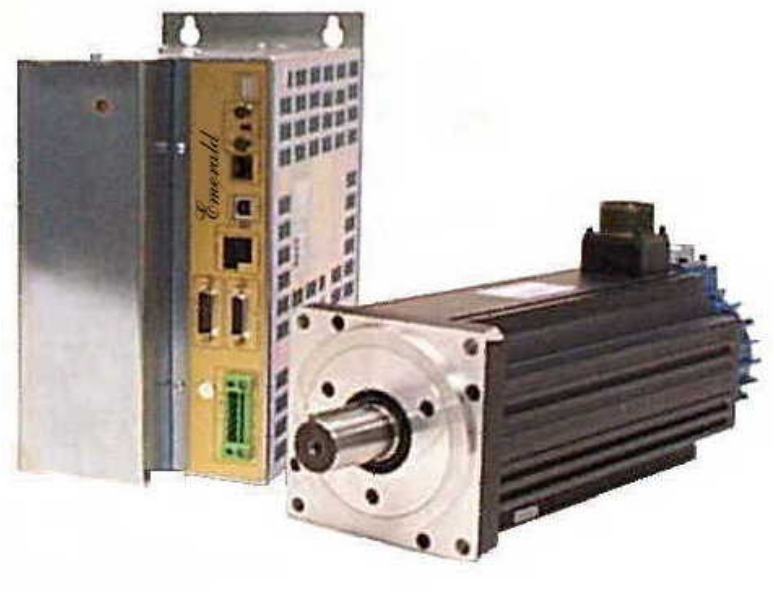
IB-21B001

EMERALD SERIES **JULY 2014**

Emerald



MOTORS & DRIVES

INSTRUCTION BOOK

INDUSTRIAL INDEXING SYSTEMS, Inc.

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Notes:

1) Section 7, Page 7-3 dated November 2014, supersedes Section 7, Page 7-3 dated April 2009.

2) Section 2, Page 2-1 dated January 2017, supersedes Section 2, Page 2-1 dated July 2014.

3) Appendix A, motor drawings ESM125, ESM145 and ESM190, dated November 2018, supersedes Appendix A, motor drawings ESM125, ESM145 and ESM190, dated July 2014.

4) Section 6, Page 6-1 dated October 2022, supersedes Section 6, Page 6-1 dated July 2014.

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INTRODUCTION

Thank you for selecting Industrial Indexing Systems' Emerald Series products. You join many other companies around the world in your choice of these powerful, flexible motion control products.

The Emerald Driver can be configured by the user to operate as a Single Axis Driver /Controller combination (CONTROLLER Mode) or as a Slave Device connected to a SERCOS Interface[TM1] Master controller (SERCOS Mode).

The design of the Emerald Drivers combine the latest in all-digital electronic design, SMT circuit board construction and clever engineering to deliver high performance, advanced features and reasonable cost. Compact, high power density motors provide low rotor inertia, making them the logical choice for positioning and indexing applications.

Emerald Drivers have a wide array of features, including a powerful embedded high speed 32-bit 150 MHz Digital Signal Processor, high visibility 7-segment LED Status display, Support for Analog and Digital I/0, programmable limit switches, S-curve profiling, fault history log and many more. Dozens of operational parameters can be programmed. Utilizing Emerald's Windows based PC software tools, allows quick set-up for a full range of diagnostics and PC oscilloscope functions to display speed and current waveforms and most any other diagnostic data the user may need.

NRTL Certification

The Emerald drive series has been evaluated by TUV SUD AMERICA INC. to the standards of UL508C, CSA C22.2.14 and CE EN61326.

Reference materials for the Emerald Series of Motion Control Systems:

IB-20B004	EMC-2005 Emerald Multi-Axis Controller
HPB Catalog	Additional Motor Specifications
EDE	Emerald Software Development Tools
EDrive	Diagnostic Tools
SMA2000	Servo Mechanical Analysis

[1] SERCOS Interface is a trademark of Interest Groups SERCOS

SECTION 1 - INSTALLATION AND SAFETY

NRTL Certification

The Emerald drive series has been evaluated by TUV SUD AMERICA INC. to the standards of UL508C, CSA C22.2.14 and CE EN61326.

Definition - Within this document will be the phrase "MAIN BUS POWER SUPPLY". This phrase is to define the AC power as 220V AC +/-20% or 440V AC +/-20%, see **Section 4.1.2** for further details.

WHEN INSTALLING AN EMERALD SERVO DRIVE FOR THE FIRST TIME OR REPLACING AN EXISTING DRIVE ALWAYS FOLLOW BOTH SECTIONS 1.1.4 AND 1.2.

1.1 INSTALLING THE EMERALD SERVO DRIVE

When installing the Emerald servo drive into an enclosure you should follow the guidelines below. First consider what regulatory directives you should follow, such as UL, TUV, CE or other regulatory agencies, see **Sections 1.1.1 and 1.1.2**. Then select the electrical enclosure best suited for the system components, power dissipation in the electrical enclosure, and regulatory approvals. If you need any assistance with the installation of the Emerald servo drive or would like a quote for a full enclosure assembly, please contact INDUSTRIAL INDEXING SYSTEMS INC. When laying out the wiring of the electrical enclosure, be sure to route the wiring as explained in **1.1.3** and to keep in mind regulatory requirements. Before applying power to the system, follow all checks listed in **Section 1.1.4** and then follow the first time system power procedure in **Section 1.2**.

If you are replacing a drive in an existing electrical enclosure with an Emerald servo drive, make sure you read through and follow all precautions and wiring requirements for the Emerald servo drive. Always follow the first time system power up procedure after the installation of a new drive, even if the Emerald drive you just installed was replacing an existing Emerald servo drive, see **Section 1.2.1**.

THE EMERALD SERVO DRIVE IS A HIGH LEAKAGE CURRENT DEVICE. MAKE SURE THAT THE EARTH GROUND IS ATTACHED PROPERLY AS DESCRIBED IN SECTION 5.1.

1.1.1 REGULATORY AGENCY INSTALLATIONS

To comply with the agency approvals for electrical enclosure installation, you must follow all wiring guidelines, install proper safety devices, and follow all labeling requirements for the regulatory agency of your choice. See **Section 1.3.1** for more details. For CE applications you must add noise suppression components as described in **Section 1.3.1**.

1.1.2 CHOOSING AN ELECTRICAL ENCLOSURE

If your installation requires CE approval, you must have a NEMA12 or IEC6 electrical enclosure with RF shielded gasketing. Make sure the electrical enclosure you choose has the appropriate agency approvals for use. Using the information provided in **Sections 4.1.2, 5.3.1**, and the average running motor(s) current, find the power loss of the drive system. Add the power loss of the Emerald servo drive system with all other components to come up with a full system power loss. Then using the information provided by the electrical enclosure manufacturer, derive the ambient temperature rise inside the electrical enclosure. Determine if you will need a cooling system for the electrical enclosure by keeping the temperature inside the electrical enclosure below 55 Degrees C in the final installation environment. If a cooling system is required be sure to use air filtration devices to keep dust, water vapors, or other contaminates from accumulating in the electrical enclosure.

1.1.3 EMERALD SERVO DRIVE AND REGEN RESISTOR MOUNTING

WHEN DRILLING, TAPPING, CUTTING, WELDING, OR OTHER ACTIVITY THAT MAY CAUSE METAL DEBRIS, THE EMERALD SERVO DRIVE SHALL BE REMOVED FROM THE ELECTRICAL ENCLOSURE. THE EMERALD SERVO DRIVE IS OF OPEN TYPE CONSTRUCTION AND FOREIGN MATTER COULD LODGE INTO THE CIRCUITRY OF THE UNIT.

When mounting the Emerald servo drive in the electrical enclosure, always mount the drive upright in the horizontal position. Always leave at least 1 inch of space between the Emerald servo drive and any other component. Tighten all mounting screws to the specified mounting torque using proper grounding methods to tie the Emerald servo drive case to earth ground. When routing the wiring in the electrical enclosure, be sure to follow proper codes, bending radii, wire gauge and separation of voltages.

When installing a Regen resistor, mount it in a location where there is free access to airflow and no flammable material is near the Regen resistor. Never mount the Regen resistor closer than 6 inches from any other device. Doing so can cause undo temperature rise to other components and impede airflow to the Regen resistor.

1.1.4 FINAL CHECKS PRIOR TO APPLYING POWER

FAILURE TO COMPLY WITH ANY OF THE PROCEEDING INFORMATION MAY CAUSE INJURY OR DEATH TO PERSONNEL OR CAUSE DAMAGE TO THE EQUIPMENT.

1) Verify you have fuses or circuit breakers in line with each Emerald servo drive in accordance with **Section 5.2.1**. Also verify if the wiring of the contactor, if one is installed, with the information in **Section 5.2.2**.

2) Verify the 24V power supply connected to the Emerald servo drive is a class 2 power supply capable of delivering not more than 10A continuous and is used for powering Emerald servo drives, Emerald controllers, and ESD-I/O16 control power only. Any I/O that drives relays, contactors, or high current devices should be powered by a separate 24V power supply. Verify the 24V power supply connected to the Emerald servo drive is connected as shown in **Section 5, Figure 5.1**.

1.1.4 FINAL CHECKS PRIOR TO APPLYING POWER (cont'd)

3) Verify the wiring to the Emerald servo drive main bus power input connector meets **Section 5, Figure 5.1** and the correct voltages and wire gauges are used. Verify the Emerald servo drive main bus power supply is wired in accordance with the information in **Sections 4.1.2 and 5.2.3**. If a transformer is used, verify it meets the information described in **Section 5.2.4**. It is recommended to use line filters of type SHAFFNER FN258-55-07 or equivalent.

CAUTION - LINE FILTERS HAVE HIGH LEAKAGE CURRENTS. THEY MUST BE PROPERLY CONNECTED TO EARTH GROUND.

CAUTION - FIRE COULD RESULT IF THE REGEN RESISTOR IS MOUNTED NEAR ANY FLAMMABLE MATERIAL.

4) If an external Regen resistor is used, verify it is mounted away from any flammable material and is wired to the Emerald servo drive in accordance with **Section 5, Figure 5.1**. Also verify the Regen resistor is mounted at least 6 inches away from any other components as described in **Section 1.1.3**.

5) Verify wiring of the electrical enclosure maintains separation of voltages. This will keep EMI from entering on to a low voltage cable. If EMI is present on a low voltage cable, it could cause intermittent operation of the Emerald servo drive.

NEVER DISABLE ANY SAFETY DEVICE IN THE SYSTEM FOR ANY REASON. INDUSTRIAL INDEXING SYSTEMS INC. CANNOT BE RESPONSIBLE FOR ANY PRACTICES NOT COMPLYING WITH THIS MANUAL, SAFETY PROCEDURES OUTLINED BY A REGULATORY AGENCY, AND/OR YOUR COMPANIES SAFETY GUIDE LINES AND PROCEDURES.

6) Verify all ESTOPS and protective devices are installed and properly wired both inside and outside of the electrical enclosure.

SOME APPLICATIONS MAY REQUIRE A CONTACTOR BETWEEN THE EMERALD SERVO DRIVE AND THE MOTOR. TO DETERMINE IF THIS IS SO, CONTACT YOUR LOCAL SAFETY REGULATORY AGENCY. IF THIS CONTACTOR IS UTILIZED, PRECAUTIONS MUST BE MADE TO ASSURE THAT THE DRIVE IS DISABLED BEFORE OPENING THE CONTACTOR OR THE MOTOR INDUCTANCE WILL CAUSE HIGH VOLTAGE ARCING IN THE CONTACTOR POSSIBLY DAMAGING THE CONTACTOR AND THE EMERALD SERVO DRIVE.

7) All cables with internal shield shall have the shield connected to the electrical enclosure case. The electrical enclosure case shall be tied to earth ground. To tie the cables shield to the electrical enclosure, a small portion of the cable jacket is removed which exposes the shield braid. The shield braid shall be clamped to a conductive harness, which is then properly secured to the electrical enclosure.

1.2 POWERING UP AN EMERALD SERVO DRIVE FOR THE FIRST TIME

DANGER - HIGH VOLTAGE EXISTS WITHIN THE DRIVE AND ON THE REGEN RESISTOR CONNECTOR FOR 5 MINUTES AFTER AC POWER IS REMOVED.

CAUTION - NEVER APPLY MAIN BUS POWER SUPPLY UNTIL ALL CHECKS FOR PROGRAM AND ALARM CONDITIONS HAVE BEEN MADE.

1.2.1 STEPS TO FIRST TIME POWER UP

CAUTION - Whether you are using an Emerald controller or have the Emerald servo drive in controller mode, NEVER assume the controller has no program loaded into it. If the controller has an unknown program loaded and the MAIN BUS POWER SUPPLY is applied to the system, the motor could move in an unexpected manner.

1) Check switch settings on the Emerald servo drive. See **Section 6.1** for more details.

2) Apply 24V power to the system and connect a computer to the Emerald controller or the Emerald servo drive in controller mode with the EDE tools. Verify the program loaded is correct for your system. If not, down load the correct program now. If your Emerald controller has a boot loader option card installed, you may use the memory card preloaded with the appropriate program to load the controller. See **IB-20B004** for more details.

3) EMERALD SERVO DRIVE IN CONTROLLER MODE.
Verify the Emerald servo drive has an "A" in the status display and is not flashing any fault codes. If a fault code is flashing on the Emerald servo drive, see **Section 7** of this manual. DO NOT CONTINUE THE POWER UP PROCEDURE IF THE EMERALD SERVO DRIVE IS SHOWING A FAULT CODE.

4) EMERALD SERVO DRIVES WITH AN EMERALD CONTROLLER.
Verify the Emerald controller has an "A" in the status display. Also verify the Sercos status LED's on the Emerald controller is indicating "Phase 4" and is solid on. On the Emerald servo drive, verify the status display is showing a "4" and is not flashing any other codes. If a fault code is flashing on the Emerald servo drive, see **Section 7** of this manual.
DO NOT CONTINUE THE POWER UP PROCEDURE IF THE EMERALD SERVO DRIVE OR EMERALD CONTROLLER IS SHOWING A FAULT CODE.

5) If you removed any fuses earlier to disable the MAIN BUS POWER SUPPLY source, then remove all power from the electrical enclosure and replace the fuses now. Then turn on any ESTOPS or circuit breakers to enable the MAIN BUS POWER SUPPLY to the Emerald servo drive. Verify the amber bus indicator on the Emerald servo drive is lit. If the amber bus indicator is not lit, check to see if one or more safety criteria are not met. If all safety requirements have been met and the amber bus indicator is still not lit, then contact INDUSTRIAL INDEXING SYSTEMS INC.

6) You are now ready to use you Emerald servo drive.

1.3 BUILDING AN ELECTRICAL ENCLOSURE FOR AGENCY APPROVAL

1.3.1 BUILDING AN ELECTRICAL ENCLOSURE FOR CE

For the electrical enclosure to meet CE specifications there are a few additions that must be made to the electrical enclosure bill of material.

1) The electrical enclosure must be of type NEMA12 or IP6X and have RF shielded gasketing.

2) A line filter of type SHAFFNER FN258-55-07 or equivalent must be installed on the MAIN BUS POWER SUPPLY inlet.

3) A main line transformer must be installed supplying the electrical enclosure with MAIN BUS POWER SUPPLY.

4) A ferrite core must be placed around the wires of U, V, and W of the motor cable at the Emerald servo drive side of part number 0431176451 from FAIR-RITE corporation or equivalent.

5) The motor cable must be a shielded cable of part number EAC-XYZMMM or equivalent where "Z" must be of selection E, F, H, or J. See documentation on armature cables series EAC for further details.

6) The 24V power supply for the Emerald servo drive control power must be of a linear type. This will ensure any momentary dropout of main supply voltages do not interrupt the Emerald servo drives control power.

SECTION 2 - OVERVIEW

This manual is organized so that information is easy to find and easy to use. It begins by detailing how to identify the basic electrical characteristics of Emerald Drivers and Emerald Motors (See **Appendix A**), and provides comprehensive product specifications.

Drive configuration and programming is detailed, followed by a comprehensive list of drive fault and status information with trouble shooting remedies. Sections on power and driver wiring, and regen resistor selection follow. A driver/motor tuning overview is included to help with setting up the driver.

2.1 IDENTIFYING EMERALD DRIVES

Emerald Drivers can be identified as follows. This information is on the Driver label:

Your Emerald Driver model number uses this designation:

ESD-XX/YZMO,

WHERE:

XX = Continuous Driver Current in amps (rms)
- 5 = 5 Amps
- 10 = 10 Amps
- 20 = 20 Amps
- 25 = 25 Amps
- 40 = 40 Amps
- 50 = 50 Amps
- 60 = 60 Amps

Y = input voltage:
- A = 220 VAC input (3∅ input voltage, 1∅/3∅ ESD-5/AXX only)
- C = 440 VAC input (3∅ input voltage)

Z = feedback method:
- E = Encoder Feedback

M = mechanical variations:
- P = Panel Mount

O = option card:
- (Blank) = No option card
- R = Resolver Option (Consult factory)
- A = Analog I/O

Example: An Emerald Driver designated ESD-10/AEP has a continuous current rating of 10 Amp rms, 220 VAC 3∅ input voltage, encoder feedback, and Panel Mount Construction.

2.2 IDENTIFYING EMERALD MOTORS

Emerald Motors can be identified in one of two ways. This information is on the motor label.

METHOD I

Your Emerald Motor model number uses this designation:

ESMXXX-WWWW/YYZM

WHERE:

XXX = Flange size in millimeters

WWWW = Rated Power in watts

YY = Rated Speed/100 (truncated to 2 digits)

Z = Feedback Type
E=Encoder (ABZUVW)

M = Mechanical Variations (Left blank means no modifications to standard motor).
F=Fan over cooled

Example: An Emerald Motor designated ESM130-1800/34E is a 130 mm flange 1800-watt motor with a 3400 rpm rated speed and encoder feedback.

METHOD II

Your Emerald Motor model number uses this designation:

ESMXXXY(W)-M

WHERE:

XXX = Flange size in millimeters

Y = Stack length A, B, C, etc

W = Winding selection (Left blank if only one winding available)

M = Mechanical Variations (Left blank means no modifications to standard motor).
C = Connectors on motors that come standard with flying leads

Example: A Emerald Motor designated ESM120C(I) is a 120 mm flange motor. Is a 3-stack motor for this flange size and utilizes a low voltage winding.

SECTION 3 - DESCRIPTION

The Emerald Driver can operate as a SERCOS Interface compatible servo drive (SERCOS Mode) or as a standalone single axis controller /drive (CONTROLLER Mode). In either mode of operation, access can be made to a wide variety of hardware features.

The external connections that exist on the Emerald are shown in **Figure 3.1**, and consist of 1 RS-232 port, 1 USB port, I/O BUS interface, SERCOS Fiber Optic Transmitter and Receiver, as well as motor, encoder, and power connections. The Emerald drive also has a +/-10V analog input and general purpose PWM based analog output.

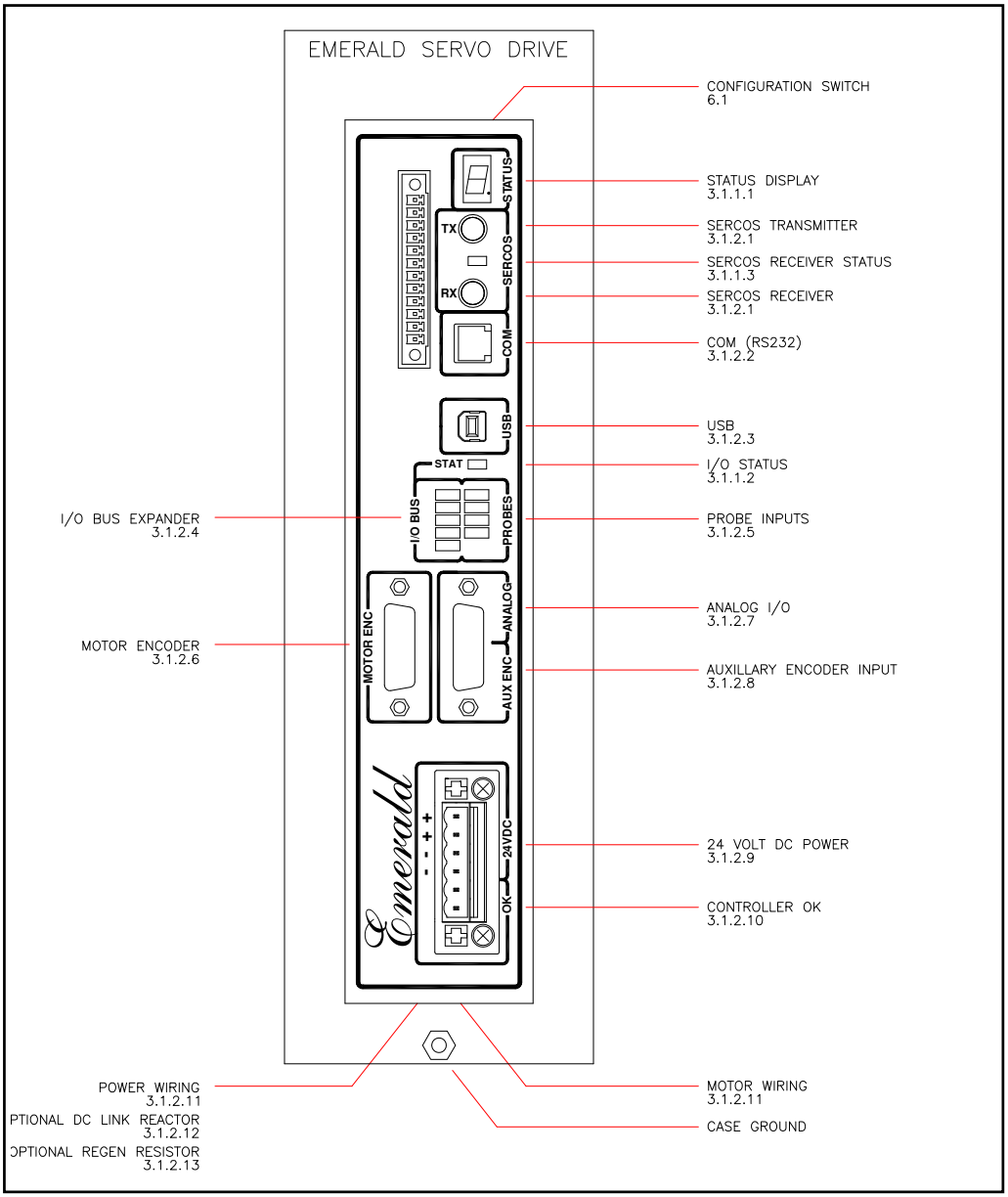


Figure 3.1 - Emerald Layout

3.1 COMPONENTS

3.1.1 STATUS INDICATORS

1. **STATUS** - This is a seven-segment display, which indicates the current status of the EMERALD driver. (See **Section 7.1)**

2. **I/O STATUS** - This is a bi-color LED that indicates the I/O BUS Expander Interface Status. (See **Section 7.3)**

3. **SERCOS RECEIVER STATUS** - This is a red LED that indicates that the SERCOS Fiber-optic receiver is detecting errors in transmitted data. (See **Section 7.4**)

3.1.2 CONNECTIONS

1. **SERCOS** - These fiber optic Transmitter/Receiver ports allow the drive to be interfaced to a SERCOS Master Controller when the drive is configured in SERCOS Mode (See **Section 4.1.6, 5.5 & Section 6.1**).

2. **COM** - This 6-pin RJ-11 connector is an RS-232 serial communication port. This port can be used to update the firmware in the drive, and to connect EDrive Diagnostic Tools. When configured in CONTROLLER mode (See **Section 6.1**), this port can be used to download CONTROLLER Application Programs. Also, this port can be configured in the CONTROLLER application as an application port. This allows the CONTROLLER to communicate directly to a wide variety of RS-232 devices including operator interfaces (See **Section 4.1.8**).

3. **USB** (USB-B connector) - This standard USB 2.0 device port allows a PC to communicate to the drive via serial to USB 2.0 driver available from IIS. This port can be used to update the firmware in the drive, and to connect EDrive Diagnostic Tools. When in CONTROLLER mode, this port can be used to download CONTROLLER Application Programs (See **Section 4.1.8**). Use standard USB A/B cable to connect to this port.

4. **I/O BUS EXPANDER** - Utilizes standard CAN hardware to interface the EMERALD driver to the ESD-IO16 input/output rack. This allows the EMERALD driver IO support of up to 2 ESD-IO16 racks with up to 32 I/O points utilizing industry standard I/O modules (See **Section 4.1.7 & Appendix B**).

5. **PROBE INPUTS** - High Speed Optically Isolated inputs that can be configured to trap the motor feedback position or the auxiliary encoder position (See **Section 4.1.10 & Section 5**).

6. **MOTOR ENCODER** - This is a 15 Pin Male D connector used for the encoder feedback from the motor to the drive (See **Section 4.1.9 & Section 5**).

7. **ANALOG I/O** - These pins allow connection to the Analog input and the PWM based analog output (See **Section 4.1.10 & Section 5**).

8. **AUXILIARY ENCODER** - Allows the connection of a second encoder input that can be read at the application level and used to implement Master/Slave axis functions in CONROLLER Mode (See **Section 4.1.9 & Section 5**).

9. **24 VOLT DC POWER** - Allows connection of the 24 VDC supply to power the drives control circuitry (See **Section 4.1.3 & Section 5.1**).

3.1.2 CONNECTIONS (cont'd)

10. **CONTROLLER OK** - A normally open dry contact that indicates the Drive is OK and ready to run when the contact is closed (See **Section 5**).

11. **MOTOR/POWER WIRING** - These are terminal blocks used to wire the incoming AC line voltage as well as the motor power cable (See **Section 5**).

12. **OPTIONAL DC LINK REACTOR** - Many of the drivers support the addition of a DC Link reactor to help with EMC noise suppression (See **Section 5.4**).

13. **OPTIONAL REGEN RESISTOR** - All of the drivers support the connection of external regeneration power resistors (See **Section 5.3**).

SECTION 4 - SPECIFICATIONS

4.1 DRIVER SPECIFICATIONS

Emerald Driver	ESD-5	ESD-10	ESD-20	ESD-25C	ESD-40	ESD-50C	ESD-60
Weight	7.7 lb 3.5 kg	11.2 lb 5.1 kg	13.6 lb 6.2 kg	13.6 lb 6.2 kg	19.1 lb 8.6 kg	29.9 lb 13.6 kg	29.9 lb 13.6 kg

TUV Approval	Evaluated to the standards of UL508C, CSA C22.2.14
CE Approval	Evaluated to the standard of En61326

4.1.1 MOTOR OUTPUT

Emerald Driver	ESD-5		ESD-10		ESD-20		ESD-25C		ESD-40		ESD-50C		ESD-60	
Motor Output	PWM, 3 Phase, sine wave		PWM, 3 Phase, sine wave		PWM, 3 Phase, sine wave		PWM, 3 Phase, sine wave		PWM, 3 Phase, sine wave		PWM, 3 Phase, sine wave		PWM, 3 Phase, sine wave	
Output Voltage	200 VRMS		200 VRMS		200 VRMS		400 VRMS		200 VRMS		400 VRMS		200 VRMS	
Speed (RPM)	6000		6000		6000		6000		6000		6000		6000	
PWM Frequency	8 KHz	16 KHz	8 KHz	16 KHz	8 KHz	16 KHz	4 KHz	8 KHz	8 KHz	16 KHz	4 KHz	8 KHz	8 KHz	16 KHz
Continuous Output Current	5 A rms	4 A rms	10 A rms	8 A rms	20 A rms	16 A rms	25 A rms	17.5 A rms	40 A rms	32 A rms	50 A rms	35 A rms	60 A rms	48 A rms
Maximum Output Current	12.5 A rms	10 A rms	25 A rms	20 A rms	50 A rms	40 A rms	50 A rms	35 A rms	100 A rms	80 A rms	100 A rms	70 A rms	120A rms	96 A rms

4.1.2 MAIN BUS POWER SUPPLY

Emerald Driver	ESD-5		ESD-10		ESD-20		ESD-25C		ESD-40		ESD-50C		ESD-60	
Main Bus Power Supply Voltage	3 Phase (1∅/3∅) Nominal: 220 VAC, Max Range: 170-264 VAC, 50/60 Hz		3 Phase (3∅) Nominal: 220 VAC, Max Range: 170-264 VAC, 50/60 Hz		3 Phase (3∅) Nominal: 220 VAC, Max Range: 170-264 VAC, 50/60 Hz		3 Phase (3∅) Nominal: 440 VAC, Max Range: 352-528 VAC, 50/60 Hz		3 Phase (3∅) Nominal: 220 VAC, Max Range: 170-264 VAC, 50/60 Hz		3 Phase (3∅) Nominal: 440 VAC, Max Range: 352-528 VAC, 50/60 Hz		3 Phase (3∅) Nominal: 220 VAC, Max Range: 170-264 VAC, 50/60 Hz	
Continuous Input Current	8.7 A/1∅ 5 A/3∅ rms		10 A Rms		20 A rms		25 A rms		40 A rms		50 A rms		60 A rms	
Max Inrush Current	55 A Rms		55 A Rms		20 A rms		22.5 A rms		40 A rms		33.7 A rms		63 A rms	
PWM Frequency	8 KHz	16 KHz	8 KHz	16 KHz	8 KHz	16 KHz	4 KHz	8 KHz	8 KHz	16 KHz	4 KHz	8 KHz	8 KHz	16 KHz
Main Circuit Heat Loss	40 Watts	45 Watts	75 Watts	85 Wats	140 Watts	155 Watts	300 Watts	330 Watts	300 Watts	330 Watts	450 Watts	510 Watts	450 Watts	510 Watts
Main Supply Capacity	1.9 KVA	1.5 KVA	3.8 KVA	3.0 KVA	7.6 KVA	6.1 KVA	19.1 KVA	13.3 KVA	15.2 KVA	12.2 KVA	38.1 KVA	26.7 KVA	22.9 KVA	18.3 KVA
Internal Regen Absorption Capacity	0 Watts	0 Watts	0 Watts	0 Watts	120 Watts	120 Watts	0 Watts	0 Watts	120 Watts	120 Watts	0 Watts	0 Watts	300 Watts	300 Watts
External Regen Absorption Capacity	2000 Watts	2000 Watts	4000 Watts	4000 Watts	8000 Watts	8000 Watts	20000 Watts	20000 Watts	16000 Watts	16000 Watts	40000 Watts	40000 Watts	24000 Watts	24000 Watts

4.1.3 CONTROL POWER SUPPLY

NOTE: The 24V power supply must be short circuit proof and must be able to deliver no more than 10A before shutting down.

Emerald Driver	ESD-5	ESD-10	ESD-20	ESD-25C	ESD-40	ESD-50C	ESD-60
Power Supply Voltage	24 VDC +/- 10%	24 VDC +/- 10%	24 VDC +/- 10%	24 VDC +/- 10%	24 VDC +/- 10%	24 VDC +/- 10%	24 VDC +/- 10%
Minimum Power Supply Current Requirements	0.5A	0.5A	1.0 A	1.5A	1.5A	1.5A	1.5A
Inrush Current	2A @ 100 ms	2A @ 100 ms	2A @ 100 ms	2.5A @ 100 ms	2.5A @ 100 ms	2.5A @ 100 ms	2.5A @ 100 ms
Control Circuit Heat Loss	12 Watts	12 Watts	24 Watts	36 Watts	36 Watts	36 Watts	36 Watts
Brown out protection	Can sustain up to a 5 mSec drop in 24 VDC power supply before shutting down.						

4.1.4 CONTROL PERFORMANCE

Feedback	Encoder - (ABZ plus UVW with 5V line driver)
Feedback Resolution	See motor/driver speed torque curves in **Appendix A** for encoder resolution**.**
Feedback Accuracy	Less than 2 arc minutes
Current Loop Update Rate	62.5 μsec
Velocity Loop Update Rate	250 μsec
Position Loop Update Rate	500 μsec
Speed Regulation	Load (0%-100%): ±0.02% Power (70-264 VAC): ±0.02% Temperature (0-55°C/32-131°F): ±0.2%
Torque Regulation	Power (170-264 VAC): ±2% Temperature (0-55°C/32-131°F): ±2%

4.1.5 ENVIRONMENT

Storage Temperature	-10 to 70°C/14-158°F
Operating Temperature	0 to 55°C/32-131°F
Humidity	35 to 90% Relative Humidity, non-condensing
Shock and Vibration	1 G or less
Operating Conditions	Free of dust, liquids, metallic particles and corrosive gases. Use in a pollution degree 2 environment.
Drive Enclosure	The drive is rated as "open type equipment" by Underwriters Laboratories, Inc.

4.1.6 SERCOS INTERFACE

Interface Version	V02.04
Topology	Multi drop fiber optic ring
Transmission Rate	16 MB/second

4.1.7 SERIAL I/O INTERFACE

Topology	Multi drop CAN Hardware
Protocol	IIS Can
Transmission Rate	500kbits/sec with 1mSec updates

4.1.8 COMMUNICATION PORTS

RS232	Up to 38400 bits/sec
USB	Version 2.0 Compliant

4.1.9 MOTOR/AUXILIARY ENCODER IINPUTS

A B Z U V W (motor encoder only)	On voltage: 5 VDC ± 5% at 20 ma Off voltage: 1 VDC ± 5% at 20 ma 2 MHz maximum frequency AB quadratured Optically isolated

4.1.10 PROBE INPUTS

Probe Input 1 Probe Input 2	24 VDC 5mA

4.1.11 ANALOG I/O SIGNALS

Analog Input	Maximum Input Voltage: ± 10 VDC Input Impedance: 274 kΩ A/D resolution: 1/4096 at ±10V (12 bit)
PWM Analog Output	PWM Output 0 to 15 volts 50mA maximum out PWM Duty Cycle Resolution: 1/9372 @ 8kHz 1/4686 @ 16kHz

4.1.12 PROTECTION

Fault Checks	Under Voltage, Over Voltage, Motor Short, Output Short, Feedback Loss, Regeneration Resistor Over Temperature and Malfunction, Driver Over Temperature, Following Error, Internal Watchdog Timer, Processor Diagnostics, Communications Errors

4.2 MOTOR SPECIFICATIONS

4.2.1 GENERAL

Duty	Continuous at rated speed and rated torque
Type	Permanent magnet synchronous
Insulation	See motor drawings in **Appendix A**
Sealing	See motor drawings in **Appendix A**
Storage Temperature	-10 to +70ºC/14 to 158ºF
Ambient Operating Temperature	-10 to +40ºC/14 to 104ºF
Shock and Vibration	2 G's
Mounting	Motor can be mounted in any position

4.2.2 FEEDBACK DEVICE

Type: Encoder	ABZ plus UVW 5V line driver

4.2.3 OTHER

Weight Shaft Loading Brake Specifications Dimensions	See motor drawings in **Appendix A**
Torque Ratings Speed Torque Curves	See specifications in **Appendix A**

SECTION 5 - CONNECTIONS/WIRING

This section details the recommended power source requirements necessary to power the Emerald drivers. The Emerald driver has been designed to NRTL certification requirements and this section will recommend the appropriate hardware necessary to maintain this certification as a system. **Figure 5.1** shows the required interconnect to all system components.

NOTE: The Emerald series drive cannot be HI-POT tested in the field due to internal protective devices. Contact Industrial Indexing Systems, Inc. if your system needs to be HI-POT tested.

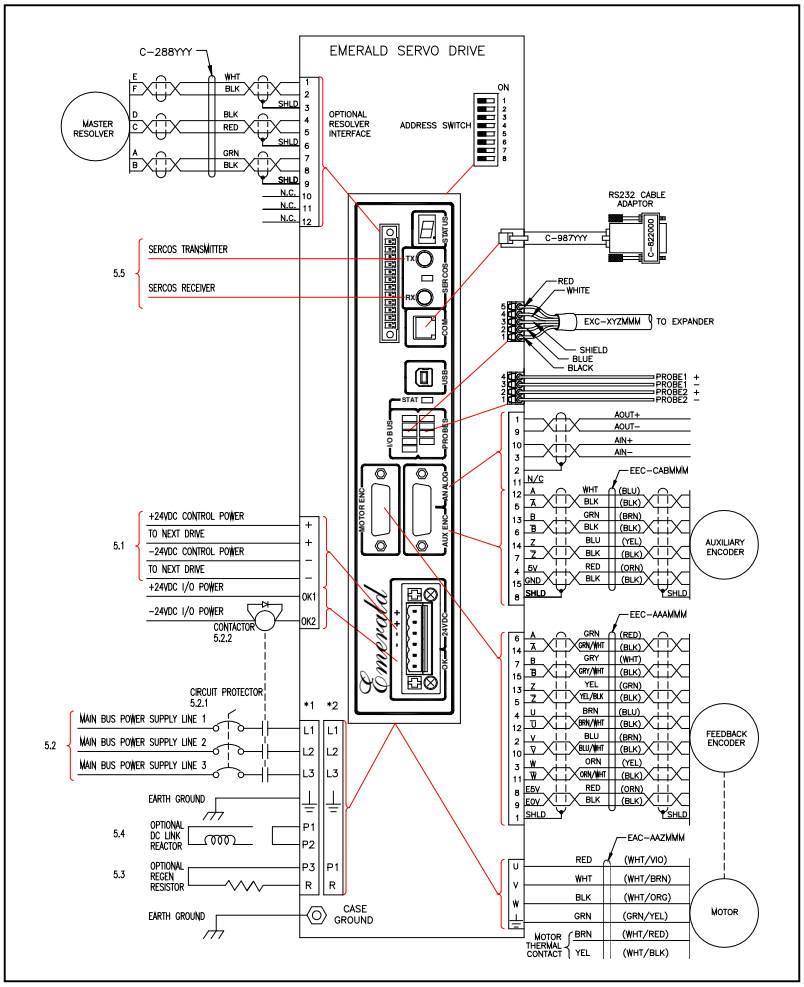


Figure 5.1 - Wiring Interconnect
***1 For ESD-5, ESD-10, ESD-20, ESD-25, ESD-40 drives**
***2 For ESD-50, ESD-60 drives**

5.1 CONTROL POWER WIRING

The Emerald drive controller power is connected to a 24 VDC supply. See **Section 4.1.3** for control voltage supply requirements. The control power connector has multiple power pins to ease the wiring connections. Drive power can be daisy chained as shown to connect back to power supply. When sizing the 24VDC supply, the load requirements of each drive must be summed up to determine the current rating of the supply. The maximum current that can be carried by the chain is 10 Amp DC. See **Figure 5.1** for the required control power wiring.

5.2 MAIN BUS POWER SUPPLY WIRING

Connect the Emerald drive main bus power (L1, L2, L3) to the incoming line or transformer (See **Section 4.1.2 & Section 5.2.4**). Section 5.2.3 details the required wiring to maintain the NRTL Certification. It is important that the recommended components or equivalent components with NRTL approval be included in system design. See **Figure 5.1** for the required power wiring connections.

5.2.1 SUPPLEMENTAL CIRCUIT PROTECTION

It is required that each driver/motor combination be provided with a circuit protector for each driver and motor pair. All of the drives are suitable for use on a circuit capable of delivering not more than 5000 rms symmetrical amperes.

Drive Part No.	Motor Rated Current (Amps)	Circuit Protectors					
		Edison MEQ FUSE	Rating	Edison JDL FUSE	Rating	Edison CIRCUIT BREAKER	Rating
ESD-5/AEP (single phase)	1.7A to 3.4A	MEQ5	5A	JDL5	5A	----	----
ESD-5/AEP (single phase)	3.4A and up	MEQ10	10A	JDL10	10A	----	----
ESD-5/AEP (3-Phase)	1.7A and up	MEQ5	5A	JDL5	5A	----	----
ESD-10/AEP (3-Phase)	3.4A and up	MEQ10	10A	JDL10	10A	----	----
ESD-20/AEP (3-Phase)	6.7A and up	MEQ20	20A	JDL20	20A	G3P-020	20A
ESD-25/CEP (3-Phase)	8.4A and up	----	----	JDL25	25A	G3P-025	25A
ESD-40/AEP (3-Phase)	13.4A and up	----	----	JDL40	40A	G3P-040	40A
ESD-50/CEP (3-Phase)	16.7A and up	----	----	JDL50	50A	G3P-050	50A
ESD-60/AEP (3-Phase)	20.0A and up	----	----	JDL60	60A	G3P-060	60A

Table 5.1 - Recommended Circuit Protector

The circuit protector is sized for the worst-case maximum power draw of the driver at the worst-case low line voltage. The chart contains specific vendor and size recommendations. Other types of circuit protectors or fuses may be used provided the continuous ratings are equivalent, the instantaneous rating is 10 to 15 times continuous and can support 3 times continuous for at least 3 seconds. Contact Industrial Indexing Systems, Inc. for specific recommendations of circuit protective devices.

NOTE: All drive sizes can be run on single-phase AC input. However with the exception of the ESD-5/XXX drive, all other drives will have their capabilities reduced by up to 50%. Industrial Indexing Systems, Inc. does not recommend running any drive with the exception of the ESD-5/XXX with a single-phase AC input.

5.2.2 CONTACTOR

It is recommended that each driver have an external power bus contactor. **Table 5.2** contains a chart of the recommended contactor for each driver size including manufacturer part number and ratings.

Drive Part No.	Rated Current (Amps)	Contactors					
		Square D	Rating	Siemens	Rating	FUJI	Rating
ESD-5/AEP (single phase)	8.7	LC1D12BD (LA4DE1E)	12	3RT1016-1BB41 (3RT1916-1CB00)	12	SC-E03G-24VDC (SZ-Z4)	12
ESD-5/AEP (3-Phase)	5	LC1D09BD (LA4DE1E)	9	3RT1015-1BB41 (3RT1916-1CB00)	9	SC-E02G-24VDC (SZ-Z4)	9
ESD-10/AEP (3-Phase)	10	LC1D12BD (LA4DE1E)	12	3RT1017-1BB41 (3RT1916-1CB00)	12	SC-E03G-24VDC (SZ-Z4)	12
ESD-20/AEP (3-Phase)	20	LC1D25BD (LA4DE1E)	25	3RT1026-1BB40 (3RT1926-1CB00)	25	SC-E05G-24VDC (SZ-Z4)	25
ESD-25/CEP (3-Phase)	25	LC1D25BD (LA4DE1E)	25	3RT1026-1BB40 (3RT1926-1CB00)	25	SC-E05G-24VDC (SZ-Z4)	25
ESD-40/AEP (3-Phase)	40	LC1D40BD (LA4DE3E)	40	3RT1035-1BB40 (3RT1936-1CB00)	40	SC-E2G-24VDC (SZ-Z31)	40
ESD-50/CEP (3-Phase)	50	LC1D50BD (LA4DE3E)	50	3RT1036-1BB40 (3RT1936-1CB00)	50	SC-E2SG-24VDC (SZ-Z31)	50
ESD-60/AEP (3-Phase)	60	LC1D65BD (LA4DE3E)	65	3RT1044-1BB40 (3RT1936-1CB00)	65	SC-E3G-24VDC (SZ-Z31)	65

Table 5.2 - Recommended Contactors, 24 VDC Coil
Part numbers in (parentheses) are surge suppressors

The contactor is sized for the worst-case maximum power draw of the driver at the worst-case low line voltage. The charts contain specific manufacture and size recommendations. Other types of contactors may be used provided the continuous ratings are equivalent and the maximum instantaneous rating is 10 to 15 times continuous. An appropriate suppressor must be installed on contactor coils. The driver is equipped with a soft start circuit to limit the contactor inrush current. Refer to **Figure 5.1** for contactor wiring. Do not exceed 500-ma draw on DRIVE_OK output.

5.2.3 WIRE SIZES

It is required that each driver be installed with the appropriate size wire for proper operation. **Table 5.3** shows a chart of recommended wire gauges and terminal connection tightening torques for each driver size.

The wire is sized for the worst-case maximum power draw of the driver at the worst-case low line voltage. The charts contain specific METRIC and AWG size recommendations for stranded wire. All wires to supply earth to the drive shall be of the same wire size used for the AC source. Use only copper wire rated for 60/75 degree C or greater. The driver terminals are specifically designed to handle the recommended wire gauge with lug or ferrule terminations. See wiring diagrams for more details.

Drive Part No.	Rated Current (Amps)	Wire Size		Required Tightening torque on power wiring terminals (LB-IN)
		(AWG)	(MM^2)	
ESD-5/AEP (single phase)	8.7	14	2	4.5
ESD-5/AEP (3-Phase)	5	14	2	4.5
ESD-10/AEP (3-Phase)	10	14	2	13.5
ESD-20/AEP (3-Phase)	20	12	3.5	13.5
ESD-25/CEP (3-Phase)	25	12	3.5	13.5
ESD-40/AEP (3-Phase)	40	10	5.5	13.5
ESD-50/CEP (3-Phase)	50	8	8.5	22.5
ESD-60/AEP (3-Phase)	60	6	13.5	22.5

Table 5.3 - Recommended Bus Power Wire Size

Note: ** Field wiring connection shall be made by a NRTL Certified crimped on ferrule sized for the wire gauge involved. Ferrule must be fixed using the crimp tool specified by the connector manufacturer.

5.2.4 TRANSFORMERS

Isolating the driver from the facility power line with a transformer is recommended but not required. A transformer may be required to step down or step up the facility power line to meet the driver voltage specifications in **Section 4**.

If a transformer is used, select a transformer with the following characteristics:

- Isolation type.
- Load regulation less than 10%.
- Ability to provide 3 times rated current for 3 to 5 seconds without saturation.
- Ability to drive load with a power factor of 0.85.
- Primary or secondary taps to provide -10%; nominal; +10%; supply voltage.

To achieve maximum performance from the driver, the power input to the driver should be as close to nominal driver input voltage rating as possible. The facility line voltage varies through wide ranges in many parts of the world and it is recommended to match the nominal facility voltage to the nominal input voltage rating of the driver with a transformer. This gives the system the maximum operating range with facility line voltage fluctuations.

If the line voltage is too low, intermittent under voltage alarms may occur. A high line voltage will result in excessive regeneration dumping or intermittent over voltage alarms.

