR ± ---	TITLE MOTOR, BRUSHLESS			
DATE 1/30/91	SHEET NO. 1 OF 1	DRAWING NUMBER IM-BLM-1019		REVISION B

DATE	SYM	REVISION RECORD	DR	CK	CK
1/30/91	A	ECN-91-0019	MFE	Y	EB

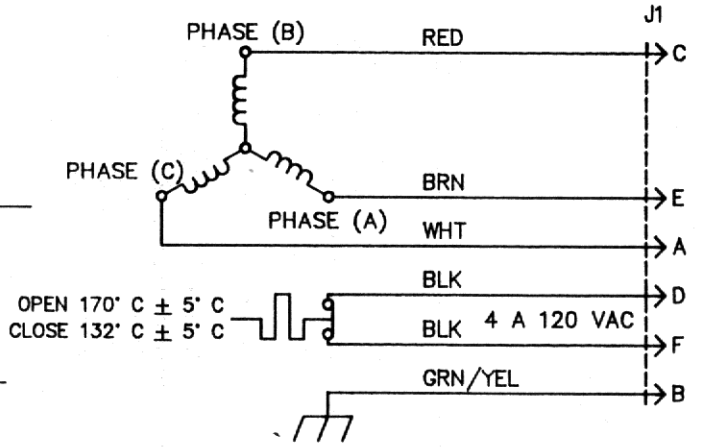
DETAIL "C"
MOTOR SHAFT DIMENSIONS

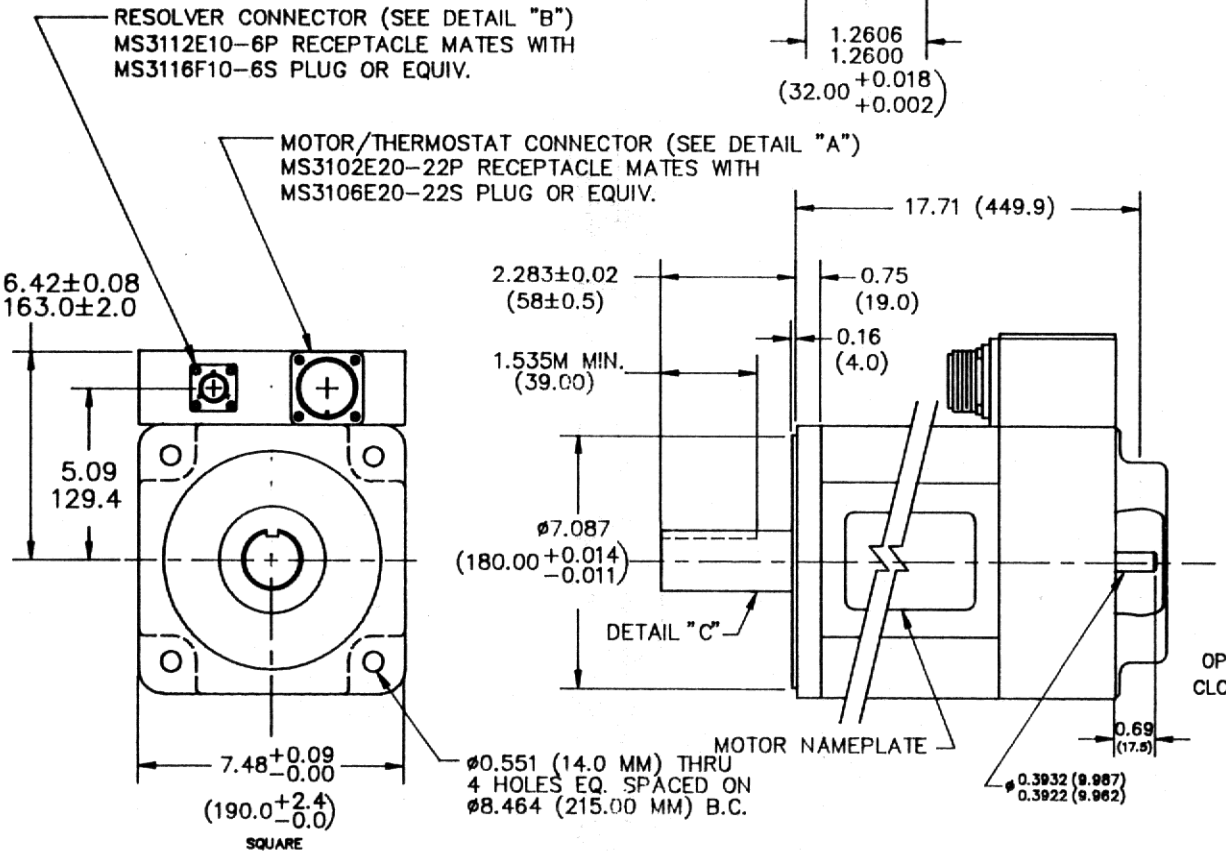


DETAIL "B"
RESOLVER CONNECTOR DIAGRAM



DETAIL "A"
MOTOR/THERMOSTAT CONNECTOR DIAGRAM





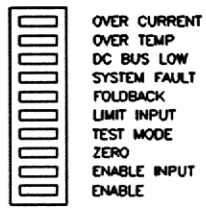
NOTES:
1. WITH PHASE SEQUENCE A-B-C, MOTOR ROTATION WILL BE CLOCKWISE (FACING MOUNTING END)
2. MOTOR CAN BE MOUNTED IN ANY POSITION
3. MOTOR WEIGHT = 65.0 LBS.
4. DIMS ARE INCHES (mm)

TOLERANCES (EXCEPT AS NOTED)	INDUSTRIAL INDEXING SYSTEMS, Inc.			
XX± 0.01 XXX± 0.005	AutoCAD FILE LOCATION G:\CAD\MOTORS\	SCALE 1:2	DRAWN BY MIKE E. APPROVED BY	
ANGULAR ± ---	TITLE MOTOR, BRUSHLESS			
DATE 1/30/91	SHEET NO. 1 OF 1	DRAWING NUMBER IM-BLM-1020		REVISION A

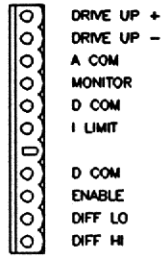
APPENDIX E
DRIVE DIMENSIONS AND CONNECTIONS

DRAWING NUMBER	DESCRIPTION
IM-0006	Drives BSD/300-30, BSD/300-40, BSD/300-40A
IM-0008	Drive BSD/300/55, BSD/300-55A

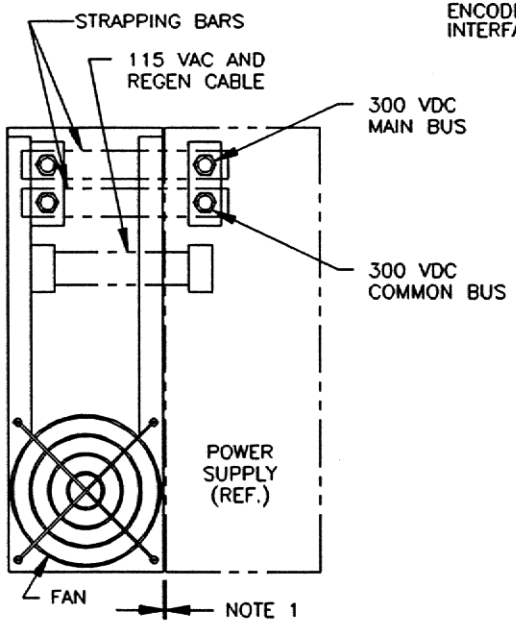
DATE	SYM	REVISION RECORD	DRN	CHK
7/27/92	A	ECN-92-155	MFE	



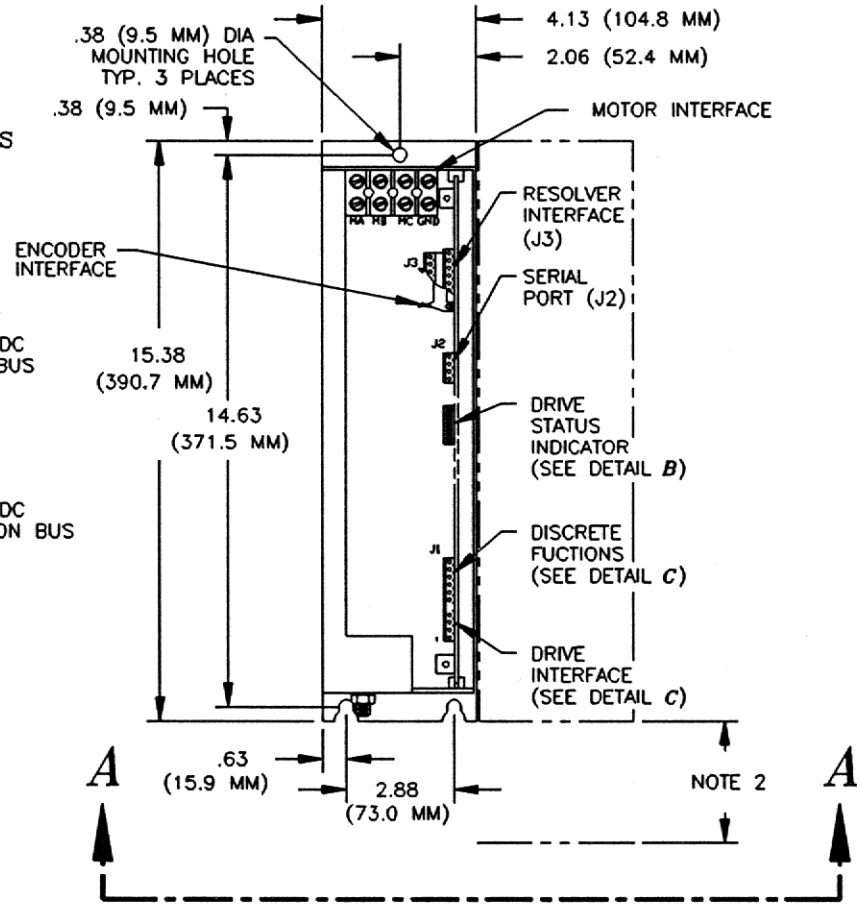
DETAIL B
DRIVE STATUS INDICATOR

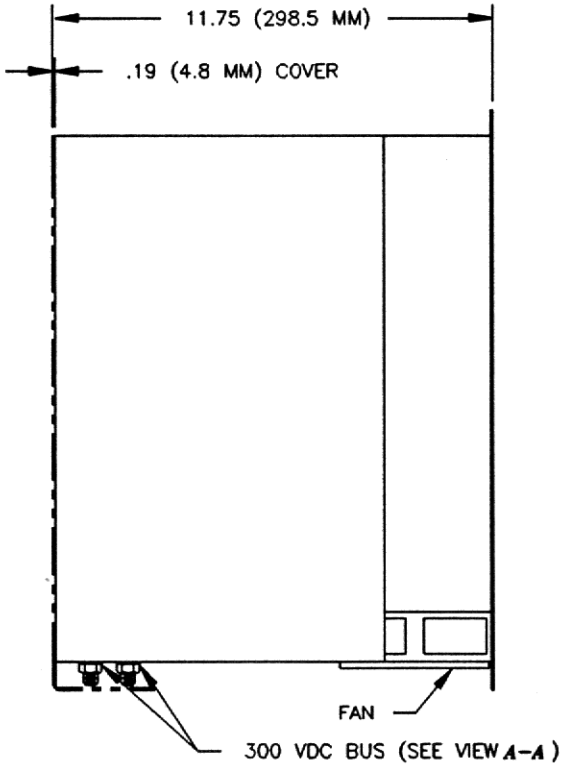


DETAIL C
DISCRETE FUNCTIONS AND DRIVE INTERFACE



VIEW A–A





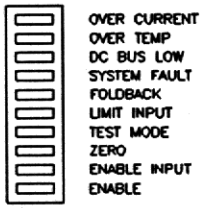
NOTES:

1. ALLOW 0.06" (1.6 MM) CLEARANCE BETWEEN POWER SUPPLY AND DRIVE
   - ALLOW 0.06" (1.6 MM) CLEARANCE BETWEEN DRIVES FOR ADDITIONAL AXES
   - POWER SUPPLY AND DRIVE MOUNTING CONFIGURATION, RIGHT TO LEFT: POWER SUPPLY/DRIVE FOR AXIS 1/DRIVE FOR ADDITIONAL AXES
2. ALLOW 2.00" (50.8 MM) CLEARANCE FOR WIRING AND VENTILATION (TYP. TOP AND BOTTOM)

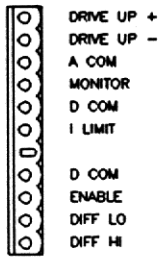
INDUSTRIAL INDEXING SYSTEMS, INC.