Buck boost transformers may be used to optimally match the facility line voltage to the driver line voltage rating. Buck boost transformers can be used with or without an isolation transformer. If buck boost transformers are used in conjunction with an isolation transformer, it is best to put the buck boost transformers on the primary side of the isolation transformer.

As a general rule the transformer rating can be calculated using the following formulas:

For single phase transformer:

$$\text{Transformer Capacity (VA)} = \frac{\text{Rated Mechanical Output (Watts)}}{0.7}$$

Where: Rated Mechanical Output is from Emerald Motor and Drive Package rating.
0.7 = motor/drive efficiency and single phase full wave rectifier factor

Example: Select transformer for a Delta S-200HRA motor/drive package

$$\text{Transformer Capacity (VA)} = \frac{200}{0.7} = 285 \text{ VA}$$

For three phase transformer:

$$\text{Transformer Capacity (Watts)} = \frac{\text{Rated Mechanical Output (Watts)}}{0.85}$$

Where: Rated Mechanical Output is from Emerald Motor and Drive Package rating.
0.85 is motor/drive efficiency and three phase rectifier factor

Example: Select transformer for a Delta S-6500HRA motor/drive package

$$\text{Transformer Capacity (VA)} = \frac{6500}{0.85} = 7647 \text{ VA}$$

5.2.4 TRANSFORMERS (cont'd)

One transformer can supply multiple motor/driver packages. Simply add the rated mechanical output of the motor/driver packages together and use the above formulas. If one transformer is used to supply multiple drivers, be sure to protect each driver with the appropriate circuit breaker or fuse.

IIS offers a full line of transformers for various line voltage and frequencies, enclosed and open frame types. Contact IIS Application Engineering Department for full details.

5.2.5 WIRING PRACTICES AND GROUNDING

All wiring must conform to accept standards such as NEMA and NEC codes. Signal and low voltage I/O wires must be physically separated from high voltage wires by at least 12 inches or separated by a suitable barrier such as steel conduit or wiring trough separator.

The driver must be adequately grounded for proper operation and to provide personnel safety. The proper grounding technique is shown in **Figure 5.1.**

5.3 DRIVER REGENERATION CAPACITIES

The Emerald motor and driver have the ability to act as a brake for a rotating load. This condition typically occurs during the deceleration of the load or when the system is stopping a vertical load such as an elevator or lift. In both cases, the driver may have to absorb the mechanical and potential energy in the system. The driver must absorb the energy if the energy in the load exceeds to mechanical losses in the system.

The driver has 2 ways to absorb the energy from the load.

- Store the energy by charging the internal main DC bus capacitors (E_C)
- Dissipate the energy using a regeneration resistor (P_R)

The Emerald driver internal energy absorption capacities are as shown in **Table 5.4**.

DRIVER SIZE	REGEN CAPACITY (P_R)	CHARGING CAPACITY (E_C)
ESD-5	0 W	4.0J
ESD-10	0 W	5.4J
ESD-20	120 W	11.2J
ESD-25	0 W	19.8J
ESD-40	120 W	22.4J
ESD-50	0 W	26.5J
ESD-60	300 W	33.6J

Table 5.4 - Energy Absorption Capabilities

The Emerald drivers are equipped with internal circuitry to detect a rise in the main DC power bus indicating energy absorption. If the DC power bus reaches approximately 410 VDC on a ESD-XX/AXX drive, 820 VDC on a ESD-XX/CXX drive, the regeneration circuit is turned on to prevent the main DC power bus from rising to 430 VDC on a ESD-XX/AXX drive, 860 VDC on a ESD-XX/CXX drive, which will result in an over voltage alarm F02.

5.3.1 SELECTION OF AN EXTERNAL REGENERATION RESISTOR

The amount of energy stored in the moving components of the system must be calculated and compared to the energy absorption capacity of the driver to determine if an external regeneration resistor is required.

The stored energy is of two basic types, kinetic energy in the form of a moving mass and potential energy of a mass being held against gravity.

$E_k = 0.5 * (J_M + J_L) * (2 * \pi * N / 60)^2$

$E_P = (2 * \pi * N * T_g * t_b / 60)$

Calculate the system losses in the motor, driver and friction.

$E_L = (P_M + (\pi * N * T_f / 60)) * t_a$

Calculate the regeneration power.

$P_R = (E_k + E_P - E_L - E_C) / t_c$

If regeneration power P_R is greater than 0.0, a regeneration resistor will be needed to prevent the main DC power bus from generating an over voltage alarm F02.

Where:

E_k = Net kinetic energy Joules
E_P = Net Potential energy Joules
E_L = Energy loss due to friction Joules
E_C = Driver charging capacity Joules
J_M = Motor rotor inertia kg-m^2
J_L = Load inertia kg-m^2
N = Motor speed in RPM
P_M = Motor loss watts (10% of motor rating)
T_f = System friction torque N-m
T_g = Net torque to hold up load against gravity N-m
P_R = Regen power watts
t_a = Deceleration time
t_b = Move time
t_c = Cycle time

See **Figure 5.2**

* The above equations are reasonable approximations.

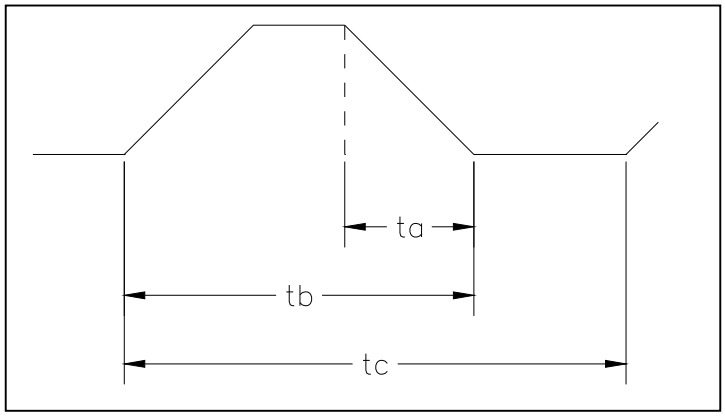


Figure 5.2 - Time

5.3.1 SELECTION OF AN EXTERNAL REGENERATION RESISTOR (cont'd)

Drivers ESD-5 and ESD-10 do not contain an internal regeneration resistor. If a regeneration resistor is required, an external resistor with a power rating of at least P_R watts must be connected.

Drivers ESD-20 through ESD-60 contain internal regeneration resistors. If the internal regeneration resistor capacity is greater than P_R watts, no external resistor is needed. If the internal resistor is not large enough, an external resistor will need to be used. The external resistor is wired in parallel with the internal resistor. Therefore care must be taken to calculate the appropriate resistance and power value such that the internal resistor power rating is not exceeded.

Calculation of External Regeneration Resistor on drive with internal Regen resistor:

Since $P_R = \frac{E^2}{R_R}$ then: $E^2 = P_R * R_R = P_{R(INTERNAL)} * R_{R(INTERNAL)} = P_{R(INTERNAL)} * R_{R(INTERNAL)}$

(for Parallel Resistances)

It then can be derived that:

$$R_{R(EXTERNAL)} \leq \frac{P_{R(INTERNAL)} * R_{R(INTERNAL)}}{P_{R(EXTERNAL)}}$$

DRIVER SIZE	$P_{R(INTERNAL)}$ Watts	$R_{R(INTERNAL)}$ Ohms	$R_{R(EXTERNAL)}$ Min Ohms	P_R Max Watts	WIRE GAUGE
ESD-5	N/A	N/A	30	400	14 AWG 2.0 mm²
ESD-10	N/A	N/A	30	600	14 AWG 2.0 mm²
ESD-20	120	100	10	1300	12 AWG 3.5 mm²
ESD-25	N/A	N/A	20	5000	12 AWG 3.5 mm²
ESD-40	120	100	5	2500	10 AWG 5.5 mm²
ESD-50	N/A	N/A	10	10000	8 AWG 8.5 mm²
ESD-60	300	50	3	5000	8 AWG 8.5 mm²

Table 5.5 - Regeneration Resistor Selection Data

Figure 5.1 shows how to connect an external regeneration resistor to the Emerald drivers.

5.3.2 STANDARD REGENERATION RESISTOR PACKAGES

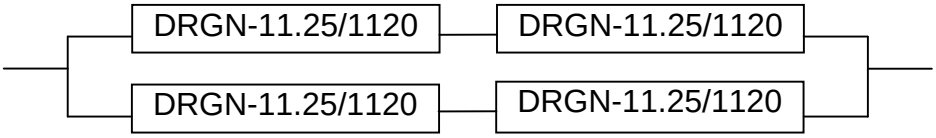
In general, wound metal ribbon resistors are recommended for this type of application. IIS offers a complete line of enclosed panel mounted regen resistor units to complement the Emerald driver. Various combinations of series and parallel connections are allowed to provide adequate regen resistor capacity.

IIS P/N	Description
MFS30A300J*	30 Ohm 30 Watts
RGH200-30*	30 Ohm 200 Watts
DRGN-20/400*	20 Ohm 400 Watts
DRGN-45/420	45 Ohm 420 Watts
DRGN-22.5/655	22.5 Ohm 655 Watts
DRGN-15/880	15 Ohm 880 Watts
DRGN-11.25/1120	11.25 Ohm 1120 Watts

*Not UL/CE approved

EXAMPLE CALCULATION:

If 4 KW of regen were needed on an ESD-60 driver, four (4) DRGN-11.25/1120 units could be connected as follows to yield 11.25 Ohms at 4480 Watts.



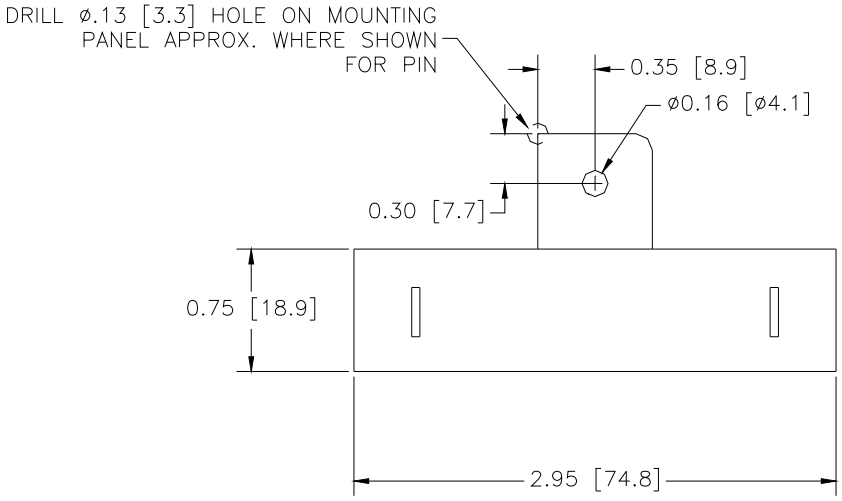
DRAWING NUMBER	DESCRIPTION
MFS30A300J	Resistor
RGH200-30	Regen Resistor
DRGN-20/400	Regen Resistor
DRGN-45/420	Regen Resistor
DRGN-45/420-2	Regen Resistor
DRGN-22.5/655	Regen Resistor
DRGN-15/880	Regen Resistor
DRGN-11.25/1120	Regen Resistor

NOTES:

1.) THIS RESISTOR IS NOT UL OR CE APPROVED.

2.) RESISTOR MUST BE SECURELY MOUNTED ON LARGE HEATSINK SUCH AS ENCLOSURE WALL OR BACKPANEL.

SPECIFICATIONS	
RESISTANCE:	30 Ohms
CONTINUOUS POWER:	30 Watts
MAXIMUM VOLTAGE:	VDC
MAXIMUM PULSE CURRENT:	15 A
MAXIMUM RMS CURRENT:	1 A
DUTY CYCLE	6 %



INDUSTRIAL INDEXING SYSTEMS, Inc.
www.iis-servo.com

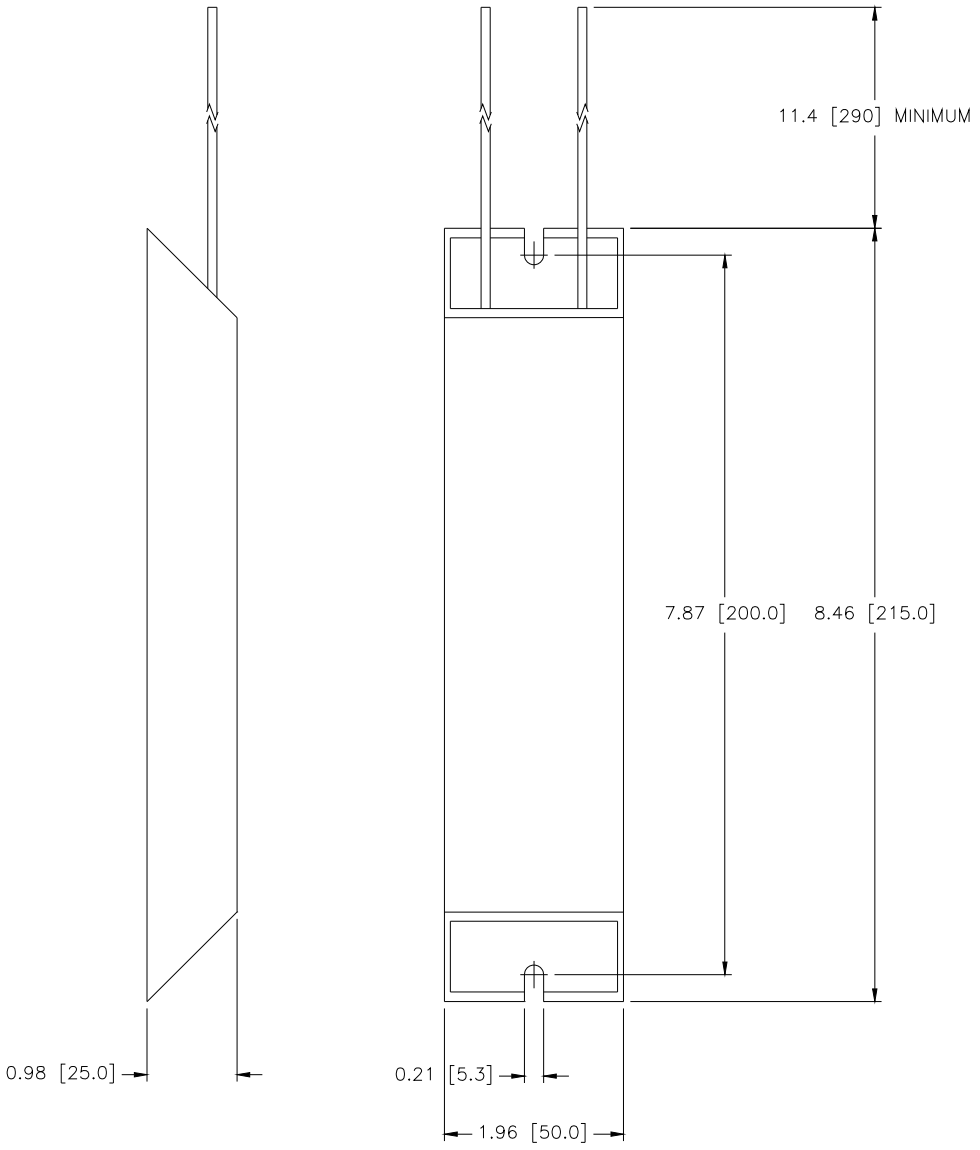
TITLE: RESISTOR, 30 OHM, 30W

DRAWING NUMBER: MFS30A300J

DIMENSIONS ARE INCHES [mm]	TOLERANCES X.XX±--- X.XXX±--- ∠ ±---	REV 0		ECN 03-322	DATE 16JUL03	SH. 1 OF 1

NOTES:
1.) RESISTOR MUST BE MOUNTED ON A FLAT SURFACE AT LEAST 12" X 12" IN FREE AIR TO MEET THE 200 WATT POWER DISSIPATION.
2.) THIS RESISTOR IS NOT UL OR CE APPROVED.

SPECIFICATIONS	
RESISTANCE:	30 Ohms
CONTINUOUS POWER:	200 Watts
MAXIMUM VOLTAGE:	425 VDC
MAXIMUM PULSE CURRENT:	14.0 A
MAXIMUM RMS CURRENT:	5.0 A
DUTY CYCLE	50%



INDUSTRIAL INDEXING SYSTEMS, Inc.
www.iis-servo.com

TITLE: REGEN RESISTOR
DRAWING NUMBER: RGH200-30

DIMENSIONS ARE INCHES [mm] | TOLERANCES X.XX±0.01 X.XXX±0.005 ∠ ±--- | REV 0 | ECN 01-067 | DATE 27FEB01 | SH. 1 OF 1

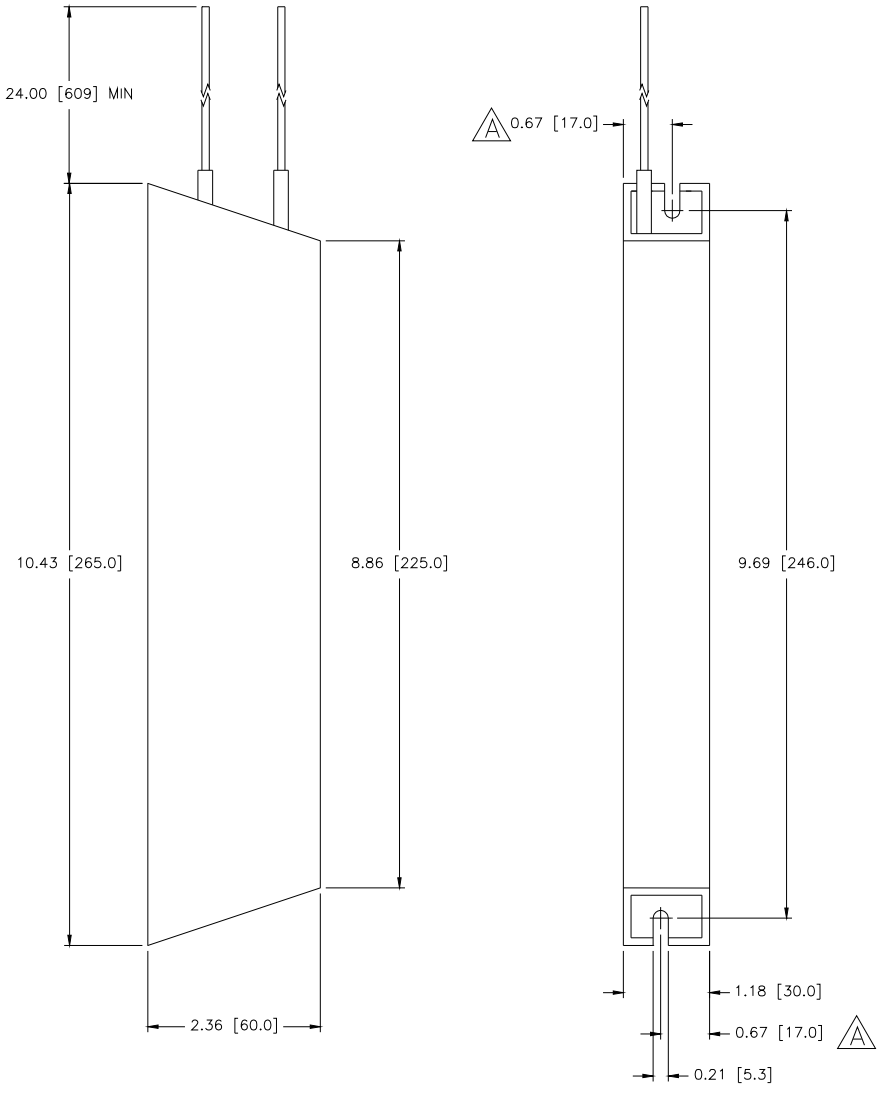
NOTES:

1.) RESISTOR MUST BE MOUNTED ON A FLAT SURFACE AT LEAST 12" X 12" IN FREE AIR TO MEET THE 200 WATT POWER DISSIPATION.

2.) THIS RESISTOR IS NOT UL OR CE APPROVED.

3.) RESISTOR MUST BE SECURELY MOUNTED ON LARGE HEATSINK SUCH AS ENCLOSURE WALL OR BACKPANEL.

SPECIFICATIONS	
RESISTANCE:	20 Ohms
CONTINUOUS POWER:	400 Watts
MAXIMUM VOLTAGE:	425 VDC
MAXIMUM PULSE CURRENT:	22 A
MAXIMUM RMS CURRENT:	4.5 A
DUTY CYCLE	15 %

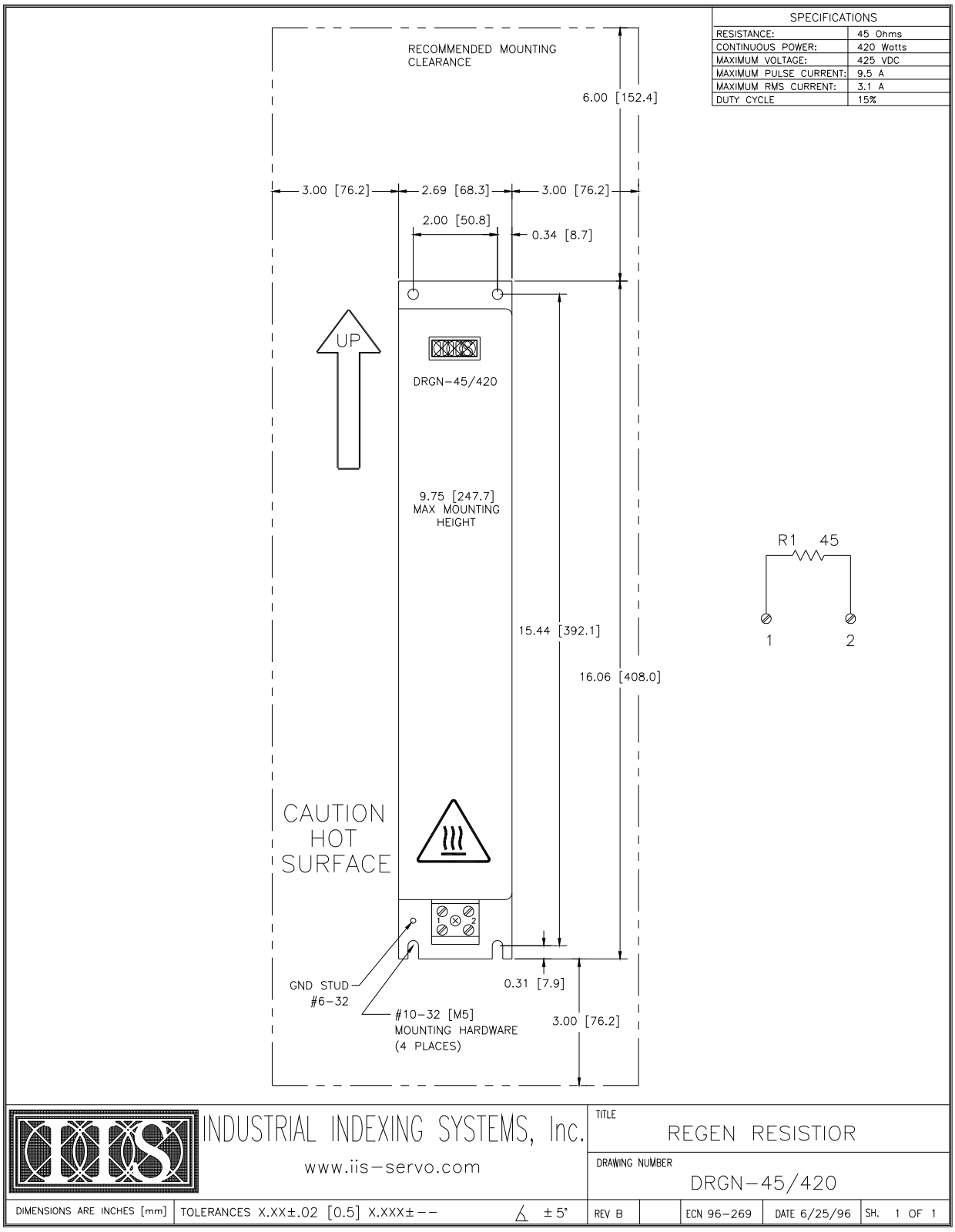


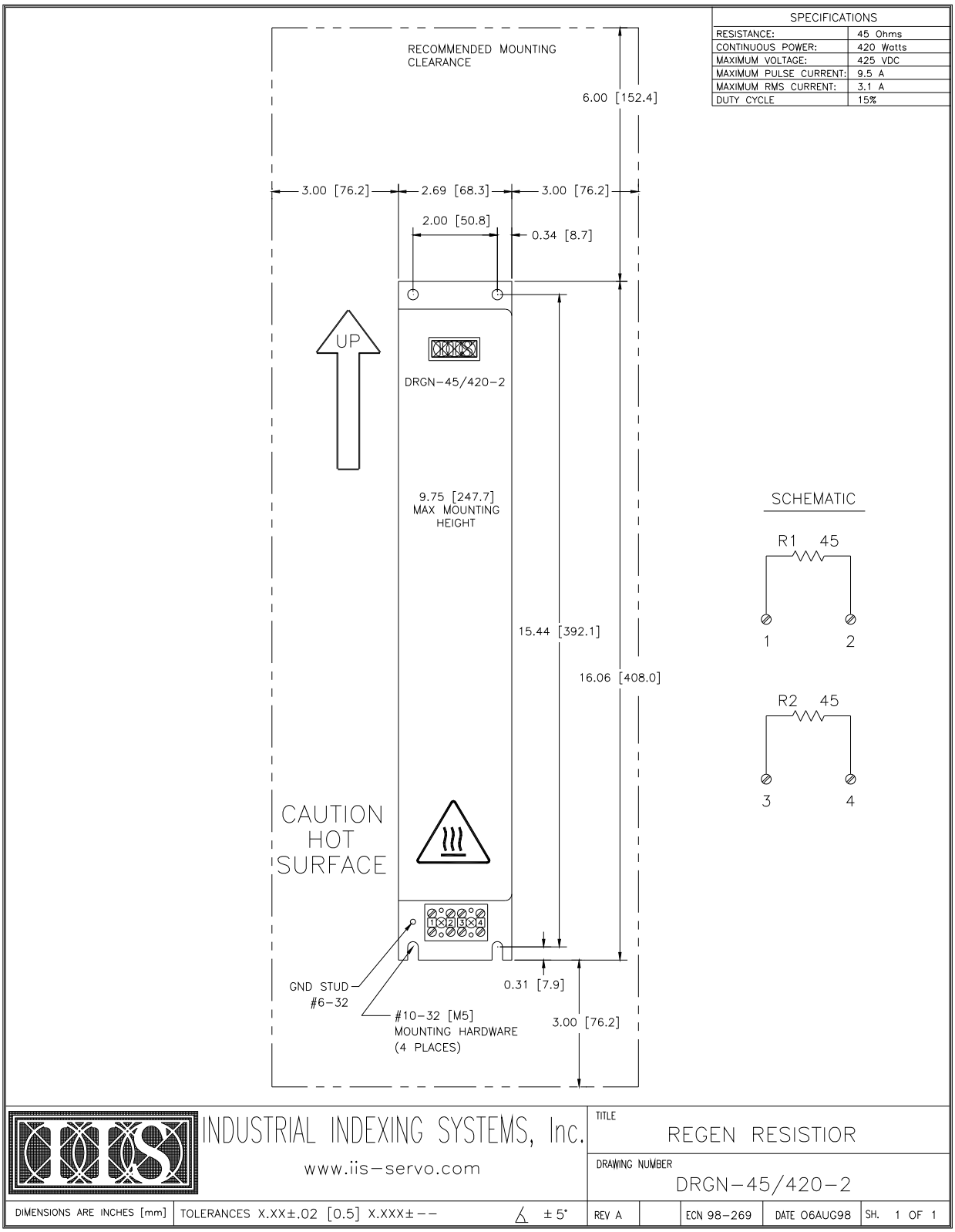
INDUSTRIAL INDEXING SYSTEMS, Inc.
www.iis-servo.com

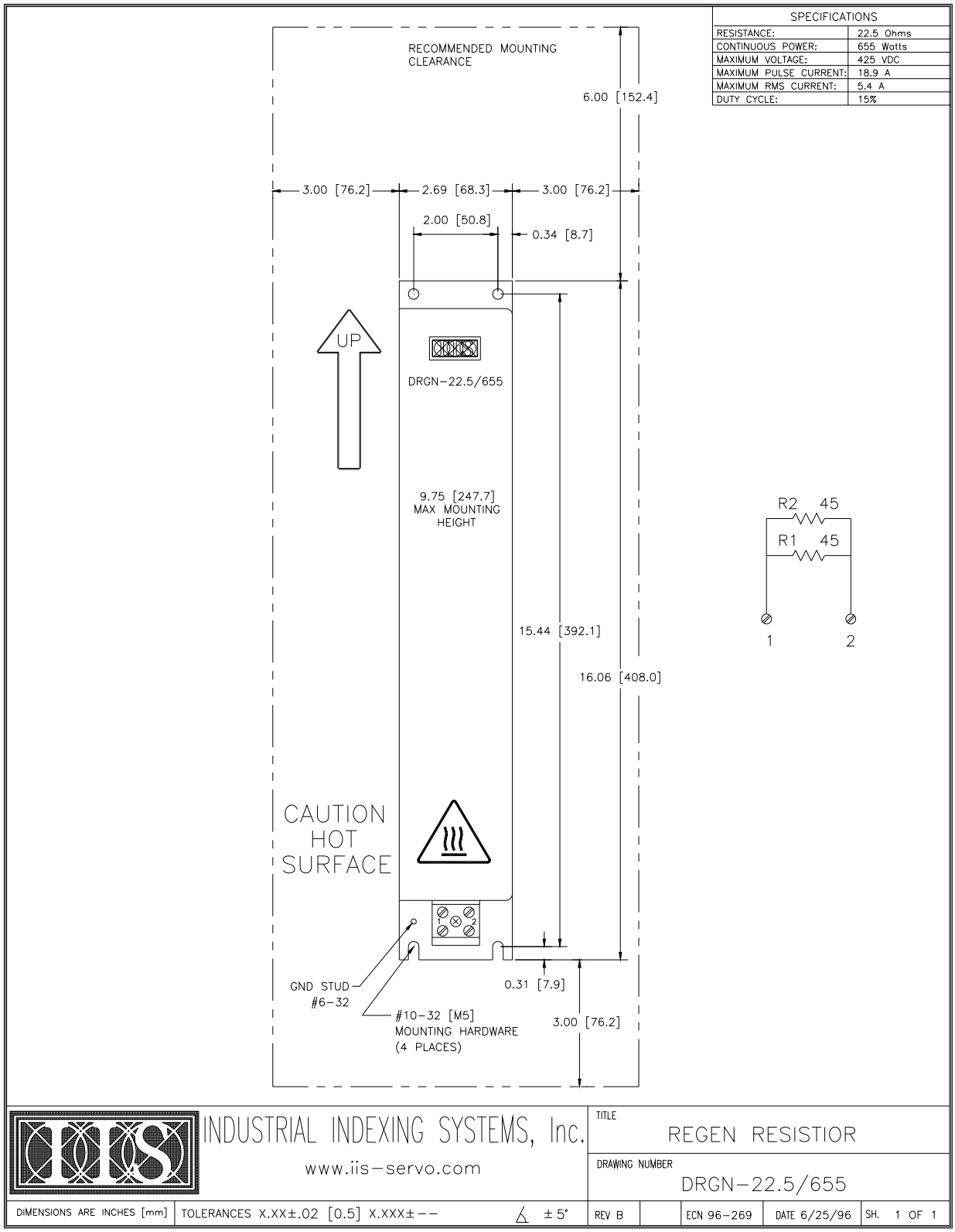
TITLE: REGEN RESISTOR

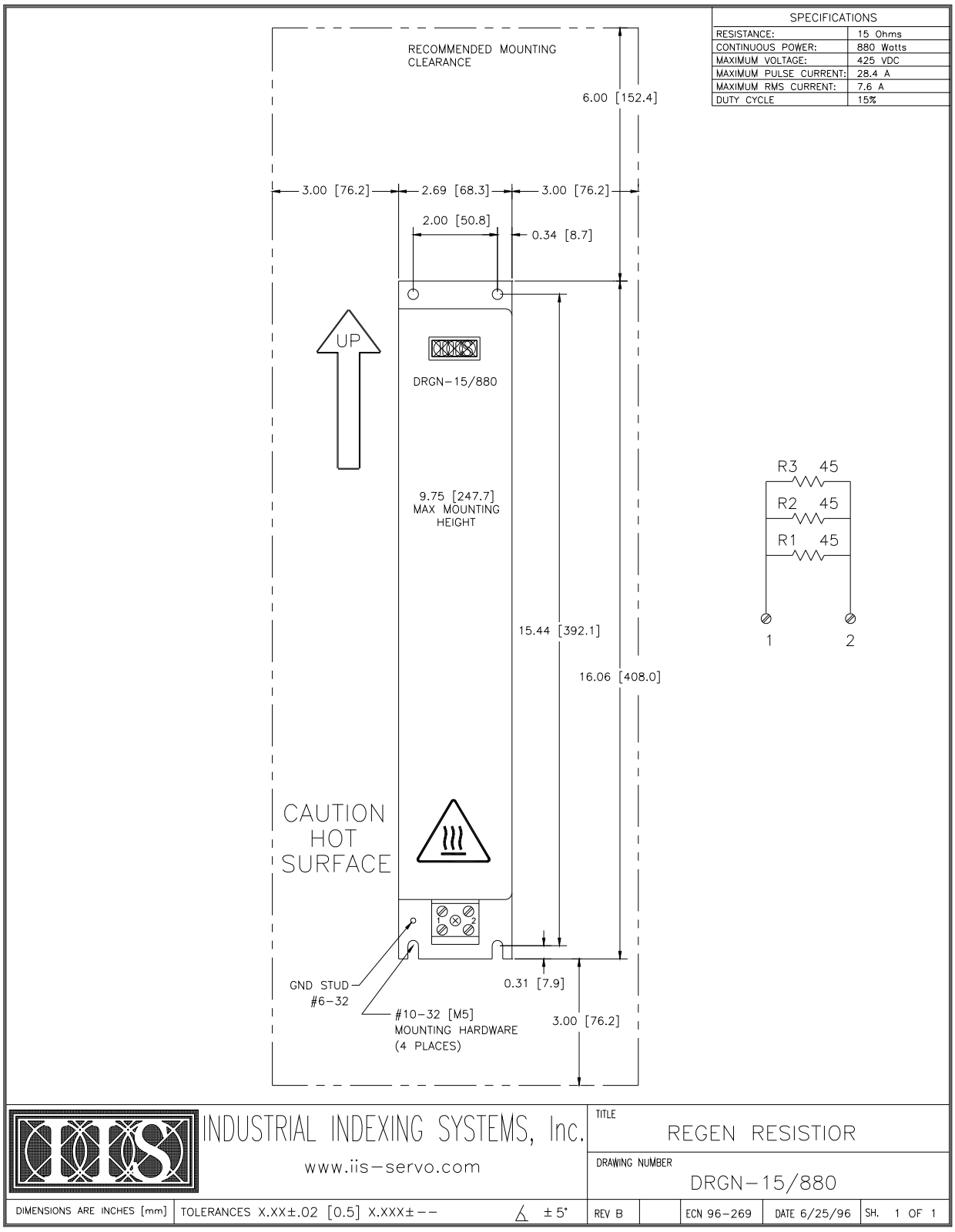
DRAWING NUMBER: DRGN-20/400

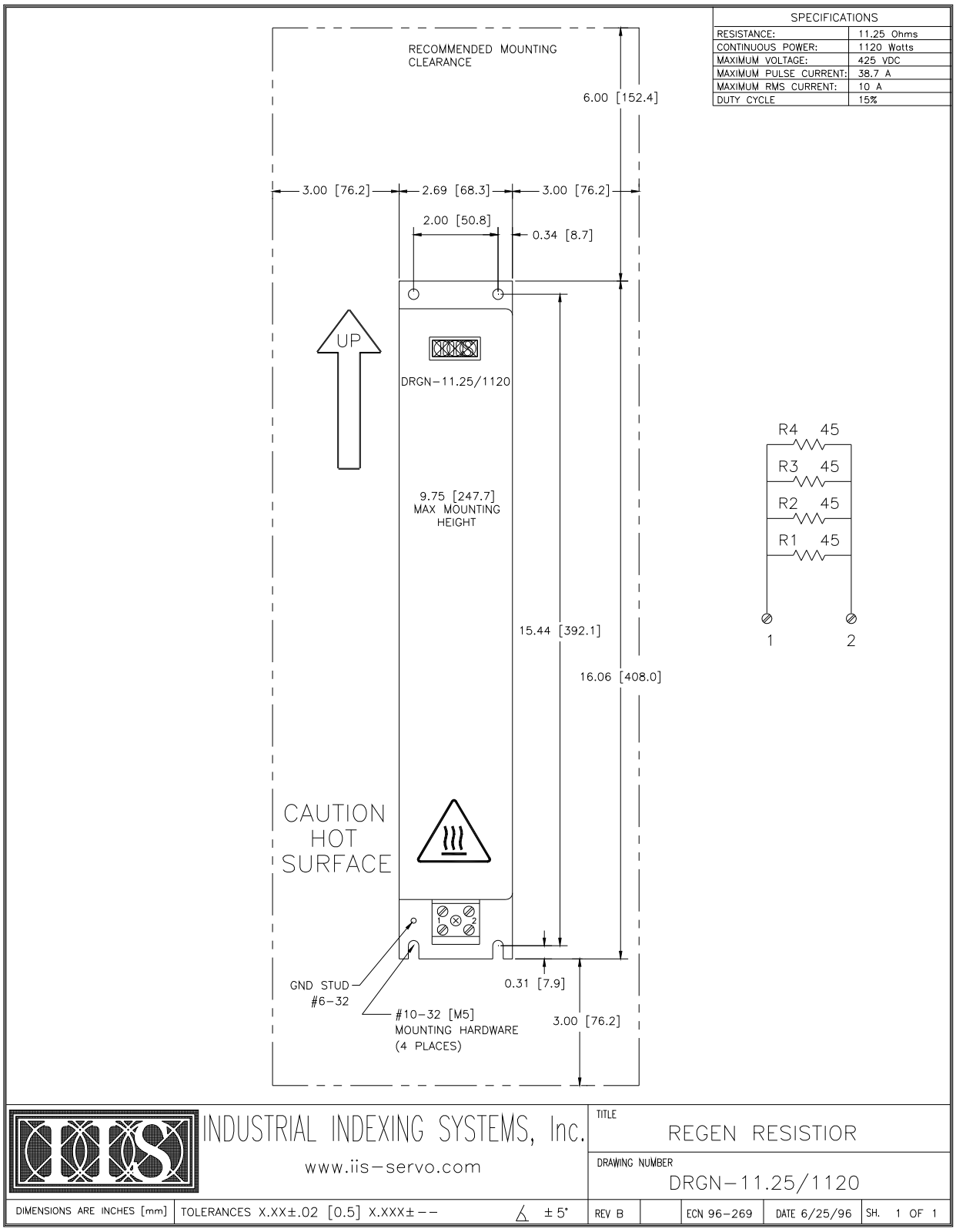
DIMENSIONS ARE INCHES [mm] | TOLERANCES X.XX±0.01 X.XXX±0.005 ∠ ±5° | REV A | ECN 01-259 | DATE 28JUN01 | SH. 1 OF 1


SPECIFICATIONS
RESISTANCE: 45 Ohms
CONTINUOUS POWER: 420 Watts
MAXIMUM VOLTAGE: 425 VDC
MAXIMUM PULSE CURRENT: 9.5 A
MAXIMUM RMS CURRENT: 3.1 A
DUTY CYCLE 15%
RECOMMENDED MOUNTING CLEARANCE
6.00 [152.4]
3.00 [76.2]
2.69 [68.3]
3.00 [76.2]
2.00 [50.8]
0.34 [8.7]
UP
DRGN-45/420
9.75 [247.7] MAX MOUNTING HEIGHT
15.44 [392.1]
16.06 [408.0]
R1 45
1
2
CAUTION HOT SURFACE
GND STUD #6-32
#10-32 [M5] MOUNTING HARDWARE (4 PLACES)
0.31 [7.9]
3.00 [76.2]
INDUSTRIAL INDEXING SYSTEMS, Inc.
www.iis-servo.com
TITLE
REGEN RESISTIOR
DRAWING NUMBER
DRGN-45/420
DIMENSIONS ARE INCHES [mm]
TOLERANCES X.XX±.02 [0.5] X.XXX±--
± 5°
REV B
ECN 96-269
DATE 6/25/96
SH. 1 OF 1


SPECIFICATIONS
RESISTANCE: 45 Ohms
CONTINUOUS POWER: 420 Watts
MAXIMUM VOLTAGE: 425 VDC
MAXIMUM PULSE CURRENT: 9.5 A
MAXIMUM RMS CURRENT: 3.1 A
DUTY CYCLE 15%
RECOMMENDED MOUNTING CLEARANCE
6.00 [152.4]
3.00 [76.2]
2.69 [68.3]
3.00 [76.2]
2.00 [50.8]
0.34 [8.7]
UP
DRGN-45/420-2
9.75 [247.7] MAX MOUNTING HEIGHT
15.44 [392.1]
16.06 [408.0]
CAUTION HOT SURFACE
1 2 3 4
GND STUD #6-32
#10-32 [M5] MOUNTING HARDWARE (4 PLACES)
0.31 [7.9]
3.00 [76.2]
SCHEMATIC
R1 45
1
2
R2 45
3
4
INDUSTRIAL INDEXING SYSTEMS, Inc.
www.iis-servo.com
TITLE
REGEN RESISTIOR
DRAWING NUMBER
DRGN-45/420-2
DIMENSIONS ARE INCHES [mm]
TOLERANCES X.XX±.02 [0.5] X.XXX±--
± 5°
REV A
ECN 98-269
DATE 06AUG98
SH. 1 OF 1


SPECIFICATIONS
RESISTANCE: 22.5 Ohms
CONTINUOUS POWER: 655 Watts
MAXIMUM VOLTAGE: 425 VDC
MAXIMUM PULSE CURRENT: 18.9 A
MAXIMUM RMS CURRENT: 5.4 A
DUTY CYCLE: 15%
RECOMMENDED MOUNTING CLEARANCE
6.00 [152.4]
3.00 [76.2]
2.69 [68.3]
3.00 [76.2]
2.00 [50.8]
0.34 [8.7]
UP
DRGN-22.5/655
9.75 [247.7] MAX MOUNTING HEIGHT
15.44 [392.1]
16.06 [408.0]
CAUTION HOT SURFACE
GND STUD #6-32
#10-32 [M5] MOUNTING HARDWARE (4 PLACES)
0.31 [7.9]
3.00 [76.2]
R2 45
R1 45
1
2
INDUSTRIAL INDEXING SYSTEMS, Inc.
www.iis-servo.com
TITLE
REGEN RESISTIOR
DRAWING NUMBER
DRGN-22.5/655
DIMENSIONS ARE INCHES [mm]
TOLERANCES X.XX±.02 [0.5] X.XXX±--
± 5°
REV B
ECN 96-269
DATE 6/25/96
SH. 1 OF 1


SPECIFICATIONS
RESISTANCE: 15 Ohms
CONTINUOUS POWER: 880 Watts
MAXIMUM VOLTAGE: 425 VDC
MAXIMUM PULSE CURRENT: 28.4 A
MAXIMUM RMS CURRENT: 7.6 A
DUTY CYCLE 15%
RECOMMENDED MOUNTING CLEARANCE
6.00 [152.4]
3.00 [76.2]
2.69 [68.3]
3.00 [76.2]
2.00 [50.8]
0.34 [8.7]
UP
DRGN-15/880
9.75 [247.7] MAX MOUNTING HEIGHT
15.44 [392.1]
16.06 [408.0]
CAUTION HOT SURFACE
GND STUD #6-32
#10-32 [M5] MOUNTING HARDWARE (4 PLACES)
0.31 [7.9]
3.00 [76.2]
R3 45
R2 45
R1 45
1
2
INDUSTRIAL INDEXING SYSTEMS, Inc.
www.iis-servo.com
TITLE
REGEN RESISTIOR
DRAWING NUMBER
DRGN-15/880
DIMENSIONS ARE INCHES [mm]
TOLERANCES X.XX±.02 [0.5] X.XXX±--
∠ ±5°
REV B
ECN 96-269
DATE 6/25/96
SH. 1 OF 1


SPECIFICATIONS
RESISTANCE: 11.25 Ohms
CONTINUOUS POWER: 1120 Watts
MAXIMUM VOLTAGE: 425 VDC
MAXIMUM PULSE CURRENT: 38.7 A
MAXIMUM RMS CURRENT: 10 A
DUTY CYCLE 15%
RECOMMENDED MOUNTING CLEARANCE
6.00 [152.4]
3.00 [76.2]
2.69 [68.3]
3.00 [76.2]
2.00 [50.8]
0.34 [8.7]
UP
DRGN-11.25/1120
9.75 [247.7] MAX MOUNTING HEIGHT
15.44 [392.1]
16.06 [408.0]
CAUTION HOT SURFACE
GND STUD #6-32
#10-32 [M5] MOUNTING HARDWARE (4 PLACES)
0.31 [7.9]
3.00 [76.2]
R4 45
R3 45
R2 45
R1 45
1
2
INDUSTRIAL INDEXING SYSTEMS, Inc.
www.iis-servo.com
TITLE
REGEN RESISTIOR
DRAWING NUMBER
DRGN-11.25/1120
DIMENSIONS ARE INCHES [mm]
TOLERANCES X.XX±.02 [0.5] X.XXX±--
∠ ±5°
REV B
ECN 96-269
DATE 6/25/96
SH. 1 OF 1

5.4 DC LINK REACTOR

The Emerald driver provides the ability to connector an external DC LINK reactor to help with CE requirements. Proper selection of the inductance is application specific. Please consult IIS factory additional information. See **Figure 5.1** for proper connection of the line reactor.

5.5 SERCOS TX/RX CONNECTIONS

When the driver is configured as a SERCOS Device Slave (See **Figure 6.1**), the Emerald will need to be connected to a SERCOS Device Master. SERCOS Fiber Optic cable are connected from the Transmitter (TX) of one device to Receiver (RX) of the next device to form a ring with one Master and multiple slave devices (See **Figure 5.3**).

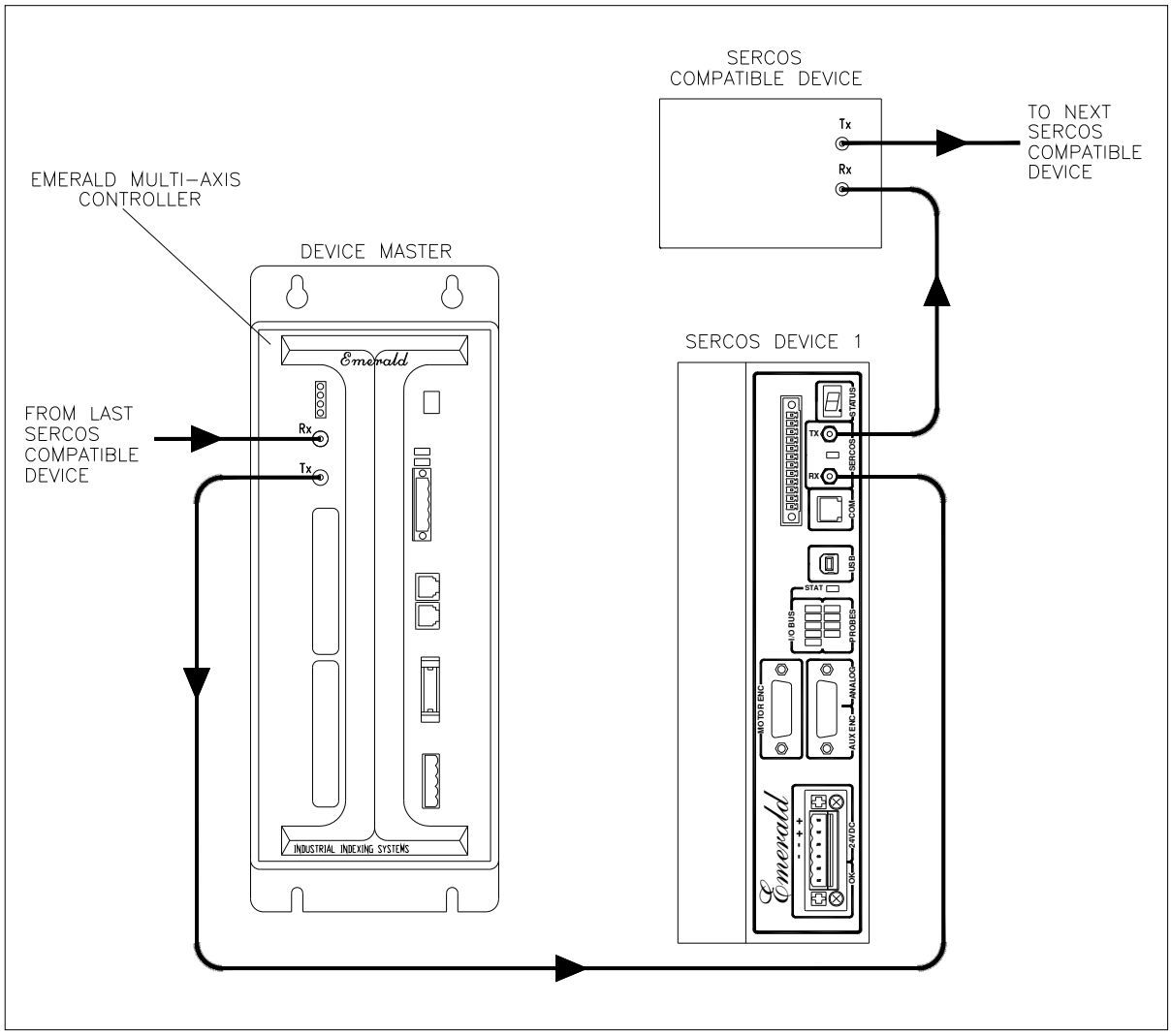


Figure 5.3 - Connecting the SERCOS Ring

5.6 TOUCHSCREEN & PC CONNECTIONS

The Emerald drive (in Controller Mode) may be connected to a touchscreen interface with PC Support or directly to a PC (See **Figure 5.4**).

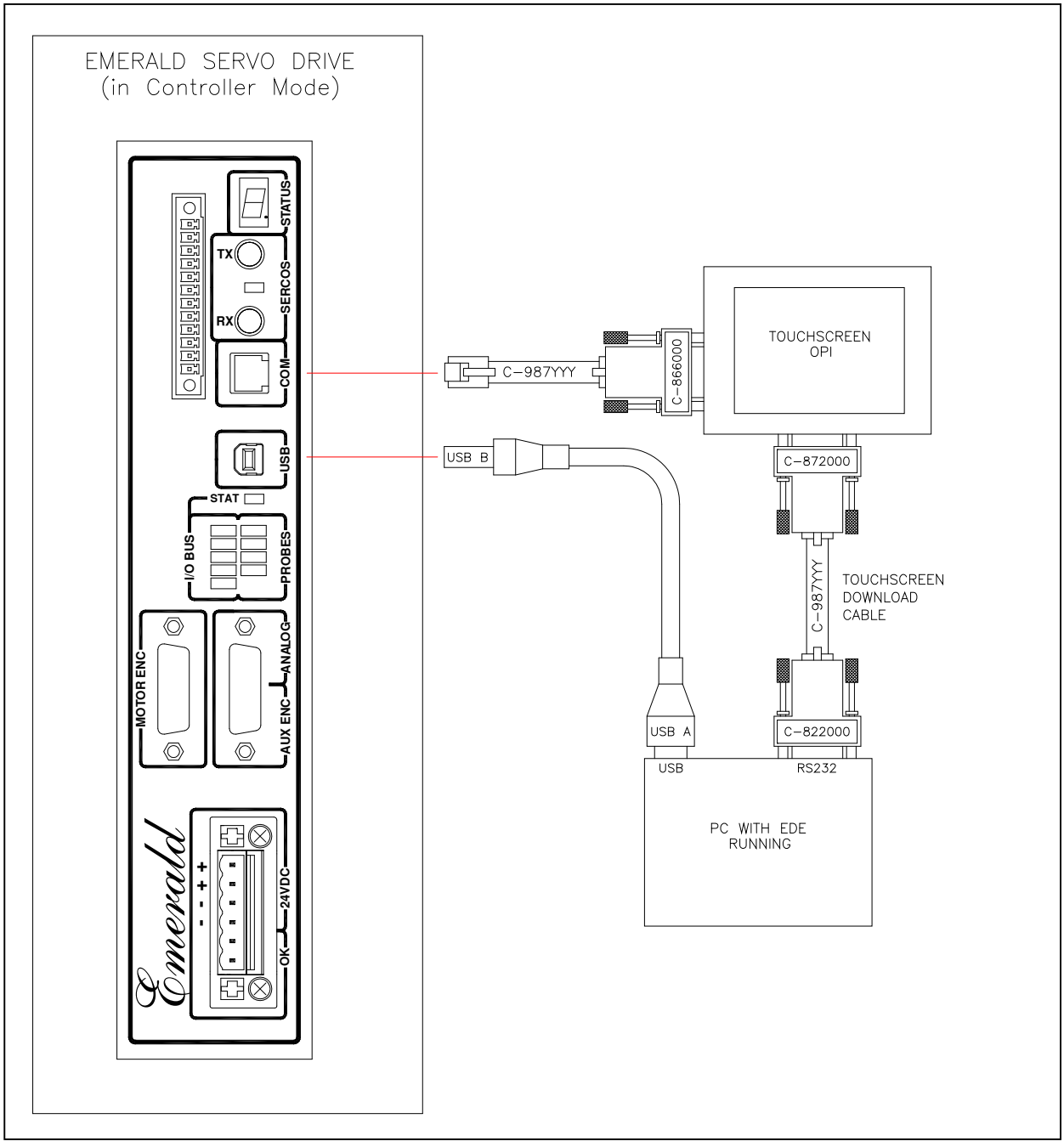


Figure 5.4 - Connecting the Emerald to a Touchscreen & PC

SECTION 6 - CONFIGURATION & PROGRAMMING

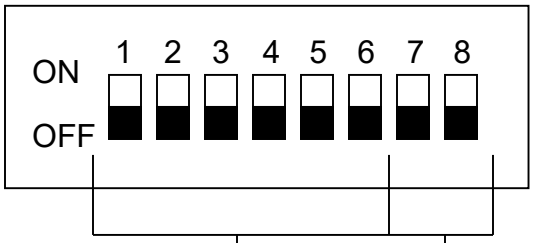
This section gives information on the Operation Data and Procedure Commands that can be transmitted over the SERCOS Communication ring, over RS-232, or over USB. It also details the settings needed in order to communicate to the drive over the SERCOS ring.

6.1 CONFIGURATION SWITCH

The eight DIP switches on top of the Emerald Drive are used to set the SERCOS device address and fiber optic transmitter intensity, in SERCOS mode. Turning all of the switches on will put the drive in CONTROLLER mode (See **Figure 6.1**).

A Device ID of Zero will put the Device in repeater mode and it will not recognize commands over SERCOS.

Switches 7 and 8 set the transmitter power. The table below lists the possible settings.



KEY	
ON	1
OFF	Ø

SERCOS Transmitter Power

SETTING		TX POWER LEVEL	LENGTH OF TRANSMISSION LINE
SW7	SW8		
0	0	1	0-15 m
1	0	2	15-30 m
0	1	3	30-45 m
1	1	4	>45 m

SERCOS Device ID

SW1-SW6	SERCOS Address
000000	0
100000	1
010000	2
---	---
011111	63

Note: Turning all of the switches ON will configure the drive in CONTROLLER Mode (SW1-SW8). Then connect the controller directly to the PC running EDE Software.

Figure 6.1 - Configuration Switch Settings

6.2 IDENTIFICATION NUMBERS

The Emerald Drive has an extensive list of Identification Numbers (IDN) to access its Operation Data and Procedure Commands. Refer to EDE or manufacturer's controller documentation for how to set IDN Parameters.

6.2.1 IDN LIST IN NUMERICAL ORDER

IDN	NAME
(STANDARD PARAMETERS)	
00001	Control Unit Cycle Time (t_{Ncyc})
00002	Communication Cycle Time (t_{Scyc})
00003	Shortest AT Transmission Starting Time (t_{1min})
00004	Transmit/Receive Transition Time (t_{ATMT})
00005	Minimum Feedback Processing Time (t_5)
00006	AT Transmission Starting Time (t_1)
00007	Feedback Acquisition Capture Point (t_4)
00008	Command Value Valid Time (t_3)
00009	Position of Data Record in MDT
00010	Length of MDT
00011	Class 1 diagnostic (C1D)
00012	Class 2 diagnostic (C2D)
00013	Class 3 diagnostic (C3D)
00014	Interface Status
00015	Telegram Type Parameter
00016	Configuration List of AT
00017	IDN - List of all Operation Data
00018	IDN - List of Operation Data for Phase 2
00019	IDN - List of Operation Data for Phase 3
00021	IDN - List of Invalid Operation Data for Phase 2
00022	IDN - List of Invalid Operation Data for Phase 3
00024	Configuration List of MDT
00025	IDN - List of all Procedure Commands
00028	MST Error Counter
00029	MDT Error Counter
00030	Manufacturer Version
00032	Primary Operation Mode
00033	Secondary Operation Mode 1
00034	Secondary Operation Mode 2
00035	Secondary Operation Mode 3
00036	Velocity Command Value
00040	Velocity Feedback Value
00041	Homing Velocity
00042	Homing Acceleration
00043	Velocity Polarity Parameter
00044	Velocity Data Scaling Type
00047	Position Command Value
00051	Position Feedback Value 1(Motor Feedback)
00052	Reference Distance 1
00053	Position Feedback Value 2 (Auxiliary Encoder Feedback)
00055	Position Polarity Parameters
00057	Position Window
00076	Position Data Scaling Type
00080	Torque Command Value
00082	PositiveTorque Limit
00083	Negative Torque Limit
00084	Torque Feedback Value

6.2.1 IDN LIST IN NUMERICAL ORDER (cont'd)

IDN	NAME
00085	Torque Polarity Parameter
00086	Torque/Force Data Scaling Type
00088	Receive to Receive Recovery Time (t_{MTSY})
00089	MDT Transmission Starting Time (t_2)
00090	Command Value Proceeding Time (t_{MTSG})
00091	Bipolar Velocity Limit Value
00092	Bipolar Torque Limit Value
00095	Diagnostic Message
00096	Slave Arrangment (SLKN)
00097	Mask Class 2 Diagnostics
00098	Mask Class 3 Diagnostics
00099	Reset Class 1 Diagnostics
00100	Velocity Loop Proportional Gain
00101	Velocity Loop Integral Action Time
00102	Velocity Loop Differential Time
00104	Position Loop Kv Factor
00105	Position Loop Integral Action Time
00106	Current Loop Proportional Gain 1
00107	Current Loop Integral Action Time 1
00109	Motor Peak Current
00110	Amplifier Peak Current
00112	Amplifier Rated Current
00113	Maximum Motor Speed
00119	Current Loop Proportional Gain 2
00120	Current Loop Integral Action Time 2
00124	Standstill Window
00125	Velocity Threshold
00126	Torque Threshold
00127	Phase 3 Transition Check
00128	Phase 4 Transition Check
00129	Product Specific Class 1 Diagnostics
00130	Probe 1 Value Positive Edge
00131	Probe 1 Value Negative Edge
00132	Probe 2 Value Positive Edge
00133	Probe 2 Value Negative Edge
00134	Master Control Word
00135	Drive Status Word
00138	Bipolar Acceleration Limit Value
00140	Controller Type
00142	Application Type
00143	SERCOS Interface Version
00147	Homing Parameter
00148	Drive Controlled Homing Procedure Command
00157	Velocity Window
00159	Monitoring Window
00160	Acceleration Data Scaling Type
00161	Acceleration Data Scaling Factor
00162	Acceleration Data Scaling Exponent
00169	Probe Control Parameter
00170	Probing Cycle Procedure Command
00179	Probe Status
00185	Length of the configurable Data Record in the AT
00186	Length of the configurable Data Record in the MDT
00187	IDN - List of configurable Data Record in the AT

6.2.1 IDN LIST IN NUMERICAL ORDER (cont'd)

IDN	NAME
00188	IDN - List of configurable Data Record in the MDT
00189	Following Distance
00196	Motor Rated Current
00200	Amplifier Warning Temperature
00203	Amplifier Shut-Down Temperature
00206	Drive On Delay Time
00207	Drive Off Delay Time
00208	Temperature Data Scaling Type
00273	Maximum Drive off delay time
00295	Drive Enable Delay Time
00296	Velocity Feed Forward Gain
00300	Real-time Control Bit 1
00301	Allocation of Real-time Control Bit 1
00302	Real-time Control Bit 2
00303	Allocation of Real-time Control Bit 2
00304	Real-time Status Bit 1
00305	Allocation of Real-time Status Bit 1
00306	Real-time Status Bit 2
00307	Allocation of Real-time Status Bit 2
00348	Acceleration Feed Forward Gain
00380	DC Bus Voltage
00384	Amplifier Temperature
00400	Home Switch
00401	Probe 1
00402	Probe 2
00403	Position Feedback Value Status
00405	Probe 1 Enable
00406	Probe 2 Enable
00409	Probe 1 Positive Latched
00410	Probe 1 Negative Latched
00411	Probe 2 Positive Latched
00412	Probe 2 Negative Latched

IDN	NAME
(IIS SPECIFIC PARAMETERS)	
32769	U Current Sensor Calibration Offset
32770	U Current Sensor Calibration Gain
32771	V Current Sensor Calibration Offset
32772	V Current Sensor Calibration Gain
32773	U Current Sensor
32774	V Current Sensor
32775	Procedure Command Remove Calibration Write-Protect
32776	Procedure Command Save Calibration Parameters
32777	DC Bus Calibration Offset
32778	DC Bus Calibration Gain
32783	Analog Input Calibration Offset
32784	Analog Input Calibration Gain
32785	W Current Sensor Calibration Offset
32786	W Current Sensor Calibration Gain
32787	W Current Sensor
32788	Current fault factor
33000	Digital Outputs 1
33001	Digital Outputs 2
33200	Probe Source
33300	I/O Device 1 Configuration

6.2.1 IDN LIST IN NUMERICAL ORDER (cont'd)

IDN	NAME
33301	I/O Device 2 Configuration
33304	I/O Device 1 Type
33305	I/O Device 2 Type
33500	Digital Inputs 1
33501	Digital Inputs 2
33600	Analog Input 1
33650	PWM Output
33700	Alarm History
33701	Current Drive Alarm
33702	Drive Alarm Bitmap 1
33703	Drive Alarm Bitmap 2
33704	Drive Alarm Bitmap 3
33705	Drive Alarm Bitmap 4
33799	Clear Alarm History Procedure Command
33800	Following Error Delay Time
33801	PWM Frequency
34000	Motor Code
34003	Motor Poles
34004	Feedback Type
34005	Resolver Cycles
34006	Motor Feedback Configuration
34007	Motor Rated Speed
34009	Overload Time
34011	Encoder Line Count
34224	Position Loop Differential Time
34243	Current Command (Amps)
34244	Current Feedback (Amps)
34245	Velocity Command (RPM)
34246	Velocity Feedback (RPM)
34260	Motor Phase Angle
34278	Velocity Command Low Pass Filter Frequency
34279	Velocity Feedback Low Pass Filter Frequency
34280	Current Command Filter Rejection Frequency
34281	Current Command Filter Bandwidth
34282	Tuning Parameter List
34283	Motor Parameter List
34284	Monitor Parameter List
34285	Monitor I/O List
34286	Monitor Alarm List
34287	Serial Error Register
34288	Power Board ID
34300	Auxiliary Encoder Features Setup
34810	Home Switch IDN
34811	Home Switch Bit
34812	Boot ROM SFO Number
34813	Regen RMS Power
34820	Password
34821	Test Mode Procedure Command
34822	Power Transistor Bitmap
35000	Resolver Card Configuration
35001	Resolver Feedback Value
35002	Resolver Feedback Polarity Parameter
35011	Auxiliary Feedback Value
35012	Auxiliary Feedback Polarity Parameter

6.2.1 IDN LIST IN NUMERICAL ORDER (cont'd)

35020	Position Feedback 1 Configuration
35021	Position Feedback 2 Configuration

6.2.2 IDN LIST BY FUNCTION

Position Control

00032	Primary Operation Mode
00033	Secondary Operation Mode 1
00034	Secondary Operation Mode 2
00035	Secondary Operation Mode 3
00047	Position Command Value
00051	Position Feedback Value 1(Motor Feedback)
00053	Position Feedback Value 2 (Auxiliary Encoder Feedback)
00055	Position Polarity Parameters
00057	Position Window
00076	Position Data Scaling Type
00138	Bipolar Acceleration Limit Value
00159	Monitoring Window
00160	Acceleration Data Scaling Type
00161	Acceleration Data Scaling Factor
00162	Acceleration Data Scaling Exponent
00189	Following Distance
33800	Following Error Delay Time
34300	Auxiliary Encoder Features Setup
35000	Resolver Card Configuration
35001	Resolver Feedback Value
35002	Resolver Feedback Polarity Parameter
35011	Auxiliary Feedback Value
35012	Auxiliary Feedback Polarity Parameter
35020	Position Feedback 1 Configuration
35021	Position Feedback 2 Configuration

Velocity Control

00032	Primary Operation Mode
00033	Secondary Operation Mode 1
00034	Secondary Operation Mode 2
00035	Secondary Operation Mode 3
00036	Velocity Command Value
00040	Velocity Feedback Value
00043	Velocity Polarity Parameter
00044	Velocity Data Scaling Type
00091	Bipolar Velocity Limit Value
00124	Standstill Window
00125	Velocity Threshold
00138	Bipolar Acceleration Limit Value
00157	Velocity Window
00160	Acceleration Data Scaling Type
00161	Acceleration Data Scaling Factor
00162	Acceleration Data Scaling Exponent
34278	Velocity Command Low Pass Filter Frequency
34279	Velocity Feedback Low Pass Filter Frequency

6.2.2 IDN LIST BY FUNCTION (cont'd)

Torque Control

00032	Primary Operation Mode
00033	Secondary Operation Mode 1
00034	Secondary Operation Mode 2
00035	Secondary Operation Mode 3
00080	Torque Command Value
00082	PositiveTorque Limit
00083	Negative Torque Limit
00084	Torque Feedback Value
00085	Torque Polarity Parameter
00086	Torque/Force Data Scaling Type
00092	Bipolar Torque Limit Value
00126	Torque Threshold

Communications

00001	Control Unit Cycle Time (t_{Ncyc})
00002	Communication Cycle Time (t_{Scyc})
00003	Shortest AT Transmission Starting Time (t_{1min})
00004	Transmit/Receive Transition Time (t_{ATMT})
00005	Minimum Feedback Processing Time (t_5)
00006	AT Transmission Starting Time (t_1)
00007	Feedback Acquisition Capture Point (t_4)
00008	Command Value Valid Time (t_3)
00009	Position of Data Record in MDT
00010	Length of MDT
00014	Interface Status
00015	Telegram Type Parameter
00016	Configuration List of AT
00017	IDN - List of all Operation Data
00018	IDN - List of Operation Data for Phase 2
00019	IDN - List of Operation Data for Phase 3
00021	IDN - List of Invalid Operation Data for Phase 2
00022	IDN - List of Invalid Operation Data for Phase 3
00024	Configuration List of MDT
00025	IDN - List of all Procedure Commands
00088	Receive to Receive Recovery Time (t_{MTSY})
00089	MDT Transmission Starting Time (t_2)
00090	Command Value Proceeding Time (t_{MTSG})
00096	Slave Arrangment (SLKN)
00127	Phase 3 Transition Check
00128	Phase 4 Transition Check
00134	Master Control Word
00135	Drive Status Word
00185	Length of the configurable Data Record in the AT
00186	Length of the configurable Data Record in the MDT
00187	IDN - List of configurable Data Record in the AT
00188	IDN - List of configurable Data Record in the MDT
00206	Drive On Delay Time
00207	Drive Off Delay Time
00273	Maximum Drive off delay time
00295	Drive Enable Delay Time
00300	Real-time Control Bit 1
00301	Allocation of Real-time Control Bit 1
00302	Real-time Control Bit 2

6.2.2 IDN LIST BY FUNCTION (cont'd)

00303	Allocation of Real-time Control Bit 2
00304	Real-time Status Bit 1
00305	Allocation of Real-time Status Bit 1
00306	Real-time Status Bit 2
00307	Allocation of Real-time Status Bit 2

Diagnostics

00011	Class 1 diagnostic (C1D)
00012	Class 2 diagnostic (C2D)
00013	Class 3 diagnostic (C3D)
00028	MST Error Counter
00029	MDT Error Counter
00095	Diagnostic Message
00097	Mask Class 2 Diagnostics
00098	Mask Class 3 Diagnostics
00099	Reset Class 1 Diagnostics
00110	Amplifier Peak Current
00112	Amplifier Rated Current
00129	Product Specific Class 1 Diagnostics
00200	Amplifier Warning Temperature
00203	Amplifier Shut-Down Temperature
00380	DC Bus Voltage
00384	Amplifier Temperature
33700	Alarm History
33701	Current Drive Alarm
33702	Drive Alarm Bitmap 1
33703	Drive Alarm Bitmap 2
33704	Drive Alarm Bitmap 3
33705	Drive Alarm Bitmap 4
33799	Clear Alarm History Procedure Command
34243	Current Command (Amps)
34244	Current Feedback (Amps)
34245	Velocity Command (RPM)
34246	Velocity Feedback (RPM)
34260	Motor Phase Angle
34282	Tuning Parameter List
34283	Motor Parameter List
34284	Monitor Parameter List
34285	Monitor I/O List
34286	Monitor Alarm List
34287	Serial Error Register
34813	Regen Resistor RMS Power

Probes

00130	Probe 1 Value Positive Edge
00131	Probe 1 Value Negative Edge
00132	Probe 2 Value Positive Edge
00133	Probe 2 Value Negative Edge
00169	Probe Control Parameter
00170	Probing Cycle Procedure Command
00179	Probe Status
00401	Probe 1
00402	Probe 2

6.2.2 IDN LIST BY FUNCTION (cont'd)

00405	Probe 1 Enable
00406	Probe 2 Enable
00409	Probe 1 Positive Latched
00410	Probe 1 Negative Latched
00411	Probe 2 Positive Latched
00412	Probe 2 Negative Latched
33200	Probe Source

Inputs/Outputs

33000	Digital Outputs 1
33001	Digital Outputs 2
33300	I/O Device 1 Configuration
33301	I/O Device 2 Configuration
33304	I/O Device 1 Type
33305	I/O Device 2 Type
33500	Digital Input 1
33501	Digital Input 2
33600	Analog Input 1
33650	PWM Output

Tuning Parameters

00100	Velocity Loop Proportional Gain
00101	Velocity Loop Integral Action Time
00102	Velocity Loop Differential Time
00104	Position Loop Kv Factor
00105	Position Loop Integral Action Time
00106	Current Loop Proportional Gain 1
00107	Current Loop Integral Action Time 1
00119	Current Loop Proportional Gain 2
00120	Current Loop Integral Action Time 2
00296	Velocity Feed Forward Gain
00348	Acceleration Feed Forward Gain
34224	Position Loop Differential Time
34280	Current Command Filter Rejection Frequency
34281	Current Command Filter Bandwidth

Miscellaneous

00030	Manufacturer Version
00140	Controller Type
00142	Application Type
00143	SERCOS Interface Version
00208	Temperature Data Scaling Type
32788	Current fault factor
33801	PWM Frequency
34288	Power Board ID
34812	Boot ROM SFO Number

6.2.2 IDN LIST BY FUNCTION (cont'd)

Homing

00041	Homing Velocity
00042	Homing Acceleration
00052	Reference Distance 1
00147	Homing Parameter
00148	Drive Controlled Homing Procedure Command
00400	Home Switch
00403	Position Feedback Value Status
34810	Home Switch IDN
34811	Home Switch Bit

Motor Parameters

00109	Motor Peak Current
00113	Maximum Motor Speed
00196	Motor Rated Current
34000	Motor Code
34003	Motor Poles
34004	Feedback Type
34005	Resolver Cycles
34006	Motor Feedback Configuration
34007	Motor Rated Speed
34009	Overload Time
34011	Encoder Line Count

Calibration

32769	U Current Sensor Calibration Offset
32770	U Current Sensor Calibration Gain
32771	V Current Sensor Calibration Offset
32772	V Current Sensor Calibration Gain
32773	U Current Sensor
32774	V Current Sensor
32775	Procedure Command Remove Calibration Write-Protect
32776	Procedure Command Save Calibration Parameters
32777	DC Bus Calibration Offset
32778	DC Bus Calibration Gain
32783	Analog Input Calibration Offset
32784	Analog Input Calibration Gain
32785	W Current Sensor Calibration Offset
32786	W Current Sensor Calibration Gain
32787	W Current Sensor
34820	Password
34821	Test Mode Procedure Command
34822	Power Transistor Bitmap

6.2.3 IDN DESCRIPTION - STANDARD PARAMETERS

00001: CONTROL UNIT CYCLE TIME, (t_{Ncyc})

The control unit cycle time defines the cyclic interval during which the control unit makes new command values available. The control unit cycle time ($t_{Ncyc)}$ must be set equal to the communication cycle time (t_{Scyc}). This value is calculated and loaded into the drive by the Master Control Unit in Phase 2. This value becomes active in phase 3.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes	500 - 5000	1 uSec	Phases 2, 3 and 4	Phase 2	5000

00002: COMMUNICATION CYCLE TIME, (t_{Scyc})

The communication cycle time of the interface defines the intervals during which the cyclic data are transferred. The communication cycle can be set from 500uSec to 5000 uSec in steps of 250 uSec. This value is calculated and loaded into the drive by the Master Control Unit in Phase 2. This value becomes active in phase 3.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes	500 - 5000	1 uSec	Phases 2, 3 and 4	Phase 2	5000

00003: SHORTEST AT TRANSMISSION STARTING TIME, (t_{1min})

Indicates the time requirement of the drive between the end of the reception of the MST and the start of the transmission of the AT. Read by the Master Controller in Phase 2, t_{1min} is used to calculate the AT Transmission Starting Time, t_1 (IDN 00006).

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes	15	1 uSec	Phases 2, 3 and 4	None	

00004: TRANSMIT/RECEIVE TRANSITION TIME, (t_{ATMT})

Time required by the drive to switch from transmitting the AT to receiving the MDT. Read by the Master Controller in Phase 2 and is used to determine the MDT starting time, t_2 (IDN 00089).

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes	0	1 uSec	Phases 2, 3 and 4	None	

6.2.3 IDN DESCRIPTION - STANDARD PARAMETERS (cont'd)

00005: MINIMUM FEEDBACK PROCESSING TIME, (t_5)

Time required by the drive between the start of feedback acquisition and the arrival of the next MST. This value is loaded by the Master Controller in Phase 2 and becomes active in Phase 3.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes	200	1 uSec	Phases 2, 3 and 4	None	

00006: AT TRANSMISSION STARTING TIME, (t_1)

The time the drive sends the AT after the end of the MST. This value is loaded by the Master Controller in Phase 2 and becomes active in Phase 3. ($t_1 \geq t_{1min}$)

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes	15 - 5000	1 uSec	Phases 2, 3 and 4	Phase 2	12

00007: FEEDBACK ACQUISITION CAPTURE POINT, (t_4)

The time the drive captures the AT Data. This value is loaded by the Master Controller in Phase 2 and becomes active in Phase 3.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes	0 - (tScyc - t5)	1 uSec	Phases 2, 3 and 4	Phase 2	0

00008: COMMAND VALUE VALID TIME, (t3)

The time the drive can start using the data sent in the MDT. Set by the Master Controller in Phase 2.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes	0 - 5000	1 uSec	Phases 2, 3 and 4	Phase 2	0

00009: POSITION OF DATA RECORD IN MDT

The position within the MDT that the drives command data can be obtained. Set by the Master Controller in Phase 2.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes	0 - 65531	1 byte	Phases 2, 3 and 4	Phase 2	1

6.2.3 IDN DESCRIPTION - STANDARD PARAMETERS (cont'd)

00010: LENGTH OF MDT

The length of the MDT, expressed in bytes, includes data records for all drives. Set by the Master Controller in Phase 2.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes	4 - 65534	1 byte	Phases 2, 3 and 4	Phase 2	4

00011: CLASS 1 DIAGNOSTICS (C1D)

Indicates a Drive Shutdown Error.

A Drive error situation leads to the following.

a) Drive safely decelerates to and releases torque when stopped.
b) The shutdown error Bit (Bit 13) is set to 1 in the drive status. IDN 99 must be issued and no Class 1 diagnostic errors exist to clear the error bit.

Bit supported by drive:

BIT NUMBER	DESCRIPTION
Bit 0:	Reserved
Bit 1:	Amplifier over temperature error
Bit 2:	Reserved
Bit 3:	Reserved
Bit 4:	Reserved
Bit 5:	Feedback error
Bit 6:	Error in the "commutation" system
Bit 7:	Over current error
Bit 8:	Over voltage error
Bit 9:	Under voltage error
Bit 10:	Reserved
Bit 11:	Excessive position deviation
Bit 12:	Communication error
Bit 13:	Reserved
Bit 14:	Reserved
Bit 15:	Manufacturer-specific error (see IDN 00129)

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Binary	2 bytes		1 byte	Phases 2, 3 and 4	None	

6.2.3 IDN DESCRIPTION - STANDARD PARAMETERS (cont'd)

00012: CLASS 2 DIAGNOSTICS (C2D)

Indicates a Drive Shutdown Warning.

The shutdown warning Bit (Bit 12) is set to 1 in the drive status.
When this IDN is read the warning bit is cleared and this IDN is reset to 0.

Bit supported by drive:

BIT NUMBER	DESCRIPTION
Bit 0:	Reserved
Bit 1:	Amplifier over temperature warning
Bit 2:	Reserved
Bit 3:	Reserved
Bit 4:	Reserved
Bit 5:	Reserved
Bit 6:	Reserved
Bit 7:	Reserved
Bit 8:	Reserved
Bit 9:	Under Voltage warning
Bit 10:	Reserved
Bit 11:	Reserved
Bit 12:	Reserved
Bit 13:	Reserved
Bit 14:	Reserved
Bit 15:	Reserved

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Binary	2 bytes		1 byte	Phases 2, 3 and 4	None	

6.2.3 IDN DESCRIPTION - STANDARD PARAMETERS (cont'd)

00013: CLASS 3 DIAGNOSTICS (C3D)

Drive operation status flags.

The status flag Bit (Bit 11) is set to 1 in the drive status when a change in C3D occurs. When this IDN is read the status bit (Bit 11) in the drive status is cleared.

Bit supported by drive:

BIT NUMBER	DESCRIPTION	
Bit 0:	$n_{feedback} = n_{command}$	(See: Velocity Window IDN 00157)
Bit 1:	$n_{feedback} = 0$	(See: Standstill Window IDN 00124)
Bit 2:	$\| n_{feedback} \| < \| n_x \|$	(See: Velocity Threshold IDN 00125)
Bit 3:	$\| T \| >= \| T_x \|$	(See: Torque Threshold IDN 00126)
Bit 4:	$\| T \| >= \| T_{limit} \|$	(See: Torque Limit IDN 00082, IDN 00083, and IDN 00092)
Bit 5:	$\| n_{command} \| > \| n_{limit} \|$	(See: Velocity Limit IDN 00091)
Bit 6:	In Position	(See: Position Window IDN 00057)
Bit 7 - 15:	Reserved	

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Binary	2 bytes		1 byte	Phases 2, 3 and 4	None	

00014: INTERFACE STATUS

Status of the SERCOS Interface. When an interface error occurs, the error and the phase the error occurred is recorded. Can only be cleared by the Reset Class 1 Diagnostics (IDN 00099).

Bit supported by drive:

BIT NUMBER	DESCRIPTION
Bit 2 - 0:	Communication phase
Bit 3:	MST Failure
Bit 4:	MDT Failure
Bit 5:	Invalid Phase (Phase > 4)
Bit 6:	Error During Phase Upshift (Invalid Sequence)
Bit 7:	Error During Phase Downshift (Not To Phase 0)
Bit 8:	Phase Switching without Ready Acknowledge
Bit 9:	Switching to Uninitialized Operating Mode
Bit 10 - 15:	Reserved

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Binary	2 bytes		1 byte	Phases 2, 3 and 4	None	

6.2.3 IDN DESCRIPTION - STANDARD PARAMETERS (cont'd)

00015: TELEGRAM TYPE PARAMETER

Selects the Telegram Configuration Type of the AT and the MDT cyclic data. Set by the Master Controller in Phase 2.

TYPE	CONFIGURATION
0	No AT or MDT IDNs
1	IDN 80 (Torque Command) in the MDT
2	IDN 36 (Velocity Command) in the MDT and IDN 40 (Velocity Feedback) in the AT
3	IDN 36 (Velocity Command) in the MDT and IDN 51 (Position Feedback) in the AT
4	IDN 47 (Position Command) in the MDT and IDN 51 (Position Feedback) in the AT
5	IDN 47 (Position Command), IDN 36 (Velocity Command) in the MDT and IDN 51 (Position Feedback), IDN 40 (Velocity Feedback in the AT
6	IDN 36 (Velocity Command) in the MDT
7	User Defined At and MDT (See IDNs 16 and 24)

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Binary	2 bytes	0 - 7		Phases 2, 3 and 4	Phase 2	0

00016: CONFIGURATION LIST OF AT

List of IDNs that are to be included in the User Defined AT Cyclic Data. Set by the Master Controller in Phase 2. Only Valid if Telegram Type 7 is selected for IDN 00015. (Refer to **IDN 00185** and **IDN 00187**.)

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	IDN	Variable	See IDN00185, IDN00187		Phases 2, 3 and 4	Phase 2	0

00017: IDN - LIST OF ALL OPERATION DATA

Returns the list of all valid operation Data IDN's

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	IDN	Variable			Phases 2, 3 and 4	None	

6.2.3 IDN DESCRIPTION - STANDARD PARAMETERS (cont'd)

00018: IDN - LIST OF OPERATION DATA FOR PHASE 2

Returns the list of all IDN's that must be written by the Master in Phase 2.
IDN's 00001, 00002, 00006, 00007, 00008, 00009, 00010, 00015, 00032 and 00089 must be written.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	IDN	Variable			Phases 2, 3 and 4	None	

00019: IDN - LIST OF OPERATION DATA FOR PHASE 3

Returns the list of all IDN's that must be written by the Master in Phase 3.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	IDN	Variable			Phases 2, 3 and 4	None	

00021: IDN - LIST OF INVALID OPERATION DATA FOR PHASE 2

Returns the list of all operation Data IDN's for Phase 2 that is considered invalid by the drive and will need to be written before switchover to phase 3 can be made.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	IDN	Variable			Phases 2, 3 and 4	None	

00022: IDN - LIST OF INVALID OPERATION DATA FOR PHASE 3

Returns the list of all operation Data IDN's for Phase 3 that is considered invalid by the drive and will need to be written before switchover to phase 4 can be made.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	IDN	Variable			Phases 2, 3 and 4	None	

00024: CONFIGURATION LIST OF MDT

List of IDNs that are to be included in the User Defined MDT Cyclic Data. Set by the Master Controller in Phase 2. Only Valid if Telegram Type 7 is selected for IDN 00015. (Refer to **IDN 00186** and **IDN 00188**.)

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	IDN	Variable	See IDN00186, IDN00188		Phases 2, 3 and 4	Phase 2	0

6.2.3 IDN DESCRIPTION - STANDARD PARAMETERS (cont'd)

00025: IDN - LIST OF ALL PROCEDURE COMMANDS

Returns the list of all valid Procedure Command IDN's on drive.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	IDN	Variable			Phases 2, 3 and 4	None	

00028: MST ERROR COUNTER

The MST error counter counts all invalid MST's in Communication Phase 3 and 4. In the case where more than 2 consecutive MST's are invalid, only the first two are counted. The MST error counter counts up to a maximum of 2^{16} -1. This means that if a value of 65535 is set in the counter, there may have been a noisy transmission over a long period of time.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes			Phases 2, 3 and 4	None	0

00029: MDT ERROR COUNTER

The MDT error counter counts all invalid MDT's in Communication Phase 3 and 4. In the case where more than 2 consecutive MDT's are invalid, only the first two are counted. The MDT error counter counts up to a maximum of 2^{16} -1. This means that if a value of 65535 is set in the counter, there may have been a noisy transmission over a long period of time.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes			Phases 2, 3 and 4	None	0

00030: MANUFACTURER VERSION

Identifies the current software version number in the drive.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Text	Variable			Phases 2, 3 and 4	None	

6.2.3 IDN DESCRIPTION - STANDARD PARAMETERS (cont'd)

00032: PRIMARY OPERATION MODE

The drive operation mode defined by this ID Number becomes active when the Primary Operation mode is set in the Control word of the MDT. Must be configured in phase 2.

VALUES	VALID MODES
0	No Command Mode
1	Torque Control Mode using Cyclic command values
2	Velocity Control Mode using Cyclic command values
3	Position Control using Cyclic command values
16385	Torque Control ignoring Cyclic command values
16386	Velocity Control ignoring Cyclic command values

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Binary	2 bytes	0 - 65535		Phases 2, 3 and 4	Phases 2	0

00033 SECONDARY OPERATION MODE 1

The drive operation mode defined by this ID Number becomes active when the Secondary Operation mode 1 is set in the Control word of the MDT. Must be configured in phase 2.

VALUES	VALID MODES
0	No Command Mode
1	Torque Control Mode using Cyclic command values
2	Velocity Control Mode using Cyclic command values
3	Position Control using Cyclic command values
16385	Torque Control ignoring Cyclic command values
16386	Velocity Control ignoring Cyclic command values

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Binary	2 bytes	0 - 65535		Phases 2, 3 and 4	Phases 2	0

6.2.3 IDN DESCRIPTION - STANDARD PARAMETERS (cont'd)

00034: SECONDARY OPERATION MODE 2

The drive operation mode defined by this ID Number becomes active when the Secondary Operation mode 2 is set in the Control word of the MDT. Must be configured in phase 2.

VALUES	VALID MODES
0	No Command Mode
1	Torque Control Mode using Cyclic command values
2	Velocity Control Mode using Cyclic command values
3	Position Control using Cyclic command values
16385	Torque Control ignoring Cyclic command values
16386	Velocity Control ignoring Cyclic command values

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Binary	2 bytes	0 - 65535		Phases 2, 3 and 4	Phases 2	0

00035: SECONDARY OPERATION MODE 3

The drive operation mode defined by this ID Number becomes active when the Secondary Operation mode 3 is set in the Control word of the MDT. Must be configured in phase 2.

VALUES	VALID MODES
0	No Command Mode
1	Torque Control Mode using Cyclic command values
2	Velocity Control Mode using Cyclic command values
3	Position Control using Cyclic command values
16385	Torque Control ignoring Cyclic command values
16386	Velocity Control ignoring Cyclic command values

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Binary	2 bytes	0 - 65535		Phases 2, 3 and 4	Phases 2	0

00036: VELOCITY COMMAND VALUE

In the velocity control-operating mode in the drive, the control unit transfers the velocity command values to the drive.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Signed Decimal	4 bytes	-32768 - +32768	32768bits = 6000RPM	Phases 2, 3 and 4	Phase 4	0

6.2.3 IDN DESCRIPTION - STANDARD PARAMETERS (cont'd)

00040: VELOCITY FEEDBACK VALUE

The velocity feedback value is transferred from the drive to the control unit in order to allow the control unit to periodically display the velocity.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Signed Decimal	4 bytes		32768bits = 6000RPM	Phases 2, 3 and 4	None	

00041: HOMING VELOCITY

The homing velocity is used during the procedure command 'drive controlled homing' (IDN 148) when activated. The drive performs its own homing control.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Signed Decimal	4 bytes	0 - +32768	32768bits = 6000RPM	Phases 2, 3 and 4	Phase 4	0

00042: HOMING ACCELERATION

The homing acceleration is needed by the drive if the procedure command 'drive controlled homing' (IDN 148) is activated.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	4 bytes	0 - 25000.000	rad/sec^2	Phases 2, 3 and 4	Phase 4	0

00043: VELOCITY POLARITY PARAMETER

This parameter is used to switch polarities of velocity data for specific applications. Polarities are not switched internally but externally (on the input and output) of a closed loop system. The motor shaft turns clockwise when there is a positive velocity command difference and no inversion is programmed (see **Figure 6.2**).

Bit supported by drive:

BIT NUMBER	DESCRIPTION
Bit 0:	Velocity command value = 0 - non-inverted = 1 - inverted
Bit 1:	Reserved
Bit 2:	Velocity feedback value = 0 - non-inverted = 1 - inverted
Bit 15 - 3:	Reserved

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Binary	2 bytes			Phases 2, 3 and 4	Phases 2, 3 and 4	0

6.2.3 IDN DESCRIPTION - STANDARD PARAMETERS (cont'd)

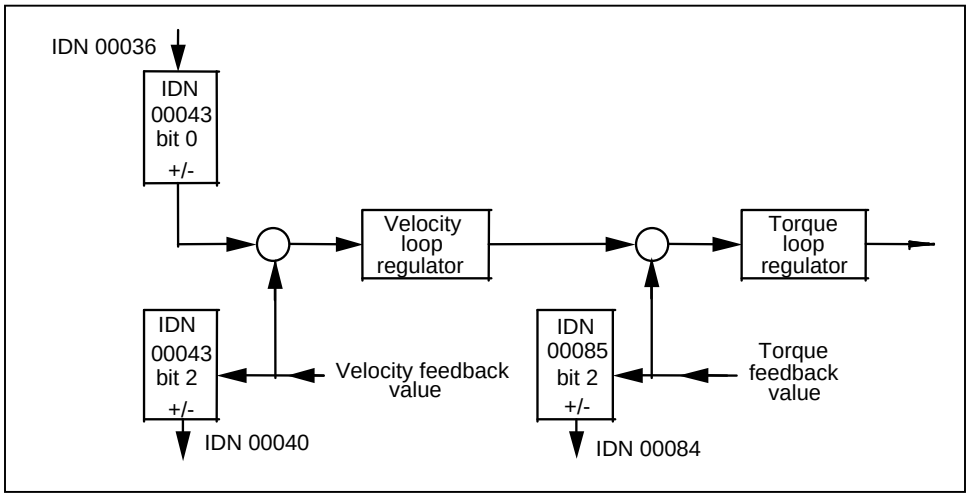


Figure 6.2 - Velocity Polarity Parameter

00044: VELOCITY DATA SCALING TYPE

Defines the scaling option for all velocity data. Only the "No scaling Method is currently supported by the drive.

Bit supported by drive:

BIT NUMBER	DESCRIPTION
Bit 2-0:	Scaling method 000 - no scaling
All others:	Reserved

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Binary	2 bytes			Phases 2, 3 and 4	None	0

00047: POSITION COMMAND VALUE

During the position control drive operation mode, the position command values are transferred from the control unit to the drive according to the time pattern of the control unit cycle.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Signed Decimal	4 bytes	-2^{31} - $+2^{31}$ - 1	1 bit	Phases 2, 3 and 4	Phase 4	0

6.2.3 IDN DESCRIPTION - STANDARD PARAMETERS (cont'd)

00051: POSITION FEEDBACK VALUE 1 (MOTOR FEEDBACK)

The position feedback value 1 is transferred from the drive to the control unit.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Signed Decimal	4 bytes		1 bit	Phases 2, 3 and 4	None	

00052: REFERENCE DISTANCE 1

This parameter describes the distance between the machine zero point and the reference point related to the motor feedback. After the homing procedure, the position feedback value 1 is calculated by:
- reference distance 1;

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Signed Decimal	4 bytes	-2^{31} - $+2^{31}$ - 1	1 bit	Phases 2, 3 and 4	Phases 2, 3 and 4	0

00053: POSITION FEEDBACK VALUE 2

The position feedback value 2 is transferred from the drive to the control unit.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Signed Decimal	4 bytes		1 bit	Phases 2, 3 and 4	None	

00055: POSITION POLARITY PARAMETERS

This parameter is used to switch polarities of reported position data for specific applications. Polarities are switched outside (i.e. on the input and output) of a closed loop system. The motor shaft turns clockwise (when viewed from the output shaft) when there is a positive position command difference and no inversion is programmed (see **Figure 6.3**).