TOLERANCES (EXCEPT AS NOTED)	DRAWN BY: JTE	DATE: 11/8/89
.XX ±.010	APPROVED:	DATE:
.XXX ±.005	SCALE: NONE	TITLE: DRIVE: BSD/300/30/40/40A
ANGULAR ±30'	SHEET NO.: 1 OF 1	DRAWING NO.: IM-0006

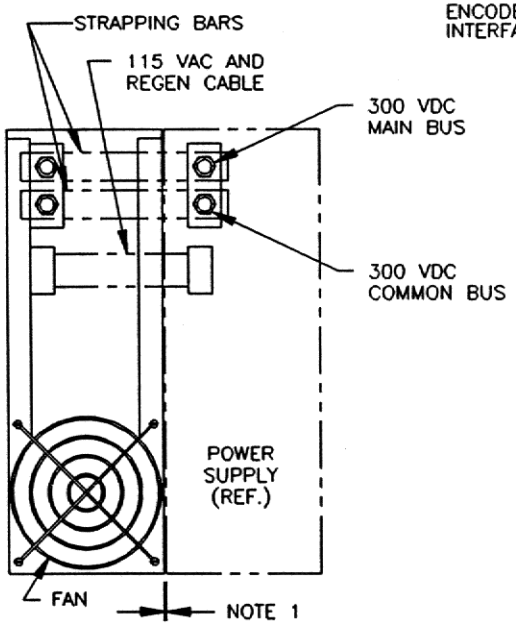
DATE	SYM	REVISION RECORD	DRN	CHK
7/27/92	A	ECN-92-155	MFE	



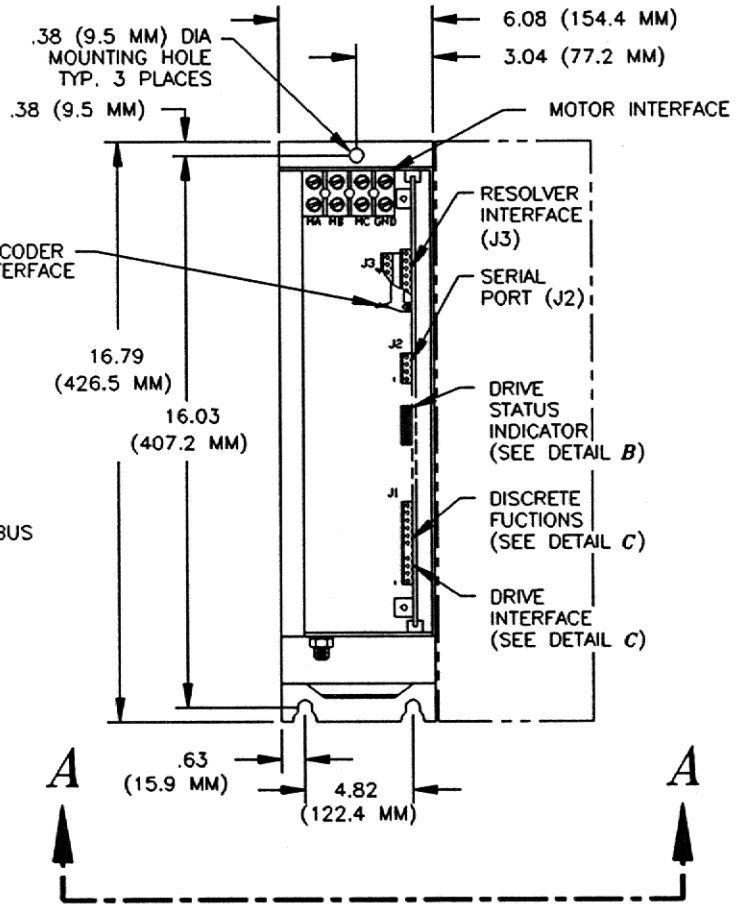
DETAIL B
DRIVE STATUS INDICATOR

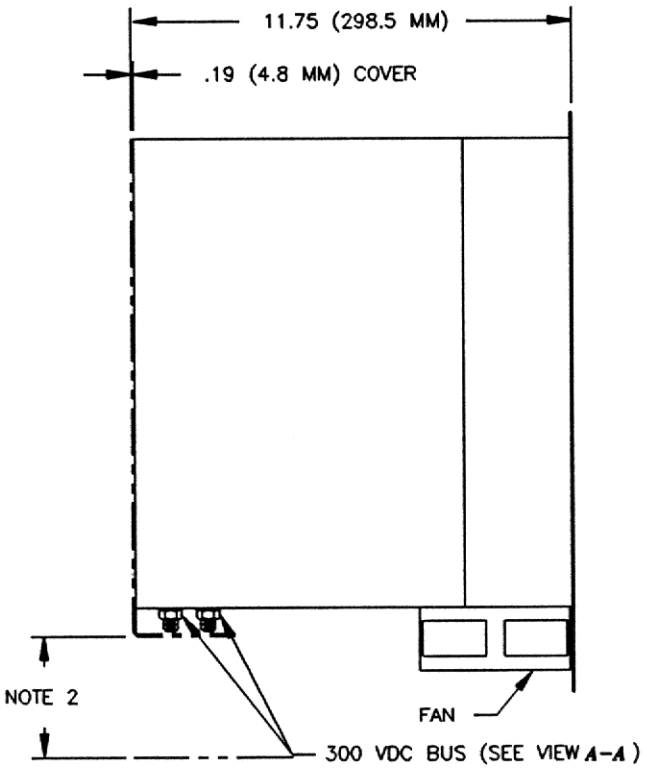


DETAIL C
DISCRETE FUNCTIONS AND DRIVE INTERFACE



VIEW A–A





NOTES:

1. ALLOW 0.06" (1.6 MM) CLEARANCE BETWEEN POWER SUPPLY AND DRIVE
   - ALLOW 0.06" (1.6 MM) CLEARANCE BETWEEN DRIVES FOR ADDITIONAL AXES
   - POWER SUPPLY AND DRIVE MOUNTING CONFIGURATION, RIGHT TO LEFT: POWER SUPPLY/DRIVE FOR AXIS 1/DRIVE FOR ADDITIONAL AXES
2. ALLOW 2.00" (50.8 MM) CLEARANCE FOR WIRING AND VENTILATION (TYP. TOP AND BOTTOM)

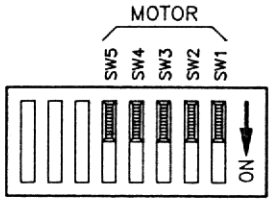
INDUSTRIAL INDEXING SYSTEMS, INC.
626 FISHERS RUN, VICTOR, N.Y. 14564 (716)924-2169

TOLERANCES (EXCEPT AS NOTED)	DRAWN BY: JTE	DATE: 11/10/89
.XX ±.010	APPROVED:	DATE:
.XXX ±.005	SCALE: NONE	TITLE: DRIVE: BSD/300/55/55A
ANGULAR ±30'	SHEET NO.: 1 OF 1	DRAWING NO.: IM-0008

APPENDIX F
DRIVE/AMPLIFIER SETUPS

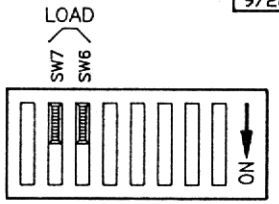
DRAWING NUMBER	DESCRIPTION
SU-039001 Shts. 1 & 2	Drive Setup

DATE	SYM	REVISION RECORD	DR	CK	CK
9-90	E	ECN-90-0173	MFE	JTF	JC
4/20/92	F	ECN-92-0079	MFE		
9/28/92	G	ECN-92-210	MFE	EB	

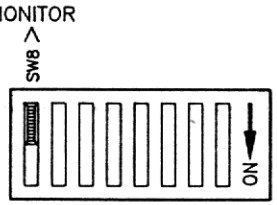


MT#	0	SERIAL PORT	MT#	16	BLM-1007-B
MT#	1	BLM-1018	MT#	17	
MT#	2	BLM-1019	MT#	18	BLM-1008-B
MT#	3	BLM-1001-A	MT#	19	
MT#	4	BLM-1020	MT#	20	BLM-1009-B
MT#	5	BLM-1021	MT#	21	BLM-1010-A
MT#	6	BLM-1018-L	MT#	22	BLM-1031
MT#	7	BLM-1003-A	MT#	23	BLM-1011-A
MT#	8		MT#	24	
MT#	9		MT#	25	BLM-1012-A
MT#	10		MT#	26	BLM-1013
MT#	11	BLM-1005-A	MT#	27	BLM-1014
MT#	12		MT#	28	BLM-1015
MT#	13		MT#	29	BLM-1016
MT#	14		MT#	30	BLM-1017
MT#	15	BLM-1007-A	MT#	31	ZERO SETUP

NOTE: REFER TO SHEET 2 OF 2 FOR SERIAL INTERFACE DIAGRAM AND LIST OF SERIAL INTERFACE COMMANDS. SET DIP SWITCHES TO MT# 0 FOR USE WITH SERIAL INTERFACE COMMANDS.



LOAD 1 (MIN)
LOAD 2
LOAD 3
LOAD 4 (MAX)



PEAK DRIVE TORQUE
RMS TORQUE

SCALE:
8V = PEAK TORQUE

INDUSTRIAL INDEXING SYSTEMS, Inc.
626 FISHERS RUN
VICTOR, NEW YORK 14584
(716) 924-9181 FAX: (716) 924-2169

CHECKED BY: E.B. DATE:
APPROVED BY: JC DATE:
APPROVED BY: DATE:
MATERIAL:
FINISH:

TITLE: **DRIVE SETUP**

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE INCHES (mm)
TOLERANCES
X.X± ANGULAR ±
X.XX±
X.XXX±

DRAWN BY: Mike E.
AutoCAD FILE LOCATION: Q:\DRAFTING\IB148004\
B DATE: 9/28/92 SCALE:

DRAWING NUMBER: SU-039001
SHEET NO.: 1 OF 2 REVISION: G

DATE	SYM	REVISION RECORD	DR	CK	CK
9-90	E	ECN-90-0173	MFE	JTF	JC
4/20/92	F	ECN-92-0079	MFE		
9/28/92	G	ECN-92-210	MFE	EB	

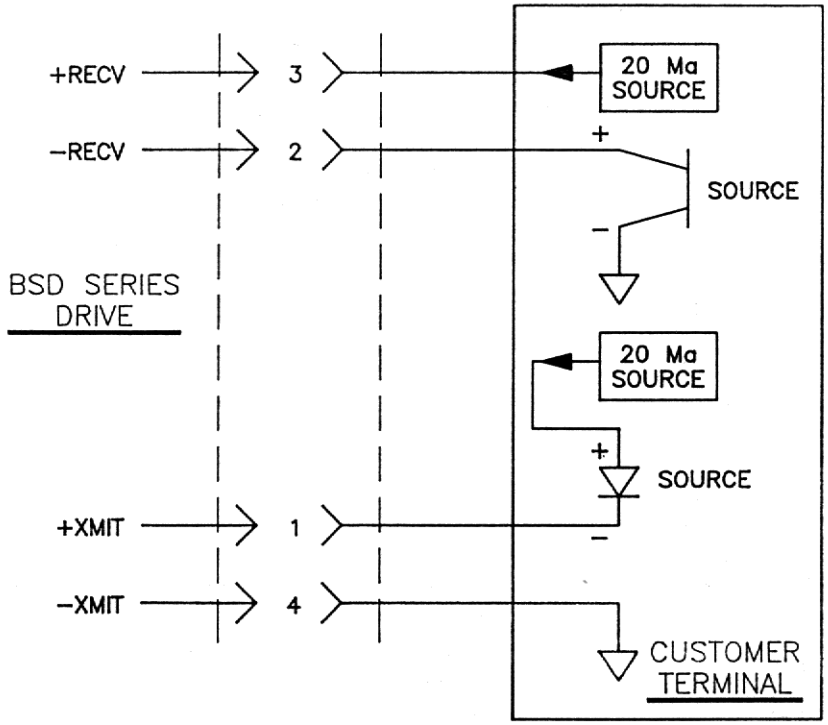
The BSD drive is equipped with a 20 Ma current loop serial port J2 (see IM-0006 or IM-0008). This serial port is for configuring the drive to the motor which is being used and to set up for various machine load conditions when the DIP selector switch is not to be used. Commands can be issued from a "dumb" ASCII terminal or other ASCII control source.

Use the following protocol setup:

1.	BAUD RATE	2400
2.	DATA BITS	7
3.	STOP BITS	1
4.	PARITY	EVEN
5.	CHK PARITY	YES
6.	AUTO LF	ON
7.	REMOTE MODE	ON

Use the following serial commands to configure the drive for each different motor (commands which show only "BLM-" are unassigned and should not be used). The motor number is located on the Industrial Indexing Systems part number tag on the motor. Find the motor number in the list below and issue the serial command from the ASCII terminal. A successful transmission will return the motor part number and a "Motor Selected" message.

SERIAL COMMAND	IIS MOTOR PART NO.	SERIAL COMMAND	IIS MOTOR PART NO.
MT,1	BLM-1018	MT,16	BLM-1007-B
MT,2	BLM-1019	MT,17	BLM-
MT,3	BLM-1001-A	MT,18	BLM-1008-B
MT,4	BLM-1020	MT,19	BLM-
MT,5	BLM-1021	MT,20	BLM-1009-B
MT,6	BLM-1018-L	MT,21	BLM-1010-A
MT,7	BLM-1003-A	MT,22	BLM-1031
MT,8	BLM-	MT,23	BLM-1011-A
MT,9	BLM-	MT,24	BLM-
MT,10	BLM-	MT,25	BLM-1012-A
MT,11	BLM-1005-A	MT,26	BLM-1013
MT,12	BLM-	MT,27	BLM-1014
MT,13	BLM-	MT,28	BLM-1015
MT,14	BLM-	MT,29	BLM-1016
MT,15	BLM-1007-A	MT,30	BLM-1017



TYPICAL SERIAL PORT CONNECTIONS (J2)

Use the following serial commands to establish the load stting to one of four possible settings.

SERIAL COMMAND	LOAD TYPE
LD,1	LOAD 1 (Min. Load)
LD,2	LOAD 2
LD,3	LOAD 3
LD,4	LOAD 4 (Max. Load)

INDUSTRIAL INDEXING SYSTEMS, Inc.
626 FISHERS RUN
VICTOR, NEW YORK 14564
(716) 924-9181 FAX: (716) 924-2169

CHECKED BY EB DATE
APPROVED BY JE DATE
APPROVED BY DATE
MATERIAL
FINISH

TITLE: DRIVE SETUP

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE INCHES (mm)
TOLERANCES
X.X± X.XX± X.XXX± ANGULAR ±

DRAWN BY Mike E.
AutoCAD FILE LOCATION Q:\DRAFTING\IB148004

DRAWING NUMBER SU-039001

B DATE 9/28/92 SCALE SHEET NO. 2 OF 2 REVISION G

APPENDIX G
PWRPAK™ SPECIFICATIONS

Series 4 Power Supply Packages Summary

DRAWING NUMBER	DESCRIPTION
PWRPAK4-4500/3	4500 Watt Power Supply Package
PWRPAK4-9000/3	9000 Watt Power Supply Package
PWRPAK4-15000/4	15000 Watt Power Supply Package
PWRPAK4-22500/6	22500 Watt Power Supply Package

DATE	SYM	REVISION RECORD	DRN	CHK

POWER SUPPLY PACKAGE SPECIFICATIONS

INPUT POWER	230/460	VOLT AC
OUTPUT POWER	4500	WATTS
MAXIMUM AXES	3	
PHASE	3 Ø	
FREQUENCY	60	Hz

LIST OF MATERIALS		
DESCRIPTION	PART NUMBER	QTY
POWER SUPPLY	IPS-300/50-ER	1
TRANSFORMER	TE-300/15-3	1
RESISTOR KIT	AC-100024	1
MANUAL	IB-14B004	1

PWRPAKX-YYYYY/Z

- MAXIMUM NUMBER OF AXES SUPPORTED BY POWER PACKAGE
- OUTPUT POWER WATTS
- TYPE NUMBER OF POWER SUPPLY PACKAGE INTENDED FOR USE WITH CORRESPONDING TYPE OF MOTOR DRIVE PACKAGE

INDUSTRIAL INDEXING SYSTEMS, INC.

TOLERANCES (EXCEPT AS NOTED) .XX ±.010 .XXX ±.005 ANGULAR ±30'	DRAWN BY: JTE	DATE: 10/26/89
	APPROVED:	DATE:
	SCALE: NONE	TITLE: POWER SUPPLY PACKAGE
	SHEET NO.: 1 OF 1	DRAWING NO.: PWRPAK4-4500/3

DATE	SYM	REVISION RECORD	DRN	CHK

POWER SUPPLY PACKAGE SPECIFICATIONS

INPUT POWER	230/460	VOLT AC
OUTPUT POWER	9000	WATTS
MAXIMUM AXES	3	
PHASE	3 Ø	
FREQUENCY	60	Hz

LIST OF MATERIALS

DESCRIPTION	PART NUMBER	QTY
POWER SUPPLY	IPS-300/50-ER	1
TRANSFORMER	TE-300/30-3	1
RESISTOR KIT	AC-100024	1
MANUAL	IB-14B004	1

PWRPAKX-YYYYY/Z

- MAXIMUM NUMBER OF AXES SUPPORTED BY POWER PACKAGE
- OUTPUT POWER WATTS
- TYPE NUMBER OF POWER SUPPLY PACKAGE INTENDED FOR USE WITH CORRESPONDING TYPE OF MOTOR DRIVE PACKAGE

INDUSTRIAL INDEXING SYSTEMS, INC.

TOLERANCES (EXCEPT AS NOTED) .XX ±.010 .XXX ±.005 ANGULAR ±30'	DRAWN BY: JTE	DATE: 10/26/89
	APPROVED:	DATE:
	SCALE: NONE	TITLE: POWER SUPPLY PACKAGE
	SHEET NO.: 1 OF 1	DRAWING NO.: PWRPAK4-9000/3

DATE	SYM	REVISION RECORD	DRN	CHK

POWER SUPPLY PACKAGE SPECIFICATIONS

INPUT POWER	230/460	VOLT AC
OUTPUT POWER	15000	WATTS
MAXIMUM AXES	4	
PHASE	3 ø	
FREQUENCY	60	Hz

LIST OF MATERIALS

DESCRIPTION	PART NUMBER	QTY
POWER SUPPLY	IPS-300/50-ER	1
TRANSFORMER	TE-300/58-3	1
RESISTOR KIT	AC-100024	1
MANUAL	IB-14B004	1

PWRPAKX-YYYYY/Z

- MAXIMUM NUMBER OF AXES SUPPORTED BY POWER PACKAGE
- OUTPUT POWER WATTS
- TYPE NUMBER OF POWER SUPPLY PACKAGE INTENDED FOR USE WITH CORRESPONDING TYPE OF MOTOR DRIVE PACKAGE

INDUSTRIAL INDEXING SYSTEMS, INC.

TOLERANCES (EXCEPT AS NOTED) .XX ±.010 .XXX ±.005 ANGULAR ±30'	DRAWN BY: JTE	DATE: 10/26/89
	APPROVED:	DATE:
	SCALE: NONE	TITLE: POWER SUPPLY PACKAGE
	SHEET NO.: 1 OF 1	DRAWING NO.: PWRPAK4-15000/4

DATE	SYM	REVISION RECORD	DRN	CHK

POWER SUPPLY PACKAGE SPECIFICATIONS

INPUT POWER	230/460	VOLT AC
OUTPUT POWER	22500	WATTS
MAXIMUM AXES	6	
PHASE	3 Ø	
FREQUENCY	60	Hz

LIST OF MATERIALS		
DESCRIPTION	PART NUMBER	QTY
POWER SUPPLY	IPS-300/75-ER	1
TRANSFORMER	TE-300/75-3	1
RESISTOR KIT	AC-100024	1
MANUAL	IB-14B004	1

PWRPAKX-YYYYY/Z

- MAXIMUM NUMBER OF AXES SUPPORTED BY POWER PACKAGE
- OUTPUT POWER WATTS
- TYPE NUMBER OF POWER SUPPLY PACKAGE INTENDED FOR USE WITH CORRESPONDING TYPE OF MOTOR DRIVE PACKAGE

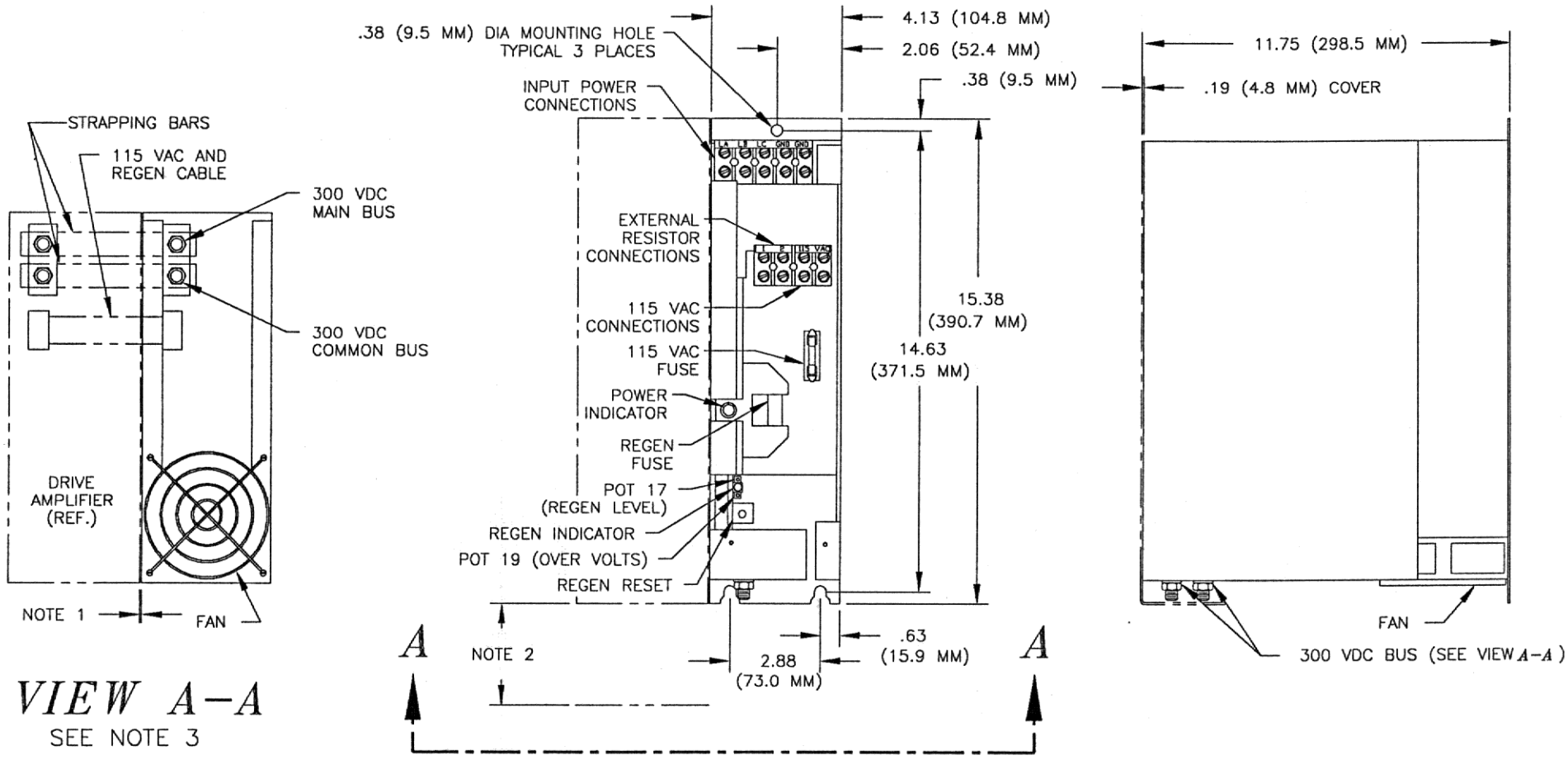
INDUSTRIAL INDEXING SYSTEMS, INC.