Bit supported by drive:

BIT NUMBER	DESCRIPTION
Bit 0:	Position command value 0 - Non-inverted 1 - Inverted
Bit 1:	Reserved
Bit 2:	Position feedback value 1 0 - Non-inverted 1 - Inverted
Bit 3:	Position feedback value 2 0 - Non-inverted 1 - Inverted
Bit 4-15:	Reserved

6.2.3 IDN DESCRIPTION - STANDARD PARAMETERS (cont'd)

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Binary	2 bytes			Phases 2, 3 and 4	Phases 2, 3 and 4	0

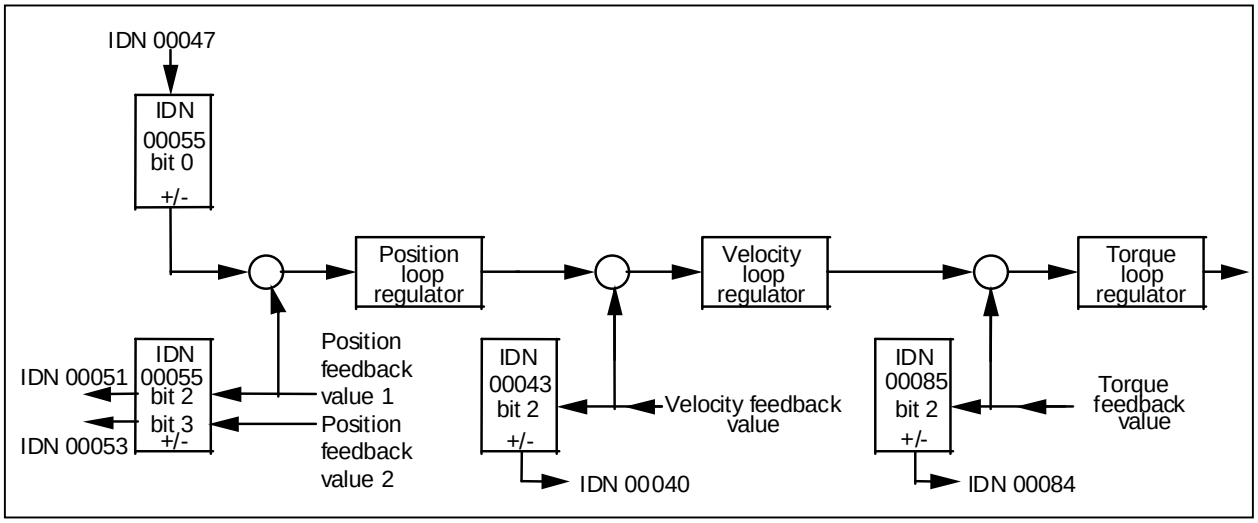


Figure 6.3 - Position Polarity Parameter

00057: POSITION WINDOW

When the difference between the position command value and the position feedback value is within the range of the position window, then the drive sets the status "in position" in C3D (IDN 00013).

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	4 bytes	$0 - +2^{31} - 1$	1 bit	Phases 2, 3 and 4	Phases 2, 3 and 4	$-2^{31} - 1$

00076: POSITION DATA SCALING TYPE

Defines the scaling option for all position data. Only the "No scaling" method is currently supported by the drive.

Bit supported by drive:

BIT NUMBER	DESCRIPTION
Bit 2-0:	Scaling method 000 - no scaling
All others:	Reserved

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Binary	2 bytes			Phases 2, 3 and 4	None	0

6.2.3 IDN DESCRIPTION - STANDARD PARAMETERS (cont'd)

00080: TORQUE COMMAND VALUE

During the torque control operation mode of the drive, torque command values are transferred from the control unit to the drive. This IDN is scaled as a percentage of the drive or motor's peak torque, whichever is less.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Signed Decimal	2 bytes	-100.00 - +100.00	0.01%	Phases 2, 3 and 4	Phase 4	0

00082: POSITIVE TORQUE LIMIT

The positive torque limit value limits the maximum torque in the positive direction. If the torque limit is exceeded, the drive sets the status T >= T_{limit} in C3D (IDN 00013).

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Signed Decimal	2 bytes	0.00 - 100.00	0.01%	Phases 2, 3 and 4	Phases 2, 3 and 4	100.00

00083: NEGATIVE TORQUE LIMIT

The negative torque limit value limits the maximum torque in the negative direction. If the torque limit is exceeded, the drive sets the status T >= T_{limit} in C3D (IDN 00013).

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Signed Decimal	2 bytes	0.00 - 100.00	0.01%	Phases 2, 3 and 4	Phases 2, 3 and 4	-100.00 ?

00084: TORQUE FEEDBACK VALUE

The torque feedback value is transferred from the drive to the control unit. This IDN is scaled as a percentage of the drive or motor's peak torque, whichever is less.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Signed Decimal	2 bytes		0.01%	Phases 2, 3 and 4	None	

6.2.3 IDN DESCRIPTION - STANDARD PARAMETERS (cont'd)

00085: TORQUE POLARITY PARAMETER

This parameter is used to switch polarities of reported torque data for specific applications. Polarities are not switched internally but externally (on the input and output) of a closed loop system. The motor shaft turns clockwise when there is a positive torque command difference and no inversion (see **Figure 6.4**).

Bit supported by drive:

BIT NUMBER	DESCRIPTION
Bit 0:	Torque command value 0 - Non-inverted 1 - Inverted
Bit 1:	Reserved
Bit 2:	Torque feedback value 0 - Non-inverted 1 - Inverted
Bit 15-3:	Reserved

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Binary	2 bytes			Phases 2, 3 and 4	Phases 2, 3 and 4	0

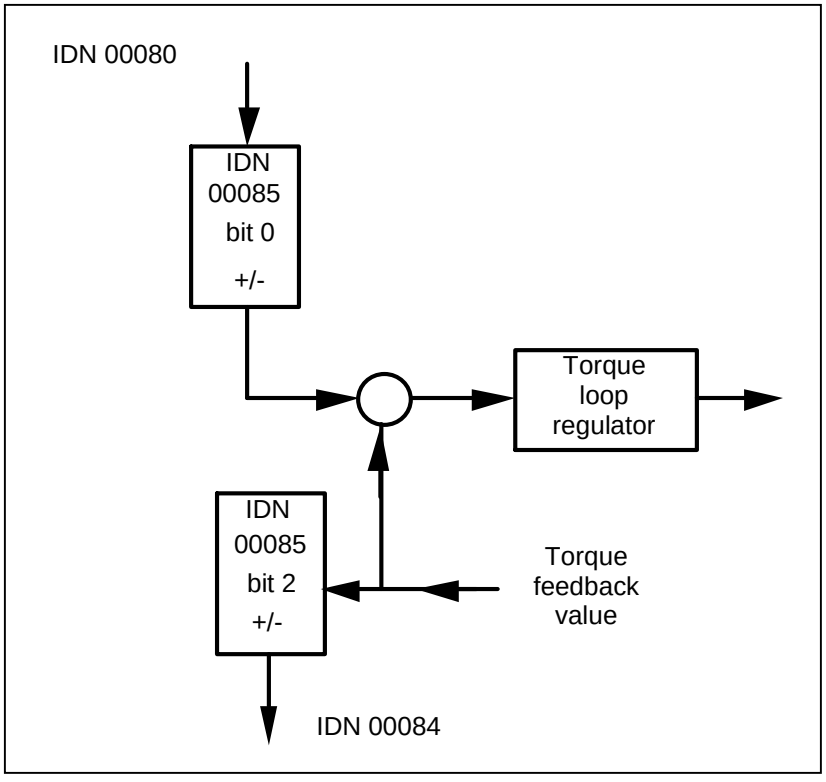


Figure 6.4 - Torque Polarity Parameter

6.2.3 IDN DESCRIPTION - STANDARD PARAMETERS (cont'd)

00086: TORQUE DATA SCALING TYPE

Defines the scaling option for all torque data. Only the "Percentage Scaling" method is currently supported by the drive.

Bit supported by drive:

BIT NUMBER	DESCRIPTION
Bit 2-0:	Scaling method 000 - Percentage scaling
Bit 3-15:	Reserved

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Binary	2 bytes			Phases 2, 3 and 4	None	0

00088: RECEIVE TO RECEIVE RECOVERY TIME (t_{mtsy})

Recovery time of the slave after reception of a MDT to switch over to receive the next MST. The master reads this time during CP_2 to ensure that the interval will be sufficient between the end of the MDT and the beginning of the MST.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes		1 µs	Phases 2, 3 and 4	None	

00089: MDT TRANSMISSION STARTING TIME (t_2)

The MDT transmission starting time determines when the master shall send its MDT during CP_3 and CP_4, following the MST. This parameter is transferred by the master to the slave during CP_2 and becomes active during CP_3.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal Number	2 bytes	1 - 5000	1 µs	Phases 2, 3 and 4	Phase 2	0 ?

00090: COMMAND VALUE PROCEEDING TIME (t_{mtsg})

The time required by the slave to make command values available for a drive after receipt of a MDT. This time is read by the master during CP_2 in order to calculate correctly the command value valid time t_3 (IDN 00008).

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes		1 µs	Phases 2, 3 and 4	None	1

6.2.3 IDN DESCRIPTION - STANDARD PARAMETERS (cont'd)

00091: BIPOLAR VELOCITY LIMIT VALUE

The bipolar velocity limit value describes the maximum allowable velocity in both directions. If the velocity limit value is exceeded, the drive responds by setting the status '$n_{command} > n_{limit}$' in C3D (IDN 00013).

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Signed Decimal	4 bytes	0 - 32768	32768 bits = 6000 RPM	Phases 2, 3 and 4	Phases 2, 3 and 4	32768

00092: BIPOLAR TORQUE LIMIT VALUE

The bipolar torque limit value limits the maximum torque symmetrically in both directions. If the torque limit value is exceeded, the drive sets the status '$T \geq T_{limit}$' in C3D (IDN 00013).

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Signed Decimal	2 bytes	0 - +100.00	0.01%	Phases 2, 3 and 4	Phases 2, 3 and 4	100.00

00095: DIAGNOSTIC MESSAGE

Not currently supported at this time.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Text	Variable			Phases 2, 3 and 4	None	

6.2.3 IDN DESCRIPTION - STANDARD PARAMETERS (cont'd)

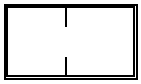
00096: SLAVE ARRANGEMENT (SLKN)

During initialization, the master needs to recognize which physical slaves and their associated drives are present in order to optimize the automatic timeslot computation. The master can request this information from the drives during CP_2. By this entry the master recognizes other drives which belong to the same physical slave. Valid drive addresses are all decimal values from 1 to 254, in accordance with hexadecimal values $(01)_H$ through $(FE)_H$.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes			Phases 2, 3 and 4	None	

SLKN:

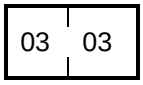
Since each Emerald Drive is configured with one drive per slave, then "Next Drives Address" = "Drive Address".



Next Drives Address (1 through 255)
Drive Address (1 through 255)

Example:

A drive with an address of "03" has a value of:



00097: MASK CLASS 2 DIAGNOSTIC

By means of this mask, warnings in class 2 diagnostic can be masked with respect to their effect on the change bit in drive status. When changing masked warnings, the change bit for class 2 diagnostic is not set in the drive status. The mask does not affect the operation data of class 2 diagnostic (see **IDN 00012**). Setting a bit to 0 masks the effects of the correspond C2D bit on the Class 2 diagnostic change bit.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Binary	2 bytes			Phases 2, 3 and 4	Phases 2, 3 and 4	0

6.2.3 IDN DESCRIPTION - STANDARD PARAMETERS (cont'd)

00098: MASK CLASS 3 DIAGNOSTIC

By means of this mask, condition flags in C3D can be masked with respect to their effect on the change bit in drive status. When masked condition flags change, the change bit for C3D is not set in the drive status. The mask does not affect the operation data of C3D (see **IDN 00013**). Setting a bit to 0 masks the effects of the correspond C3D bit on the Class 3 diagnostic change bit.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Binary	2 bytes			Phases 2, 3 and 4	Phases 2, 3 and 4	0

00099: RESET CLASS 1 DIAGNOSTIC

When this procedure command is received by the drive via the service channel and no error exists, C1D, the interface status, the manufacturer's C1D, the drive shutdown error (drive status bit 13), and the drive shutdown mechanism in the drive are all reset (see **IDN 00011, IDN 00014, and IDN 00129**).

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Procedure Command	Binary	2 bytes			Phases 2, 3 and 4	Phases 2, 3 and 4	0

00100: VELOCITY LOOP PROPORTIONAL GAIN

Sets the proportional gain for the velocity loop controller.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	4 bytes	0.000 - 65.535	0.001 Amp/(rad/sec)	Phases 2, 3 and 4	Phases 2, 3 and 4	0.400

00101: VELOCITY LOOP INTEGRAL ACTION TIME

Sets the integral time constant for the velocity loop controller.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes	0.0 - 6553.5	0.1 msec	Phases 2, 3 and 4	Phases 2, 3 and 4	0.0

00102: VELOCITY LOOP DIFFERENTIAL TIME

Sets the derivative time for the velocity loop controller.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes	0.0 - 6553.5	0.1 msec	Phases 2, 3 and 4	Phases 2, 3 and 4	0.0

6.2.3 IDN DESCRIPTION - STANDARD PARAMETERS (cont'd)

00104: POSITION LOOP K_V - FACTOR

The K_V-factor determines the gain of the position loop regulator throughout the entire velocity range.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes	0.0 - 6553.5	0.1 (rad/sec)/rad	Phases 2, 3 and 4	Phases 2, 3 and 4	30.0

00105: POSITION LOOP INTEGRAL ACTION TIME

Sets the integral time constant for the postion loop controller.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes	0.0 - 6553.5	0.1 msec	Phases 2, 3 and 4	Phases 2, 3 and 4	0.0

00106: CURRENT LOOP PROPORTIONAL GAIN 1

Sets the proportional gain for the torque/force-producing current loop.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	4 bytes	0.000 - 100.000	0.001 V/A	Phases 2, 3 and 4	Phases 2, 3 and 4	0.0

00107: CURRENT LOOP INTEGRAL ACTION TIME 1

Sets the integral time constant for the torque/force-producing current loop.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes	0 - 65535	1 μsec	Phases 2, 3 and 4	Phases 2, 3 and 4	0

6.2.3 IDN DESCRIPTION - STANDARD PARAMETERS (cont'd)

00109: MOTOR PEAK CURRENT

If the motor peak current is less than that of the amplifier, the amplifier is automatically limited to the level of the motor peak current. The setting range for this IDN is dependant on drive size and PWM frequency.

Emerald Driver	ESD-5		ESD-10		ESD-20		ESD-40		ESD-60	
PWM Frequency	8 KHz	16 KHz	8 KHz	16 KHz	8 KHz	16 KHz	8 KHz	16 KHz	8 KHz	16 KHz
Min. Setting	0 A peak	0 A peak	0 A peak	0 A peak	0 A peak	0 A peak	0 A peak	0 A peak	0 A peak	0 A peak
Max. Setting	17.675 A peak	14.140 A peak	35.350 A peak	28.280 A peak	70.700 A peak	56.560 A peak	141.40 A peak	113.12 A peak	169.68 A peak	135.74 4 A peak

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	4 bytes	See table above	0.001 A	Phases 2, 3 and 4	Phases 2 and 3	0.000

00110: AMPLIFIER PEAK CURRENT

The amplifier peak current is limited by the hardware, which means that the current for the maximum attainable torque limit value is fixed as well.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	4 bytes		0.001 A peak	Phases 2, 3 and 4	None	Depends on drive size

00112: AMPLIFIER RATED CURRENT

The amplifier rated current is equal to the allowable continuous current of the drive unit.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	4 bytes		0.001 A peak	Phases 2, 3 and 4	None	Depends on drive size

00113: MAXIMUM MOTOR SPEED

The maximum motor speed is listed in the motor spec sheet provided by the manufacturer.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	4 bytes	0.0000 - 6000.0000	0.0001 RPM	Phases 2, 3 and 4	Phases 2 and 3	0.0000

6.2.3 IDN DESCRIPTION - STANDARD PARAMETERS (cont'd)

00119: CURRENT LOOP PROPORTIONAL GAIN 2

Sets the proportional gain for the flux-producing current loop.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	4 bytes	0.000 - 100.000	0.001 V/A	Phases 2, 3 and 4	Phases 2, 3 and 4	0.000

00120: CURRENT LOOP INTEGRAL ACTION TIME 2

Sets the integral time constant for the flux-producing current loop.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes	0 - 65535	1 μsec	Phases 2, 3 and 4	Phases 2, 3 and 4	0

00124: STANDSTILL WINDOW

The standstill window describes the amount of the deviation of the velocity from 0. If the velocity feedback value is within the standstill window the drive sets the status $n_{feedback} = 0$ in C3D (IDN 00013).

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	4 bytes	0 - 32768	32768 bits = 6000 RPM	Phases 2, 3 and 4	Phases 2, 3 and 4	0

00125: VELOCITY THRESHOLD (n_x)

If the velocity feedback value falls below the velocity threshold n_X, the drive sets the status '$n_{feedback} < n_X$ ' in C3D (IDN 00013).

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	4 bytes	0 - 32768	32768 bits = 6000 RPM	Phases 2, 3 and 4	Phases 2, 3 and 4	32768

00126: TORQUE THRESHOLD (T_X)

If the torque feedback value exceeds the torque threshold T_X, the drive sets the status '$T \geq T_X$' in C3D (IDN 00013).

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes	0 - +100.00	0.01%	Phases 2, 3 and 4	Phases 2, 3 and 4	0

6.2.3 IDN DESCRIPTION - STANDARD PARAMETERS (cont'd)

00127: CP_3 TRANSITION CHECK

The master uses this procedure command to instruct the slave to check that all necessary parameters have been transferred for CP_3. Otherwise, this procedure command results in an error (see **IDN 00021**). After the procedure command is performed correctly, the control unit has to cancel the procedure command. The control unit can then activate CP_3 in the MST.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Procedure Command	Binary	2 bytes			Phases 2, 3 and 4	Phases 2	0

00128: CP_4 TRANSITION CHECK

The master uses this procedure command to instruct the slave to check that all necessary parameters have been transferred for CP_4. Otherwise, this procedure command results in an error (see **IDN 00022**). After the procedure command is performed correctly, the control unit has to cancel the procedure command. The control unit can then activate CP_4 in the MST.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Procedure Command	Binary	2 bytes			Phases 2, 3 and 4	Phases 3	0

00129: MANUFACTURER CLASS 1 DIAGNOSTIC

If an error is set in the manufacturer class 1 diagnostic, the manufacturer-specific error bit in class 1 diagnostic (see **IDN 00011**) is set as well. The drive cancels the manufacturer-specific error and resets to '0' only if the error in manufacturer class 1 diagnostic has been eliminated and on receiving the command 'reset class 1 diagnostic' (see **IDN 00099**) via the service channel.

Bits supported by drive:

BIT NUMBER	DESCRIPTION
Bit 0:	Sercos synchronization error
Bit 1:	Non-volatile parameter loss
Bit 2:	I/O CAN network error
Bit 3:	Regen resistor errort (Open or Over-Temperature)
Bit 4:	Power board not recognized
Bit 5:	Power module fault
Bit 6:	Cycle of power required
Bit 7:	Option card error
Bit 8:	Invalid PWM frequency
Bit 9 - 15:	Reserved

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Binary	2 bytes			Phases 2, 3 and 4	None	0

6.2.3 IDN DESCRIPTION - STANDARD PARAMETERS (cont'd)

00130: PROBE VALUE 1 POSITIVE EDGE

Based on the configure Probe Feedback Source (IDN 33200) the drive stores position feedback value in the measuring cycle in this parameter following the positive edge of the input signal of probe 1 (see **IDN 00401**). This allows the control unit to read 'probe value 1 positive edge' at a later time.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Signed Decimal	4 bytes			Phases 2, 3 and 4	None	

00131: PROBE VALUE 1 NEGATIVE EDGE

Based on the configure Probe Feedback Source (IDN 33200) the drive stores position feedback value in the measuring cycle in this parameter following the negative edge of the input signal of probe 1 (see **IDN 00401**). This allows the control unit to read 'probe value 1 negative edge' at a later time.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Signed Decimal	4 bytes			Phases 2, 3 and 4	None	

00132: PROBE VALUE 2 POSITIVE EDGE

Based on the configured Probe Feedback Source (IDN 33200) the drive stores position feedback value in the measuring cycle in this parameter following the positive edge of the input signal of probe 2 (see **IDN 00402**). This allows the control unit to read 'probe value 2 positive edge' at a later time.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Signed Decimal	4 bytes			Phases 2, 3 and 4	None	

00133: PROBE VALUE 2 NEGATIVE EDGE

Based on the configured Probe Feedback Source (IDN 33200) the drive stores position feedback value in the measuring cycle in this parameter following the negative edge of the input signal of probe 2 (see **IDN 00402**). This allows the control unit to read 'probe value 2 negative edge' at a later time.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Signed Decimal	4 bytes			Phases 2, 3 and 4	None	

6.2.3 IDN DESCRIPTION - STANDARD PARAMETERS (cont'd)

00134: MASTER CONTROL WORD

Allows reading of the master control word on the control unit screen, via the service channel. (This can be useful during start-up and error recovery.)

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Binary	2 bytes			Phases 2, 3 and 4	None	

00135: DRIVE STATUS WORD

Allows reading of the drive status word on the control unit screen, via the service channel. (This can be useful during start-up and error recovery.)

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Binary	2 bytes			Phases 2, 3 and 4	None	

00138: BIPOLAR ACCELERATION LIMIT VALUE

The bipolar acceleration parameter limits the maximum acceleration ability of the drive symmetrically to the programmed value in both directions.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	4 bytes	0 - 25000.000	rad/sec/sec	Phases 2, 3 and 4	Phases 2, 3 and 4	25000.000

00140: CONTROLLER TYPE

The operation data of the controller type contains the name of the company and the manufacturer controller type.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Text	Variable			Phases 2, 3 and 4	None	

00142: APPLICATION TYPE

The operation data of the application type contains the type of the drive application (e.g., main spindle drive, round axis).

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Text	Variable			Phases 2, 3 and 4	Phases 2, 3 and 4	Not defined

6.2.3 IDN DESCRIPTION - STANDARD PARAMETERS (cont'd)

00143: SYSTEM INTERFACE VERSION

The operation data of SYSTEM interface version contains the version of the SYSTEM Interface specification.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Text	Variable			Phases 2, 3 and 4	None	V02.04

00147: HOMING PARAMETER

This parameter is used to setup the Homing Procedure.

Structure of homing parameter:
Bit 0: Homing direction
- 0 - positive: increasing position values
- 1 - negative: decreasing position values

Bit 1: Position feedback marker pulse
- 0 - first marker pulse after the positive edge of the home switch (S-0-0400)
- 1 - first marker pulse after the negative edge of the home switch (S-0-0400)

Bit 2: Home switch (S-0-0400)
- 0 - connected to the control unit **(Not Supported)**
- 1 - connected to the drive

Bit 3: Homing
- 0 - using motor feedback
- 1 - using external feedback **(Not Supported)**

Bit 4: **(Not Supported)**
Bit 5: Evaluation of home switch
- 0 - home switch is evaluated
- 1 - home switch is not evaluated

Bit 6 Evaluation of position feedback marker pulse
- 0 - marker pulse is evaluated
- 1 - marker pulse is not evaluated

Bits 7-15: **(Not Supported)**

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Binary	2 bytes			Phases 2, 3 and 4	Phases 2, 3 and 4	0

6.2.3 IDN DESCRIPTION - STANDARD PARAMETERS (cont'd)

00148: DRIVE CONTROLLED HOMING PROCEDURE COMMAND

When the Master sets and enables the Drive Controlled homing procedure command, the drive automatically activates the drive internal position control and accelerates to the homing velocity (S-0-0041) taking the Homing acceleration (S-0-0042) into account. The drive resets the bit "position feedback value status" (S-0-0403). Further options for the homing procedure are programmed in the "homing parameter" (S-0-0147). All changes of the cyclic command values are ignored as long as the procedure command is activated. After passing over the reference marker pulse, the drive decelerates to standstill, taking the homing acceleration into account. The procedure command "drive controlled homing" is successfully completed when the drive has stopped and the position feedback value is referred to the reference point of the machine. The drive announces this by setting the bit "position feedback value status" (S-0-0403). The drive internally calculates the commanded position value (S-0-0047) relationship to the reference mark and adjusts S-0-0047 accordingly. The control unit must then either read the "position command value" (S-0-0047) of the drive via the service channel and resets it's position command value to this position command value, or the control sets its position command off the reference distance (S-0-0052), (S-0-0147 must be set to 1). Afterwards, the control unit cancels the procedure command and the drive once again follows the command values of the control unit. An interrupt of this procedure command will result in the position feedback value not being referenced to the position feedback reference mark. Also the 'position feedback status value' bit will not be set. When an error of C1D occurs, the procedure command results in an error in the procedure command acknowledgment.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Procedure Command	Binary	2 bytes			Phases 2, 3 and 4	Phases 4	0

00157: VELOCITY WINDOW

The velocity window" relates the current velocity to the velocity command value (IDN 00036). If the current velocity feedback value falls within the calculated velocity window, the drive sets the status '*n* feedback = *n* command' in C3D (IDN 00013)·

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	4 bytes	0 - 32768	32768 bits = 6000 RPM	Phases 2, 3 and 4	Phases 2, 3 and 4	0

6.2.3 IDN DESCRIPTION - STANDARD PARAMETERS (cont'd)

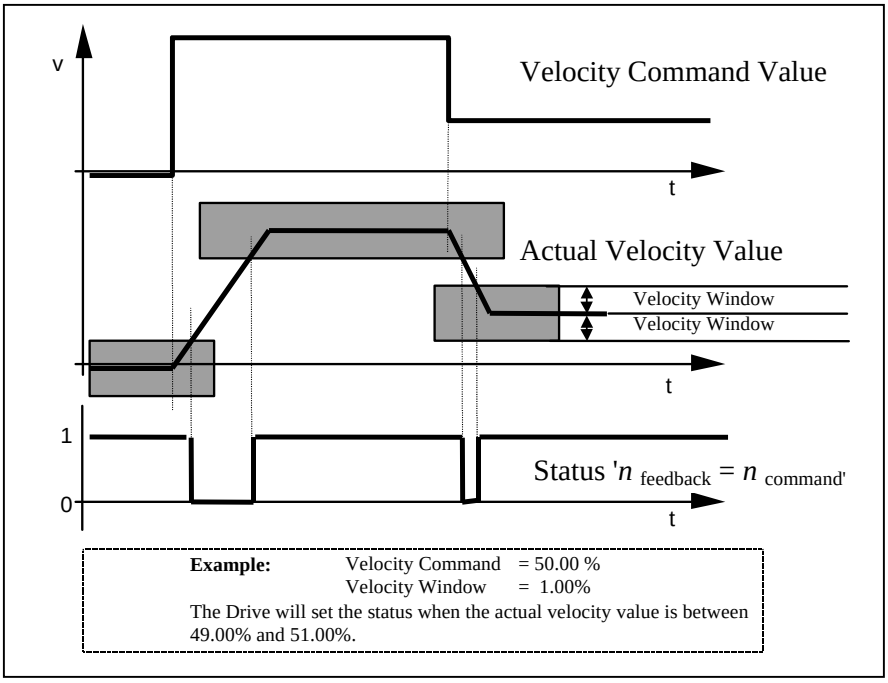


Figure 6.5 - Example of Velocity Window

00159: MONITORING WINDOW

By means of the monitoring window, the maximum position deviation, as referenced to the active actual position value, can be defined for the position feedback value. When the position error value exceeds the maximum position window value for a time longer than the following error delay time (IDN 33800), the drive sets an error for excessive position deviation in C1D (IDN 00011).

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	4 bytes	$0-+2^{31} - 1$		Phases 2, 3 and 4	Phases 2, 3 and 4	$-2^{31} - 1$

6.2.3 IDN DESCRIPTION - STANDARD PARAMETERS (cont'd)

00160: ACCELERATION DATA SCALING TYPE

Structure of the acceleration data scaling type:
Bits 2-0: Scaling method
- 000 - no scaling **(Not Supported)**
- 001 - linear scaling **(Not Supported)**
- 010 - rotational scaling
- 011 - ramp time **(Not Supported)**

Bit 3:
- 0 - preferred scaling
- 1 - parameter scaling **(Not Supported)**

Bit 4: Units for linear scaling
- 0 - meters [m] **(Not Supported)**
- (1 - inches [in]) additional **(Not Supported)**

Bit 4: Units for rotational scaling
- 0 - radian [rad]
- 1 - (reserved)

Bit 5: Time units
- 0 - seconds [s]
- 1 - (reserved)

Bit 6: Data reference
- 0 - at the motor shaft
- 1 - at the load **(Not Supported)**

(All other bits are reserved)

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Binary	2 bytes			Phases 2, 3 and 4	None	2

00161: ACCELERATION DATA SCALING FACTOR

This parameter defines the scaling factor for all acceleration data in a drive. This parameter is read only and is always a value of 1.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes			Phases 2, 3 and 4	None	1

00162: ACCELERATION DATA SCALING EXPONENT

This parameter defines the scaling exponent for all acceleration data in a drive. This parameter is read only and is always a value of -3.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Signed Decimal	2 bytes			Phases 2, 3 and 4	None	-3

6.2.3 IDN DESCRIPTION - STANDARD PARAMETERS (cont'd)

00169: PROBE CONTROL PARAMETER

This parameter fixes which probes and which edges are activated for the probing cycle procedure command. Only 1 edge (either rising or falling) can be selected for each probe input.

Bits supported by drive:

BIT NUMBER	DESCRIPTION
Bit 0:	0 - positive edge is not active 1 - positive edge is active
Bit 1:	0 - negative edge is not active 1 - negative edge is active
Bit 2:	0 - positive edge is not active 1 - positive edge is active
Bit 3:	0 - negative edge is not active 1 - negative edge is active
Bit 4 -15:	Reserved

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Binary	2 bytes			Phases 2, 3 and 4	Phases 2, 3 and 4	0

00170: PROBING CYCLE PROCEDURE COMMAND

When the master sets and enables the probing cycle procedure command, the drive reacts on the following parameters:

- Probe 1/2 enable (IDN 00405/00406); and
- Probe 1/2 (IDN 00401/00402) as programmed in the probe control parameter (IDN 00169).

While the procedure command is activated the control unit can start multiple measurements.

If the control unit does not want any more measurements the control unit cancels the procedure command.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Procedure Command	Binary	2 bytes			Phases 2, 3 and 4	Phases 4	0

6.2.3 IDN DESCRIPTION - STANDARD PARAMETERS (cont'd)

00179: PROBE STATUS

Indicates the latch status of Probe1 and Probe 2

Bits supported by drive:

BIT NUMBER	DESCRIPTION
Bit 0:	0 - positive edge is not latched 1 - positive edge is latched
Bit 1:	0 - negative edge is not latched 1 - negative edge is latched
Bit 2:	0 - positive edge is not latched 1 - positive edge is latched
Bit 3:	0 - negative edge is not latched 1 - negative edge is latched
Bit 4 -15:	Reserved

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Binary	2 bytes			Phases 2, 3 and 4	None	

00185: LENGTH OF THE CONFIGURABLE DATA RECORD IN THE AT

This parameter indicates the maximum length, in bytes, which can be processed in the configurable data record of the AT.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes		1 Byte	Phases 2, 3 and 4	None	36

00186: LENGTH OF THE CONFIGURABLE DATA RECORD IN THE MDT

This parameter indicates the maximum length, in bytes, which can be processed in the configurable data record of the MDT.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes		1 Byte	Phases 2, 3 and 4	None	36

00187: IDN-LIST OF CONFIGURABLE DATA IN THE AT

In this list the IDNs of operation data that can be processed by the drive cyclically as feedback values.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	IDN	Variable			Phases 2, 3 and 4	None	

6.2.3 IDN DESCRIPTION - STANDARD PARAMETERS (cont'd)

00188: IDN-LIST OF CONFIGURABLE DATA IN THE MDT

In this list the IDNs of operation data that can be processed by the drive cyclically as command values.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	IDN	Variable			Phases 2, 3 and 4	None	

00189: FOLLOWING DISTANCE

The drive uses the operation data of this IDN to store the distance between position command value and the position feedback value 1. Calculation of the following distance:
following distance = position command value - position feedback value 1

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Signed Decimal	4 bytes			Phases 2, 3 and 4	None	

00196: MOTOR RATED CURRENT

The motor rated current is the current at which the motor produces the rated torque according to the motor spec sheet. The setting range for this IDN is dependant on drive size and PWM frequency.

Emerald Driver	ESD-5		ESD-10		ESD-20		ESD-40		ESD-60	
PWM Frequency	8 KHz	16 KHz	8 KHz	16 KHz	8 KHz	16 KHz	8 KHz	16 KHz	8 KHz	16 KHz
Min. Setting	0 A peak	0 A peak	0 A peak	0 A peak	0 A peak	0 A peak	0 A peak	0 A peak	0 A peak	0 A peak
Max. Setting	7.070 A peak	5.656 A peak	14.140 A peak	11.312 A peak	28.280 A peak	22.624 A peak	56.560 A peak	45.248 A peak	84.840 A peak	67.872 A peak

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	4 bytes	See table above	0.001 A	Phases 2, 3 and 4	Phases 2 and 3	0

00200: AMPLIFIER WARNING TEMPERATURE

When the amplifier temperature exceeds the amplifier warning temperature value, the drive sets the warning bit for amplifier over temperature in C2D (IDN 12).

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes	0.0 - 105.0	IDN 208	Phases 2, 3 and 4	Phases 2, 3 and 4	105.0

6.2.3 IDN DESCRIPTION - STANDARD PARAMETERS (cont'd)

00203: AMPLIFIER SHUTDOWN TEMPERATURE

When the amplifier temperature exceeds the amplifier shutdown temperature value, the drive sets the bit for amplifier over temperature shutdown in C1D (IDN 11).

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes		IDN 208	Phases 2, 3 and 4	None	105.0

00206: DRIVE ON DELAY TIME

After torque is activated (bit 14, drive status is set) "drive on delay time" is started. The drive follows the command values after the "drive on delay time" has elapsed.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes	0 - 6553.6	0.1 ms	Phases 2, 3 and 4	Phases 2, 3 and 4	0

00207: DRIVE OFF DELAY TIME

After "drive off" (bit 15 of the master control word) is reset and n_{min} is reached, the torque remains activated in the drive until this waiting time is elapsed.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes	0 - 6553.6	0.1 ms	Phases 2, 3 and 4	Phases 2, 3 and 4	0

00208: TEMPERATURE DATA SCALING TYPE

This scaling type parameter determines whether temperature is used in units of °C or F. Temperature scaling is 0,1 °C or 0,1 F.

Structure of temperature data scaling type:
Bit 0:
0 - entry in 0,1 °C
1 - entry in 0,1 F **(Not Supported)**
(All other bits are reserved)

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Binary	2 bytes			Phases 2, 3 and 4	None	0

6.2.3 IDN DESCRIPTION - STANDARD PARAMETERS (cont'd)

00273: MAXIMUM DRIVE OFF DELAY TIME

After "drive off" (bit 15, control word) is reset, the "maximum drive off delay time" is started. After the "maximum drive off delay time" is elapsed, the locking of the brake is initiated and the torque is disabled.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes	0 - 6553.6	0.1 ms	Phases 2, 3 and 4	Phases 2, 3 and 4	0.0

00295: DRIVE ENABLE DELAY TIME

When "drive enable" is set (bits 14, control word) the "drive enable delay time" is started. Motor current (torque) will first be activated after this time delay. The enable delay is required at use of a contactor in the motor cable.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes	0 - 6553.6	0.1 ms	Phases 2, 3 and 4	Phases 2, 3 and 4	0

00296: VELOCITY FEED FORWARD GAIN

Velocity feed forward serves to reduce the velocity-dependent following error.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Signed Decimal	4 bytes	0.0 - 200.0	0.1%	Phases 2, 3 and 4	Phases 2, 3 and 4	0.0

00300: REAL-TIME CONTROL BIT 1

Contains the state of the control signal defined in IDN 00301 in Bit 0.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Binary	2 bytes			Phases 2, 3 and 4	None	

00301: ALLOCATION OF REAL-TIME CONTROL BIT 1

Assigns a control signal to the real-time control bit 1 by writing the IDN of the control signal to this IDN. After the allocation the assigned signal appears in the real-time control bit 1.
Valid IDN's are (IDN 00405, 00406).

Writing a value of zero disables Real Time Control Bit 1. (Default)

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	IDN	2 bytes			Phases 2, 3 and 4	Phases 2, 3 and 4	0

6.2.3 IDN DESCRIPTION - STANDARD PARAMETERS (cont'd)

00302: REAL-TIME CONTROL BIT 2

Contains the state of the control signal defined in IDN 00303 in Bit 0.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Binary	2 bytes			Phases 2, 3 and 4	None	0

00303: ALLOCATION OF REAL-TIME CONTROL BIT 2

Assigns a control signal to the real-time control bit 2 by writing the IDN of the control signal to this IDN. After the allocation the assigned signal appears in the real-time control bit 2.
Valid IDN's are (IDN 00405, 00406).

Writing a value of zero disables Real Time Control Bit 2. (Default)

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	IDN	2 bytes			Phases 2, 3 and 4	Phases 2, 3 and 4	0

00304: REAL-TIME STATUS BIT 1

Contains the state of the status signal defined in IDN 00305 in Bit 0.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Binary	2 bytes			Phases 2, 3 and 4	None	0

00305: ALLOCATION OF REAL-TIME STATUS BIT 1

Assigns a control signal to the real-time status bit 1 by writing the IDN of the control signal to this IDN. After the allocation the assigned signal appears in the real-time status bit 1.
Valid IDN's are (IDN 00401, 00402, 00409, 00410, 00411, 00412).

Writing a value of zero disables real time status bit 1. (Default)

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	IDN	2 bytes			Phases 2, 3 and 4	Phases 2, 3 and 4	0

6.2.3 IDN DESCRIPTION - STANDARD PARAMETERS (cont'd)

00306: REAL-TIME STATUS BIT 2

Contains the state of the status signal defined in IDN 00307 in Bit 0.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Binary	2 bytes			Phases 2, 3 and 4	None	

00307: ALLOCATION OF REAL-TIME STATUS BIT 2

Assigns a control signal to the real-time status bit 2 by writing the IDN of the control signal to this IDN. After the allocation the assigned signal appears in the real-time status bit 2.
Valid IDN's are (IDN 00401, 00402, 00409, 00410, 00411, 00412).

Writing a value of zero disables real time status bit 2. (Default)

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	IDN	2 bytes			Phases 2, 3 and 4	Phases 2, 3 and 4	0

00348: ACCELERATION FEED FORWARD GAIN

Acceleration feed forward serves to reduce acceleration / deceleration-dependent following error.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	4 bytes	0.0 - 6553.5	0.1 ($mAsec^2$/rad)	Phases 2, 3 and 4	Phases 2, 3 and 4	0.0

00380: DC BUS VOLTAGE

The drive's DC (intermediate) bus voltage value is placed in this parameter.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes		1 volt	Phases 2, 3 and 4	None	

00384: AMPLIFIER TEMPERATURE

The drive places the measured (actual) amplifier temperature (output stage) in this parameter.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes		IDN 208	Phases 2, 3 and 4	None	

6.2.3 IDN DESCRIPTION - STANDARD PARAMETERS (cont'd)

00400: HOME SWITCH

This parameter is used to assign an IDN to the home switch (external signal).

Structure of home switch:
Bit 0 = 0: inactive switch
1: active switch

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Binary	2 bytes			Phases 2, 3 and 4	None	

00401: PROBE 1

Contains the state of the Probe 1 Input in Bit 0.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Binary	2 bytes			Phases 2, 3 and 4	None	

00402: PROBE 2

Contains the state of the Probe 2 Input in Bit 0.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Binary	2 bytes			Phases 2, 3 and 4	None	

00403: POSITION FEEDBACK VALUE STATUS

When the drive switches the position feedback values to the coordinates referred to the machine zero point the drive sets bit 0 of this parameter in order to inform the control unit that all actual position values are based on the zero point of the machine. Bit 0 is reset when the procedure command "drive controlled homing procedure" (IDN 148) is started or when the drive loses its reference to the zero point of the machine. Bit 0 is defined for operation data only.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Binary	2 bytes			Phases 2, 3 and 4	None	0

6.2.3 IDN DESCRIPTION - STANDARD PARAMETERS (cont'd)

00405: PROBE 1 ENABLE

Probe 1 enable is checked by the drive only if the procedure commands "probing cycle" (IDN 00170) is active. For a new probing cycle with the same edge of probe 1 the control unit has to reset probe 1 enable to "0" and set it to "1". (For more details see **IDN 00179**.)

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Binary	2 bytes			Phases 2, 3 and 4	Phases 4	0

00406: PROBE 2 ENABLE

Probe 2 enable is checked by the drive only if the procedures command "probing cycle" (IDN 00170) is active. For a new probing cycle with the same edge of probe 2 the control unit has to reset probe 2 enable to "0" and set it to "1". (For more details see **IDN 00179**.)

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Binary	2 bytes			Phases 2, 3 and 4	Phases 4	0

00409: PROBE 1 POSITIVE LATCHED

This parameter is used to assign an IDN to probe 1 positive latched. This allows assigning the status "probe 1 positive latched" to a real-time status bit (see **IDN 00305**). Bit 0 of this parameter is set by the drive only if the procedure command "probing cycle" (IDN 00170) is active, the signal "probe 1 enable" (IDN 00405) is set to 1 and the positive edge of "probe 1" (IDN 00401) is announced. Simultaneously the drive stores the position feedback value in "probe 1 positive edge" (IDN 00130). The drive resets this bit when the control unit cancels the procedure command "probing cycle" or when probe 1 enable is reset to 0. Bit 0 is defined for operation data only. (For more details see **IDN 00179**.)

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Binary	2 bytes			Phases 2, 3 and 4	None	

6.2.3 IDN DESCRIPTION - STANDARD PARAMETERS (cont'd)

00410: PROBE 1 NEGATIVE LATCHED

This parameter is used to assign an IDN to probe 1 negative latched. This allows assigning the status "probe 1 negative latched" to a real-time status bit (see **IDN 00305**). Bit 0 of this parameter is set by the drive only if the procedure command "probing cycle" (IDN 00170) is active, the signal "probe 1 enable" (IDN 00405) is set to 1 and the negative edge of "probe 1" (IDN 00401) is announced. Simultaneously the drive stores the position feedback value in "probe 1 negative edge" (IDN 00131). The drive resets this bit when the control unit cancels the procedure command "probing cycle" or when probe 1 enable is reset to 0. Bit 0 is defined for operation data only. (For more details see **IDN 00179**.)

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Binary	2 bytes			Phases 2, 3 and 4	None	

00411: PROBE 2 POSITIVE LATCHED

This parameter is used to assign an IDN to probe 2 positive latched. This allows assigning the status "probe 2 positive latched" to a real-time status bit (see IDN 00305). Bit 0 of this parameter is set by the drive only if the procedure command "probing cycle" (IDN 00170) is active, the signal "probe 2 enable" (IDN 00406) is set to 1 and the positive edge of "probe 2" (IDN 00402) is announced. Simultaneously the drive stores the position feedback value in "probe 2 positive edge" (IDN 00132). The drive resets this bit when the control unit cancels the procedure command "probing cycle" or when probe 2 enable is reset to 0. Bit 0 is defined for operation data only. (For more details see **IDN 00179**.)

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Binary	2 bytes			Phases 2, 3 and 4	None	

00412: PROBE 2 NEGATIVE LATCHED

This parameter is used to assign an IDN to probe 2 negative latched. This allows assigning the status "probe 2 negative latched" to a real-time status bit (see **IDN 00305**). Bit 0 of this parameter is set by the drive only if the procedure command "probing cycle" (IDN 00170) is active, the signal "probe 2 enable" (IDN 00406) is set to 1 and the negative edge of "probe 2" (IDN 00402) is announced. Simultaneously the drive stores the position feedback value in "probe 2 negative edge" (IDN 00133). The drive resets this bit when the control unit cancels the procedure command "probing cycle" or when probe 2 enable is reset to 0. Bit 0 is defined for operation data only. (For more details see **IDN 00179**.)