TOLERANCES (EXCEPT AS NOTED)	DRAWN BY: JTE	DATE: 10/26/89
	APPROVED:	DATE:
.XX ±.010	SCALE: NONE	TITLE: POWER SUPPLY PACKAGE
.XXX ±.005	SHEET NO.: 1 OF 1	DRAWING NO.: PWRPAK4-22500/6
ANGULAR ±30'		

APPENDIX H
POWER SUPPLY DIMENSIONS AND CONNECTIONS

DRAWING NUMBER	DESCRIPTION
IM-0009	Power Supply IPS-300/50-ER
IM-0010	Power Supply IPS-300/75-ER

DATE	SYM	REVISION RECORD	DRN	CHK



VIEW A–A

SEE NOTE 3

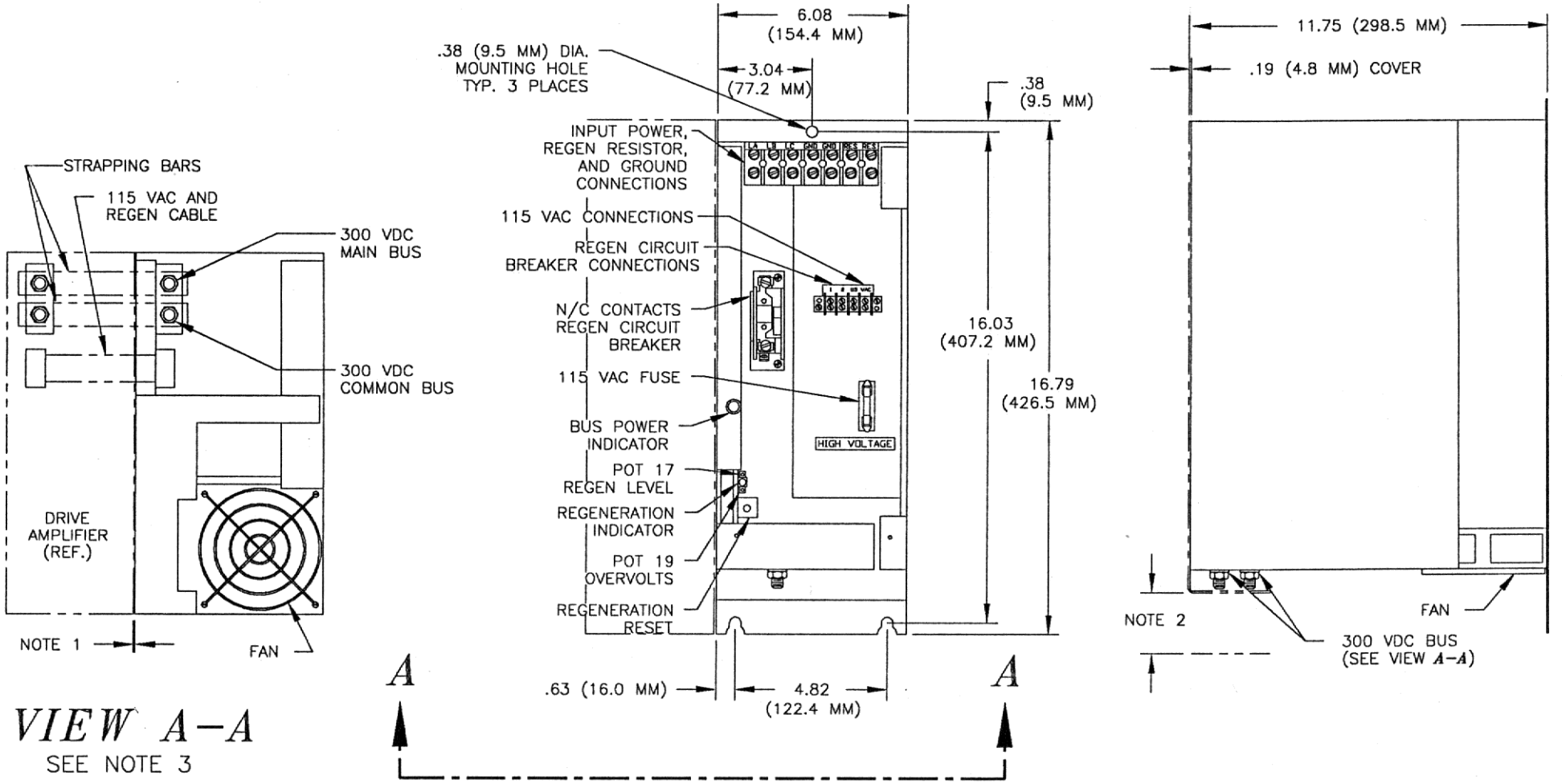
NOTES:

1. ALLOW 0.06" (1.6 MM) CLEARANCE BETWEEN POWER SUPPLY AND DRIVE
   – ALLOW 0.06" (1.6 MM) CLEARANCE BETWEEN DRIVES FOR ADDITIONAL AXES
   – POWER SUPPLY AND DRIVE MOUNTING CONFIGURATION, RIGHT TO LEFT: POWER SUPPLY/DRIVE FOR AXIS 1/DRIVE FOR ADDITIONAL AXES
2. ALLOW 2.00" (50.8 MM) CLEARANCE FOR WIRING AND VENTILATION (TYP. TOP AND BOTTOM)
3. STRAPPING BARS, 115 VAC/REGEN CABLE SUPPLIED WITH DRIVE; SHOWN IN VIEW *A–A* FOR REFERENCE ONLY

INDUSTRIAL INDEXING SYSTEMS, INC.

TOLERANCES (EXCEPT AS NOTED)	DRAWN BY: JTE	DATE: 11/8/89
.XX ±.010	APPROVED:	DATE:
.XXX ±.005	SCALE: NONE	TITLE: POWER SUPPLY: IPS-300/50-ER
ANGULAR ±30'	SHEET NO.: 1 OF 1	DRAWING NO.: IM-0009

DATE	SYM	REVISION RECORD	DRN	CHK



VIEW A–A

SEE NOTE 3

NOTES:

1. ALLOW 0.06" (1.6 MM) CLEARANCE BETWEEN POWER SUPPLY AND DRIVE
   – ALLOW 0.06" (1.6 MM) CLEARANCE BETWEEN DRIVES FOR ADDITIONAL AXES
   – POWER SUPPLY AND DRIVE MOUNTING CONFIGURATION, RIGHT TO LEFT:
   POWER SUPPLY/DRIVE FOR AXIS 1/DRIVE FOR ADDITIONAL AXES
2. ALLOW 2.00" (50.8 MM) CLEARANCE FOR WIRING AND VENTILATION (TYP. TOP AND BOTTOM)
3. STRAPPING BARS, 115 VAC/REGEN CABLE SUPPLIED WITH DRIVE;
   SHOWN IN VIEW *A–A* FOR REFERENCE ONLY

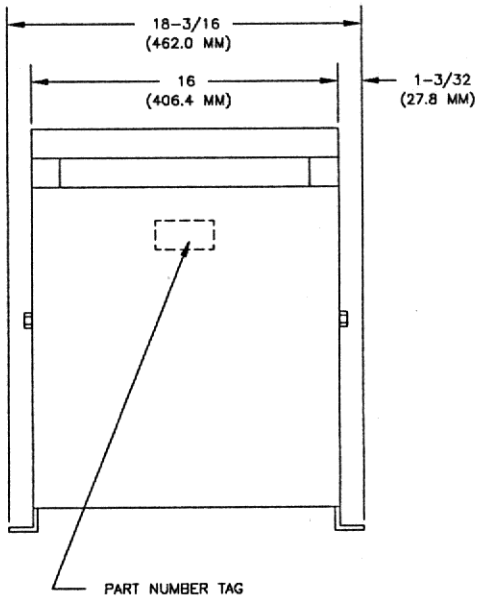
INDUSTRIAL INDEXING SYSTEMS, INC.

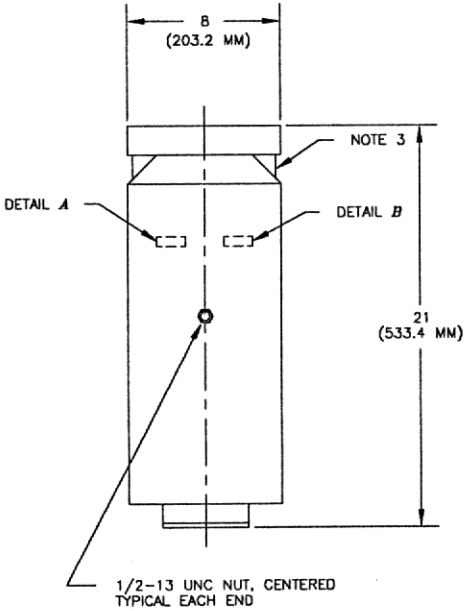
TOLERANCES (EXCEPT AS NOTED)	DRAWN BY: JTE	DATE: 11/10/89
.XX ±.010	APPROVED:	DATE:
.XXX ±.005	SCALE: NONE	TITLE: POWER SUPPLY: IPS–300/75–ER
ANGULAR ±30'	SHEET NO.: 1 OF 1	DRAWING NO.: IM–0010

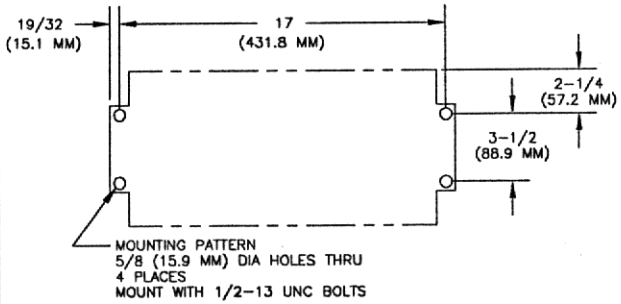
APPENDIX I
TRANSFORMER DIMENSIONS AND CONNECTIONS

DRAWING NUMBER	DESCRIPTION
TE-300/15-3	Transformer
TE-300/30-3	Transformer
TE-300/58-3	Transformer
TE-300/75-3	Transformer

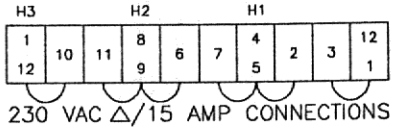
DATE	SYM	REVISION RECORD	DRN	CHK



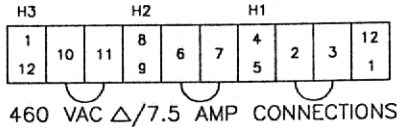




DETAIL A
WIRING/PRIMARY TERMINALS

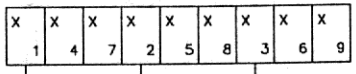


230 VAC △/15 AMP CONNECTIONS

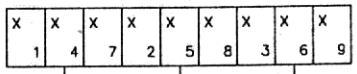


460 VAC △/7.5 AMP CONNECTIONS

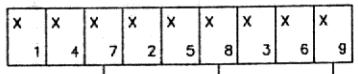
DETAIL B
WIRING/SECONDARY TERMINALS



253 VAC Y/13.7 AMP LINES



230 VAC Y/15 AMP LINES



207 VAC Y/16.7 AMP LINES

TECHNICAL DATA

FREQUENCY	60 Hz
PHASES	3
CLASS	AA
TEMPERATURE RISE	150°C
OUTPUT	6 KVA
PRIMARY	SEE DETAIL *A*
SECONDARY	SEE DETAIL *B*

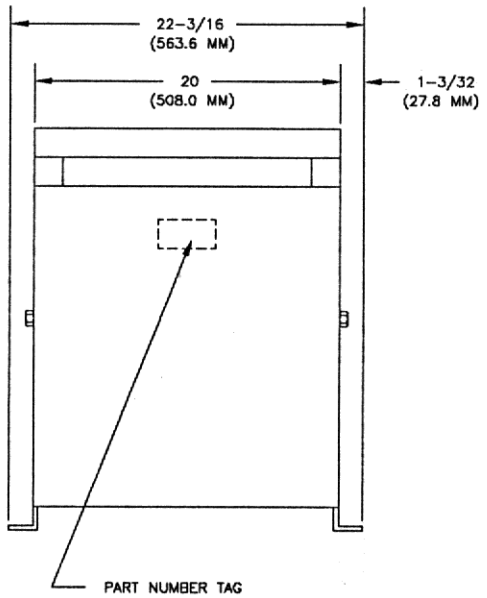
NOTES:

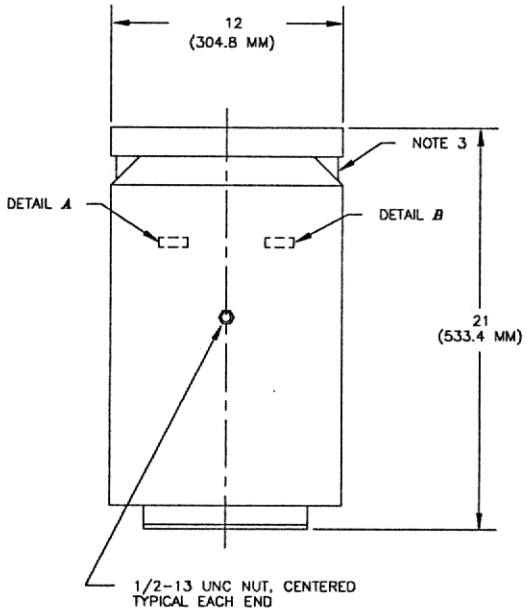
1. ALL DIMENSIONS GIVEN AS – INCHES (MILLIMETERS)
2. BREAK–DOWN ENCLOSURE; REMOVABLE TOP COVER, FRONT AND REAR PANEL
3. AMBIENT VENTILATION AT FRONT AND REAR
4. FINISH: PAINT GRAY, ANSI–70

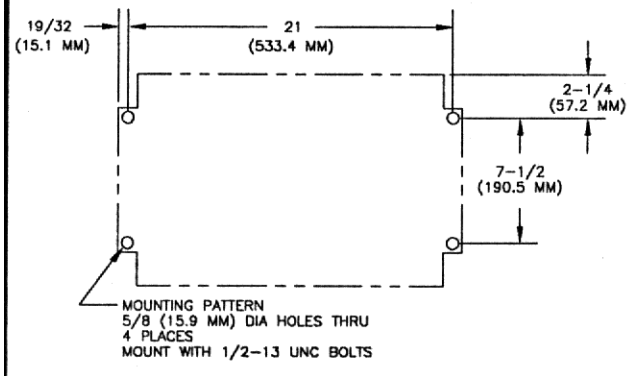
INDUSTRIAL INDEXING SYSTEMS, INC.