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Binary	2 bytes			Phases 2, 3 and 4	None	

6.2.3 IDN DESCRIPTION - STANDARD PARAMETERS (cont'd)

32769: U CURRENT SENSOR CALIBRATION OFFSET

This IDN is used to set a calibration offset for the U leg current sensor. This IDN is write-protected until Procedure Command Remove Calibration Write-Protect (IDN 32775) is active.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Signed Decimal	2 bytes	-5000 to +5000	None	Phases 2, 3 and 4	See Above	Factory set

32770: U CURRENT SENSOR CALIBRATION GAIN

This IDN is used to set a calibration gain for the U leg current sensor. This IDN is write-protected until Procedure Command Remove Calibration Write-Protect (IDN 32775) is active.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Signed Decimal	4 bytes	-2^{31} - $+2^{31}-1$	None	Phases 2, 3 and 4	See Above	Factory set

32771: V CURRENT SENSOR CALIBRATION OFFSET

This IDN is used to set a calibration offset for the V leg current sensor. This IDN is write-protected until Procedure Command Remove Calibration Write-Protect (IDN 32775) is active.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Signed Decimal	2 bytes	-5000 to +5000	None	Phases 2, 3 and 4	See Above	

32772: V CURRENT SENSOR CALIBRATION GAIN

This IDN is used to set a calibration gain for the V leg current sensor. This IDN is write-protected until Procedure Command Remove Calibration Write-Protect (IDN 32775) is active.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Signed Decimal	4 bytes	-2^{31} - $+2^{31}-1$	None	Phases 2, 3 and 4	See Above	Factory set

32773: U CURRENT SENSOR

This IDN returns the current sensed by the U leg current sensor. The only scaling done on this value is the Calibration Gain and Offset.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Signed Decimal	2 bytes		None	Phases 2, 3 and 4	None	Factory set

6.2.3 IDN DESCRIPTION - STANDARD PARAMETERS (cont'd)

32774: V CURRENT SENSOR

This IDN returns the current sensed by the V leg current sensor. The only scaling done on this value is the Calibration Gain and Offset.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Signed Decimal	2 bytes		None	Phases 2, 3 and 4	None	

32775: PROCEDURE COMMAND REMOVE CALIBRATION WRITE-PROTECT

Activating this Procedure Command removes the write-protection on the following Calibration IDNs: 32769, 32770, 32771, 32772, 32777, 32778, 32783, 32784, 32785, 32786

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Procedure Command	Binary	2 bytes			Phases 2, 3 and 4	Phases 4	0

32776: PROCEDURE COMMAND SAVE CALIBRATION PARAMETERS

Activating this Procedure Command causes all calibration data to be saved into non-volatile memory.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Procedure Command	Binary	2 bytes			Phases 2, 3 and 4	Phases 4	0

32777: DC BUS CALIBRATION OFFSET

This IDN is used to set a calibration offset for the DC Bus Voltage measurement. This IDN is write-protected until Procedure Command Remove Calibration Write-Protect (IDN 32775) is active.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Signed Decimal	2 bytes	-5000 to +5000	None	Phases 2, 3 and 4	See Above	Factory set

32778: DC BUS CALIBRATION GAIN

This IDN is used to set a calibration gain for the DC Bus Voltage measurement. This IDN is write-protected until Procedure Command Remove Calibration Write-Protect (IDN 32775) is active.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes	0 - 65535	None	Phases 2, 3 and 4	See Above	Factory set

6.2.3 IDN DESCRIPTION - STANDARD PARAMETERS (cont'd)

32783: ANALOG INPUT CALIBRATION OFFSET

This IDN is used to set a calibration offset for the Analog Input. This IDN is write-protected until Procedure Command Remove Calibration Write-Protect (IDN 32775) is active.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Signed Decimal	2 bytes	-5000 to +5000	None	Phases 2, 3 and 4	See Above	Factory set

32784: ANALOG INPUT CALIBRATION GAIN

This IDN is used to set a calibration gain for the Analog Input. This IDN is write-protected until Procedure Command Remove Calibration Write-Protect (IDN 32775) is active.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes	0 - 65535	None	Phases 2, 3 and 4	See Above	Factory set

32785: W CURRENT SENSOR CALIBRATION OFFSET

This IDN is used to set a calibration offset for the W leg current sensor. This IDN is write-protected until Procedure Command Remove Calibration Write-Protect (IDN 32775) is active.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Signed Decimal	2 bytes	-5000 to +5000	None	Phases 2, 3 and 4	See Above	Factory set

32786: W CURRENT SENSOR CALIBRATION GAIN

This IDN is used to set a calibration gain for the W leg current sensor. This IDN is write-protected until Procedure Command Remove Calibration Write-Protect (IDN 32775) is active.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Signed Decimal	4 bytes	-2^{31} - $+2^{31}-1$	None	Phases 2, 3 and 4	See Above	Factory set

32787: W CURRENT SENSOR

This IDN returns the current sensed by the W leg current sensor. The only scaling done on this value is the Calibration Gain and Offset.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Signed Decimal	2 bytes		None	Phases 2, 3 and 4	None	

6.2.3 IDN DESCRIPTION - STANDARD PARAMETERS (cont'd)

32788: CURRENT FAULT FACTOR

This IDN is used to set the peak current fault point. The fault point is set as a percentage of the motor or drive's peak current, whichever is less. The default is 120%.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes		1%	Phases 2, 3 and 4	None	120

33000: DIGITAL OUTPUTS 1

The state of the digital outputs on I/O device 1 can be set via this parameter.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Binary	2 bytes	0 - 65535		Phases 2, 3 and 4	Phases 2, 3 and 4	0

33001: DIGITAL OUTPUTS 2

The state of the digital outputs on I/O device 2 can be set via this parameter.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Binary	2 bytes	0 - 65535		Phases 2, 3 and 4	Phases 2, 3 and 4	0

33200: PROBE SOURCE

This parameter sets which feedback is trapped by the probes.

Bits supported by drive:

BIT NUMBER	DESCRIPTION
Bit 0:	0 - Probe 1 traps position feedback value 1 1 - Probe 1 traps position feedback value 2
Bit 1:	0 - Probe 2 traps position feedback value 1 1 - Probe 2 traps position feedback value 2
Bit 2 -15:	Reserved

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Binary	2 bytes	0 - 3		Phases 2, 3 and 4	Phases 2, 3 and 4	0

6.2.3 IDN DESCRIPTION - STANDARD PARAMETERS (cont'd)

33300: I/0 DEVICE 1 CONFIGURATION

This parameter configures I/O device 1. Currently only the ESD-I/O16 device is supported. This device has 16 configurable digital I/O.

Bits supported by drive for ESD-I/O16:

BIT NUMBER	DESCRIPTION
Bit 0 - 15:	0 - Configured as Input 1 - Configured as Output

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Binary	2 bytes	0 - 65535		Phases 2, 3 and 4	Phases 2, 3 and 4	0

33301: I/0 DEVICE 2 CONFIGURATION

This parameter configures I/O device 2. Currently only the ESD-I/O16 device is supported. This device has 16 configurable digital I/O.

Bits supported by drive for ESD-I/O16:

BIT NUMBER	DESCRIPTION
Bit 0 - 15:	0 - Configured as Input 1 - Configured as Output

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Binary	2 bytes	0 - 65535		Phases 2, 3 and 4	Phases 2, 3 and 4	0

33304: I/O DEVICE 1 TYPE

This parameter sets the expected device type for I/O device 1. Currently only the ESD-I/O16 is supported with a device type of 1.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes	1		Phases 2, 3 and 4	Phases 2, 3 and 4	0

33305: I/O DEVICE 2 TYPE

This parameter sets the expected device type for I/O device 2. Currently only the ESD-I/O16 is supported with a device type of 1.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes	1		Phases 2, 3 and 4	Phases 2, 3 and 4	0

6.2.3 IDN DESCRIPTION - STANDARD PARAMETERS (cont'd)

33500: DIGITAL INPUTS 1

Reads the State of the Digital Inputs from I/0 Device 1.

Bit supported by drive:

BIT NUMBER	DESCRIPTION
Bit 0:	Input 1
Bit 1:	Input 2
Bit 2:	Input 3
Bit 3:	Input 4
Bit 4:	Input 5
Bit 5:	Input 6
Bit 6:	Input 7
Bit 7:	Input 8
Bit 8:	Input 9
Bit 9:	Input 10
Bit 10:	Input 11
Bit 11:	Input 12
Bit 12:	Input 13
Bit 13:	Input 14
Bit 14:	Input 15
Bit 15:	Input 16

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Binary	2 bytes			Phases 2, 3 and 4	None	

33501: DIGITAL INPUTS 2

Reads the State of the Digital Inputs from I/0 Device 2.

Bit supported by drive:

BIT NUMBER	DESCRIPTION
Bit 0:	Input 1
Bit 1:	Input 2
Bit 2:	Input 3
Bit 3:	Input 4
Bit 4:	Input 5
Bit 5:	Input 6
Bit 6:	Input 7
Bit 7:	Input 8
Bit 8:	Input 9
Bit 9:	Input 10
Bit 10:	Input 11
Bit 11:	Input 12
Bit 12:	Input 13
Bit 13:	Input 14
Bit 14:	Input 15
Bit 15:	Input 16

6.2.3 IDN DESCRIPTION - STANDARD PARAMETERS (cont'd)

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Binary	2 bytes			Phases 2, 3 and 4	None	

33600: ANALOG INPUT 1

Read the counts from the Analog Input 1.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Signed Decimal	2 bytes		-2^{15} - $+2^{15}$ – 1 = -10V - +10V	Phases 2, 3 and 4	None	

33650: PWM OUTPUT

This parameter sets the duty cycle for the general purpose PWM output. The switching frequency for this output is the same as the motor switching frequency and is set by IDN 33801. The output swings between 0 and +15V.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes	0 - 65535	0 - 65535 = 0% -100% duty cycle	Phases 2, 3 and 4	None	0

33700: ALARM HISTORY

The drive maintains a list of the last 15 Fault Codes.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	Variable 1 byte each			Phases 2, 3 and 4	None	

33701: CURRENT DRIVE FAULT

This IDN returns the fault code of the most recent drive fault. If there are no faults a value of 0 will be returned.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes			Phases 2, 3 and 4	None	

6.2.3 IDN DESCRIPTION - STANDARD PARAMETERS (cont'd)

33702: CURRENT DRIVE FAULT BITMAP 1

Returns a status bitmap of faults 0 - 31. Some bits are reserved so see **Section 7** for a list of fault codes and their descriptions.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Binary	4 bytes			Phases 2, 3 and 4	None	

33703: CURRENT DRIVE FAULT BITMAP 2

Returns a status bitmap of faults 32 - 63. Some bits are reserved so see **Section 7** for a list of fault codes and their descriptions.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Binary	4 bytes			Phases 2, 3 and 4	None	

33704: CURRENT DRIVE FAULT BITMAP 3

Returns a status bitmap of faults 64 - 95. Some bits are reserved so see **Section 7** for a list of fault codes and their descriptions.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Binary	4 bytes			Phases 2, 3 and 4	None	

33705: CURRENT DRIVE FAULT BITMAP 4

Returns a status bitmap of faults 96 - 127. Some bits are reserved so see **Section 7** for a list of fault codes and their descriptions.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Binary	4 bytes			Phases 2, 3 and 4	None	

33799: CLEAR DRIVE FAULT HISTORY PROCEDURE COMMAND

This procedure command sets all values in the drive fault history (IDN 33700) to zero.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Procedure Command	Binary	2 bytes			Phases 2, 3 and 4	Phases 4	0

6.2.3 IDN DESCRIPTION - STANDARD PARAMETERS (cont'd)

33800: FOLLOWING ERROR DELAY TIME

This parameter sets a time delay from when the position deviation is outside the monitoring window (IDN 159) and when a fault is triggered.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes	0 - 65535	1 msec	Phases 2, 3 and 4	Phases 2, 3 and 4	0

33801: PWM FREQUENCY

Sets the PWM switching frequency for the motor and the general purpose PWM output. If this parameter is changed from its current value a Fault 50 will result and the drive's 24V power must be cycled.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes	4, 8 or 16	kHz	Phases 2, 3 and 4	Phases 2	Non-volatile

34000: MOTOR CODE

This parameter is used to store a unique code for every motor that IIS has approved to run on the Emerald drive.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes	0 - 65535		Phases 2, 3 and 4	Phases 2 and 3	0

34003: MOTOR POLES

This parameter sets the number of motor magnetic poles.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes	2 - 12		Phases 2, 3 and 4	Phases 2 and 3	4

6.2.3 IDN DESCRIPTION - STANDARD PARAMETERS (cont'd)

34004: FEEDBACK TYPE

This parameter sets the motor feedback type.

Values supported by drive:

VALUE	DESCRIPTION
0	Resolver **(Not Supported)**
1	Incremental Encoder

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes	0 or 1		Phases 2, 3 and 4	Phases 2 and 3	1

34005: RESOLVER CYCLES

Not yet supported.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes	1 or 2		Phases 2, 3 and 4	Phases 2 and 3	0

34006: MOTOR FEEDBACK CONFIGURATION

This parameter is used to change the direction of the motor feedback.

Bit supported by drive:

BIT NUMBER	DESCRIPTION
Bit 0:	Reserved
Bit 1:	0 - Motor Feedback is inverted. 1 - Motor Feedback is not inverted.
Bit 2 - 15:	Reserved

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Binary	2 bytes	0 or 1		Phases 2, 3 and 4	Phases 2 and 3	1

34007: MOTOR RATED SPEED

The rated motor speed is listed in the motor spec sheet provided by the manufacturer.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	4 bytes	0.0000 - 6000.0000	0.0001 RPM	Phases 2, 3 and 4	Phases 2 and 3	0

6.2.3 IDN DESCRIPTION - STANDARD PARAMETERS (cont'd)

34009: OVERLOAD DELAY TIME

Reserved for future use.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Decimal	2 bytes	0.1 - 6553.5	0.1 ms	Phases 2, 3 and 4	Phases 2 and 3	0

34011: ENCODER LINE COUNT

This parameter sets the encoder line count before quadrature.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes	0 - 65535		Phases 2, 3 and 4	Phases 2 and 3	2000

34224: POSITION LOOP DIFFERENTIAL TIME

Sets the derivative time for the position loop controller.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes	0.0 - 6553.5	0.1 msec	Phases 2, 3 and 4	Phases 2, 3 and 4	0

34243: CURRENT COMMAND (AMPS)

This IDN returns the current loop command value in Amps. This is a read only IDN for display purposes.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Signed Decimal	4 bytes		0.001 Amps	Phases 2, 3 and 4	None	

34244: CURRENT FEEDBACK (AMPS)

This IDN returns the current loop feedback value in Amps. This is a read only IDN for display purposes.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Signed Decimal	4 bytes		0.001 Amps	Phases 2, 3 and 4	None	

6.2.3 IDN DESCRIPTION - STANDARD PARAMETERS (cont'd)

34245: VELOCITY COMMAND (RPM)

This IDN returns the velocity loop command value in RPM. This is a read only IDN for display purposes.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Signed Decimal	2 bytes		1 RPM	Phases 2, 3 and 4	None	

34246: VELOCITY FEEDBACK (RPM)

This IDN returns the velocity loop feedback value in RPM. This is a read only IDN for display purposes.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Signed Decimal	2 bytes		1 RPM	Phases 2, 3 and 4	None	

34260: MOTOR PHASE ANGLE

This IDN returns the motor's phase angle used for commutation. This is a read only IDN for display purposes.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes		0.1 Degree	Phases 2, 3 and 4	None	

34278: VELOCITY COMMAND LOW PASS FILTER FREQUENCY

This parameter sets corner frequency for a low pass filter on the velocity loop command value. A value of '0' disables the filter.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes	0 - 1000	1 Hz	Phases 2, 3 and 4	Phases 2, 3 and 4	0

34279: VELOCITY FEEDBACK LOW PASS FILTER FREQUENCY

This parameter sets corner frequency for a low pass filter on the velocity loop feedback value. A value of '0' disables the filter.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes	0 - 1000	1 Hz	Phases 2, 3 and 4	Phases 2, 3 and 4	0

6.2.3 IDN DESCRIPTION - STANDARD PARAMETERS (cont'd)

34280: CURRENT COMMAND REJECTION FREQUENCY

This parameter sets rejection frequency for a notch filter on the current loop command value.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes	50 - 950	1 Hz	Phases 2, 3 and 4	Phases 2, 3 and 4	900

34281: CURRENT COMMAND REJECTION BANDWIDTH

This parameter sets bandwidth for a notch filter on the current loop command value.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes	0 - 500	1 Hz	Phases 2, 3 and 4	Phases 2, 3 and 4	0

34282: TUNING PARAMETERS LIST

This IDN returns a list of all available control loop-tuning IDNs.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	IDN	Variable 2 byte each			Phases 2, 3 and 4	None	

34283: MOTOR PARAMETER LIST

This IDN returns a list of all available motor specific IDNs.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	IDN	Variable 2 byte each			Phases 2, 3 and 4	None	

34284: MONITOR PARAMETERS LIST

This IDN returns a list of IDNs that could be useful for monitor or display purposes.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	IDN	Variable 2 byte each			Phases 2, 3 and 4	None	

6.2.3 IDN DESCRIPTION - STANDARD PARAMETERS (cont'd)

34285: MONITOR I/O LIST

This IDN returns a list of I/O related IDNs that could be useful for monitor or display purposes.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	IDN	Variable 2 byte each			Phases 2, 3 and 4	None	

34286: MONITOR ALARM LIST

This IDN returns a list of IDNs that provide diagnostic or fault code information.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	IDN	Variable 2 byte each			Phases 2, 3 and 4	None	

34287: READ ERROR

This IDN returns error information when reading/writing IDNs over RS-232 or USB. The structure of this IDN is as follows:

BYTE NUMBER	DESCRIPTION
Byte 0 - 1	Number of bytes returned. Always 4.
Byte 2 - 3	Maximum bytes available. Always 4.
Byte 4 - 5	IDN Number.
Byte 6 - 7	Element Number.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	Variable 2 byte each			Phases 2, 3 and 4	None	

6.2.3 IDN DESCRIPTION - STANDARD PARAMETERS (cont'd)

34288: POWER BOARD ID

This IDN returns the ID of the power stage.

POWER BOARED ID	DRIVE SIZE
1	ESD-5
2	ESD-10
4	ESD-20
8	ESD-40
16	ESD-60
All Other IDs	Reserved

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes			Phases 2, 3 and 4	None	

34300: AUXILIARY ENCODER FEATURES SETUP

This IDN enables/disables special features of the Emerald Drive's Auxiliary Encoder.

BYTE NUMBER	DESCRIPTION
Bit 0:	Wait for marker
Bits 1 - 15:	Reserved

Setting the bit "Wait for marker" will zero the Auxiliary Encoder and the Emerald Drive will not count Auxiliary Encoder pulses until the first marker pulse is observed. This bit will always be read as a "0".

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Binary	2 bytes	0 - 1		Phases 2, 3 and 4	Phases 2, 3 and 4	0

34810: CONFIGURATION OF HOME SWITCH

Assigns a control signal to the home switch by writing the IDN of the control signal to this IDN. After the allocation the assigned signal appears in IDN 400.
Valid IDN's are (IDN 00401, 00402, 33500, 33501).

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	IDN	2 bytes			Phases 2, 3 and 4	Phases 2, 3 and 4	401

6.2.3 IDN DESCRIPTION - STANDARD PARAMETERS (cont'd)

34811: CONFIGURATION OF HOME SWITCH BIT

Configures the bit position of the home switch within the IDN defined by IDN 34810.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes	0 - 15		Phases 2, 3 and 4	Phases 2, 3 and 4	0

34812: BOOT ROM VERSION

This IDN returns the revision of the drive's boot ROM.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Text	Variable			Phases 2, 3 and 4	None	

34813: REGEN POWER

This IDN returns the average power being dissipated by the internal regen resistor.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	4 bytes		1 Watt	Phases 2, 3 and 4	None	

34820: PASSWORD

This IDN is used to enter a password to unlock some special features.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes	0 - 65535	None	Phases 2, 3 and 4	Phases 2, 3 and 4	0

34821: TEST MODE PROCEDURE COMMAND

This procedure command puts the drive in a special mode for factory test purposes. A valid Password (IDN 34820) must be entered before entering test mode. After running in test mode the drive's power must be cycled in order to return to normal operation.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Procedure Command	Binary	2 bytes			Phases 2, 3 and 4	Phases 4	0

6.2.3 IDN DESCRIPTION - STANDARD PARAMETERS (cont'd)

34822: POWER TRANSISTOR BITMAP

This IDN is used to set the state of each power transistor individually. The drive must be in test mode for this IDN to be active.

BIT NUMBER	Transistor
Bit 0	U HI
Bit 1	U LO
Bit 2	V HI
Bit 3	V LO
Bit 4	W HI
Bit 5	W LO
Bit 6	REGEN
Bit 7 - 15	Reserved

An error will be generated if the following conditions are met:

1) An attempt is made to both transistors in a pair.
2) An attempt is made to change the state of both transistors in a pair simultaneously. Both transistors in a pair must be turned off before one of them can change from off to on.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes	0 - 65535	None	Phases 2, 3 and 4	Phases 4	0

35000: RESOLVER CARD CONFIGURATION

This IDN is used to setup the resolver option card. This parameter is stored in non-volatile memory. If it is changed from the current stored setting you will need to cycle the drive's power.

BIT NUMBER	DESCRIPTION
Bit 0	Reference Frequency 0 - 2500Hz 1 - 5000Hz
Bit 1	Gain 0 - 0.5 1 - 1.0
Bit 2	Accuracy 0 - 12 bit 1 - 14 bit
Bit 3 - 15	Reserved

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Binary	2 bytes	0 - 7		Phases 2, 3 and 4	Phases 2, 3 and 4	0

6.2.3 IDN DESCRIPTION - STANDARD PARAMETERS (cont'd)

35001: RESOLVER FEEDBACK VALUE

This IDN is used to read the position returned from the resolver option card.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Signed Decimal	4 bytes			Phases 2, 3 and 4	None	

35002: RESOLVER FEEDBACK POLARITY PARAMETER

This parameter is used to switch polarities of reported position data for specific applications. There is a positive position difference when the resolver shaft turns clockwise (when viewed from the output shaft) and no inversion is programmed.

Bit supported by drive:

BIT NUMBER	DESCRIPTION
Bit 0:	Resolver feedback value 0 - Non-inverted 1 - Inverted
Bit 1-15:	Reserved

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Binary	2 bytes	0 - 1		Phases 2, 3 and 4	Phases 2, 3 and 4	0

35011: AUXILIARY FEEDBACK VALUE

This IDN is used to read the position returned from the Auxiliary Encoder.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Signed Decimal	4 bytes			Phases 2, 3 and 4	None	

6.2.3 IDN DESCRIPTION - STANDARD PARAMETERS (cont'd)

35012: AUXILIARY FEEDBACK POLARITY PARAMETER

This parameter is used to switch polarities of reported position data for specific applications. There is a positive position difference when the encoder shaft turns clockwise (when viewed from the output shaft) and no inversion is programmed.

Bit supported by drive:

BIT NUMBER	DESCRIPTION
Bit 0:	Auxiliary encoder feedback value 0 - Non-inverted 1 - Inverted
Bit 1-15:	Reserved

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Binary	2 bytes	0 - 1		Phases 2, 3 and 4	Phases 2, 3 and 4	0

35020: POSITION FEEDBACK 1 CONFIGURATION

Not implemented at this time.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	IDN	2 bytes			Phases 2, 3 and 4	Phases 2, 3 and 4	0

35021: POSITION FEEDBACK 2 CONFIGURATION

This IDN configures which auxiliary feedback device points to position feedback 2 (IDN 00053)

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	IDN	2 bytes	35001, 35011		Phases 2, 3 and 4	Phases 2, 3 and 4	35011

SECTION 7 - FAULT CODES / STATUS

7.1 STATUS

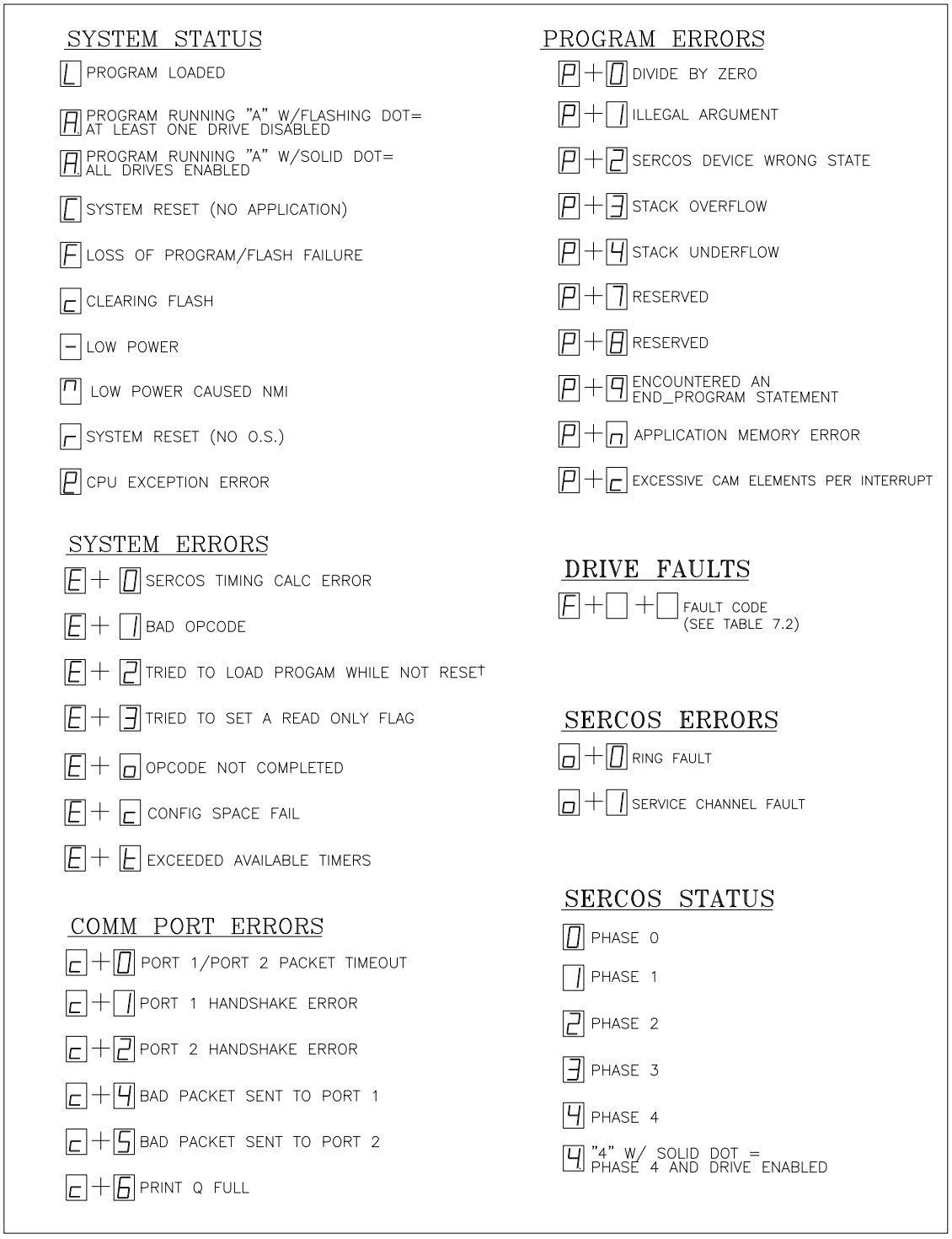


Figure 7.1- System Status (7 Segment Status Display)

7.2 FAULT CODES

FAULT CODE	DESCRIPTION	REMEDY
F01 Internal Power Module Error	Driver has detected the following: • Overcurrent • Overheat • Gate voltage drop	Check if the motor wire (A/B/C) is shorted or grounded. Ambient temperature over 55° C. Indicates a fatal fault in the driver power stage. If motor wires are not shorted and temperature is below 55° C, contact IIS factory.
F02 Overvoltage	DC power bus exceeds max. bus voltage.	Power line voltage fluctuation above maximum. 264 VAC for ESD-XX/A style drives. 528 VAC for ESD-XX/C style drives. Excessive regeneration energy. Check line voltage fluctuations. Add additional external regeneration resistor.
F03 Under Voltage	DC power bus below min. bus voltage.	Power line voltage fluctuation below minimum. 170 VAC for ESD-XX/A style drives. 352 VAC for ESD-XX/C style drives. Check line voltage fluctuations. Check for missing phase of AC line power.
F04 DC Bus Contactor Error	DC bus contactor FAILED TO CLOSE CORRECTLY	Contact IIS factory
F07 Power Stage Error	Main control unit does not recognize the power stage of the driver.	Indicates a fatal fault in the driver power stage. Contact IIS factory.
F09 Regen Resistor Over Temperature	Excessive regen energy being dissipated by the internal or external regeneration resistor.	The frequency or rate of acceleration/deceleration may be too high. Excessive power line voltage. Add additional regen resistor capacity.
F10 Regen Resistor Open	Regen transistor is ON for more than 50ms.	**WITH POWER OFF:** If the drive has an internal regen resistor (20, 40, 60 Amp drives only), check that the resistance from P3 to R is: Approx. 100 ohms for 20 and 40 Amp Drives Approx. 50 ohms for 60 Amp Drive If an external regen resistor is used, verify the regen resistor is the proper value and that all wiring to the resistor is secure.
F15 Excessive Current	Motor current exceeds the rating by 120%.	Check if the motor wire (A/B/C) is shorted or grounded. Verify that motor shaft or machine system is not jammed. Check that the proper motor parameters have been sent to the drive.
F16 Speed amp Saturated	Internal speed loop is saturated and max.torque is applied for more than 3 sec.	Verify that motor shaft or machine system is not jammed. Check that the proper motor parameters have been sent to the drive. Acel/decel rate is too large for the inertia load on the motor causing maximum torque during acel/decel.

Table 7.1 - Fault Codes

7.2 FAULT CODES (cont'd)

FAULT CODE	DESCRIPTION	REMEDY
F19 Resolver Error	Resolver feedback error.	Check resolver cable and connectors. Verify that resolver cable is separated from power wiring to prevent noise coupling to resolver signals.
F25 Option	Self-diagnostic checks of options failed or wrong option card installed.	Option card configured in program does not match installed option card. Option card not functioning to specification. Return to factory.
F40 Encoder Signal Short	U, V or W phases of encoder not functional.	Check encoder cable and connections.
F50 Cycle Power	A change has been made that requires the drive's control power to be cycled.	Power needs to be cycled to the drive if: PWM switching frequency is changed Option card configuration is changed Cycle the drive's control power.
F51 Unsupported PWM Frequency	Drive has been configured to operate at a PWM Frequency not supported.	Change PWM Frequency (IDN 33801) to a valid frequency for drive.
F70 Following Error	Motor is not following the command	Check monitoring window (IDN 00159). Check for binding in mechanical travel of motor.
F71* SERCOS synchronization Error	The drive is not maintaining synchronization with the SERCOS master.	Contact IIS Factory.
F72 Non-Volatile Parameter Failure	Non-Volatile calibration data has been lost.	Contact IIS Factory.
F73 Amplifier Over-Temperature	Drive heat-sink temperature rose to over 105° C.	Ambient temperature exceeds 55° C. Continuous current demand from the drive exceeds its rating. Reduce the ambient temperature. Decrease current demand on the drive.
F74 Encoder Phase Error	Encoder A or B tracks are out of phase with U track or UVW tracks are out phase to each other.	Check encoder wiring. Make sure there are no loose connections. Make sure encoder cable is separated from any high-power wiring. Check motor code, verify the configured encoder counts match the actual encoder counts
F75 W-Phase Over-Current	W-phase current exceeds the rating by 120%.	Check if the motor wire (A/B/C) is shorted or grounded. Verify that motor shaft or machine system is not jammed. Check that the proper motor parameters have been sent to the drive.
F80* SERCOS MST Error	Drive has detected unacceptable errors in the Master Sync Telegrams of the SERCOS Communication	Check fiber optic connections on the SERCOS Ring. Replace fiber optic cable.
F81* SERCOS MDT Error	Drive has detected unacceptable errors in the Master Data telegram	Check fiber optic connections on the SERCOS Ring. Replace fiber optic cable.

Table 7.1 - Fault Codes (cont'd)

7.2 FAULT CODES (cont'd)

FAULT CODE	DESCRIPTION	REMEDY
F82* Invalid SERCOS Phase	Drive has detected an invalid phase in the initialization of the SERCOS Ring	Contact IIS Factory.
F83* SERCOS Phase UP_SHIFT Error	Invalid sequence of the SERCOS Ring Initialization Phases	Re-initialize the SERCOS Ring at the controller.
F84* SERCOS Phase DOWN_SHIFT Error	Invalid sequence of the SERCOS Ring Initialization Phases	Re-initialize the SERCOS Ring at the controller.
F85* SERCOS Phase Switching Error	Attempt to switch phase with out satisfying the requirements of the previous phase.	Verify that all required parameters are written in Phase 2 (See IDN 00018) and that Command 127 and 128 execute successfully.
F86 Invalid Operation Mode	A request was made to switch to an invalid operation mode.	Check for a programming error.
F90 I/O Device 1 Communication Error	The drive cannot communicate with I/O device 1.	Check that there is power to the I/O CAN network. Check that the address switches are set properly for I/O device 1. Check the I/O CAN network cabling.
F91 I/O Device 2 Communication Error	The drive cannot communicate with I/O device 2.	Check that there is power to the I/O CAN network. Check that the address switches are set properly for I/O device 2. Check the I/O CAN network cabling.
F94 I/O Device 1 Wrong Type	Configured I/O Device 1 type and actual device type do not match.	Check that your program has the correct I/O Device type configured for device 1.
F95 I/O Device 2 Wrong Type	Configured I/O Device 2 type and actual device type do not match.	Check that your program has the correct I/O Device type configured for device 2.
F98 No I/O CAN Network Power	External I/O CAN network power is off.	Make sure you have an external power supply for the I/O CAN network. Check the cabling between the I/O devices and the drive.

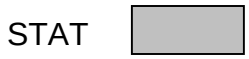
Table 7.1 - Fault Codes (cont'd)

* Indicates a fault that can only exist when the drive is configured for SERCOS communications.

	Class 1 Diagnostics (IDN 00011)																Manufacturer Class 1 Diagnostics (IDN 00129)															
Fault Code	Bit 0: reserved	Bit 1: Amplifier overtemperature error	Bit 2: reserved	Bit 3: reserved	Bit 4: reserved	Bit 5: Feedback error	Bit 6: Error in the "commutation" system	Bit 7: Over current error	Bit 8: Over voltage error	Bit 9: Under voltage error	Bit 10: reserved	Bit 11: Excessive position deviation	Bit 12: Communication Error	Bit 13: reserved	Bit 14: reserved	Bit 15: Manufacturer-specific error	Bit 0: Sercos synchronization error	Bit 1: Non-volatile parameter loss	Bit 2: I/O CAN network error	Bit 3: Regen resistor error	Bit 4: Power board not recognized	Bit 5: Power module error	Bit 6: Cycle of power required	Bit 7: Option card error	Bit 8: Invalid PWM Frequency	Bit 9: reserved	Bit 10: reserved	Bit 11: reserved	Bit 12: reserved	Bit 13: reserved	Bit 14: reserved	Bit 15: reserved
F01																X						X										
F02									X																							
F03										X																						
F07																X					X											
F09																X				X												
F10																X				X												
F15								X																								
F16								X																								
F19						X																										
F25																X								X								
F40						X																										
F50																X							X									
F51																									X							
F70												X																				
F71																X	X															
F72																X		X														
F73		X																														
F74							X																									
F75								X																								
F80													X																			
F81													X																			
F82													X																			
F83													X																			
F84													X																			
F85													X																			
F86													X																			
F90																X			X													
F91																X			X													
F94																X			X													
F95																X			X													
F98																X			X													

Table 7.2 - Cross Reference of Fault Codes to Class 1 Diagnostics

7.3 I/O CAN NETWORK STATUS DISPLAY



The bi-color (green/red) LED provides the I/O CAN network status. It indicates whether or not the devices have power and are operating properly. The table below defines the status LED states.

STATE	LED IS	TO INDICATE
No Power	Flashing Red	There is no power applied to the device. See also fault code F98
Network Operational	Green	The entire network is operating in a normal condition.
Device Error	Red	At least one of the I/O devices is missing or not operational. See also fault codes F90, F91, F94, and F95.
Watchdog Error	Flashing Green/Red	Indicates that the microprocessor watchdog timer has timed out. This display is not necessarily related to the I/O CAN network. Contact IIS factory.

7.4 SERCOS RECEIVER ERROR LED

When this LED is on, the driver is indicating that it is receiving bit errors or transmission errors from the device preceding it in the SERCOS Ring. To trouble shoot, first verify that the SERCOS master is trying to communicate to the driver. If the SERCOS Master SERCOS communication is not active then the Error LED is appropriate. If communications is established or is trying to be established then further checks are necessary. Verify all devices in the ring are connected correctly (**Section 5.5**). Verify that the SERCOS communication baud-rate on all devices in the ring is set the same. Verify all devices have unique device ID (**Section 6.1**). Verify transmitter power of the device preceding the Emerald in the ring is set correctly for the length of fiber optic cable connected between the devices. Replace if necessary any suspected damaged fiber optic cables. (NOTE: Only active in SERCOS mode.)

APPENDIX A - MOTORS, DRIVES, CABLES AND ACCESSORIES

A.1 MOTORS, DRIVES AND CABLES

The **Selector Guide** on pages A.2 and A-3 show recommended cables for standard Emerald series motors. If motor has been custom terminated then these part number may not apply. Refer to cable drawings EEC-XYZMMM and EAC-XYZMMM for details.

A.2 CABLES AND ACCESSORIES DRAWINGS

DRAWING NUMBER	DESCRIPTION
EAC-XYZMMM	Armature Cable
EBC-XYZMMM	Brake Cable
EEC-XYZMMM	Encoder Cable
EEC-002101	Emerald Encoder Cable
EEC-003MMM	Emerald Encoder Cable
EXC-XYZMMM	ESD-IO16 I/O Expander Interface Cable
C-288YYY	Auxiliary Resolver Cable
C-752YYY	SERCOS Fiber Optic Cable, Armored Coating
C-753YYY	SERCOS Fiber Optic Cable
C-822YYY	RS-232 Communication Cable Adapter
C-987YYY	RS-232 Communication Cable

For encoder cables longer than 15 meters and not exceeding 26 meters use the EEC-002101 along with EEC-003MMM. A terminal strip rated for 0.25MM^2 [24 AWG] thru 0.50MM^2 [20 AWG] is required to connect the two cables (see **Figure A.1**).

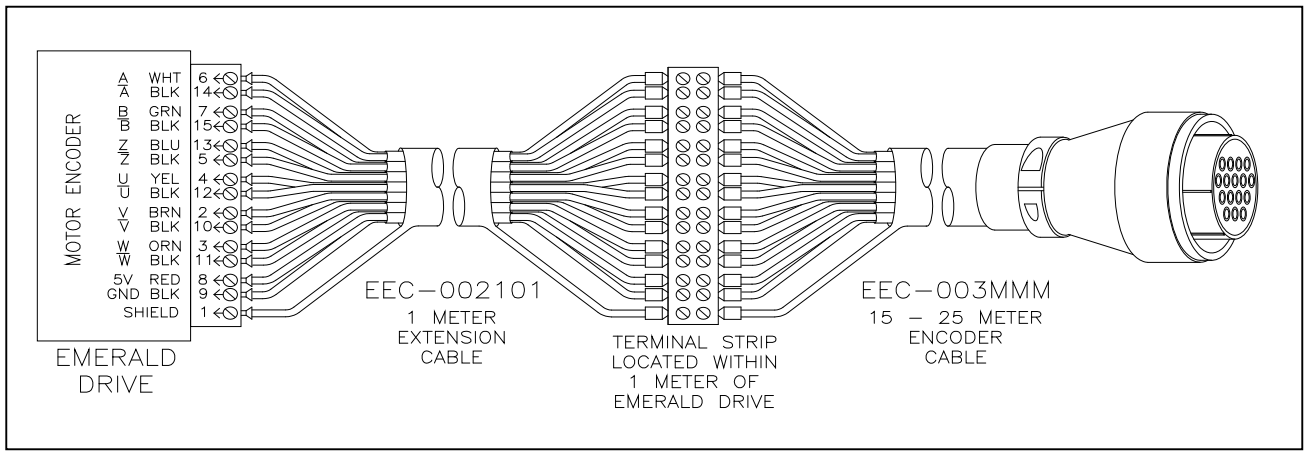


Figure A.1 - Extended Encoder Cable Configuration

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				Emerald Drives -- at nominal 220VAC line voltage						
MOTOR	*MOTOR*	*PACKAGE*	*PACKAGE*	*ESD-5/AEP* [3]	*ESD-10/AEP* [4]	*ESD-20/AEP* [5]	*ESD-40/AEP* [6]	*ESD-60/AEP* [7]	*ENCODER* [1]	*ARMATURE* [2]
	RATED	*RATED*	*RATED*	*% RATED*	*% RATED*	*% RATED*	*% RATED*	*% RATED*	*LINE*	*CABLE*
	TORQUE Nm	*POWER*	*SPEED RPM*	*TORQUE*	*TORQUE*	*TORQUE*	*TORQUE*	*TORQUE*	*COUNT*	
ESM60A[1]	1.27	400W	3000	100%					2500	EAC-DAA---
ESM85A-C	1.9	400W	2000	100%					2500	EAC-AAA---
ESM85B-C	2.84	600W	2000	100%					2500	EAC-AAA---
ESM85C-C	3.53	750W	2000	100%					2500	EAC-AAA---
ESM85D-C	4.8	1000W	2000	96%	100%				2500	EAC-AAA---
ESM125A(I)	3.6	750W	2000	100%					2500	EAC-FAA---
ESM125B(I)	4.8	1000W	2000	100%					2500	EAC-FAA---
ESM125C(I)	7.2	1500W	2000		100%				2500	EAC-FAA---
ESM125D(I)	10.5	2200W	2000		94%	100%			2500	EAC-FAA---/EAC-FAB---
ESM125E(I)	14.3	3000W	2000			100%			2500	EAC-FAB---
ESM125F(I)	19	4000W	2000			100%			2500	EAC-FAB---
ESM125B(II)	4.8	1000W	1500	100%					2500	EAC-FAA---
ESM125C(II)	7.2	1500W	1500	100%					2500	EAC-FAA---
ESM125D(II)	10.5	2200W	1500	94%	100%				2500	EAC-FAA---
ESM125E(II)	14.3	2300W	1500		100%				2500	EAC-FAA---
ESM125F(II)	19	2600W	1300		100%				2500	EAC-FAA---
ESM130-1800/34E	5.09	1800W	3400		100%				2048	EAC-AAA---
ESM130-3700/34E	10.5	3700W	3400			100%			2048	EAC-AAB---
ESM130-5700/34E	15.9	5700W	3400			70%	100%		2048	EAC-BAB---/EAC-BAC---
ESM130-5700H/34E	15.9	3300W	2000		70%	100%			2048	EAC-AAB---
ESM142-5100/24E	20.2	5100W	2400			100%			2048	EAC-BAB---
ESM142-9100/28E	31	9100W	2800				100%		2048	EAC-BAC---
ESM145A(I)	14.3	3000W	2000			100%			2500	EAC-HAB---
ESM145B(I)	19	4000W	2000			100%			2500	EAC-HAB---
ESM145C(I)	26.7	5600W	2000				100%		2500	EAC-JAC---
ESM145D(I)	35.8	7500W	2000				100%		2500	EAC-JAC---
ESM145A(II)	14.3	3000W	1500		100%				2500	EAC-HAB---
ESM145B(II)	19	2200W	1500		100%				2500	EAC-HAB---
ESM145C(II)	26.7	4100W	1500			100%			2500	EAC-JAC---
ESM145D(II)	35.8	5500W	1500			100%			2500	EAC-JAC---
ESM180-7500/20E	35.8	7500W	2000				97%		2048	EAC-BAC---

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				Emerald Drives -- at nominal 220VAC line voltage						
MOTOR	MOTOR	PACKAGE	PACKAGE	ESD-5/AEP [3]	ESD-10/AEP [4]	ESD-20/AEP [5]	ESD-40/AEP [6]	ESD-60/AEP [7]	ENCODER [1]	ARMATURE [2]
	RATED	RATED	RATED	% RATED	% RATED	% RATED	% RATED	% RATED	LINE	CABLE
	TORQUE Nm	POWER	SPEED RPM	TORQUE	TORQUE	TORQUE	TORQUE	TORQUE	COUNT	
ESM190A(I)	29	4500W	1500				100%		2500	EAC-CAC---
ESM190B(I)	39	6000W	1500				100%		2500	EAC-CAC---
ESM190C(I)	48	7500W	1500				83%	100%	2500	EAC-CAC---/EAC-CAD---
ESM190D(I)	71.5	11000W	1500					90%	2500	EAC-CAD---
ESM190E(I)	95	15000W	1500					75%	2500	EAC-CAD---
ESM190A(II)	29	4500W	1000			100%			2500	EAC-CAB---
ESM190B(II)	39	6000W	1000			100%			2500	EAC-CAB---
ESM190C(II)	48	7500W	1000			83%	100%		2500	EAC-CAB---/EAC-CAC---
ESM190D(II)	71.5	11000W	1000				100%		2500	EAC-CAC---
ESM190E(II)	95	15000W	1000					100%	2500	EAC-CAD---
ESM190-13KW/30E	41.8	13.2KW	3000					96%	2048	EAC-EAD---
ESM190-15KW/24E	62	10300KW	1500				65%	100%	2048	EAC-EAD---
ESM190-17KW/15E	111.9	17KW	1500					100%	2048	EAC-EAD---

[1]ENCODER CABLE FOR ALL SIZES EEC-AAAMMM (EEC-BAAMMM for ESM60 motor) WHERE MMM IS LENGTH IN METERS
[2]ARMATURE CABLE PER CHART WHERE --- IS LENGTH IN METERS
**** FOR CABLE LENGTHS GREATER THAN 15M CONSULT FACTORY ****

CONNECTOR KITS

[3]ESD-5/AEP ESD-CONKIT-5/10
[4]ESD-10/AEP ESD-CONKIT-5/10
[5]ESD-20/AEP ESD-CONKIT-20/40
[6]ESD-25/AEP ESD-CONKIT-20/40
[6]ESD-40/AEP ESD-CONKIT-20/40
[7]ESD-60/AEP ESD-CONKIT-60
[7]ESD-50/CEP ESD-CONKIT-60

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				Emerald Drives -- at nominal 440VAC line voltage						
MOTOR	*MOTOR*	*PACKAGE*	*PACKAGE*	*ESD-25/CEP*[6]	*ESD-50/CEP*[7]				*ENCODER*[1]	*ARMATURE*[2]
	RATED	*RATED*	*RATED*	*% RATED*	*% RATED*				*LINE*	*CABLE*
	TORQUE Nm	*POWER*	*SPEED RPM*	*TORQUE*	*TORQUE*				*COUNT*	
ESM145D(II)	35.8	5500W	2000	100%					2500	EAC-JAC---
ESM190A(II)	29	4500W	1500	100%					2500	EAC-CAB---
ESM190B(II)	39	6000W	1500	100%					2500	EAC-CAB---
ESM190C(II)	48	7500W	1500	100%					2500	EAC-CAB---/EAC-CAC---
ESM190D(II)	71.5	11000W	1500		100%				2500	EAC-CAC---
ESM190E(II)	95	15000W	1500		88%				2500	EAC-CAD---
ESM190-21.5KW/24E	85.5	21.5 KW	2400		100%				2048	EAC-BAH---
ESM190-26.7KW/24E	93.9	26.7 KW	2400		100%				2048	EAC-BAH---

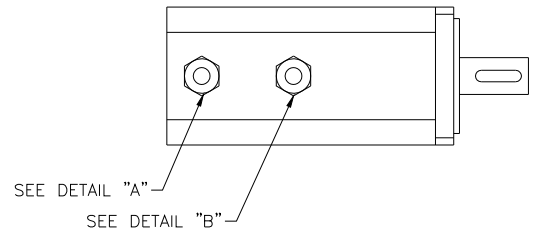
[1]ENCODER CABLE FOR ALL SIZES EEC-AAAMMM (EEC-BAAMMM for ESM60 motor) WHERE MMM IS LENGTH IN METERS
[2]ARMATURE CABLE PER CHART WHERE --- IS LENGTH IN METERS
**** FOR CABLE LENGTHS GREATER THAN 15M CONSULT FACTORY ****

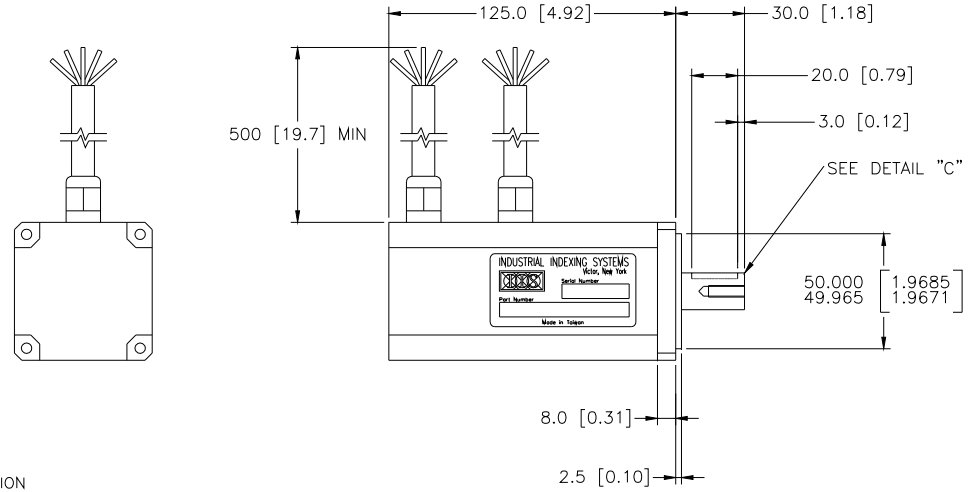
CONNECTOR KITS

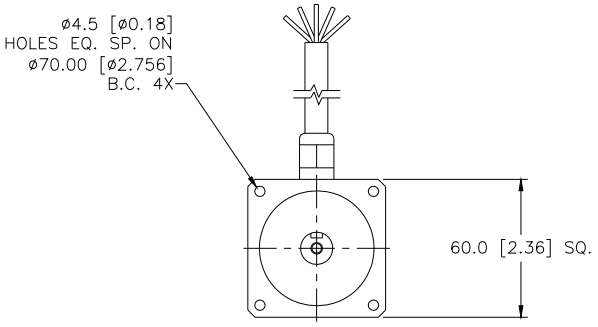
[3]ESD-5/AEP ESD-CONKIT-5/10
[4]ESD-10/AEP ESD-CONKIT-5/10
[5]ESD-20/AEP ESD-CONKIT-20/40
[6]ESD-25/AEP ESD-CONKIT-20/40
[6]ESD-40/AEP ESD-CONKIT-20/40
[7]ESD-60/AEP ESD-CONKIT-60
[7]ESD-50/CEP ESD-CONKIT-60

NOTES:
1. THRUST LOAD 12 KG [26 LBS].
2. RADIAL LOAD 71 KG [157 LBS].
3. ENCODER 2500 LINE COUNT.
4. IP-55 SEALING.
5. COLORS IN ( ) INDICATE ALTERNATE WIRE COLORS.
6. MOTOR WEIGHT: 2 KG [4.4 LBS].