TOLERANCES (EXCEPT AS NOTED)	DRAWN BY: JTE	DATE: 11/7/89
	APPROVED:	DATE:
.XX ±.010	SCALE: NONE	TITLE: TRANSFORMER
.XXX ±.005	SHEET NO.: 1 OF 1	DRAWING NO.: TE–300/15–3
ANGULAR ±30'		

DATE	SYM	REVISION RECORD	DRN	CHK

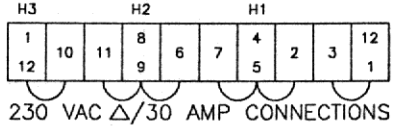




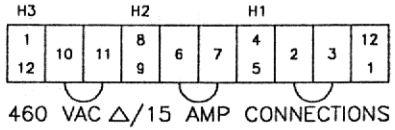


DETAIL A

WIRING/PRIMARY TERMINALS



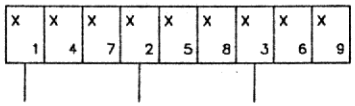
230 VAC △/30 AMP CONNECTIONS



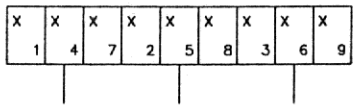
460 VAC △/15 AMP CONNECTIONS

DETAIL B

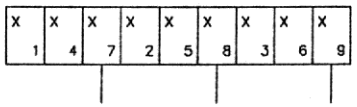
WIRING/SECONDARY TERMINALS



253 VAC Y/27.4 AMP LINES



230 VAC Y/30 AMP LINES



207 VAC Y/33.5 AMP LINES

TECHNICAL DATA

FREQUENCY	60 Hz
PHASES	3
CLASS	AA
TEMPERATURE RISE	150°C
OUTPUT	12 KVA
PRIMARY	SEE DETAIL *A*
SECONDARY	SEE DETAIL *B*

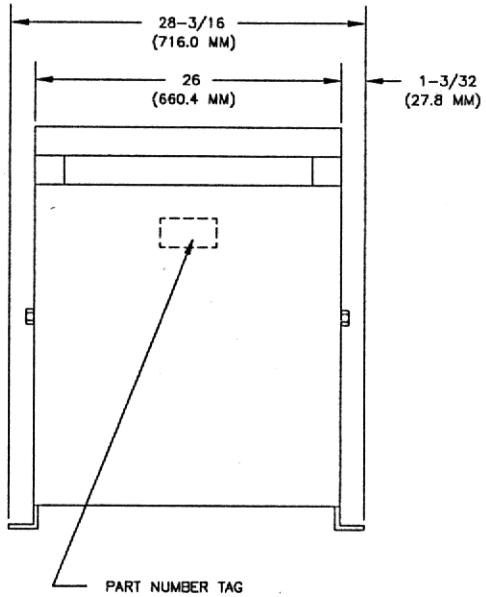
NOTES:

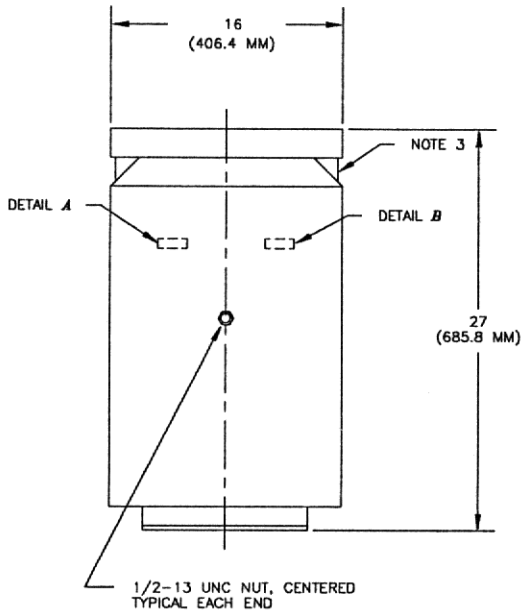
1. ALL DIMENSIONS GIVEN AS – INCHES (MILLIMETERS)
2. BREAK–DOWN ENCLOSURE; REMOVABLE TOP COVER, FRONT AND REAR PANEL
3. AMBIENT VENTILATION AT FRONT AND REAR
4. FINISH: PAINT GRAY, ANSI–70

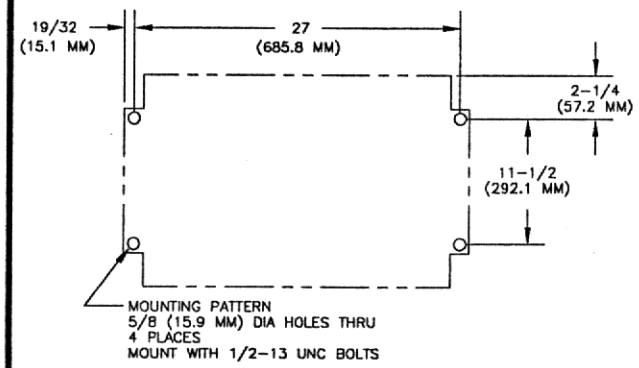
INDUSTRIAL INDEXING SYSTEMS, INC.

TOLERANCES (EXCEPT AS NOTED)	DRAWN BY: JTE	DATE: 11/7/89
	APPROVED:	DATE:
.XX ±.010	SCALE: NONE	TITLE: TRANSFORMER
.XXX ±.005	SHEET NO.: 1 OF 1	DRAWING NO.: TE–300/30–3
ANGULAR ±30'		

DATE	SYM	REVISION RECORD	DRN	CHK

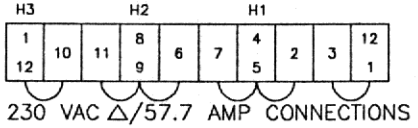




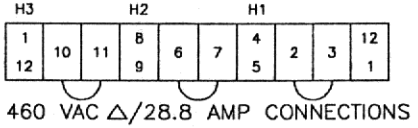


DETAIL A

WIRING/PRIMARY TERMINALS



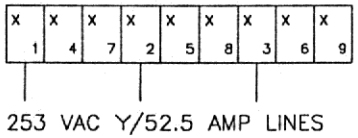
230 VAC △/57.7 AMP CONNECTIONS



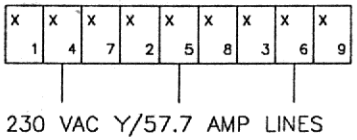
460 VAC △/28.8 AMP CONNECTIONS

DETAIL B

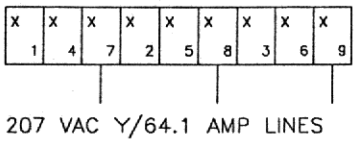
WIRING/SECONDARY TERMINALS
(SEE DETAIL *C* /TERMINAL DIMENSIONS)



253 VAC Y/52.5 AMP LINES



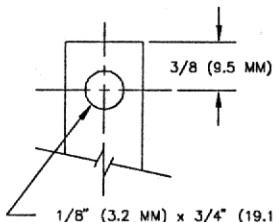
230 VAC Y/57.7 AMP LINES



207 VAC Y/64.1 AMP LINES

DETAIL C

SECONDARY TERMINAL



TECHNICAL DATA

FREQUENCY	60 Hz
PHASES	3
CLASS	AA
TEMPERATURE RISE	150°C
OUTPUT	23 KVA
PRIMARY	SEE DETAIL *A*
SECONDARY	SEE DETAIL *B*

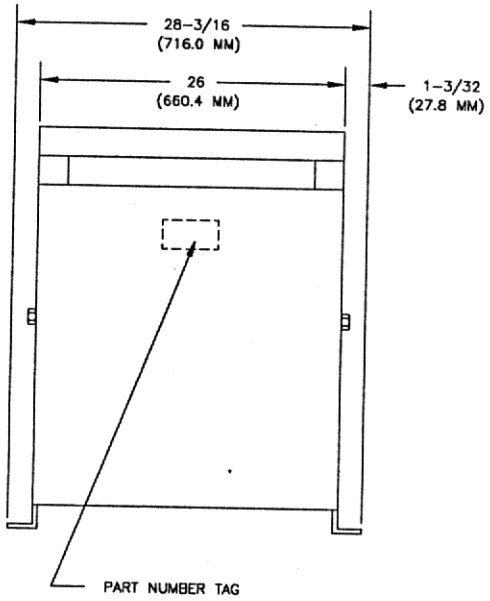
NOTES:

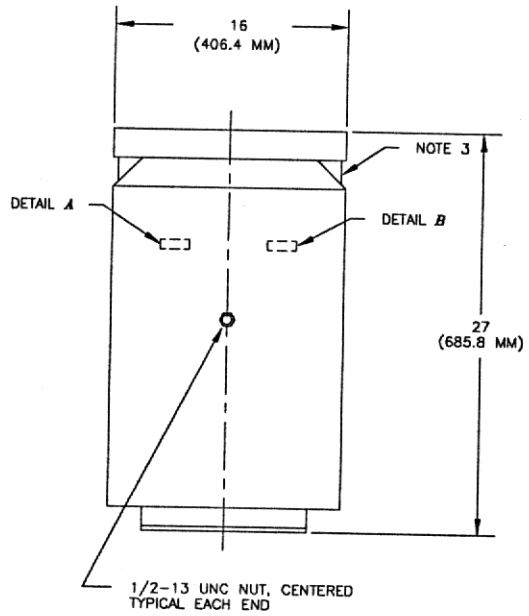
1. ALL DIMENSIONS GIVEN AS – INCHES (MILLIMETERS)
2. BREAK-DOWN ENCLOSURE; REMOVABLE TOP COVER, FRONT AND REAR PANEL
3. AMBIENT VENTILATION AT FRONT AND REAR
4. FINISH: PAINT GRAY, ANSI-70

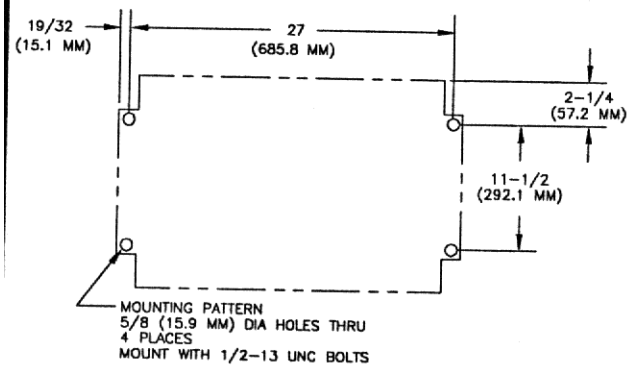
INDUSTRIAL INDEXING SYSTEMS, INC.