DATE	SYM	REVISION RECORD	DR	CK	CK
05JAN07	0	PER ECN 07-012	JC		



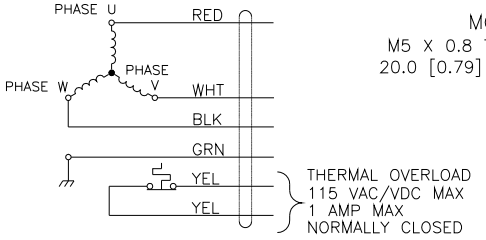




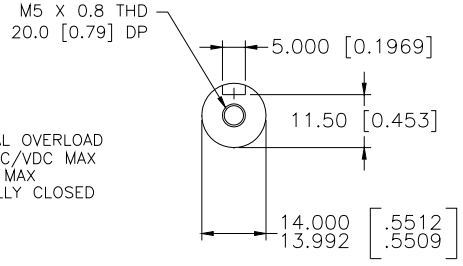
DETAIL A
ENCODER CONNECTION
(SEE NOTE 5)

FROM ENCODER	A	(WHT/GRY)	LT GRN
	$\overline{A}$	(GRY)	DRK BLU
	B	(WHT/GRN)	RED
	$\overline{B}$	(GRN)	PINK
	Z	(WHT/YEL)	ORG
	$\overline{Z}$	(YEL)	YEL
	U	(WHT/BRN)	BRN
	$\overline{U}$	(BRN)	TAN
	V	(WHT/ORG)	VIO
	$\overline{V}$	(ORG)	LT BLU
	W	(WHT/BLU)	GRY
	$\overline{W}$	(BLU)	DRK GRN
	5V	(RED)	WHT
	COM	(BLK)	BLK
	SHLD		

DETAIL B
ARMATURE CONNECTION



DETAIL C
MOTOR SHAFT DIMENSIONS



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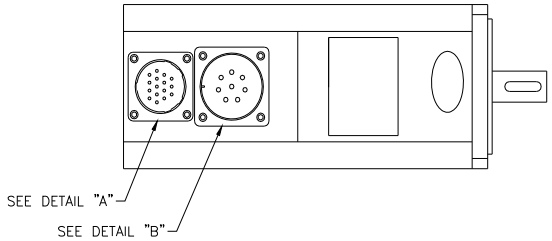
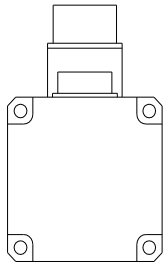
TITLE: MOTOR, EMERALD SERIES

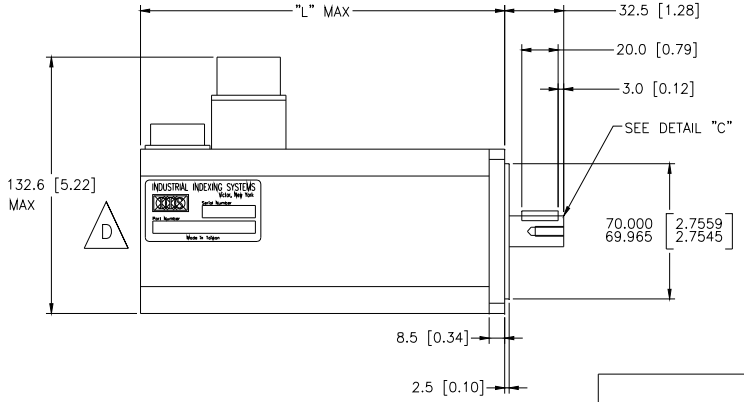
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE MM [INCHES]	DRAWN BY: JBC		DRAWING NUMBER: ESM60A
TOLERANCES: X.X± 0.25, X.XX± 0.125, X.XXX± --- ; ANGULAR ±	AutoCAD FILE LOCATION: Q:\CURRENT DWGS.		
	B	DATE: 05JAN07	SCALE:	SHEET NO.: 1 OF 1	REVISION: 0

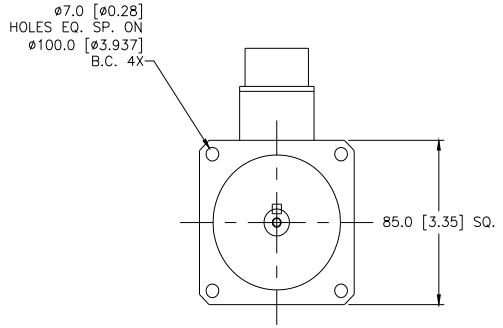
DATE	SYM	REVISION RECORD	DR	CK	CK
01NOV06	A	PER ECN 06-227	CD		
19APR07	B	PER ECN 07-082	CD		
24APR07	C	PER ECN 07-119	CD		
17AUG07	D	PER ECN 07-227	CD		

NOTES:
1.) THRUST LOAD 12 KG 26 LBS.
2.) RADIAL LOAD 71 KG 157 LBS.
3.) ENCODER 2500 LINE COUNT.
4.) IP-55 SEALING.
5.) MOTOR SHAFT SEAL IS STANDARD.



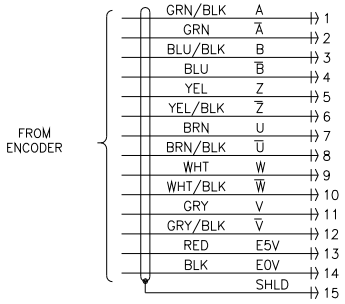






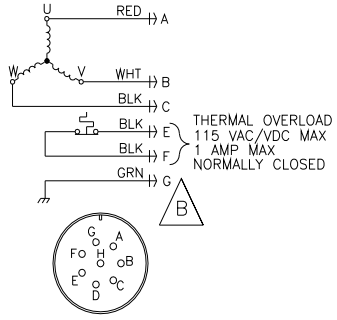
	ESM85A-C	ESM85B-C	ESM85C-C	ESM85D-C
MOTOR BODY LENGTH (L)	160.0 [6.30]	192.5 [7.58]	200.0 [7.87]	220.0 [8.66]
SHAFT DIAMETER (S)	14.000 [0.5512] 13.992 [0.5509]	16.000 [0.6299] 15.992 [0.6296]	16.000 [0.6299] 15.992 [0.6296]	16.000 [0.6299] 15.992 [0.6296]
KEY DEPTH (K)	11.50 [0.453]	13.50 [0.531]	13.50 [0.531]	13.50 [0.531]
KEY WIDTH (W)	4.988 [0.1964] 4.958 [0.1952]	4.988 [0.1964] 4.958 [0.1952]	4.988 [0.1964] 4.958 [0.1952]	4.988 [0.1964] 4.958 [0.1952]
MOTOR WEIGHT (kg [lb])	3.0 [6.6]	4.0 [8.8]	5.0 [11.0]	6.0 [13.2]

DETAIL A
ENCODER CONNECTION
PLS-2816-RM



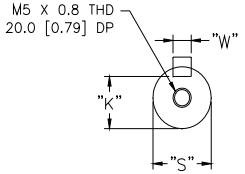
VIEW OF CONNECTOR
MATING SOCKET:
ENCODER: PLS-2816-PF

DETAIL B
ARMATURE CONNECTION
MS3102A22-23P



VIEW OF CONNECTOR
MATING SOCKET:
MOTOR: MS3106A22-23S

DETAIL C
MOTOR SHAFT DIMENSIONS



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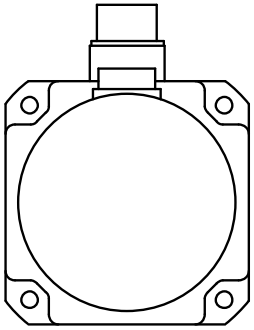
TITLE: MOTOR, EMERALD SERIES

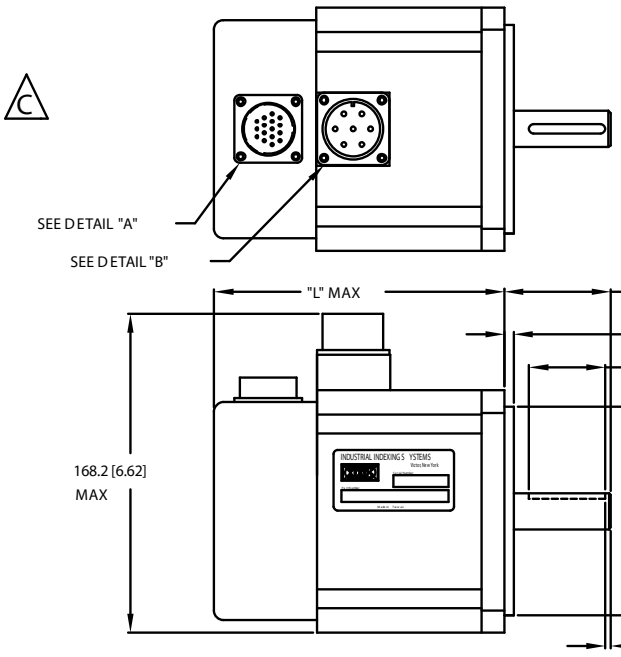
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE MM [INCHES]	DRAWN BY	DRAWING NUMBER
TOLERANCES	C.DRAPER	ESM85X-C
X.X± .25 ANGULAR	AutoCAD FILE LOCATION Q:\CURRENT DWGS.	
X.XX± .125 ±	B DATE 01NOV06 SCALE	SHEET NO. 1 OF 1 REVISION D
X.XXX± ---		

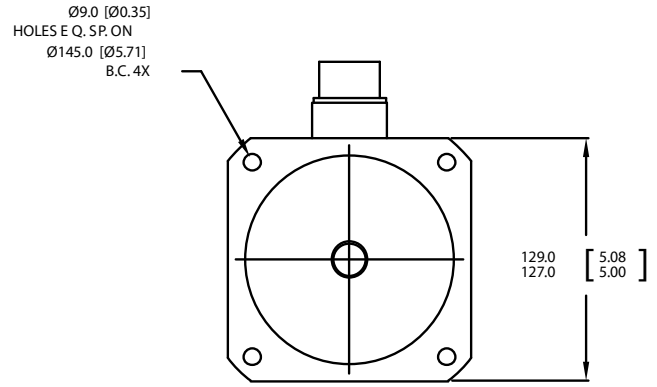
NOTES:

1.) MOTOR SEALED TO IP55.
2.) ENCODER: 2500 COUNTS/REV.
3.) THRUST LOAD 81.5 KG (180 LBS).
4.) RADIAL LOAD 81.5 KG (180 LBS), FROM CENTER POINT OF SHAFT.

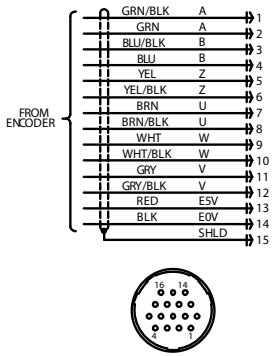
DATE	SYM	REVISION RECORD	DR	CK	CK
12DEC06	B	PER ECN 06-227	JC		
21AUG18	C	PER ECN 18-097	CD		







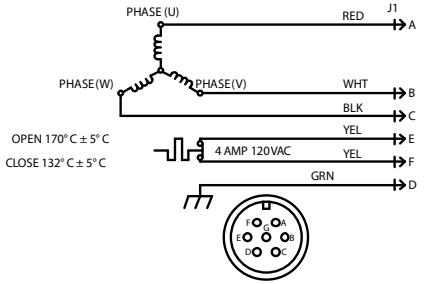
DETAIL A
ENCODER CONNECTION
PLS-2816-RM



VIEW OF CONNECTOR

MATING SOCKET:
ENCODER: PLS-2816-PF

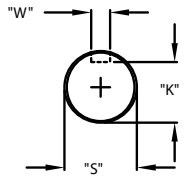
DETAIL B
MOTOR/THERMOSTAT CONNECTION
MS3102A20-15P



VIEW OF CONNECTOR

MATING SOCKET:
MOTOR: MS3106A20-15S

DETAIL C
MOTOR SHAFT DETAIL



	ESM125A(I) ESM125A(II)	ESM125B(I) ESM125B(II)	ESM125C(I) ESM125C(II)	ESM125D(I) ESM125D(II)	ESM125E(I) ESM125E(II)	ESM125F(I) ESM125F(II)
MOTOR BODY LENGTH (L)	153.0 [6.0]	173.0 [6.8]	198.0 [7.8]	233 [9.2]	273.0 [10.7]	323.0 [12.1]
SHAFT DIAMETER (S)	19.000 [0.7478] 18.987 [0.7472]	22.000 [0.8661] 21.987 [0.8656]	24.000 [0.9449] 23.988 [0.9444]	24.000 [0.9449] 23.988 [0.9444]	28.000 [1.1020] 27.986 [1.1014]	28.000 [1.1020] 27.986 [1.1014]
KEY DEPTH (K)	16.00 [0.629]	17.00 [0.669]	19.00 [0.747]	19.00 [0.747]	23.00 [0.905]	23.00 [0.905]
KEY WIDTH (W)	4.988 [0.1964] 4.958 [0.1952]	6.985 [0.2749] 6.949 [0.2735]	6.985 [0.2749] 6.949 [0.2735]	6.985 [0.2749] 6.949 [0.2735]	7.985 [0.3144] 7.949 [0.3130]	7.985 [0.3144] 7.949 [0.3130]
MOTOR WEIGHT (kg [lb])	5.3 [11.0]	6.4 [14.1]	8.7 [19.2]	12.0 [26.5]	15.0 [33.1]	19.0 [41.9]

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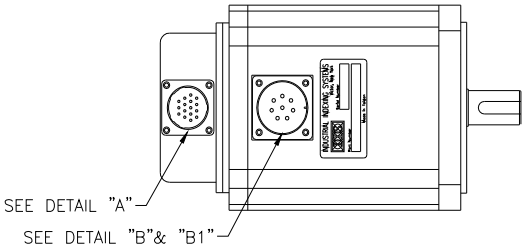
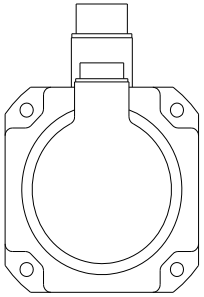
TITLE: MOTOR, EMERALD SERIES				
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE MM [INCHES]	DRAWN BY: CHRIS D.		DRAWING NUMBER: ESM125	
TOLERANCES: X.X± / X.XX± / X.XXX± ; ANGULAR ±	AutoCAD FILE LOCATION: Q:\CURRENT DWGS.			
	B	DATE: 21 AUG06	SCALE	SHEET NO.: 1 OF 1
				REVISION: C

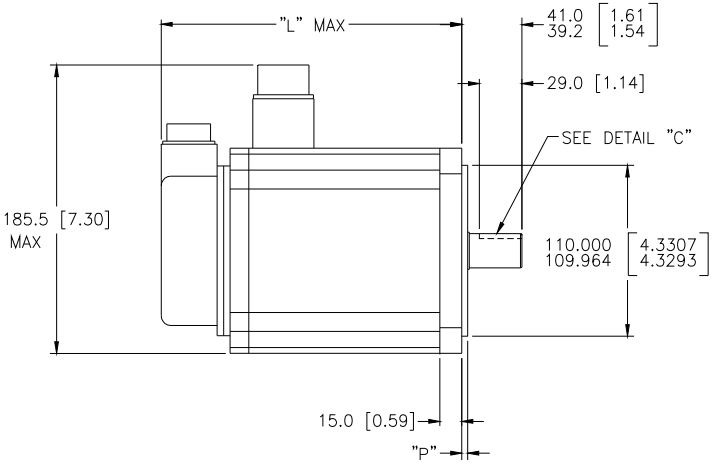
NOTES:

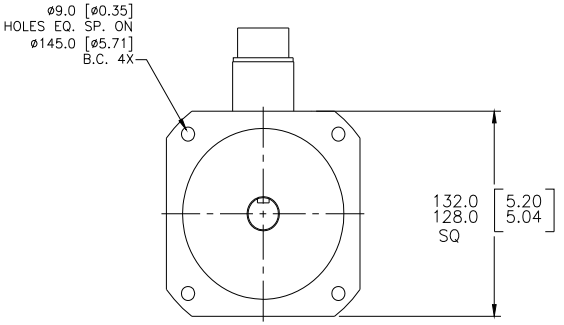
1. MOTOR SEALED TO IP65.
2. MOTOR SHAFT: SCM440H STEEL.
3. THRUST LOAD: 10 KG [22 LBS].
4. RADIAL LOAD @ 20 MM [0.78] FROM MOTOR FACE: 50 KG [110 LBS].

DATE	SYM	REVISION RECORD	DR	CK	CK
01NOV06	F	PER ECN 07-071	CD		



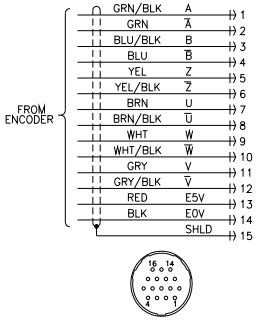






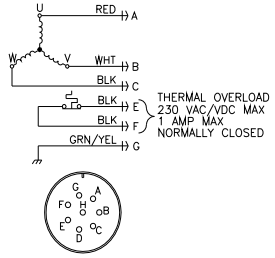
	ESM130-1800/34E	ESM130-1800H/34E	ESM130-3700/34E	ESM130-5700H/34E	ESM130-5700/34E
MOTOR BODY LENGTH (L)	145.0 [5.71]	145.0 [5.71]	175.0 [6.89]	205.0 [8.07]	205.0 [8.07]
SHAFT DIAMETER (S)	22.000 [0.8661] 21.987 [0.8656]	19.000 [0.7480] 18.987 [0.7475]	22.000 [0.8661] 21.987 [0.8656]	26.000 [1.0236] 25.987 [1.0231]	26.000 [1.0236] 25.987 [1.0231]
PILOT SHOULDER (P)	4.0 [0.16]	4.0 [0.16]	4.0 [0.16]	6.0 [0.24]	6.0 [0.24]
KEY DEPTH (K)	18.00 [0.709] 17.80 [0.701]	15.50 [0.610] 15.30 [0.602]	18.00 [0.709] 17.80 [0.701]	22.00 [0.866] 21.80 [0.858]	22.00 [0.866] 21.80 [0.858]
KEY WIDTH (W)	7.986 [0.3144] 7.950 [0.3130]	5.988 [0.2357] 5.958 [0.2346]	7.986 [0.3144] 7.95 [0.3130]	7.986 [0.3144] 7.95 [0.3130]	7.986 [0.3144] 7.95 [0.3130]
MOTOR WEIGHT	4.8 KG [10.6 LBS]	4.8 KG [10.6 LBS]	8.0 KG [17.6 LBS]	11.2 KG [24.7 LBS]	11.2 KG [24.7 LBS]
CONNECTOR	DETAIL B	DETAIL B	DETAIL B	DETAIL B	DETAIL B1

DETAIL A
ENCODER CONNECTION
PLS-2816-RM



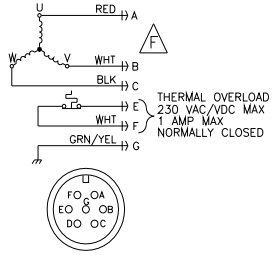
VIEW OF CONNECTOR
MATING SOCKET:
ENCODER: PLS-2816-PF

DETAIL B
ARMATURE CONNECTION
MS3102E22-23P



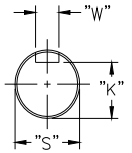
VIEW OF CONNECTOR
MATING SOCKET:
MOTOR: MS3106B22-23S

DETAIL B1
ARMATURE CONNECTION
MS3102E24-10P



VIEW OF CONNECTOR
MATING SOCKET:
MOTOR: MS3106B24-10S

DETAIL C
MOTOR SHAFT DETAIL



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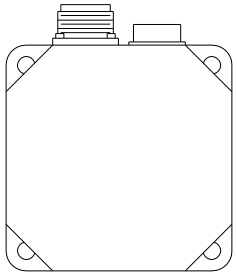
TITLE
MOTOR, EMERALD SERIES

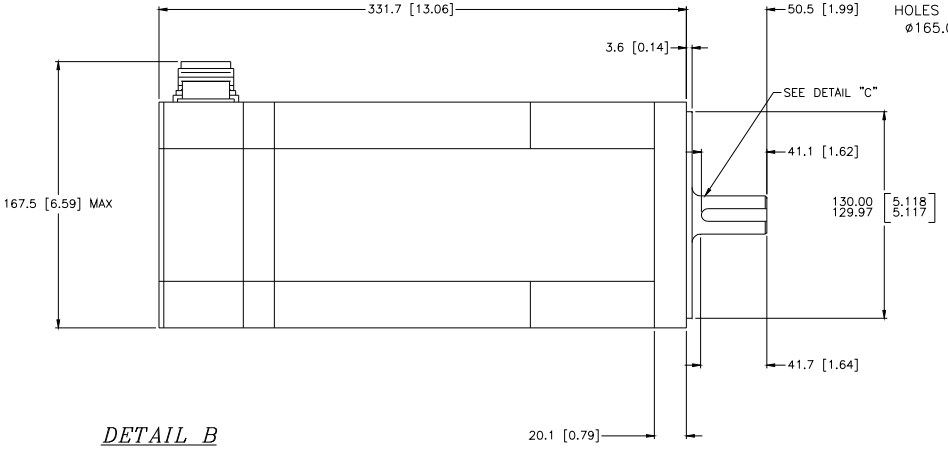
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE MM [INCHES]	DRAWN BY	DRAWING NUMBER
TOLERANCES	C.DRAPER	
X.X± .25	AutoCAD FILE LOCATION	ESM130-WWWW/34E
X.XX± .125	Q:\CURRENT DWGS.	
X.XXX± ---	ANGULAR ±	B DATE 02NOV05 SCALE

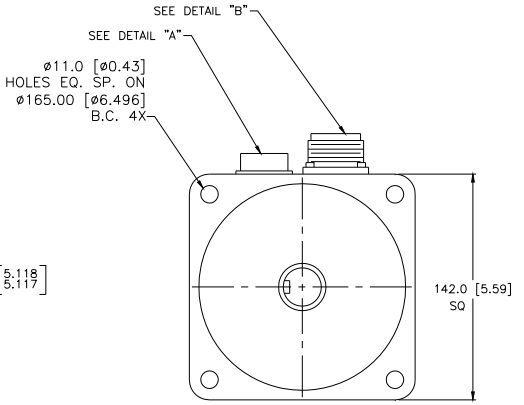
SHEET NO. 1 OF 1
REVISION F

DATE	SYM	REVISION RECORD	DR	CK	CK
18DEC06	B	PER ECN 06-227	JC		

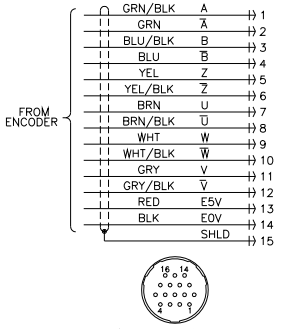
NOTES:
1. MOTOR SEALED TO IP65.
2. MOTOR SHAFT: 416 STAINLESS STEEL
3. THRUST LOAD: 23 KG [50 LBS]
4. RADIAL LOAD @ 25 MM [1 INCH] FROM MOTOR FACE: 68 KG [150 LBS]
5. MOTOR WEIGHT: 22.7 KG [50 LBS]





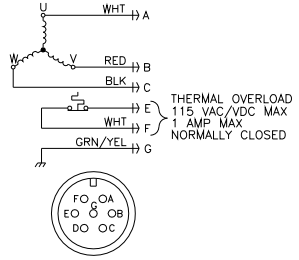


DETAIL A
ENCODER CONNECTION
PLS-2816-RM



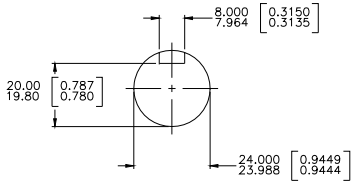
VIEW OF CONNECTOR
MATING SOCKET:
ENCODER: PLS-2816-PF

DETAIL B
ARMATURE CONNECTION
MS3102E24-10P



VIEW OF CONNECTOR
MATING SOCKET:
MOTOR: MS3106B24-10S

DETAIL C
MOTOR SHAFT DETAIL



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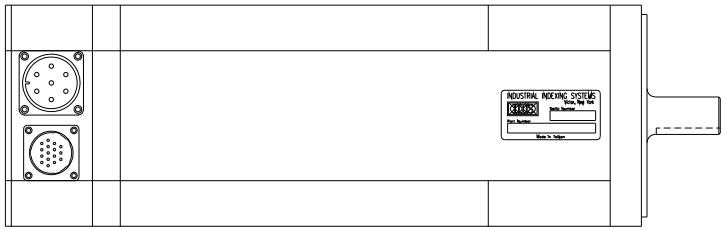
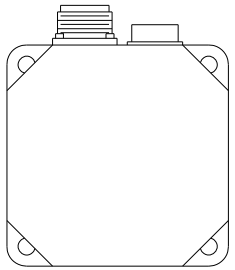
TITLE: MOTOR, EMERALD SERIES

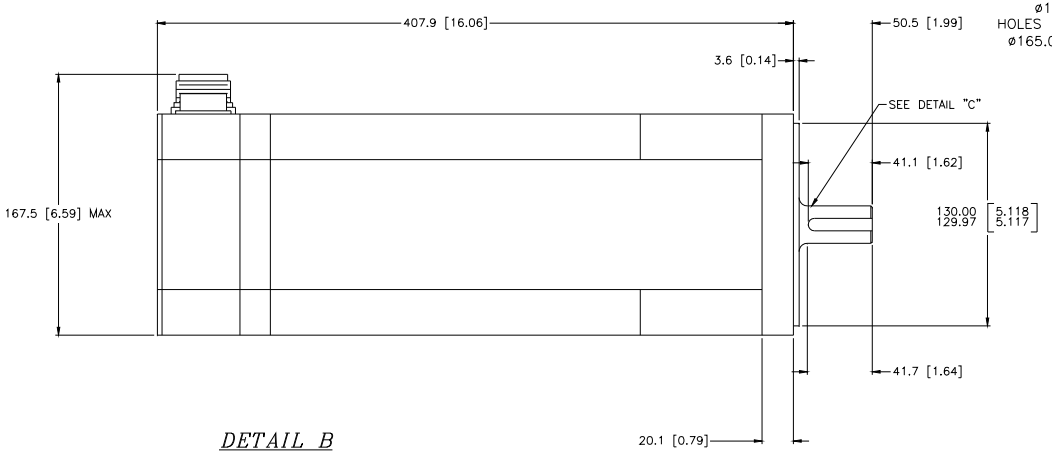
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE MM [INCHES]	DRAWN BY: CHRIS D.	DRAWING NUMBER: ESM142-5100/24E
TOLERANCES: X.X± 0.25, X.XX± 0.125, X.XXX± --- ; ANGULAR ± 0'30"	AutoCAD FILE LOCATION: Q:\CURRENT DRAWINGS	
	B | DATE: 18MAY06 | SCALE: ---	SHEET NO.: 1 OF 1 | REVISION: B

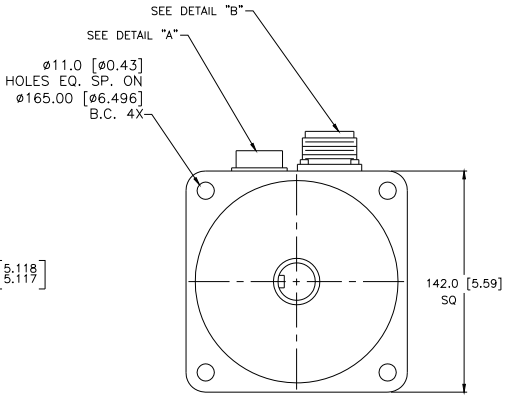
DATE	SYM	REVISION RECORD	DR	CK	CK
18DEC06	C	PER ECN 06-227	JC		

NOTES:
1. MOTOR SEALED TO IP65.
2. MOTOR SHAFT: 416 STAINLESS STEEL
3. THRUST LOAD: 23 KG [50 ILBS]
4. RADIAL LOAD @ 25 MM [1 INCH] FROM MOTOR FACE: 68 KG [150 LBS]
5. MOTOR WEIGHT: 29.5 KG [65 LBS]

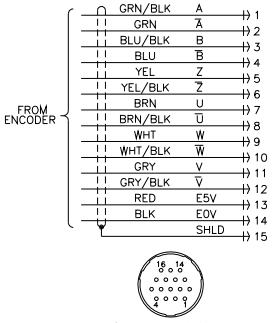






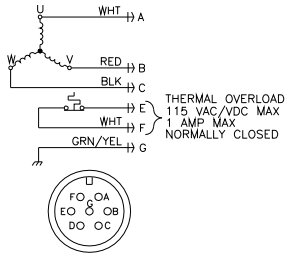


DETAIL A
ENCODER CONNECTION
PLS-2816-RM



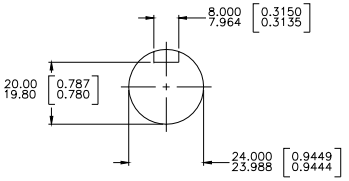
VIEW OF CONNECTOR
MATING SOCKET:
ENCODER: PLS-2816-PF

DETAIL B
ARMATURE CONNECTION
MS3102E24-10P



VIEW OF CONNECTOR
MATING SOCKET:
MOTOR: MS3106B24-10S

DETAIL C
MOTOR SHAFT DETAIL



INDUSTRIAL INDEXING SYSTEMS, Inc.
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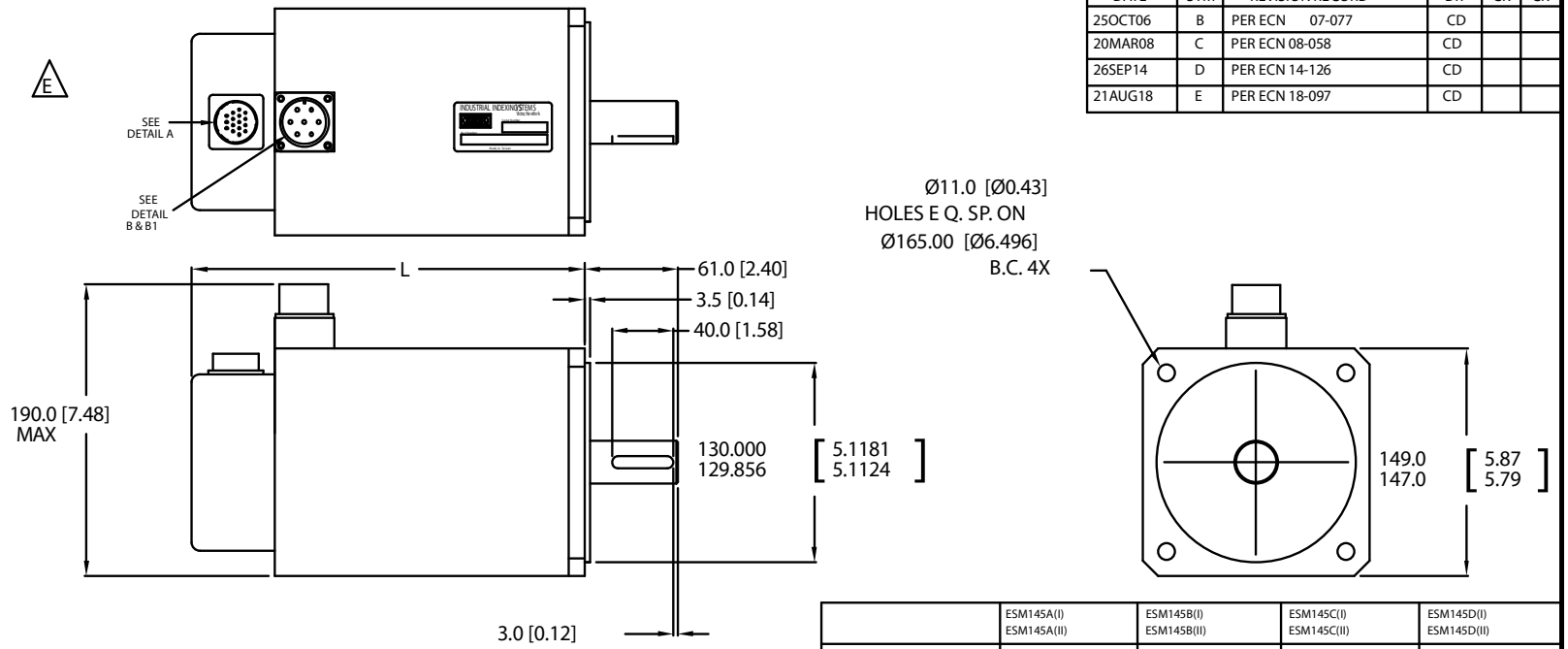
TITLE: MOTOR, EMERALD SERIES

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE MM [INCHES]	DRAWN BY	DRAWING NUMBER
TOLERANCES	CHRIS D.	
X.X± .25	AutoCAD FILE LOCATION	ESM142-9100/28E
X.XX± .125	Q:\CURRENT DRAWINGS	
X.XXX± ---	ANGULAR ± ---	B / DATE 09MAY06 / SCALE --- / SHEET NO. 1 OF 1 / REVISION C

NOTES:

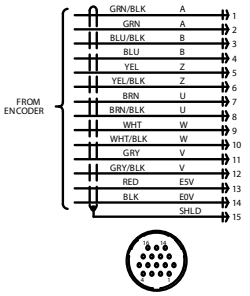
1. MOTOR SEALED TO IP55.
2. ENCODER: 2500 COUNTS/REV.
3) THRUST LOAD 270 KG (595 LBS).
4) RADIAL LOAD 337 KG (743 LBS), FROM CENTER POINT OF SHAFT.

DATE	SYM	REVISION RECORD	DR	CK	CK
25OCT06	B	PER ECN 07-077	CD		
20MAR08	C	PER ECN 08-058	CD		
26SEP14	D	PER ECN 14-126	CD		
21AUG18	E	PER ECN 18-097	CD		



	ESM145A(I) ESM145A(II)	ESM145B(I) ESM145B(II)	ESM145C(I) ESM145C(II)	ESM145D(I) ESM145D(II)
MOTOR BODY LENGTH (L)	256.0 [10.0]	296.0 [11.6]	400.0 [15.7]	436 [17.2]
SHAFT DIAMETER (S)	28.000 [1.1020] 27.986 [1.1014]	32.000 [1.2598] 31.984 [1.2592]	32.000 [1.2598] 31.984 [1.2592]	32.000 [1.2598] 31.984 [1.2592]
KEY DEPTH (K)	23.00 [0.905]	27.00 [1.063]	27.00 [1.063]	27.00 [1.063]
KEY WIDTH (W)	7.985 [0.3144] 7.949 [0.3130]	7.985 [0.3144] 7.949 [0.3130]	7.985 [0.3144] 7.949 [0.3130]	7.985 [0.3144] 7.949 [0.3130]
MOTOR WEIGHT (kg [l b])	17.7 [39.0]	22.0 [48.5]	28.5 [62.8]	36.7 [80.9]
CONNECTOR	22-23P	22-23P	24-10P	24-10P

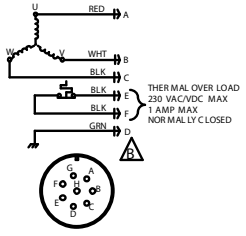
DETAIL A
ENCODER CONNECTION
PLS-2816-RM



VIEW OF CONNECTOR

MATING SOCKET:
ENCODER: PIS-2816-PF

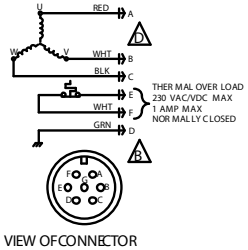
DETAIL B
ARMATURE CONNECTION
MS3102E22-23P



VIEW OF CONNECTOR

MATING SOCKET:
MOTOR: MS3106B22-23S

DETAIL B1
ARMATURE CONNECTION
MS3102E24-10P

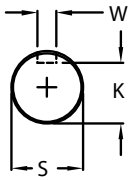


VIEW OF CONNECTOR

MATING SOCKET:
MOTOR: MS3106A24-10S

C

DETAIL C
MOTOR SHAFT DETAIL



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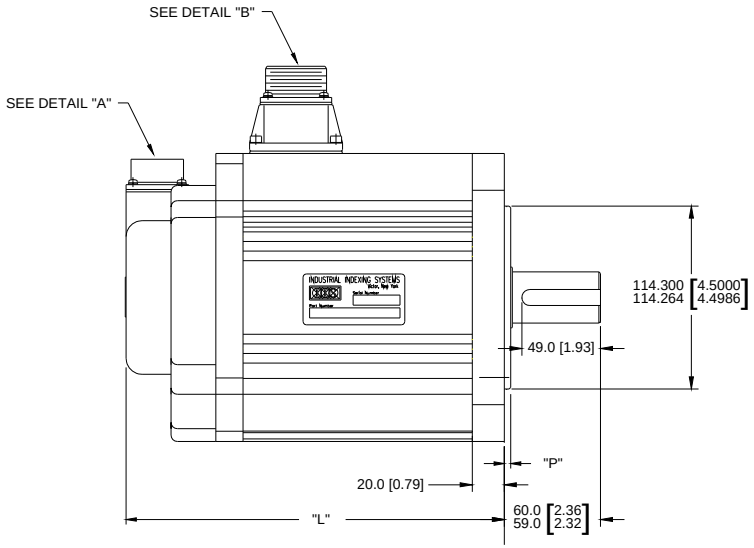
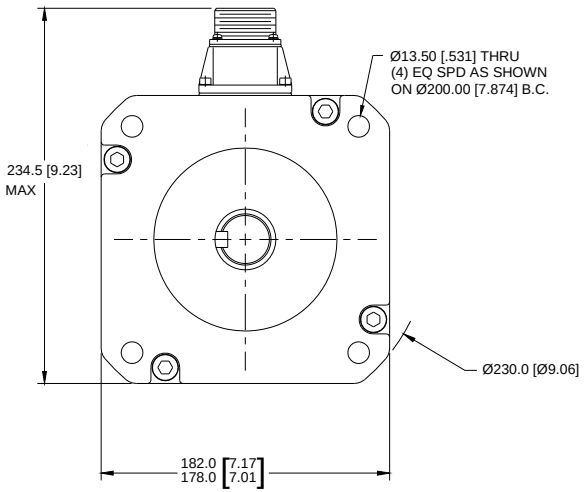
TITLE: MOTOR, EMERALD SERIES

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE MM [INCHES]	DRAWN BY	DRAWING NUMBER
TOLERANCES	KSY	ESM145
X.X±	AutoCAD FILE LOCATION	
X.XX±	Q:\CURRENT DWGS.	
X.XXX± ANGULAR ±	B — DATE 15SEP06 — SCALE — SHEET NO. 1 OF 1 — REVISION E	

NOTES:
1. MOTOR SEALED TO IP65.
2. MOTOR SHAFT: SCM440H STEEL.
3. OIL SEAL: ø38 [1.50] PROTRUDES FROM FACE 3.0 [0.12].
4. THRUST LOAD: 40 KG [88 LBS].
5. RADIAL LOAD: 80 KG [176 LBS] @20MM [.79] FROM FACE.

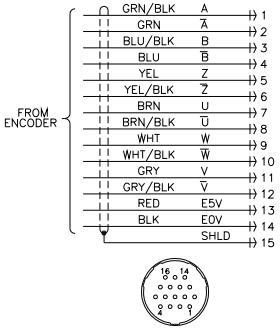
DATE	SYM	REVISION RECORD	DR	CK	CK
18DEC06	D	PER ECN 07-071	CD		





	ESM180-7500/20E
MOTOR BODY LENGTH (L)	238.0 [9.37]
SHAFT DIAMETER (S)	32.000 [1.2598] 31.984 [1.2592]
PILOT SHOULDER (P)	4.0 [0.16]
KEY DEPTH (K)	25.00 [0.984] 24.8 [0.976]
KEY WIDTH (W)	10.000 [0.3937] 9.964 [0.3923]
MOTOR WEIGHT	21 KG [46 LBS]

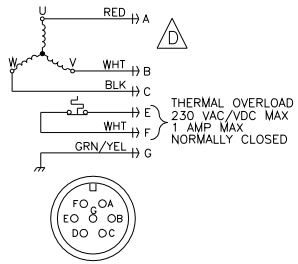
DETAIL A
ENCODER CONNECTION
PLS-2816-RM



VIEW OF CONNECTOR

MATING SOCKET:
ENCODER: PLS-2816-PF

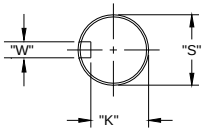
DETAIL B
ARMATURE CONNECTION
MS3102E24-10P



VIEW OF CONNECTOR

MATING SOCKET:
MOTOR: MS3106B24-10S

DETAIL C
MOTOR SHAFT DETAIL



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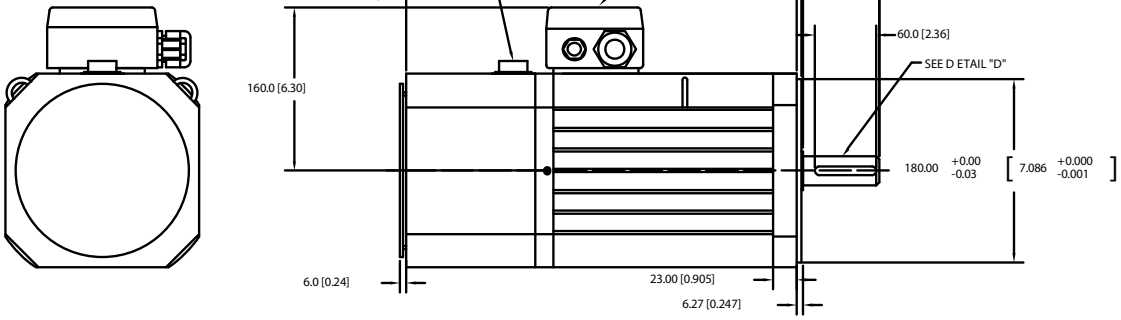
TITLE: MOTOR, EMERALD SERIES

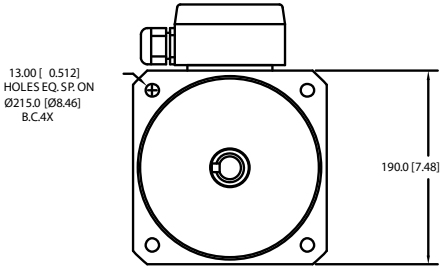
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE MM [INCHES]	DRAWN BY: C.DRAPER	DRAWING NUMBER
TOLERANCES: X.X± 0.25, X.XX± 0.125, X.XXX± ---, ANGULAR ±	AutoCAD FILE LOCATION: Q:\CURRENT DWGS.	ESM180-WWWW/20E
	B — DATE: 01AUG05 — SCALE:	SHEET NO.: 1 OF 1 — REVISION: D

DATE	SYM	REVISION RECORD	DR	CK	CK
04APR07	0	PER ECN 07-101	CD		
21 AUG18	A	PER ECN 18-097	CD		

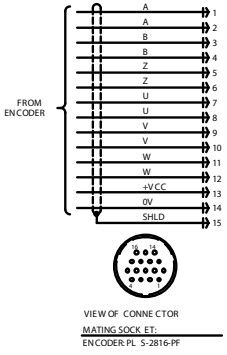
NOTES:

1) MOTOR SEALED TO IP55
2) ENCODER: 2500 COUNTS/REV
3) THRUST LOAD 152 KG (335 LBS).
4) RADIAL LOAD 255 KG (562 LBS), FROM CENTER POINT OF SHAFT.