TOLERANCES (EXCEPT AS NOTED)	DRAWN BY: JTE	DATE: 11/7/89
	APPROVED:	DATE:
.XX ±.010	SCALE: NONE	TITLE: TRANSFORMER
.XXX ±.005	SHEET NO.: 1 OF 1	DRAWING NO.: TE-300/58-3
ANGULAR ±30'		

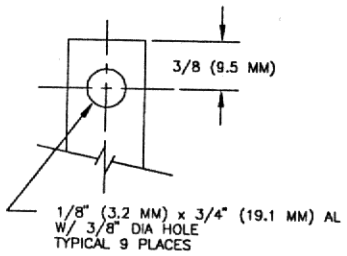
DATE	SYM	REVISION RECORD	DRN	CHK



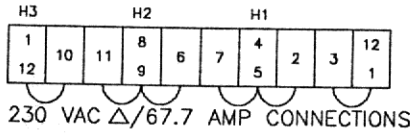




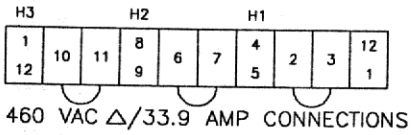
DETAIL C
SECONDARY TERMINAL



DETAIL A
WIRING/PRIMARY TERMINALS

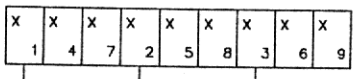


230 VAC △/67.7 AMP CONNECTIONS

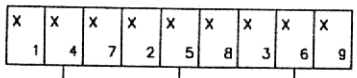


460 VAC △/33.9 AMP CONNECTIONS

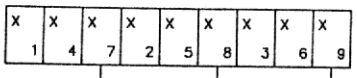
DETAIL B
WIRING/SECONDARY TERMINALS
(SEE DETAIL *C* /TERMINAL DIMENSIONS)



253 VAC Y/61.6 AMP LINES



230 VAC Y/67.8 AMP LINES



207 VAC Y/75.3 AMP LINES

TECHNICAL DATA

FREQUENCY	60 Hz
PHASES	3
CLASS	AA
TEMPERATURE RISE	150°C
OUTPUT	27 KVA
PRIMARY	SEE DETAIL *A*
SECONDARY	SEE DETAIL *B*

NOTES:

1. ALL DIMENSIONS GIVEN AS – INCHES (MILLIMETERS)
2. BREAK-DOWN ENCLOSURE; REMOVABLE TOP COVER, FRONT AND REAR PANEL
3. AMBIENT VENTILATION AT FRONT AND REAR
4. FINISH: PAINT GRAY, ANSI-70

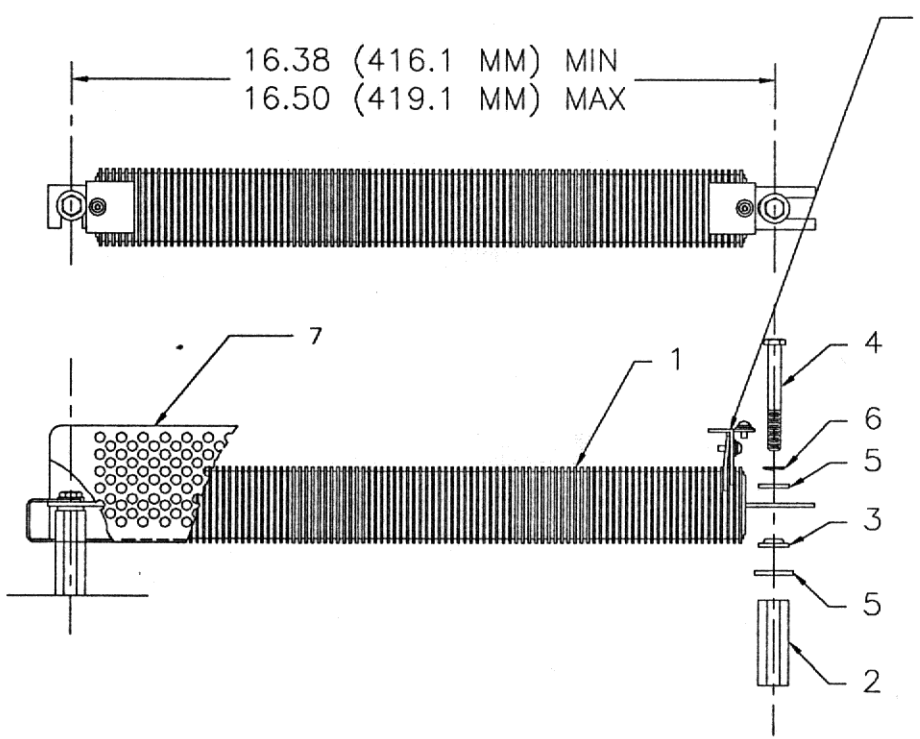
INDUSTRIAL INDEXING SYSTEMS, INC.

TOLERANCES (EXCEPT AS NOTED)	DRAWN BY: JTE	DATE: 11/7/89
	APPROVED:	DATE:
.XX ±.010	SCALE: NONE	TITLE: TRANSFORMER
.XXX ±.005	SHEET NO.: 1 OF 1	DRAWING NO.: TE-300/75-3
ANGULAR ±30'		

APPENDIX J
REGENERATION RESISTOR DIMENSIONS

DRAWING NUMBER	DESCRIPTION
AC-100024	Regeneration Resistor Kit
AC-100060	Regeneration Resistor Shield

DATE	SYM	REVISION RECORD	DRN	CHK



ITEM	DESCRIPTION	PART NUMBER	QUAN.
1	RESISTOR, 4.5 OHM	233-4-A	1
2	SPACER, 5/8"x 2"	AL-6356-31-2-22	2
3	WASHER, PHENOLIC	2744-50063-PH375	2
4	BOLT, HEX, PL	5/16"-18 UNC x 2-1/2"	2
5	WASHER, FLAT	3/8" x 7/8"	4
6	WASHER, SP, LK	5/16-SPLK	2
7	SHIELD	AC-100060	1

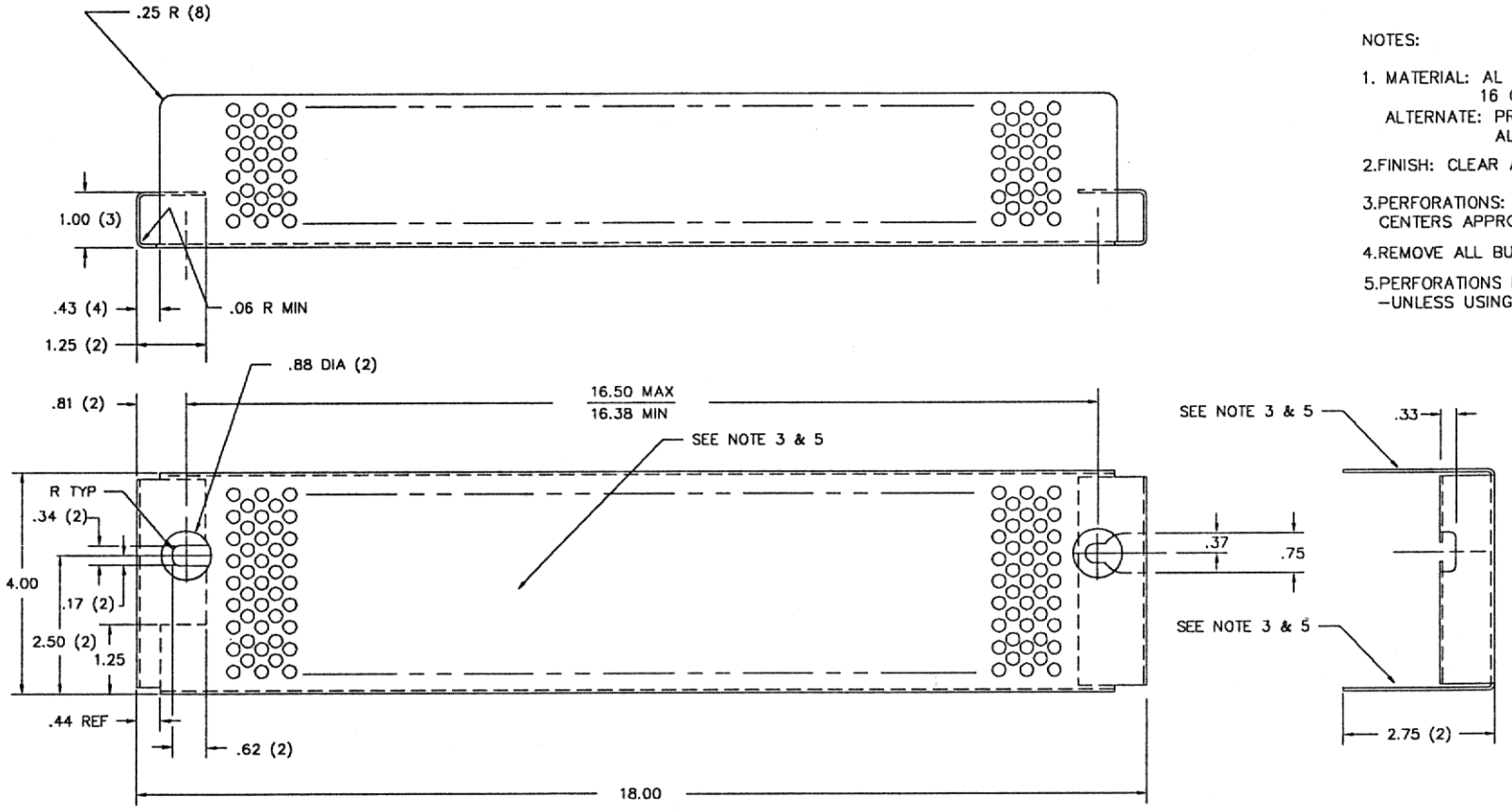
NOTES:

1. HARDWARE CONFIGURATION TYPICAL EACH END
2. RESISTOR, 4.5 OHM, ADJUSTABLE TERMINALS (29 AMP OR LESS)

INDUSTRIAL INDEXING SYSTEMS, INC.

TOLERANCES (EXCEPT AS NOTED)	DRAWN BY: JTE	DATE: 11/7/89
.XX ±.010	APPROVED:	DATE:
.XXX ±.005	SCALE: NONE	TITLE: REGENERATION RESISTOR KIT
ANGULAR ±30'	SHEET NO.: 1 OF 1	DRAWING NO.: AC-100024

DATE	SYM	REVISION RECORD	DRN	CHK



NOTES:

1. MATERIAL: AL ALY 5052-H32
   16 GA. (.050)
   ALTERNATE: PRE-PERFORATED
   AL-ALY 18 GA.
2. FINISH: CLEAR ANODIZE
3. PERFORATIONS: .25 DIA ON .38 CENTERS APPROX. (3 PLACES)
4. REMOVE ALL BURRS, BREAK SHARP EDGES.
5. PERFORATIONS REQUIRED IN THIS AREA -UNLESS USING PRE-PERFORATED MATERIAL.

INDUSTRIAL INDEXING SYSTEMS, INC.			
TOLERANCES (EXCEPT AS NOTED)	DRAWN BY: BAIER	DATE: 1/5/90	
.XX ±.010	APPROVED:	DATE:	
.XXX ±.005	SCALE: NONE	TITLE: SHIELD, REGEN RESISTOR	
ANGULAR ±30'	SHEET NO.: 1 OF 1	DRAWING NO.: AC-100060	

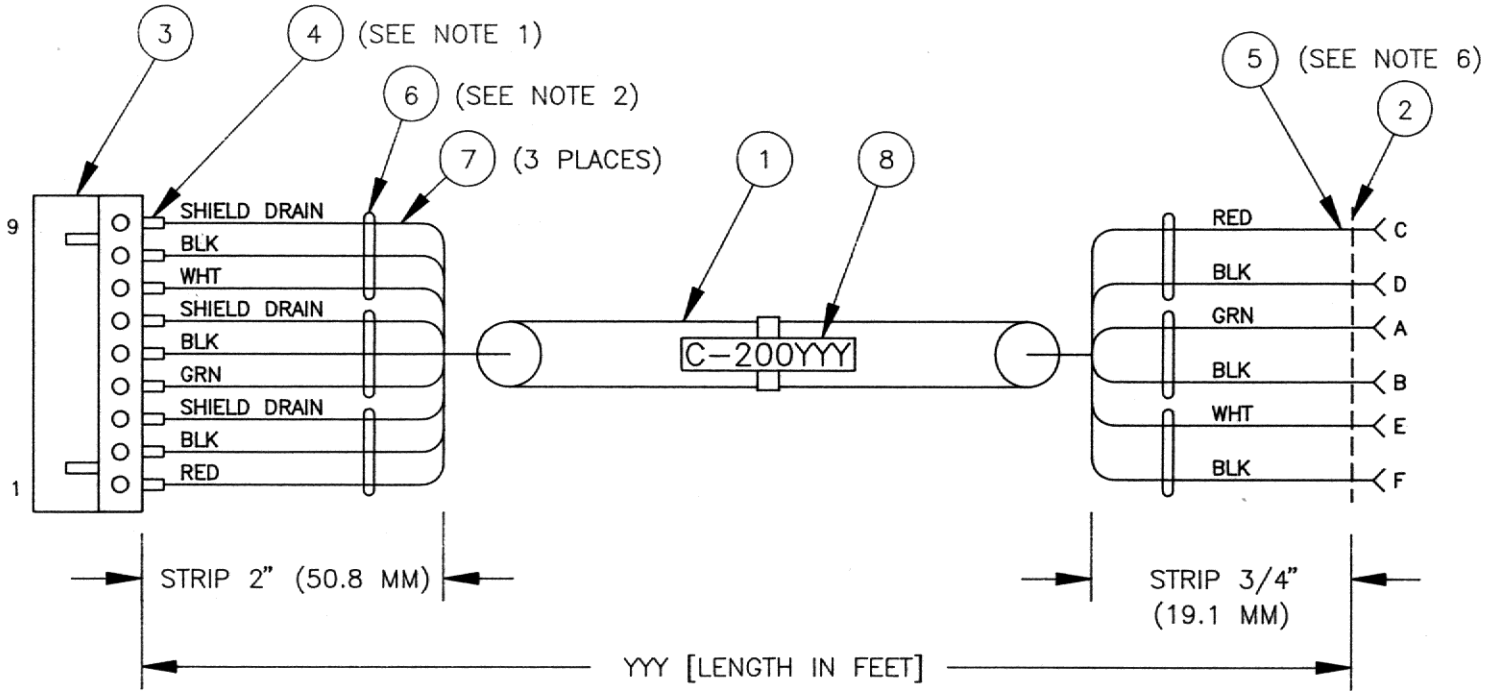
APPENDIX K
CONNECTING CABLES

DRAWING NUMBER	DESCRIPTION
C-200YYY	Resolver Cable
C-208YYY	Resolver Cable
C-220YYY	Resolver Cable
C-303YYY	Encoder Cable
C-437YYY	Command Cable
C-654YYY	Motor Cable

NOTES:

1. ALTERNATE CONSTRUCTION: STRIP AND TIN 1/4" (6.4 MM)
2. HEAT SHRINK TUBING [ITEM 6] OVER FOIL END (6 PLACES)
3. PIN NUMBERS SHOWN FOR REFERENCE ONLY
4. HEAT SHRINK TUBING [ITEM 6] OVER SPIDER JOINT (6 PLACES)
5. CRIMP FURRELS USING WEIDMULLER CRIMP TOOL PZ4 OF EQUIVALENT
6. HEAT SHRINK TUBING [ITEM 5] OVER SOLDER JOINT (6 PLACES)

DATE	SYM	REVISION RECORD	DR	CK	CK
3/6/89	D	ECN 89-0073	EB	CE	
6/21/93	E	ECN 93-131	EB	WJ	



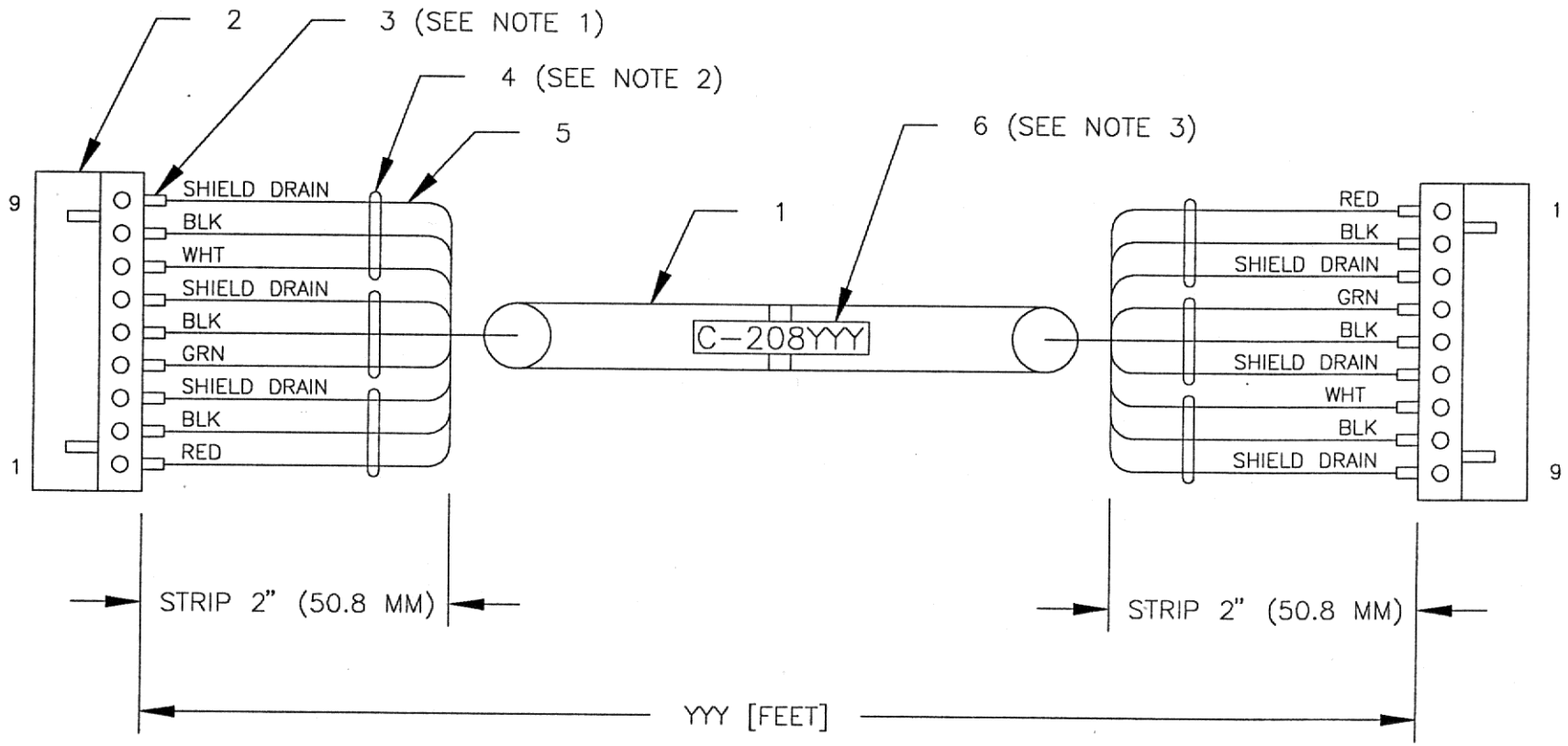
INDUSTRIAL INDEXING SYSTEMS, Inc.
626 FISHERS RUN
VICTOR, NEW YORK 14564
(716) 924-9181 FAX: (716) 924-2169

CHECKED BY: E. BAIER — DATE: 3/6/89	
APPROVED BY: C.M.E. — DATE: 3/7/89	
APPROVED BY: — DATE:	
MATERIAL: ----------	
FINISH: ----------	

TITLE: CABLE, RESOLVER

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE INCHES (mm)	DRAWN BY: BAIER		DRAWING NUMBER: C-200YYY
TOLERANCES: X.X± ---- / X.XX± .01 / X.XXX± .005 — ANGULAR ± ---	AutoCAD FILE LOCATION		
	B — DATE: 6/21/93	SCALE: ----	SHEET NO.: 1 OF 1 — REVISION: E

DATE	SYM	REVISION RECORD	DRN	CHK



NOTES:

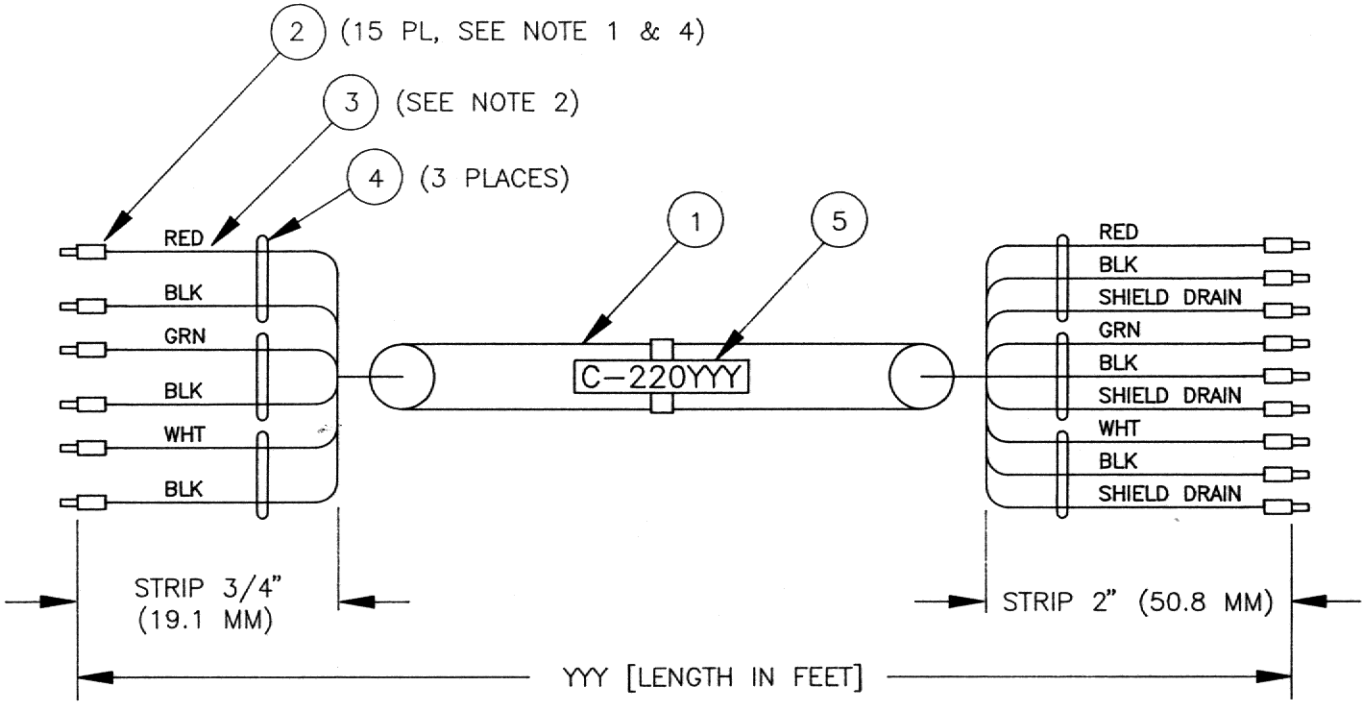
1. ALTERNATE CONSTRUCTION: STRIP AND TIN 1/4" (6.4 MM)
2. HEAT SHRINK TUBING OVER FOIL END (6 PLACES)
3. PIN NUMBERS SHOWN FOR REFERENCE ONLY
4. CRIMP FURRELS USING WEIDMULLER CRIMP TOOL PZ4 OR EQUIVALENT

INDUSTRIAL INDEXING SYSTEMS, INC.		
TOLERANCES (EXCEPT AS NOTED)	DRAWN BY: JTE	DATE: 11/8/89
	APPROVED:	DATE:
.XX ±.010	SCALE: NONE	TITLE: CABLE, RESOLVER
.XXX ±.005	SHEET NO.: 1 OF 1	DRAWING NO.: C-208YYY
ANGULAR ±30'		

NOTES:

1. ALTERNATE CONSTRUCTION: STRIP AND TIN 1/4" (6.4 MM)
2. HEAT SHRINK TUBING [ITEM 3] OVER FOIL END (6 PLACES)
3. HEAT SHRINK TUBING [ITEM 3] OVER SPIDER JOINT (6 PLACES)
4. CRIMP FURRELS USING WEIDMULLER CRIMP TOOL PZ4 OF EQUIVALENT