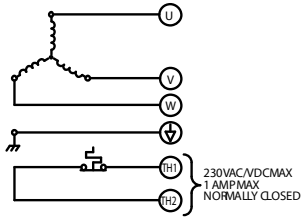




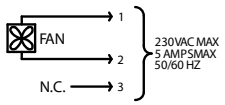
DETAIL A
ENCODER CONNECTION
PLS-2816-RM



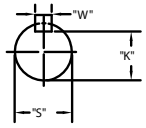
DETAIL B
ARMATURE CONNECTION



DETAIL C
FAN CONNECTION



DETAIL D
MOTOR SHAFT D ETAIL



	ESM190A(I) ESM190A(II)	ESM190B(I) ESM190B(II)	ESM190C(I) ESM190C(II)	ESM190D(I) ESM190D(II)	ESM190E(I) ESM190E(II)
MOTOR BODY LENGTH (L)	380.0 [15.0]	400.0 [15.7]	450.0 [17.7]	500 [19.7]	550.0 [21.7]
SHAFT DIAMETER (S)	28.000 [1.1023] 27.984 [1.1014]	38.000 [1.4960] 37.984 [1.4954]	38.000 [1.4960] 37.984 [1.4954]	42.000 [1.6534] 41.984 [1.6529]	42.000 [1.6534] 41.984 [1.6529]
KEY DEPTH (K)	24.00 [.944] 23.80 [.937]	34.00 [1.338] 33.80 [1.330]	34.00 [1.338] 33.80 [1.330]	37.00 [1.456] 36.80 [1.448]	37.00 [1.4567] 36.80 [1.4488]
KEY WIDTH (W)	8.000 [0.3149] 7.964 [0.3135]	10.000 [0.3937] 9.964 [0.3923]	10.000 [0.3937] 9.964 [0.3923]	12.000 [0.4724] 11.964 [0.4710]	12.000 [0.4724] 11.964 [0.4710]
MOTOR WEIGHT (kg [l b])	28.0 [61.7]	33.0 [72.7]	42.0[92.6]	50.0 [110.2]	65.0 [143.3]

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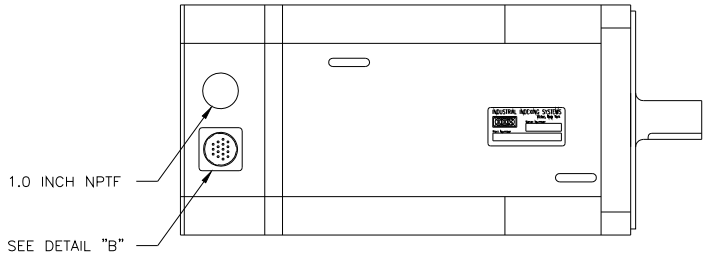
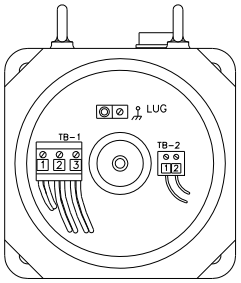
TITLE: MOTOR, EMERALD SERIES

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE MM [INCHES]	DRAWN BY: CHRIS D.	DRAWING NUMBER: ESM190
TOLERANCES: X.X± / X.XX± / X.XXX± ; ANGULAR ±	AutoCAD FILE LOCATION	B; DATE: 04APR07; SCALE; SHEET NO.: 1 OF; REVISION: A

DATE	SYM	REVISION RECORD	DR	CK	CK
25OCT06	D	PER ECN 06-227	CD		

NOTES:
1. MOTOR WEIGHT 43 KG [95 LBS].
2. SHAFT SEAL STANDARD.
3. THRUST LOAD 45 KG [100 LBS].
4. RADIAL LOAD 113 KG [250 LBS].
5. IP-65 SEALING.





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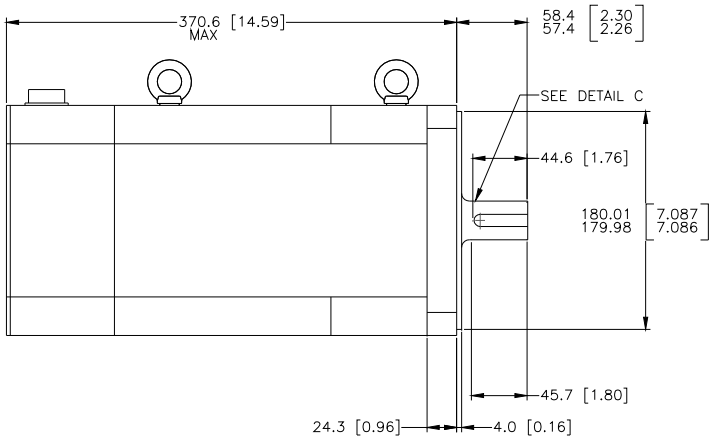
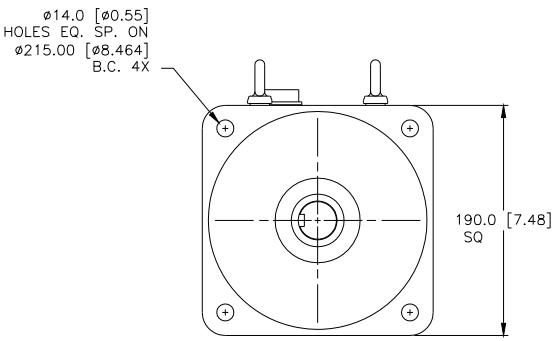
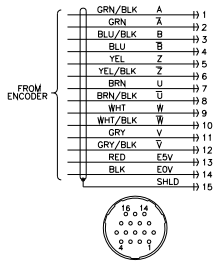
(SEE DETAIL "B")



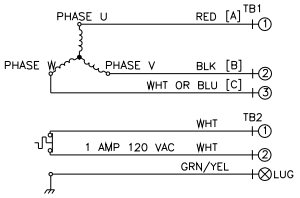


DETAIL A
ENCODER CONNECTION
PLS-2816-RM

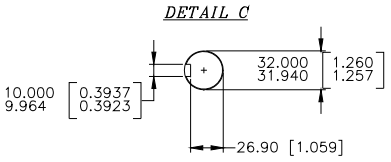


VIEW OF CONNECTOR
MATING SOCKET:
ENCODER: PLS-2816-PF

DETAIL B
ARMATURE CONNECTION



DETAIL C



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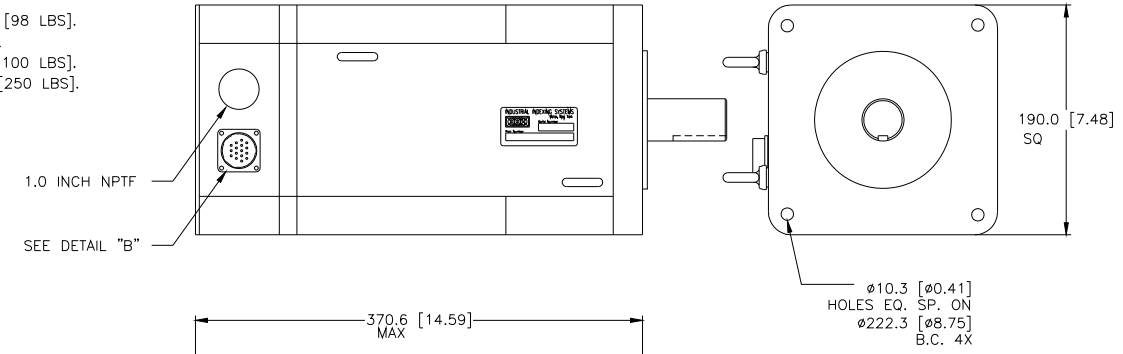
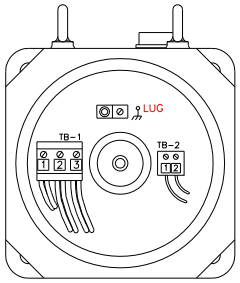
TITLE: MOTOR, EMERALD SERIES

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE MM [INCHES]		DRAWN BY: BOWMAN	DRAWING NUMBER: ESM190-13KW/30E
TOLERANCES		AutoCAD FILE LOCATION: Q:\CURRENT DWGS.	
X.X± 0.25	ANGULAR ± 0°30'	B / DATE: 11AUG06	SCALE:	SHEET NO.: 1 OF 1	REVISION: D
X.XX± 0.125			
X.XXX± ---			

NOTES:
1. MOTOR WEIGHT 44 KG [98 LBS].
2. SHAFT SEAL STANDARD.
3. THRUST LOAD 45 KG [100 LBS].
4. RADIAL LOAD 113 KG [250 LBS].
5. IP-65 SEALING.

DATE	SYM	REVISION RECORD	DR	CK	CK
06OCT09	0	PER ECN 09-112	CD		





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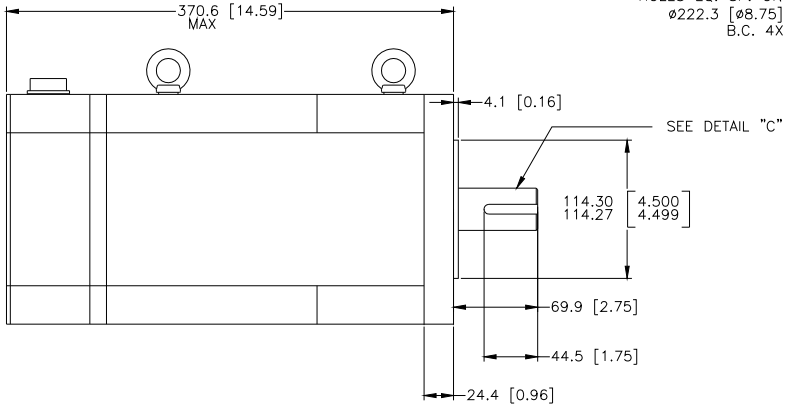
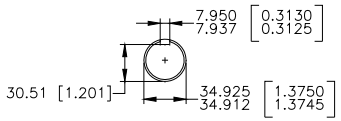
(SEE DETAIL "B")



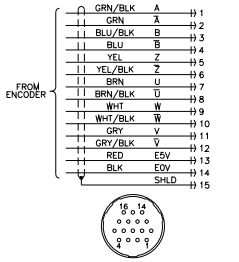
DETAIL C
MOTOR SHAFT DIMENSIONS



ELECTRICAL DATA			
MOTOR PARAMETERS		UNITS/MEASURE	VALUES
VOLTAGE		VOLTS-AC	230
AMP TYPE		-	SINE
HORSEPOWER		Hp	20.9
KILOWATTS		KW	15.6
MAX OPERATING SPEED		RPM	3000
SPEED @ RATED TORQUE		RPM	2400
*CONTINUOUS RATED TORQUE @ 2400		RPM IN-LBS[Nm]	550[62.1]
*CONTINUOUS STALL TORQUE		IN-LBS[Nm]	640[72.3]
CONTINUOUS LINE CURRENT		AMPS(RMS/ϕ)	50.4
PEAK TORQUE		IN-LBS[Nm]	1780[201.1]
PEAK CURRENT		AMPS(RMS/ϕ)	140.2
MAX THEORETICAL ACCEL.		RAD/SEC²	23,733
TORQUE SENSITIVITY	Kt	IN-LBS/AMP(RMS/ ϕ)[Nm/AMP(RMS/ ϕ)]	12.7[1.44]
BACK EMF (LINE TO LINE)	±10%	Vrms/Krpm	80
D.C. RESISTANCE (P-P)	±10%	OHMS	.09
INDUCTANCE (P-P)	±10%	MILLIHENRIES	1.0
ROTOR INERTIA	Jm	IN-LBS-SEC ²[Kg-M²]	.0750[.00847]
STATIC FRICTION	Tf	IN-LBS[Nm]	9.8[1.1]

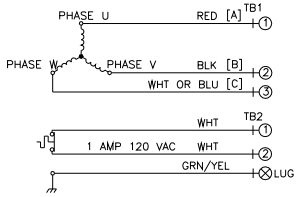
*25°C AMBIENT WITH A MAXIMUM CASE TEMPERATURE OF 100°C ON THE MOTOR. THERMOSTAT IN STATOR WILL OPEN IF STATOR TEMPERATURE EXCEEDS 155°C. THIS WILL GIVE YOU ~10% HEADROOM IN THE CONTINUOUS TORQUE RATING BEFORE THERMOSTAT OPENS. MOTOR MOUNTED ON A 356 X 356 X 19MM ALUMINUM HEATSINK.

DETAIL A
ENCODER CONNECTION
PLS-2816-RM



VIEW OF CONNECTOR
MATING SOCKET:
ENCODER: PLS-2816-PF

DETAIL B
ARMATURE CONNECTION



INDUSTRIAL INDEXING SYSTEMS, Inc.
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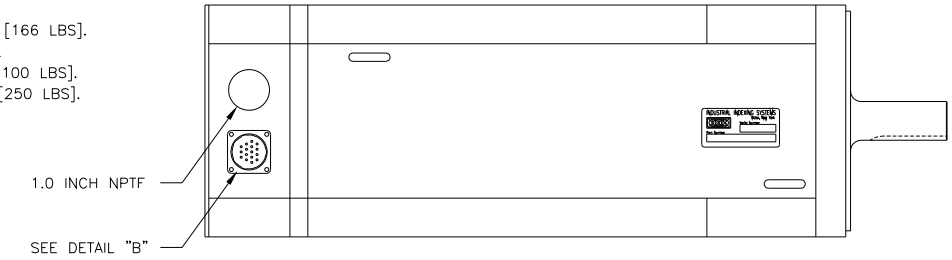
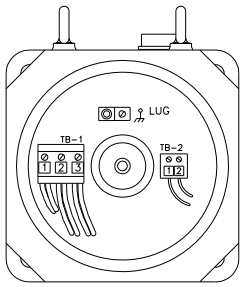
TITLE
MOTOR, EMERALD SERIES

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE MM [INCHES]		DRAWN BY		DRAWING NUMBER	
TOLERANCES		CHRIS D.			
X.X± 0.25	ANGULAR	AutoCAD FILE LOCATION		ESM190-15KW/24E	
X.XX± 0.125	± 0°30'	Q:\CURRENT DWGS.			
X.XXX± ---		B	DATE 06OCT09	SCALE	SHEET NO. 1 OF 1 / REVISION 0

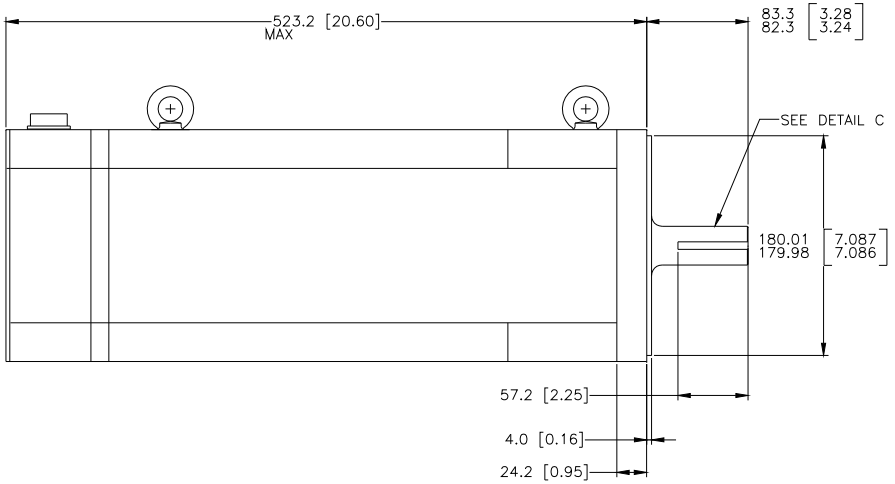
DATE	SYM	REVISION RECORD	DR	CK	CK
18DEC06	B	PER ECN 06-227	JC		

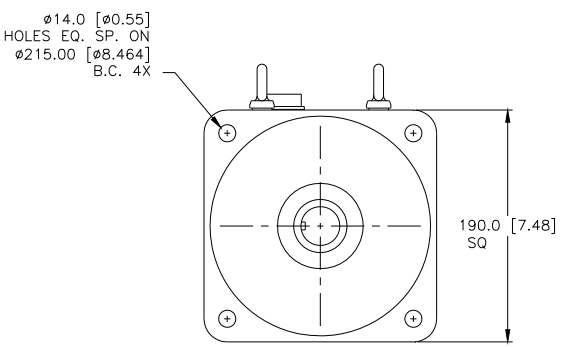
NOTES:
1. MOTOR WEIGHT 76 KG [166 LBS].
2. SHAFT SEAL STANDARD.
3. THRUST LOAD 45 KG [100 LBS].
4. RADIAL LOAD 113 KG [250 LBS].
5. IP-65 SEALING.



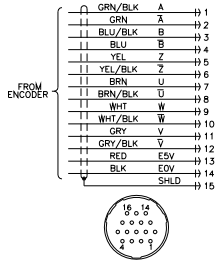


(END COVER REMOVED)
(SEE DETAIL "B")



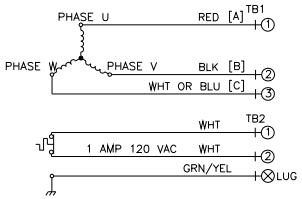


DETAIL A
ENCODER CONNECTION
PLS-2816-RM

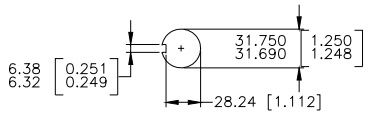


VIEW OF CONNECTOR
MATING SOCKET:
ENCODER: PLS-2816-PF

DETAIL B
ARMATURE CONNECTION



DETAIL C



INDUSTRIAL INDEXING SYSTEMS, Inc.
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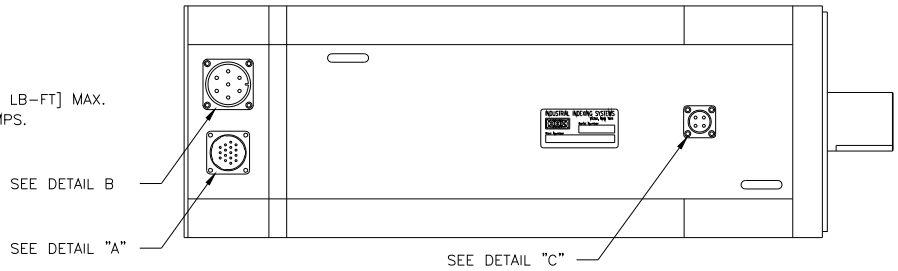
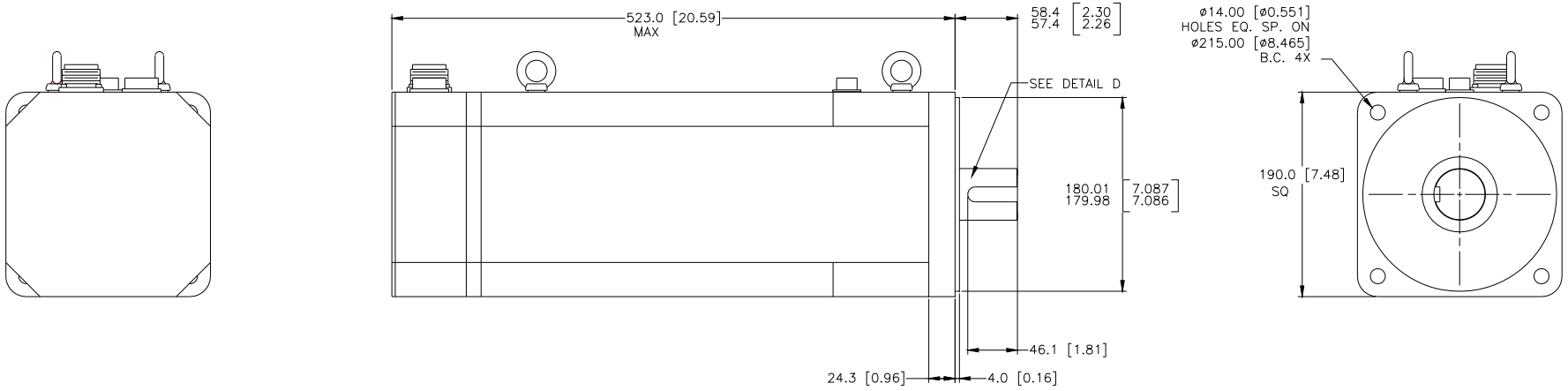
TITLE: MOTOR, EMERALD SERIES

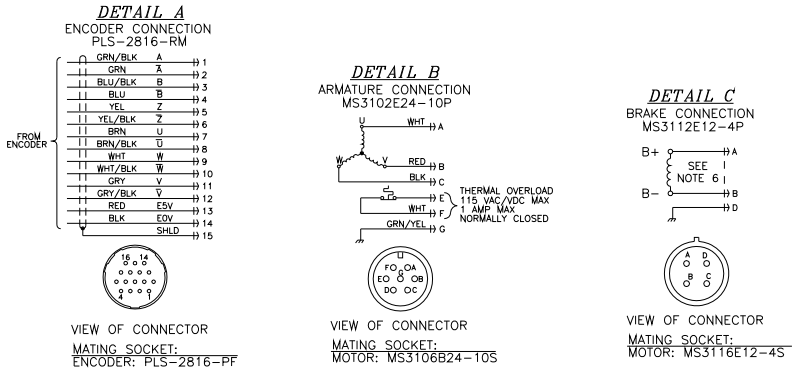
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE MM [INCHES]	DRAWN BY: JBC	DRAWING NUMBER: ESM190-17KW/15E
TOLERANCES: X.X± 0.25, X.XX± 0.125, X.XXX± --- ; ANGULAR: ± 0°30"	AutoCAD FILE LOCATION: Q:\CURRENT DWGS.	
	B; DATE: 08AUG06; SCALE:	SHEET NO.: 1 OF 1; REVISION: B

NOTES:
1. MOTOR WEIGHT 69 KG [153 LBS].
2. SHAFT SEAL STANDARD.
3. THRUST LOAD 45 KG [100 LBS].
4. RADIAL LOAD 113 KG [250 LBS].
5. IP-65 SEALING.
6. BRAKE HOLDING FORCE: 122 NM [90 LB-FT] MAX.
   BRAKE ELECTRICAL: 24 VDC 2.51 AMPS.

DATE	SYM	REVISION RECORD	DR	CK	CK
03JAN07	0	PER ECN 07-007	JC		







INDUSTRIAL INDEXING SYSTEMS, Inc.
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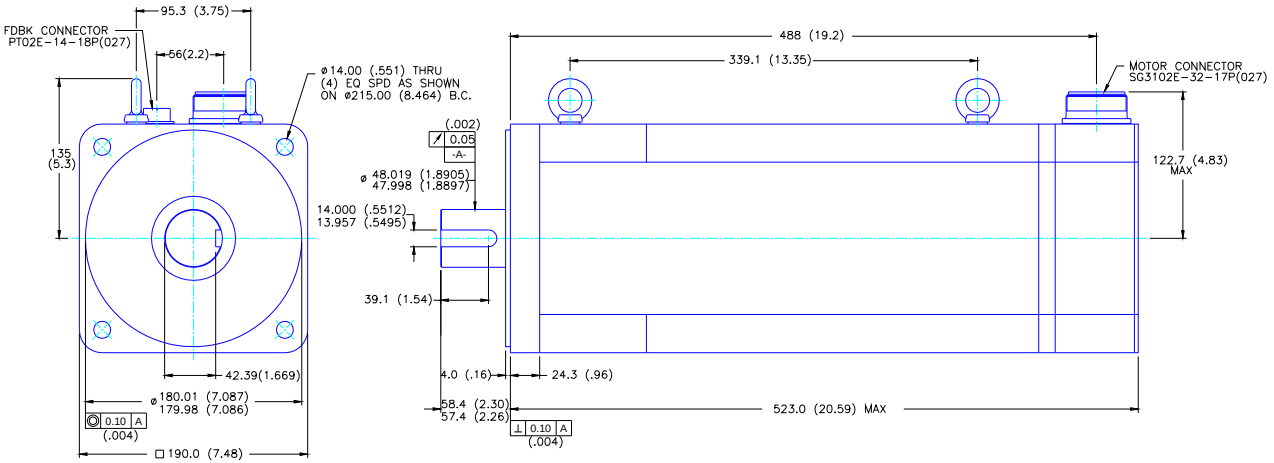
TITLE: MOTOR, EMERALD SERIES

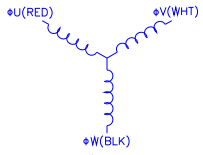
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE MM [INCHES]	DRAWN BY	DRAWING NUMBER
TOLERANCES	JBC	ESM190-21.5KW/24EB
X.X± 0.25	AutoCAD FILE LOCATION	
X.XX± 0.125	Q:\CURRENT DWGS.	
X.XXX± ---	ANGULAR ± 0'30"	B / DATE 03JAN07 / SCALE / SHEET NO. 1 OF 1 / REVISION 0

NOTES:
1. MILLIMETERS (INCHES)
2. AXIAL LOAD: 45 KG [100 LBS] MAX
3. RADIAL LOAD: 113 KG [250 LBS] MAX @ 25.4MM [1.00] FROM FACE
4. MOTOR SEALED TO IP65
5. MOTOR SHAFT: G&P STEEL, GRADE 1144
6. MOTOR FINISH: BLACK MATT FINISH
7. MOTOR WEIGHT 73 KG [162 LBS]

DATE	SYM	REVISION RECORD	DR	CK	CK
29JUL09	0	PER ECN 09-097	CD		



ENCODER INFO:
5V - 2048L COMMUTATING



3 PHASE - 6 POLE

ELECTRICAL DATA			
MOTOR PARAMETERS		UNITS/MEASURE	VALUES
VOLTAGE		VOLTS-AC	460
AMP TYPE		-	SINE
HORSEPOWER		Hp	35.7
KILOWATTS		KW	26.7
MAX OPERATING SPEED		RPM	2850
SPEED @ RATED TORQUE		RPM	2400
*CONTINUOUS RATED TORQUE@2400 RPM		IN-LBS[Nm]	939[106.1]
*CONTINUOUS STALL TORQUE		IN-LBS[Nm]	1092[123.4]
CONTINUOUS LINE CURRENT		AMPS(RMS/Φ)	43.0
PEAK TORQUE		IN-LBS[Nm]	3276[370.2]
PEAK CURRENT		AMPS(RMS/Φ)	127.5
MAX THEORETICAL ACCEL.		RAD/SEC²	23,450
TORQUE SENSITIVITY	Kt	IN-LBS/AMP(RMS/Φ)[Nm/AMP(RMS/Φ)]	25.7[2.91]
BACK EMF (LINE TO LINE)	±10%	Vrms/Krpm	162
D.C. RESISTANCE (P-P)	±10%	OHMS	.14
INDUCTANCE (P-P)	±10%	MILLIHENRIES	1.9
ROTOR INERTIA	Jm	IN-LBS-SEC² [Kg-M²]	.1397[.01579]
STATIC FRICTION	Tf	IN-LBS[Nm]	13.0[1.5]

*25°C AMBIENT WITH A MAXIMUM CASE TEMPERATURE OF 100°C ON THE MOTOR. THERMOSTAT IN STATOR WILL OPEN IF STATOR TEMPERATURE EXCEEDS 155°C. THIS WILL GIVE YOU ~10% HEADROOM IN THE CONTINUOUS TORQUE RATING BEFORE THERMOSTAT OPENS. MOTOR MOUNTED ON A 356 X 356 X 19MM ALUMINUM HEATSINK.

CONNECTION CHART

PT02E-14-18P(027)

ENC/THERM WIRE LEADS		
PIN	WIRE FUNCTION	WIRE COLOR
A	THERM	WHT
B	CH A	BLU
C	CH A\	BLU/BLK
D	GND CABLE	SHLD
E	CH U	BRN
F	CH V	GRY
G	CH W	WHT
H	CH W\	WHT/BLK
J	-	-
K	+5VDC	RED
L	THERM	WHT
M	CH Z	YEL
N	CH B	GRN
P	CH B\	GRN/BLK
R	CH U\	BRN/BLK
S	CH V\	GRY/BLK
T	GND	BLK
U	CH Z\	YEL/BLK

SG3102E-32-17P(027)

MOTOR WIRE LEADS		
PIN	WIRE FUNCTION	WIRE COLOR
A	ΦU	RED
B	ΦV	WHT
C	ΦW	BLK
D	PE GND	GRN/YEL

INDUSTRIAL INDEXING SYSTEMS, Inc.
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CHECKED BY	DATE
APPROVED BY	DATE
APPROVED BY	DATE
MATERIAL	
FINISH	

TITLE: MOTOR

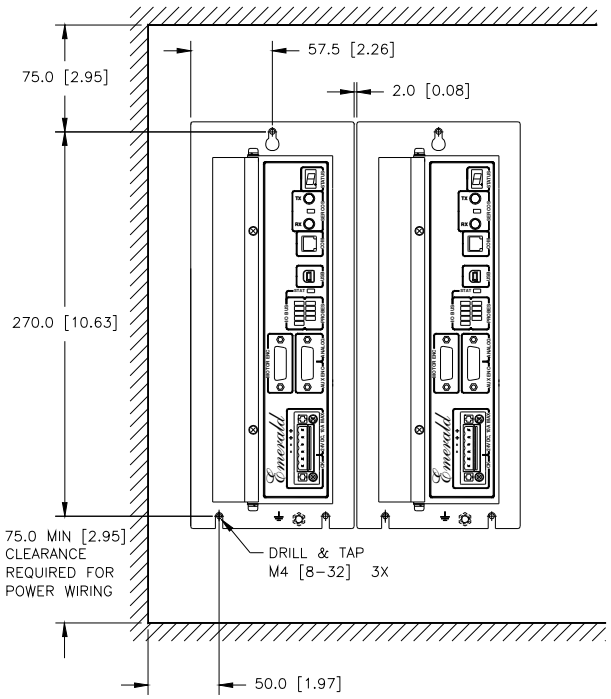
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE INCHES (mm)
TOLERANCES: X.X± ; X.XX± ; X.XXX± ; ANGULAR ±

DRAWN BY: CHRIS D.
AutoCAD FILE LOCATION: Q\CURRENT DWGS

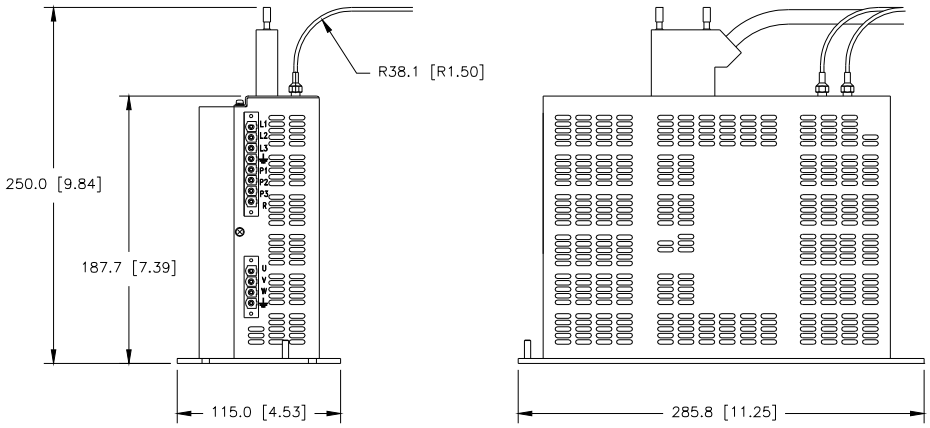
DRAWING NUMBER: ESM190-26.7KW/24E

B	DATE	SCALE	SHEET NO.	REVISION
	29JUL09	CAD	1 OF 1	0

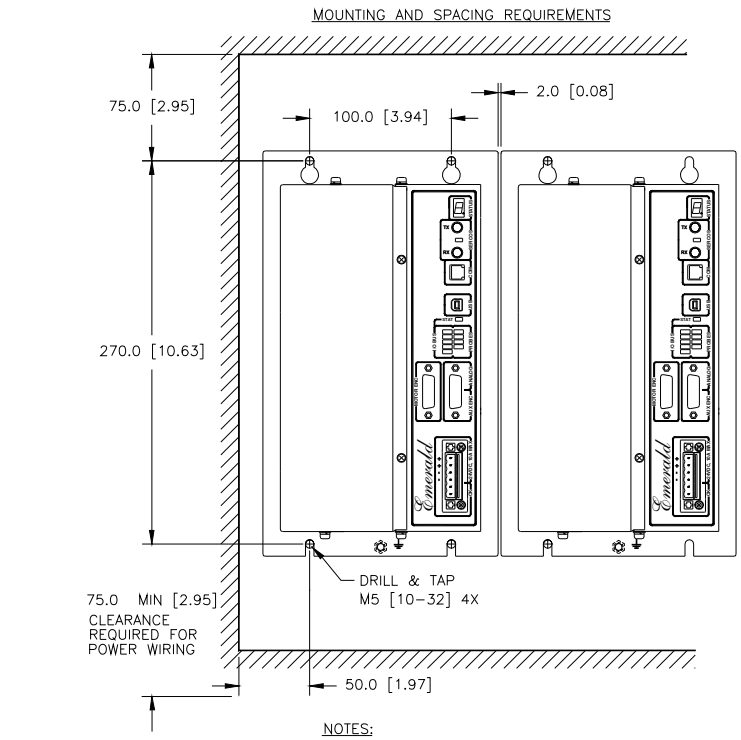
MOUNTING AND SPACING REQUIREMENTS

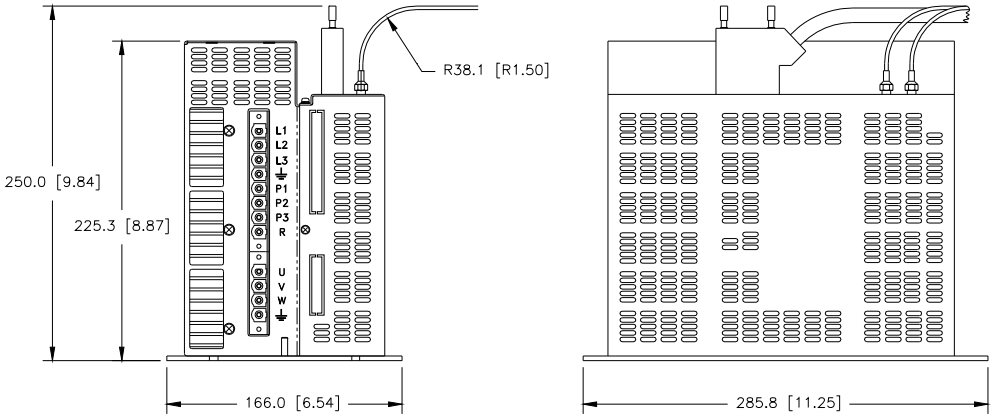


NOTES:
1. RECOMMENDED CABINET DEPTH 305 [12.00]

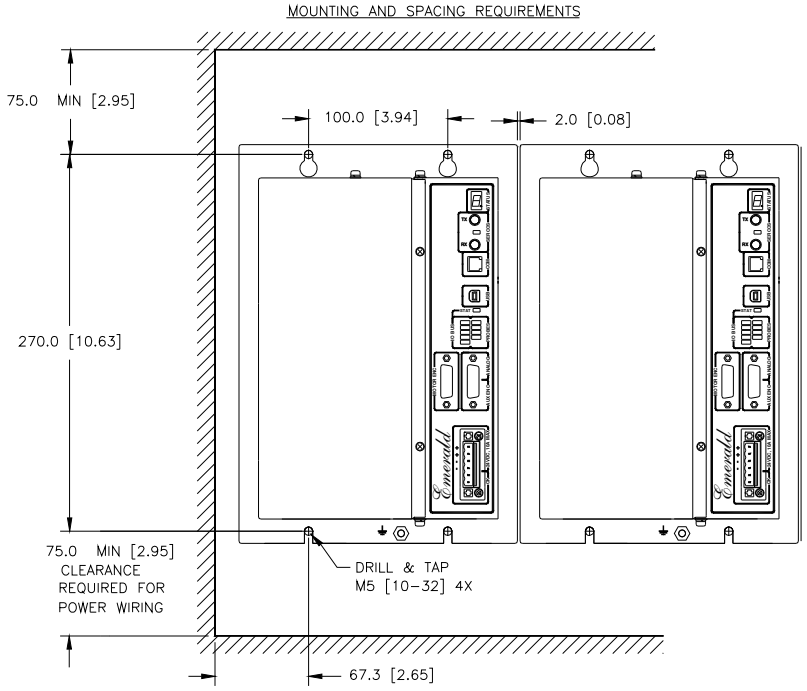


INDUSTRIAL INDEXING SYSTEMS, Inc. www.iis-servo.com			TITLE: DRIVE, EMERALD 5 & 10 AMP			
			DRAWING NUMBER: ESD-5/10			
DIMENSIONS ARE MM [INCHES]	TOLERANCES X.XX±0.25 X.XXX±0.125 ∠ ± –	REV A	ECN 06-227	DATE 04JAN07	SH. 1 OF 1	

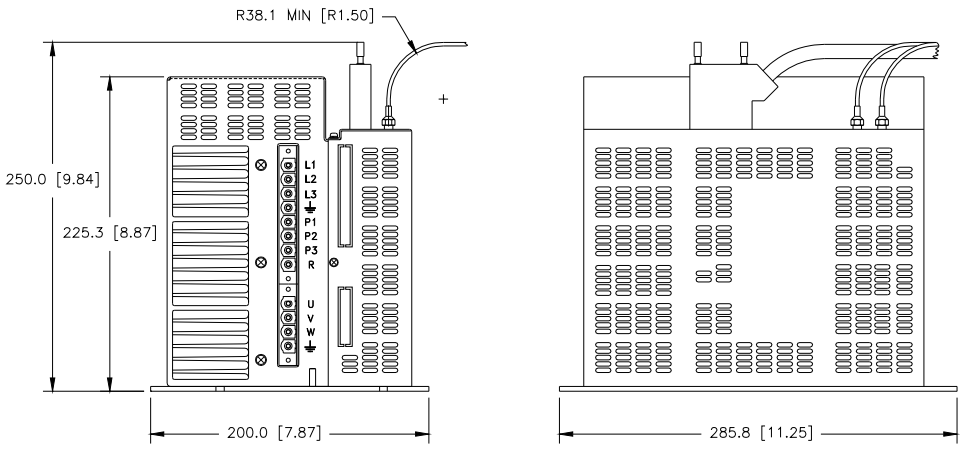




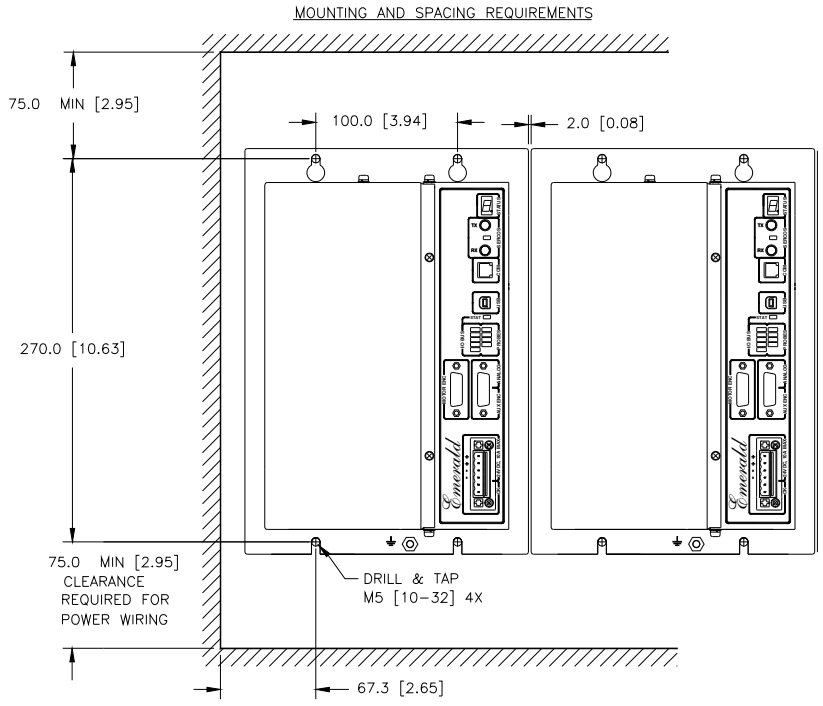
INDUSTRIAL INDEXING SYSTEMS, Inc. www.iis-servo.com				TITLE: DRIVE, EMERALD 20 AMP	
				DRAWING NUMBER: ESD-20	
DIMENSIONS ARE MM [INCHES]	TOLERANCES X.XX±0.25 X.XXX±0.125 ∠ ± –	REV A	ECN 06-227	DATE 04JAN07	SH. 1 OF 1



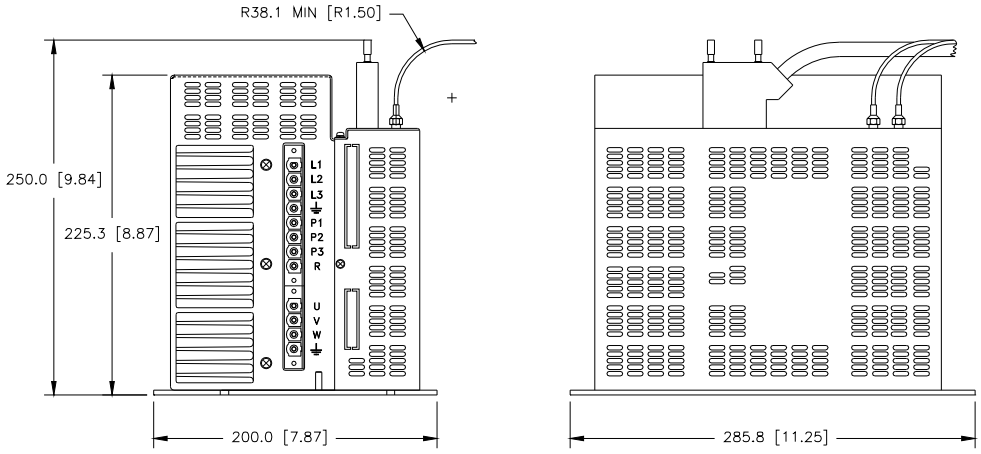
NOTES:
1. RECOMMENDED CABINET DEPTH 305 [12.00]



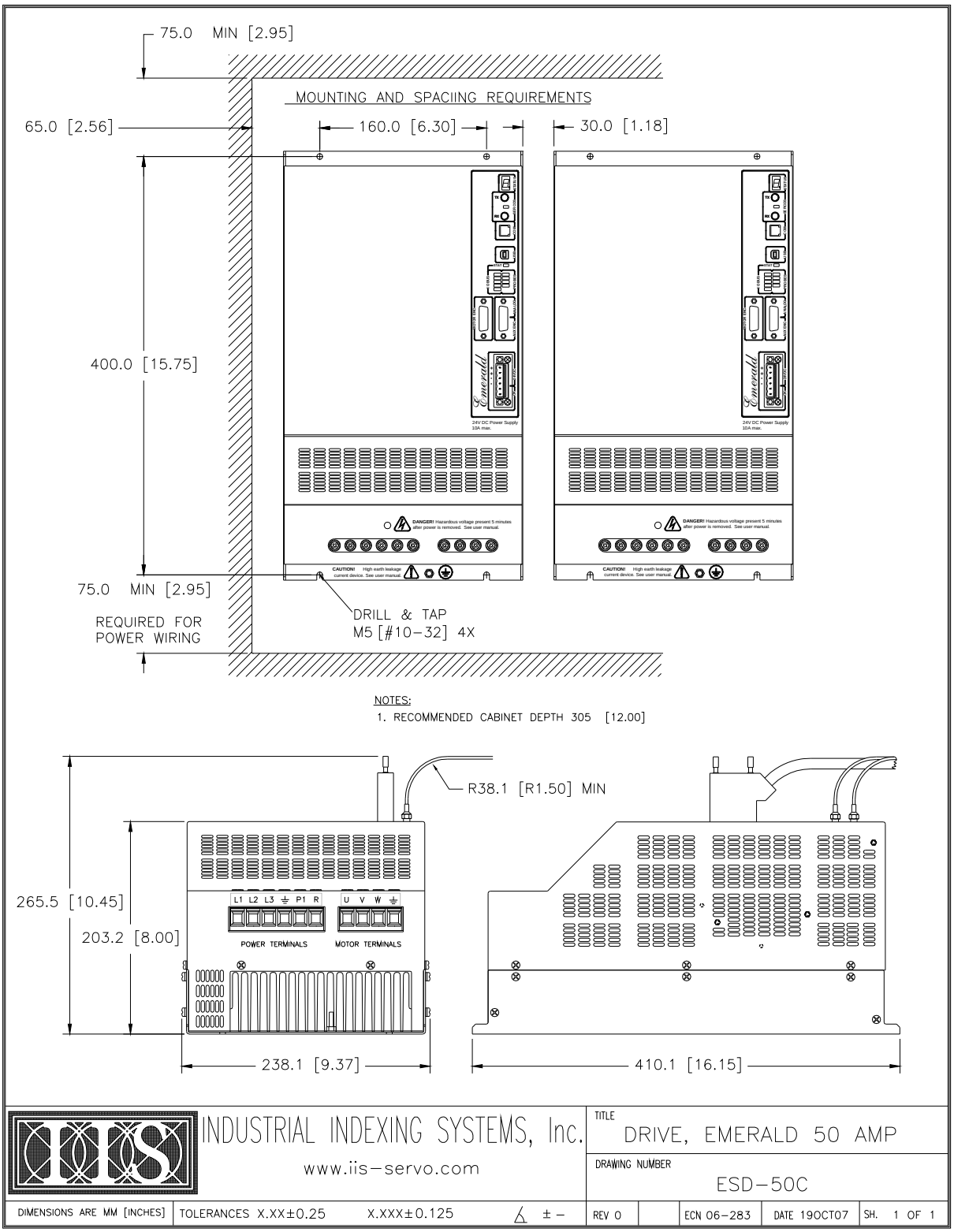
INDUSTRIAL INDEXING SYSTEMS, Inc. www.iis-servo.com			TITLE: DRIVE, EMERALD 25 AMP			
			DRAWING NUMBER: ESD-25C			
DIMENSIONS ARE MM [INCHES]	TOLERANCES X.XX±0.25 X.XXX±0.125 ∠ ± –	REV 0		ECN 07-249	DATE 19OCT07	SH. 1 OF 1