DATE	SYM	REVISION RECORD	DR	CK	CK
6/29/93	A	ECN 93-131	DAD	WJS	



INDUSTRIAL INDEXING SYSTEMS, Inc.
626 FISHERS RUN
VICTOR, NEW YORK 14564
(716) 924-9181 FAX: (716) 924-2169

CHECKED BY	DATE
APPROVED BY ELS	DATE 01/86
APPROVED BY	DATE
MATERIAL ----------	
FINISH ----------	

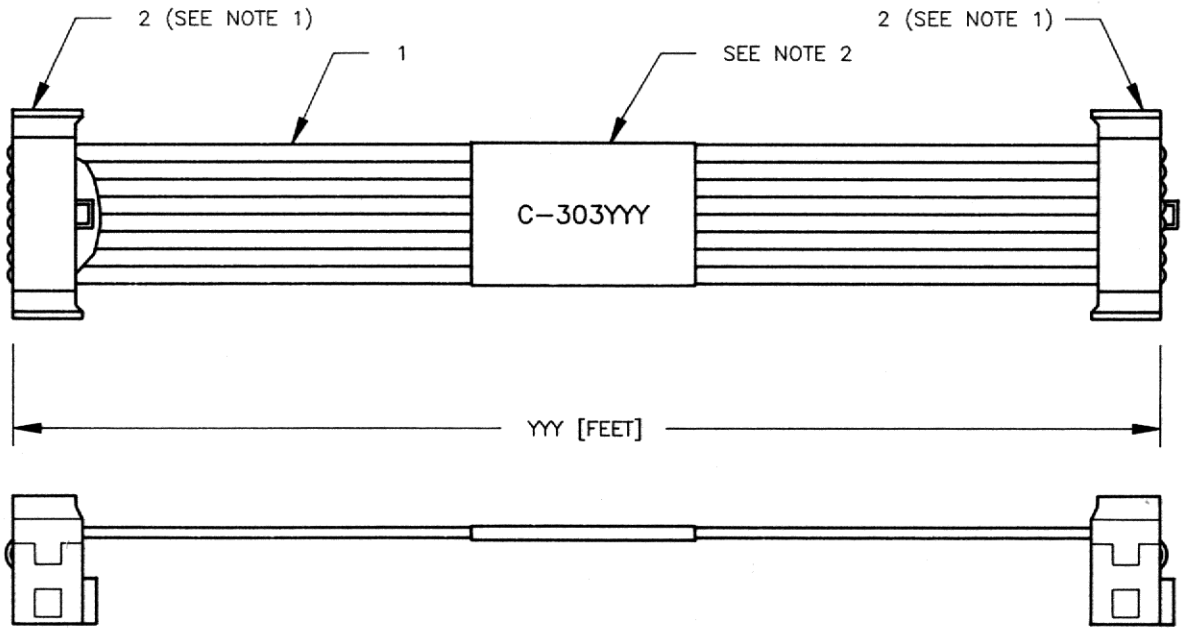
TITLE: CABLE, RESOLVER

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE INCHES (mm)	DRAWN BY DAD		DRAWING NUMBER C-220YYY
TOLERANCES	AutoCAD FILE LOCATION		
X.X± ---- X.XX± .01 X.XXX± .005 ANGULAR ± --	B	DATE 01/30/86 SCALE ---	SHEET NO. 1 OF 1 REVISION A

NOTES:

1. INSTALL ITEM 2 USING ROBINSON NUGENT CABLING TOOL CT–1 OR EQUIVALENT
2. MARK CABLE NUMBER IN AREA SHOWN USING PERMANENT INK MARKER OF EQUIVALENT

DATE	SYM	REVISION RECORD	DR	CK	CK
5/89	A	ECN 89–0107	EB	CE	
8/89	B	ECN 89–0022	DD	CE	
6/93	C	ECN 93–131	EB	WEJ	



INDUSTRIAL INDEXING SYSTEMS, Inc.
626 FISHERS RUN
VICTOR, NEW YORK 14564
(716) 924–9181 FAX: (716) 924–2169

CHECKED BY	DATE
APPROVED BY WEJ	DATE 7/21/93
APPROVED BY	DATE
MATERIAL ----------	
FINISH ----------	

TITLE: CABLE, ENCODER

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE INCHES (mm)

TOLERANCES: X.X± ---- ; X.XX± 0.01 ; X.XXX± 0.005 ; ANGULAR ± --

DRAWN BY: BAIER

AutoCAD FILE LOCATION: G:\CABLES\

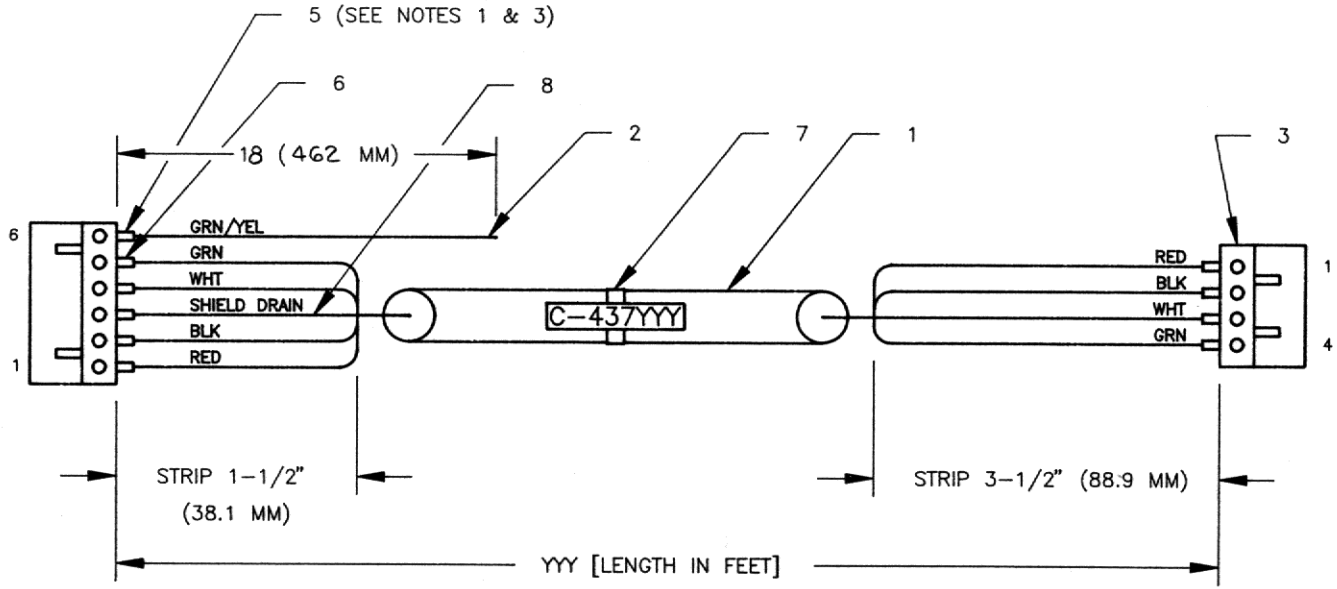
DRAWING NUMBER: C–303YYY

B	DATE	SCALE	SHEET NO.	REVISION
	6/21/93	----	1 OF 1	C

NOTES:

1. ALTERNATE CONSTRUCTION: STRIP AND TIN 1/4" (6.4 MM)
2. PIN NUMBERS SHOWN FOR REFERENCE ONLY
3. CRIMP FURRELS USING WEIDMULLER
   CRIMP TOOL PZ4 OR EQUIVALENT

DATE	SYM	REVISION RECORD	DR	CK	CK
3/27/89	0	ECN 89-0075	EB	CE	
6/23/93	A	ECN 93-131	EB	WC	



INDUSTRIAL INDEXING SYSTEMS, Inc.
626 FISHERS RUN
VICTOR, NEW YORK 14564
(716) 924-9181 FAX: (716) 924-2169

CHECKED BY: E.BAIER	DATE: 3/89
APPROVED BY: C.M.E.	DATE: 3/89
APPROVED BY: WC	DATE: 7/21/93
MATERIAL: ----------	
FINISH: ----------	

TITLE: CABLE, COMMAND

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE INCHES (mm)

TOLERANCES: X.X± ---- ; X.XX± 0.05 ; X.XXX± 0.001 ; ANGULAR ± ---

DRAWN BY: BAIER

AutoCAD FILE LOCATION: G:\CAD\CABLES\

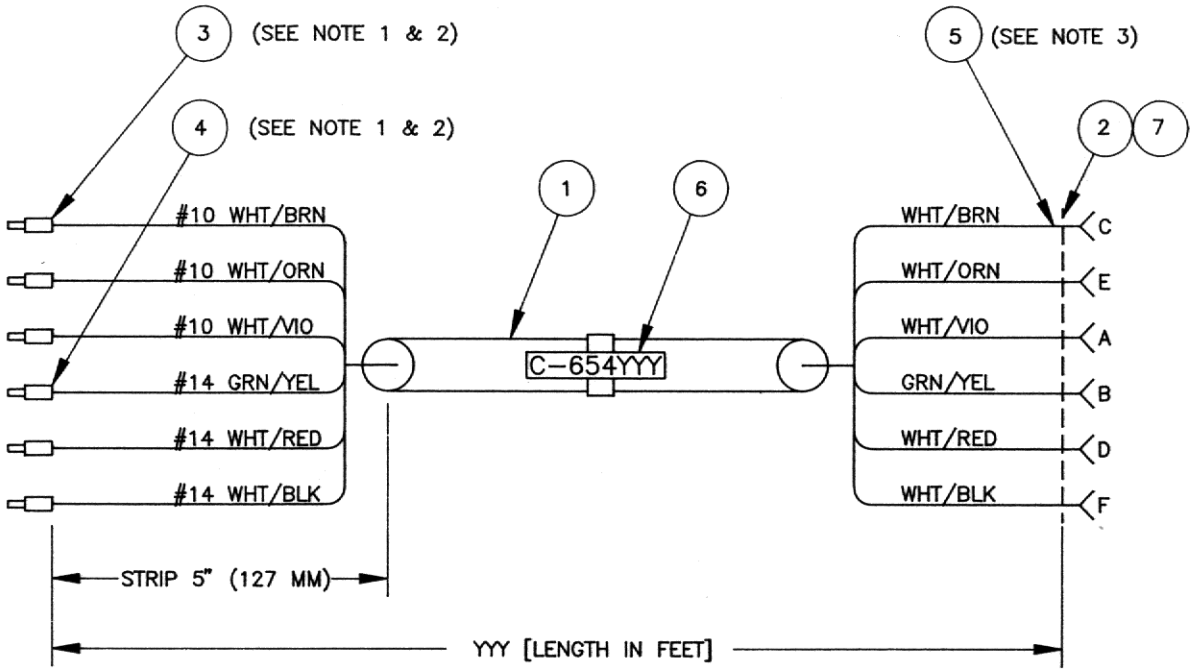
DRAWING NUMBER: C-437YYY

B | DATE: 6/23/93 | SCALE: ---- | SHEET NO.: 1 OF 1 | REVISION: B

NOTES:

1. INSTALL ITEM 2 USING WEIDMULLER CRIMP TOOL PZ–4 OR EQUIVALENT
2. ALTERNATE CONSTRUCTION; STRIP AND TIN 1/4"
3. HEAT SHRINK TUBING (ITEM 5) OVER SOLDER JOINT

DATE	SYM	REVISION RECORD	DR	CK	CK
11/88	A	ECN 88–0188	RT	EB	
8/90	B	ECN 89–0194	MFE	EB	JC
6/93	C	ECN 93–131	EB	[illegible]	



INDUSTRIAL INDEXING SYSTEMS, Inc.
626 FISHERS RUN
VICTOR, NEW YORK 14564
(716) 924–9181 FAX: (716) 924–2169

CHECKED BY: E. BAIER	DATE: 9/4/90
APPROVED BY: J.C.	DATE: 9/4/90
APPROVED BY:	DATE:
MATERIAL: ----------	
FINISH: ----------	

TITLE: CABLE, MOTOR

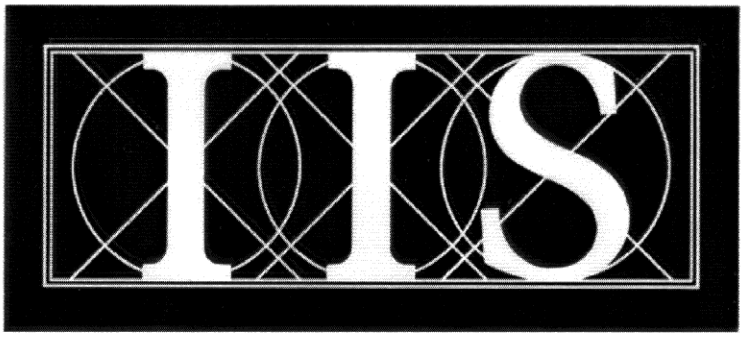
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE INCHES (mm)
TOLERANCES: X.X± ---- ; X.XX± 0.01 ; X.XXX± 0.005 ; ANGULAR ± ----

DRAWN BY: MIKE E.
AutoCAD FILE LOCATION: G:\CAD\CABLES\

B	DATE: 6/23/93	SCALE: ----	SHEET NO.: 1 OF 1	REVISION: C

DRAWING NUMBER: C–654YYY

IB-14B004



INDUSTRIAL INDEXING SYSTEMS INC.

626 FISHERS RUN
VICTOR, NEW YORK 14564

(585) 924-9181
FAX: (585) 924-2169

PRINTED IN USA