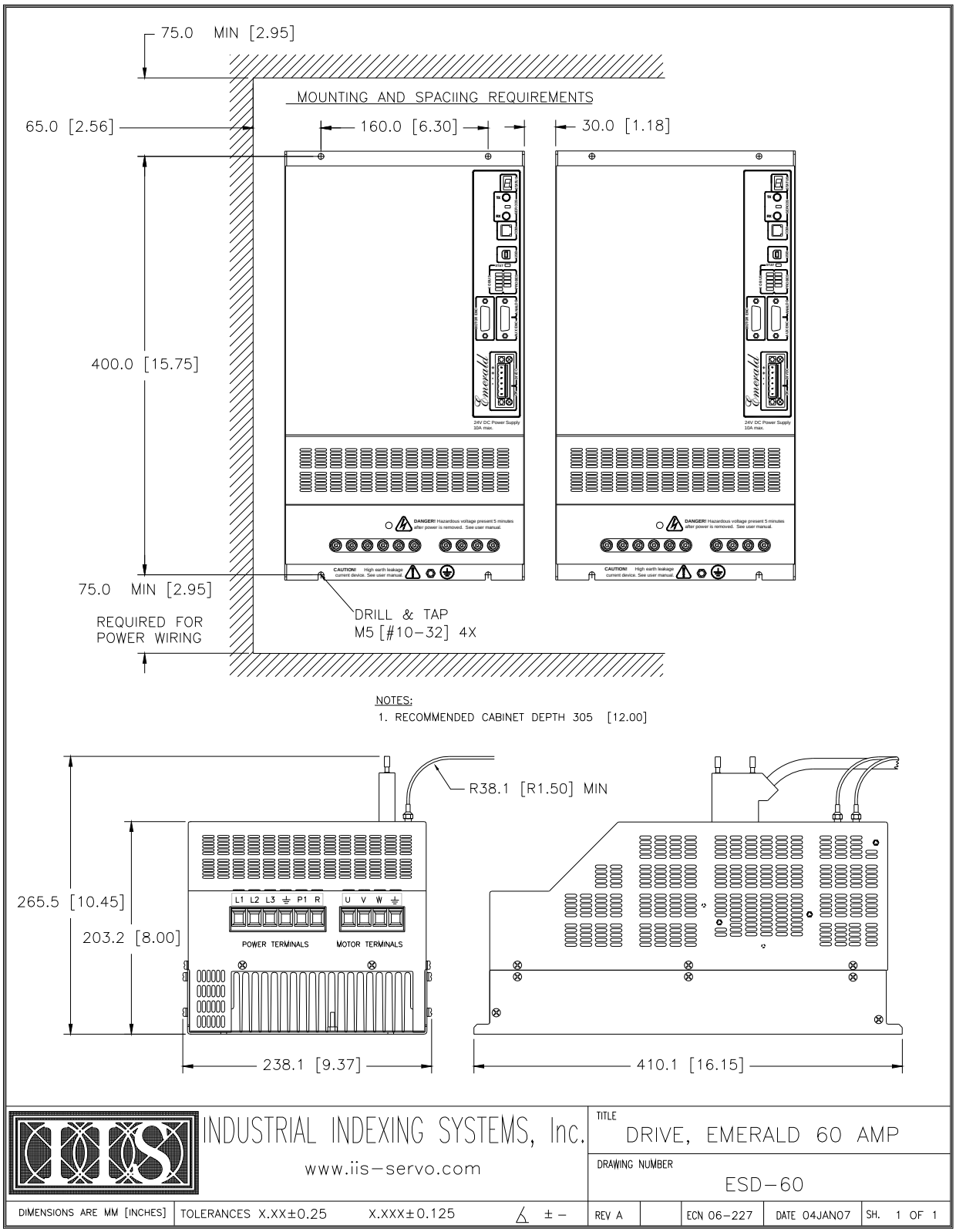


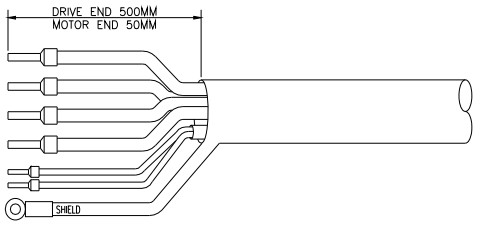
NOTES:
1. RECOMMENDED CABINET DEPTH 305 [12.00]



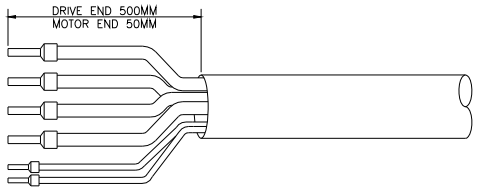
INDUSTRIAL INDEXING SYSTEMS, Inc. www.iis-servo.com			TITLE: DRIVE, EMERALD 40 AMP		
			DRAWING NUMBER: ESD-40		
DIMENSIONS ARE MM [INCHES]	TOLERANCES X.XX±0.25 X.XXX±0.125 ∠ ± –	REV A	ECN 06-227	DATE 04JAN07	SH. 1 OF 1


75.0 MIN [2.95]
MOUNTING AND SPACIING REQUIREMENTS
65.0 [2.56]
160.0 [6.30]
30.0 [1.18]
400.0 [15.75]
75.0 MIN [2.95]
REQUIRED FOR POWER WIRING
DRILL & TAP
M5 [#10-32] 4X
NOTES:
1. RECOMMENDED CABINET DEPTH 305 [12.00]
R38.1 [R1.50] MIN
265.5 [10.45]
203.2 [8.00]
L1 L2 L3 P1 R
U V W
POWER TERMINALS
MOTOR TERMINALS
238.1 [9.37]
410.1 [16.15]
INDUSTRIAL INDEXING SYSTEMS, Inc.
www.iis-servo.com
TITLE
DRIVE, EMERALD 50 AMP
DRAWING NUMBER
ESD-50C
DIMENSIONS ARE MM [INCHES]
TOLERANCES X.XX±0.25 X.XXX±0.125 ± -
REV 0
ECN 06-283
DATE 19OCT07
SH. 1 OF 1


75.0 MIN [2.95]
MOUNTING AND SPACIING REQUIREMENTS
65.0 [2.56]
160.0 [6.30]
30.0 [1.18]
400.0 [15.75]
75.0 MIN [2.95]
REQUIRED FOR POWER WIRING
DRILL & TAP
M5 [#10-32] 4X
NOTES:
1. RECOMMENDED CABINET DEPTH 305 [12.00]
R38.1 [R1.50] MIN
265.5 [10.45]
203.2 [8.00]
L1 L2 L3 P1 R
U V W
POWER TERMINALS
MOTOR TERMINALS
238.1 [9.37]
410.1 [16.15]
INDUSTRIAL INDEXING SYSTEMS, Inc.
www.iis-servo.com
TITLE
DRIVE, EMERALD 60 AMP
DRAWING NUMBER
ESD-60
DIMENSIONS ARE MM [INCHES]
TOLERANCES X.XX±0.25 X.XXX±0.125
REV A
ECN 06-227
DATE 04JAN07
SH. 1 OF 1



EITHER END FERRULED WITH SHIELD FIG. 1



EITHER END FERRULED WITHOUT SHIELD FIG. 2

EITHER END WITH NO TERMINATION FIG. 3

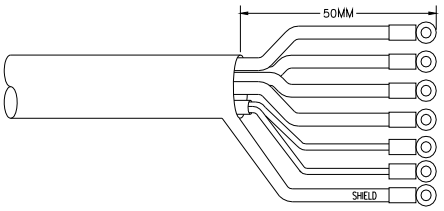


FIG. 4 MOTOR END WITH RING LUGS AND SHIELD

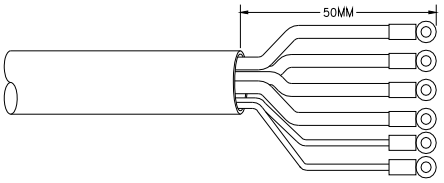


FIG. 5 MOTOR END WITH RING LUGS WITHOUT SHIELD

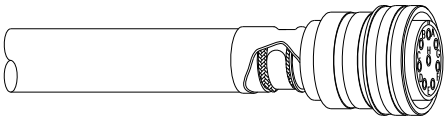


FIG. 6 MOTOR END WITH MS TYPE CONNECTOR AND SHIELD

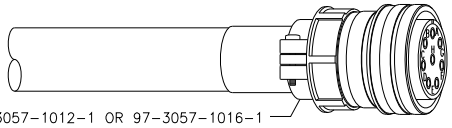


FIG. 7 MOTOR END WITH MS TYPE CONNECTOR WITHOUT SHIELD

EAC-XYZMMM

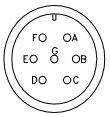
- LENGTH IN METERS
  - 301=3M [9.8 FT]
  - 601=6M [19.7 FT]
  - 102=10M [32.8 FT]
  - 152=15M [49.2]
- MOTOR CABLE TYPE & DRIVE SIZE
  - SEE TABLE 1 (1)
  - A=NON SHIELDED 5/10 AMP DRIVE (14 AWG)
  - B=NON SHIELDED 20/25 AMP DRIVE (12 AWG)
  - C=NON SHIELDED 40 AMP DRIVE (10 AWG)
  - D=NON SHIELDED 50/60 AMP DRIVE (8 AWG)
  - E=SHIELDED 5/10 AMP DRIVE (14 AWG)
  - F=SHIELDED 20/25 AMP DRIVE (12 AWG)
  - H=SHIELDED 40 AMP DRIVE (10 AWG)
  - J=SHIELDED 50/60 AMP DRIVE (8 AWG)
- DRIVE END TERMINATION
  - A=FERRULES (FIG. 1 & 2)
  - B=NO TERMINATION (FIG. 3)
- MOTOR END TERMINATION
  - SEE TABLE 1 (2)
  - A=MS3106A22-23S OR EQUIV. (FIG. 6, 7 & 8)
  - B=MS3106A24-10S OR EQUIV. (FIG. 6, 7 & 9)
  - C=RING LUGS (FIG. 4 & 5)
  - D=NO TERMINATION (FIG. 3)
  - E=FERRULES (FIG. 1 & 2)
  - F=MS3106A20-15S OR EQUIV. (FIG. 6, 7 & 9)
  - H=MS3106A22-23S OR EQUIV. (FIG. 6, 7 & 8)
  - J=MS3106A24-10S OR EQUIV. (FIG. 6, 7 & 9)
- EAC=EMERALD ARMATURE CABLE

CABLE PART NUMBER TABLE

FIG. 8

MS3106A22-23S CONNECTOR

FIG. 9



MS3106A20-15S
MS3106A24-10S
CONNECTOR

CONNECTOR WIRING VIEW

TABLE 1

	CABLE TYPE (1)		CONNECTOR (2)			FUNCTION
COLOR	E,F,H,J	B,D	A	B	F,H,J	
RED	BLK-1	WHT/VIO	PIN A	PIN A	PIN A	U PHASE
WHT	BLK-2	WHT/BRN	PIN B	PIN B	PIN B	V PHASE
BLK	BLK-3	WHT/ORN	PIN C	PIN C	PIN C	W PHASE
BRN (BLU/WHT)	BLK-4	WHT/RED	PIN E	PIN E	PIN F	THERMAL
YEL (BLU)	BLK-5	WHT/BLK	PIN F	PIN F	PIN E	THERMAL
GRN	GRN/YEL	GRN/YEL	PIN G	PIN G	PIN D	GROUND

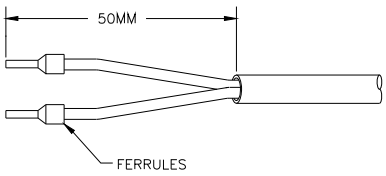
INDUSTRIAL INDEXING SYSTEMS, Inc.
www.iis-servo.com

TITLE: CABLE, ARMATURE

DRAWING NUMBER: EAC-XYZMMM

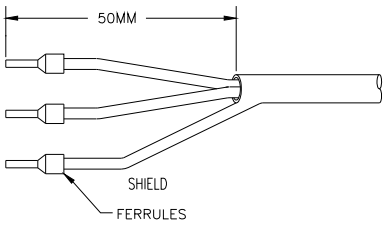
DIMENSIONS ARE MM [INCHES] | TOLERANCES X.XX±-- X.XXX±-- ∠ ±-- | REV D | ECN 08-043 | DATE 29FEB08 | SH. 1 OF 1

FIG.1



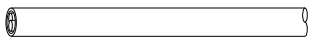
DRIVE END WITH FERRULES WITHOUT SHIELD

FIG.2



DRIVE END WITH FERRULES WITH SHIELD

FIG.3



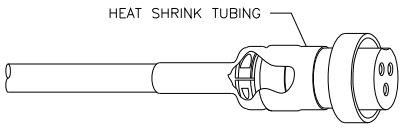
EITHER END WITH NO TERMINATION

EBC-XYZMMM

- LENGTH IN METERS
  - 301=3M [9.8 FT]
  - 601=6M [19.7 FT]
  - 102=10M [32.8 FT]
  - 152=15M [49.2]
- BRAKE CABLE TYPE
  - A=1 PAIR, 16 AWG
  - B=1 PAIR, 16 AWG, WITH OVERALL SHIELD (CE INSTALLATIONS)
- DRIVE END TERMINATION
  - A=FERRULES (FIG. 1 & 2)
  - B=NO TERMINATION (FIG. 3)
- MOTOR BRAKE END TERMINATION
  - A=PLT-163-P (FIG. 4 & 5)
  - B=NO TERMINATION (FIG. 3)
  - C=MS3116E12-4S OR EQUIV. (FIG. 6 & 7)
  - D=RING LUG (FIG. 8 & 9)
- EBC=EMERALD BRAKE CABLE

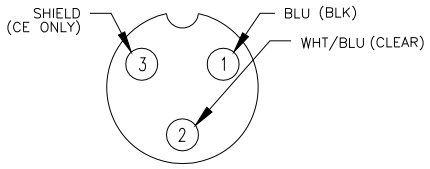
CABLE PART NUMBER TABLE

FIG.4



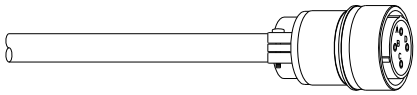
MOTOR BRAKE END WITH PLT-163-P CONNECTOR

FIG.5



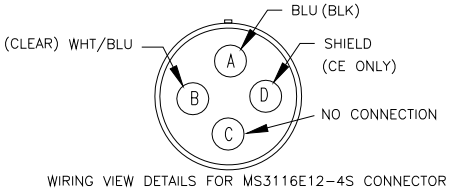
WIRING VIEW DETAILS FOR PLT-163-P CONNECTOR
COLORS IN( ) INDICATE ALTERNATE CABLE CONDUCTOR COLORS.

FIG.6



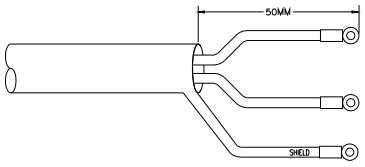
MOTOR BRAKE END WITH MS3116E12-4S CONNECTOR

FIG.7



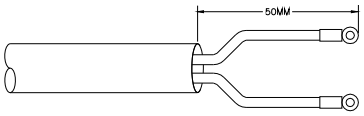
WIRING VIEW DETAILS FOR MS3116E12-4S CONNECTOR
COLORS IN( ) INDICATE ALTERNATE CABLE CONDUCTOR COLORS.

FIG.8



MOTOR END WITH RING LUGS AND SHIELD

FIG.9



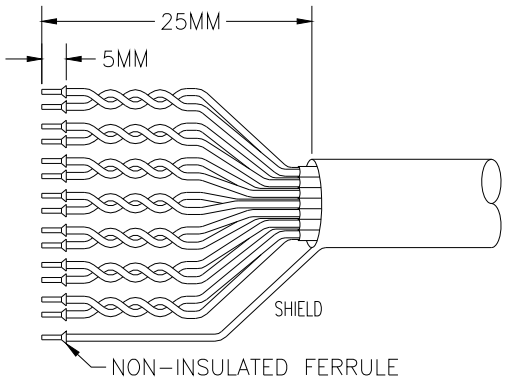
MOTOR END WITH RING LUGS WITHOUT SHIELD

INDUSTRIAL INDEXING SYSTEMS, Inc.
www.iis-servo.com

TITLE: CABLE, BRAKE

DRAWING NUMBER: EBC-XYZMMM

DIMENSIONS ARE MM [INCHES]	TOLERANCES X.XX±-- X.XXX±-- ∠ ±--	REV B		ECN 12-119	DATE 28JUN12	SH. 1 OF 1



DRIVE END WITH FERRULES AND SHIELD FIG. 1

EITHER END WITH NO TERMINATION FIG. 2

EEC-XYZMMM

- LENGTH IN METERS
  - 301=3M [9.8 FT]
  - 601=6M [19.7 FT]
  - 102=10M [32.8 FT]
  - 152=15M [49.2]
- ENCODER CABLE TYPE
  - A=7 PAIR, 24 AWG, WITH OVERALL SHIELD
  - B=4 PAIR, 24 AWG, WITH OVERALL SHIELD (AUXILIARY ENCODER ONLY)
- DRIVE END TERMINATION
  - A=FERRULES (FIG. 1)
  - B=NO TERMINATION (FIG. 2)
- ENCODER END TERMINATION
  - A=PLS-2816-PF OR EQUIV. (FIG. 3 & 4)
  - B=NO TERMINATION (FIG. 2)
  - C=MS3106A18-1S OR EQUIV. (FIG. 5 & 6) (AUXILIARY ENCODER ONLY)
  - D=16 PIN MALE PLUG (FIG 7) XG4E-1631 CONNECTOR XG4S-1604 STRAIN RELIEF
- EEC=EMERALD ENCODER CABLE

CABLE PART NUMBER TABLE

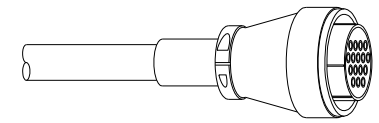
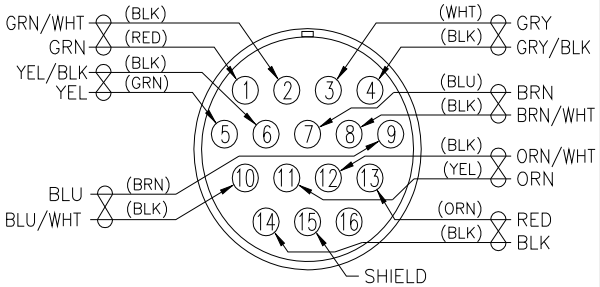


FIG. 3 ENCODER END WITH PLS TYPE CONNECTOR



WIRING VIEW DETAILS FOR PLS-2816-PF CONNECTOR
WIRE COLORS IN (*) FOR ALTERNATE CABLE TYPE

FIG. 4

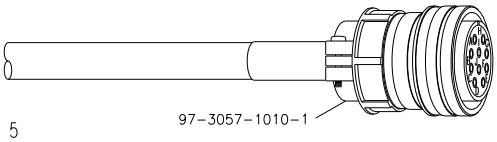


FIG. 5 AUXILIARY ENCODER END WITH MS310618-1S CONNECTOR

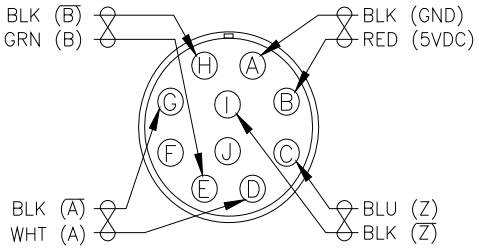


FIG. 6 WIRING VIEW DETAILS FOR MS3106A18-10S AUXILIARY ENCODER CONNECTOR

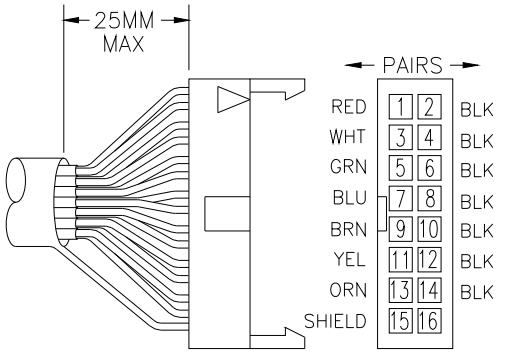


FIG. 7 ENCODER END WITH XG4E-1631 CONNECTOR

INDUSTRIAL INDEXING SYSTEMS, Inc.
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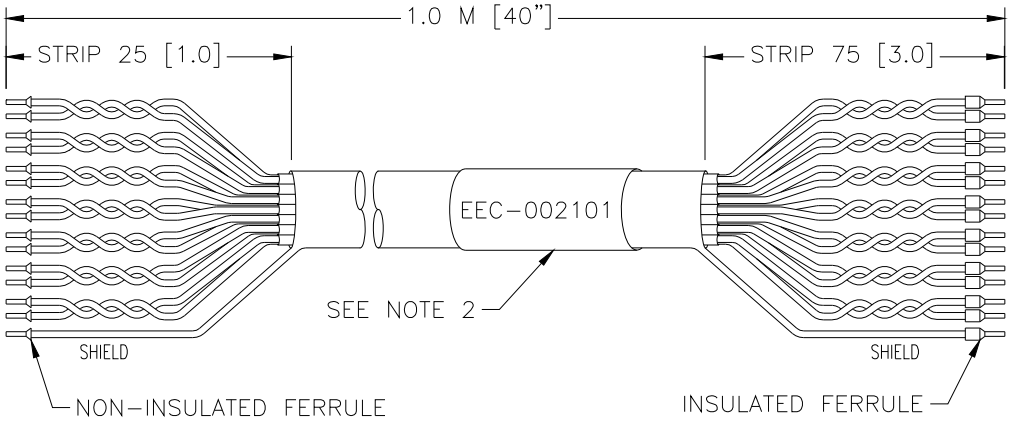
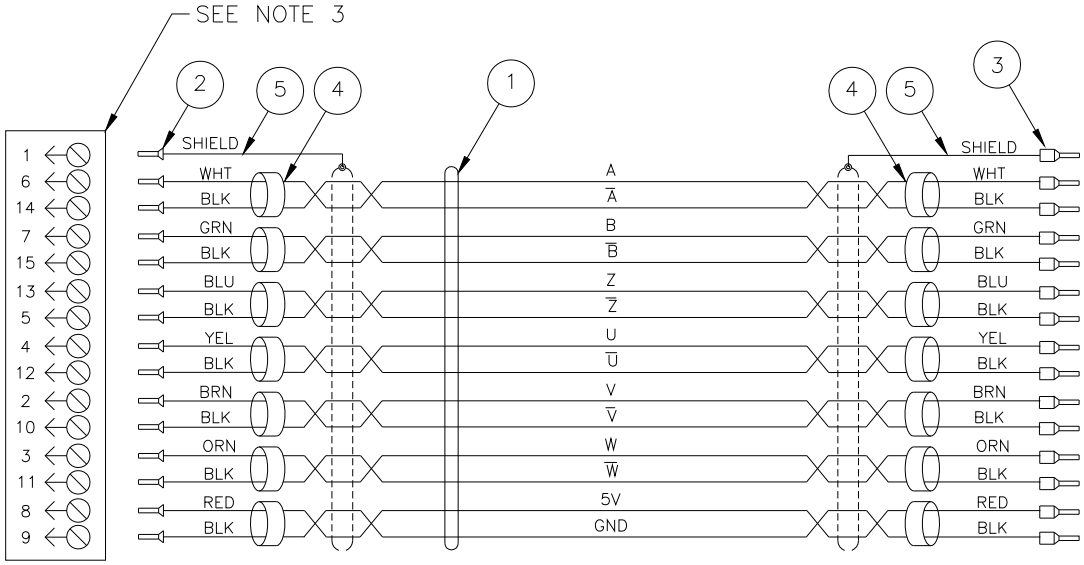
TITLE: CABLE, ENCODER

DRAWING NUMBER: EEC-XYZMMM

DIMENSIONS ARE MM [INCHES]	TOLERANCES X.XX±-- X.XXX±-- ∠ ±--	REV D		ECN 14-016	DATE 01MAY06	SH. 1 OF 1

DATE	SYM	REVISION RECORD	DR	CK	CK
17AUG06	0	PER ECN 06-339	JC		

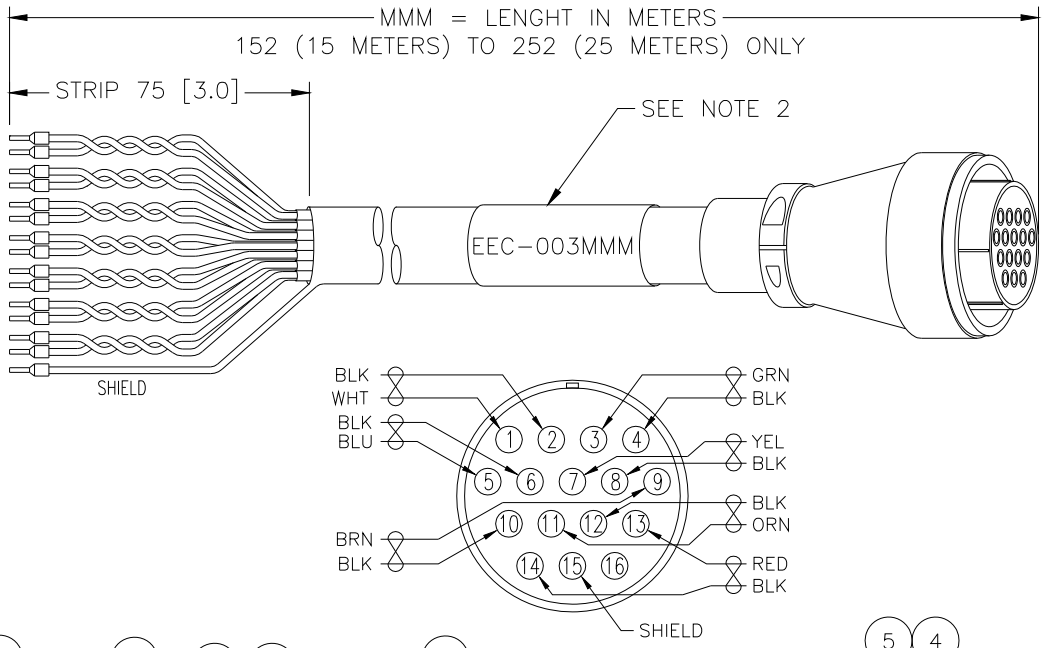


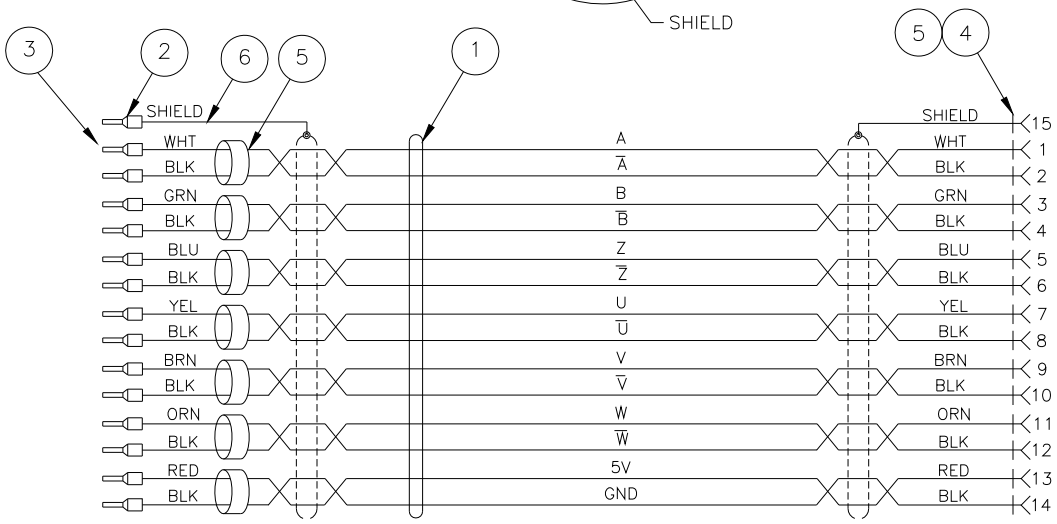


NOTES:
1. INSTALL CLEAR TUBING [ITEM 6] ON SHIELD DRAIN WIRE.
2. MARK PER QP-08-0001.
3. CONNECTOR (2761606) SHOWN FOR REFERENCE ONLY, NOT SUPPLIED WITH CABLE.

INDUSTRIAL INDEXING SYSTEMS, Inc. www.iis-servo.com	TITLE CABLE, ENCODER	
	DRAWING NUMBER EEC-002101	
DIMENSIONS ARE MM [INCHES] TOLERANCES X.XX±-- X.XXX±-- ∠ ±--	REV 0 / ECN 06-339 / DATE 22NOV06	SH. 1 OF 1

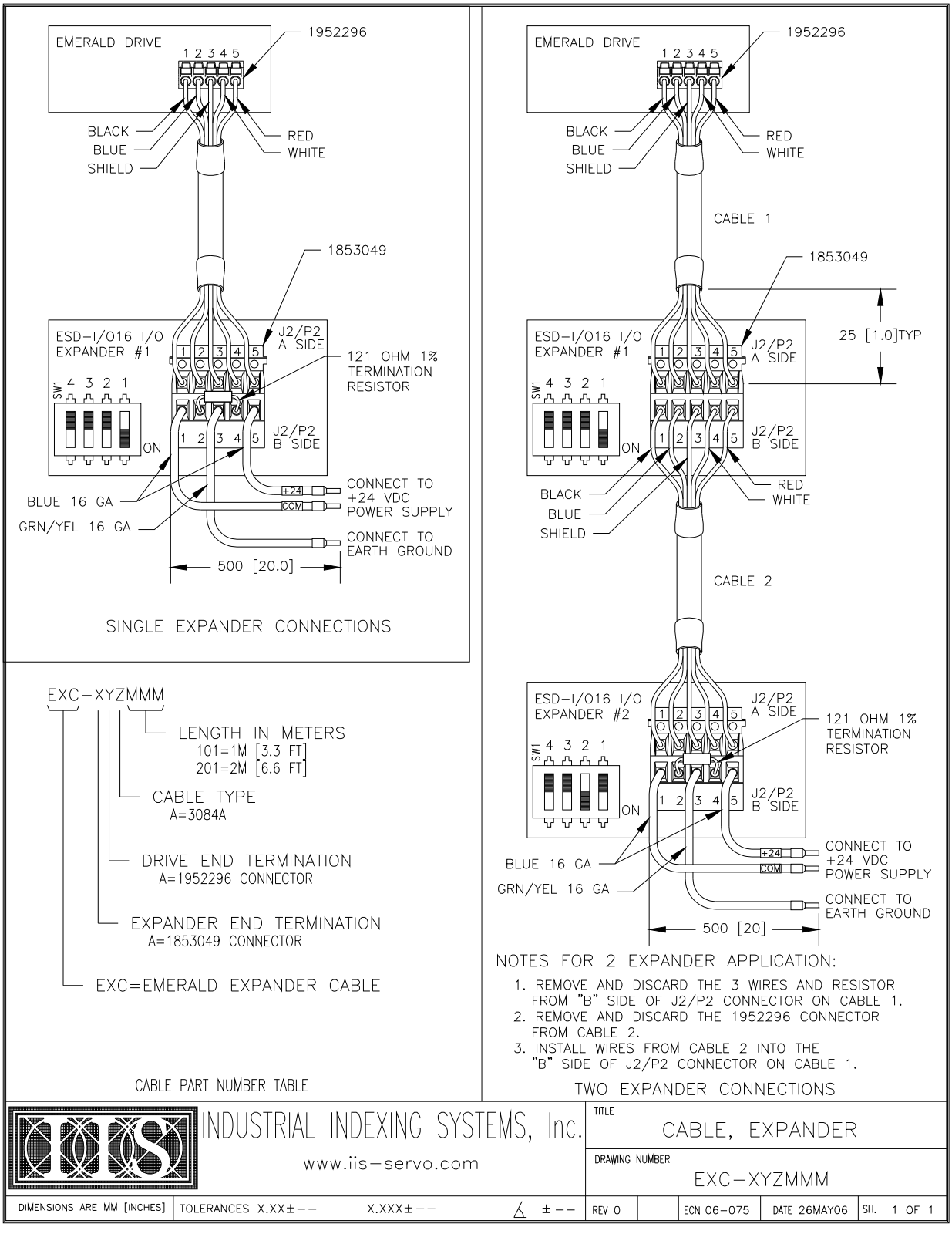
DATE	SYM	REVISION RECORD	DR	CK	CK
17AUG06	0	PER ECN 06-339	JC		





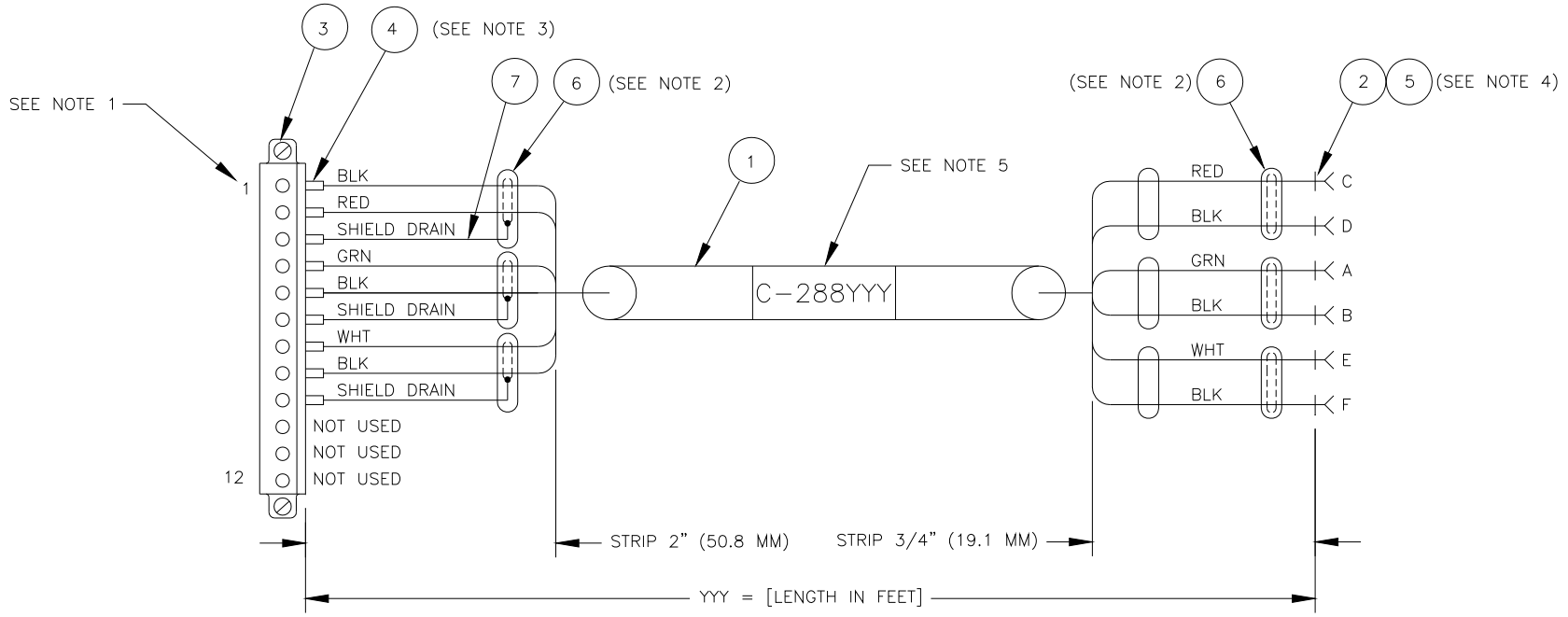
NOTES:
1. INSTALL CLEAR TUBING [ITEM 6] ON SHIELD DRAIN WIRE.
2. MARK PER QP-08-0001.

INDUSTRIAL INDEXING SYSTEMS, Inc. www.iis-servo.com	TITLE: CABLE, ENCODER	
	DRAWING NUMBER: EEC-003MMM	
DIMENSIONS ARE MM [INCHES] TOLERANCES X.XX±-- X.XXX±-- ∠ ±--	REV 0 ECN 06-339 DATE 22NOV06	SH. 1 OF 1


EMERALD DRIVE
1 2 3 4 5
1952296
BLACK
BLUE
SHIELD
RED
WHITE
1853049
ESD-I/O16 I/O
EXPANDER #1
J2/P2
A SIDE
121 OHM 1%
TERMINATION
RESISTOR
SW1
4 3 2 1
ON
J2/P2
B SIDE
BLUE 16 GA
GRN/YEL 16 GA
+24
COM
CONNECT TO
+24 VDC
POWER SUPPLY
CONNECT TO
EARTH GROUND
500 [20.0]
SINGLE EXPANDER CONNECTIONS
CABLE 1
25 [1.0]TYP
CABLE 2
ESD-I/O16 I/O
EXPANDER #2
EXC-XYZMMM
LENGTH IN METERS
101=1M [3.3 FT]
201=2M [6.6 FT]
CABLE TYPE
A=3084A
DRIVE END TERMINATION
A=1952296 CONNECTOR
EXPANDER END TERMINATION
A=1853049 CONNECTOR
EXC=EMERALD EXPANDER CABLE
CABLE PART NUMBER TABLE
500 [20]
NOTES FOR 2 EXPANDER APPLICATION:
1. REMOVE AND DISCARD THE 3 WIRES AND RESISTOR FROM "B" SIDE OF J2/P2 CONNECTOR ON CABLE 1.
2. REMOVE AND DISCARD THE 1952296 CONNECTOR FROM CABLE 2.
3. INSTALL WIRES FROM CABLE 2 INTO THE "B" SIDE OF J2/P2 CONNECTOR ON CABLE 1.
TWO EXPANDER CONNECTIONS
INDUSTRIAL INDEXING SYSTEMS, Inc.
www.iis-servo.com
TITLE
CABLE, EXPANDER
DRAWING NUMBER
EXC-XYZMMM
DIMENSIONS ARE MM [INCHES]
TOLERANCES X.XX±-- X.XXX±--
± --
REV 0
ECN 06-075
DATE 26MAY06
SH. 1 OF 1

DATE	SYM	REVISION RECORD	DR	CK	CK
20OCT03	0	PER ECN 03-432	EB		

NOTES:
1. PIN NUMBERS SHOWN FOR REFERENCE ONLY.
2. HEAT SHRINK TUBING [ITEM 6] OVER FOIL END (6 PLACES).
3. CRIMP FERRULES USING WEIDMULLER CRIMP TOOL PZ4 OR EQUIVALENT.
4. HEAT SHRINK TUBING [ITEM 5] OVER SOLDER JOINT (6 PLACES).
5. MARK PER QP-08-0001.



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APPROVED BY / DATE	
APPROVED BY / DATE	TITLE: CABLE, RESOLVER
MATERIAL: ----------	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE INCHES (mm) / TOLERANCES: X.X± --- ; X.XX± --- ; X.XXX± --- ; ANGULAR ± ---
FINISH: ----------	DRAWN BY: BAIER; AutoCAD FILE LOCATION: Q:\CURRENT DWGS; B; DATE: 21OCT03; SCALE: ---
	DRAWING NUMBER: C-288YYY; SHEET NO.: 1 OF 1; REVISION: 0

DATE	SYM	REVISION RECORD	DR	CK	CK
07JAN05	B	PER ECN 04-441	EB		

NOTES:

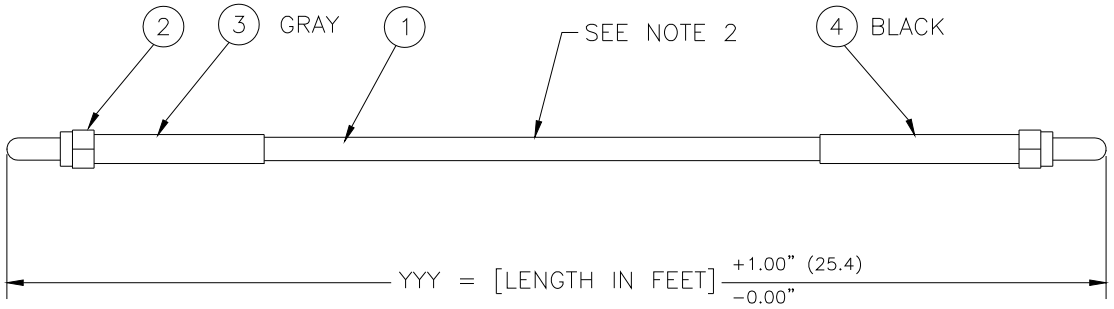
1.) ASSEMBLE PER QP-08-0006.

2.) MARK PER QP-08-0001.

3.) TEST USING TEST PROCEDURE TST-0061.

4.) MINIMUMM BEND RADIUS - 1.58 (40 MM)
LOSS INCREMENT=< 0.5dB
(QUARTER BEND)

5.) REPEATED BENDING ENDURANCE: 5000 TIMES MIN.
LOSS INCREMENT=< 1dB
(IN CONFORMITY TO JIS C 6861)



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APPROVED BY: J.CARTER	DATE: 3/7/01	
APPROVED BY:	DATE:	TITLE: CABLE, SERCOS FIBER OPTIC, EXTERNAL
MATERIAL: ----------		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE INCHES (mm) / TOLERANCES: X.X± --- X.XX± --- X.XXX± --- ANGULAR ± ---
FINISH: ----------		DRAWN BY: BOWMAN / AutoCAD FILE LOCATION: Q:\DFTG\CABLES\C-7XX
		DRAWING NUMBER: C-752YYY
		B / DATE: 10MAY00 / SCALE: ---
		SHEET NO.: 1 OF 1 / REVISION: B

DATE	SYM	REVISION RECORD	DR	CK	CK
07JAN05	C	PER ECN 04-441	EB		

NOTES:

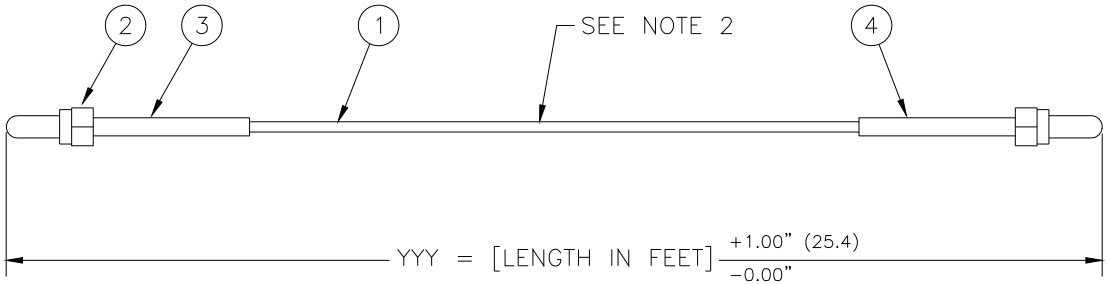
1.) ASSEMBLE PER QP-08-0006.

2.) MARK PER QP-08-0001.

3.) TEST USING TEST PROCEDURE TST-0061.

4.) MINIMUN BEND RADIUS - .98 (25 MM)
LOSS INCREMENT=<0.5 dB
(QUARTER BEND)

5.) REPEATED BENDING ENDURANCE: 5000 TIMES MIN.
LOSS INCREMENT=< 1dB
(IN CONFORMITY TO JIS C 6861)



INDUSTRIAL INDEXING SYSTEMS, Inc.
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CHECKED BY / DATE	
APPROVED BY / DATE	
APPROVED BY J.CARTER / DATE 3/7/01	TITLE: CABLE, SERCOS FIBER OPTIC, INTERNAL
MATERIAL: SPEC SHT: GHCP 4001	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE INCHES (mm) / TOLERANCES: X.X± --- X.XX± --- X.XXX± --- ANGULAR ± ---
FINISH: ----------	DRAWN BY: BOWMAN / AutoCAD FILE LOCATION: Q:\DFTG\CABLES\C-7XX
	DRAWING NUMBER: C-753YYY
	B / DATE 10MAY00 / SCALE --- / SHEET NO. 1 OF 1 / REVISION C

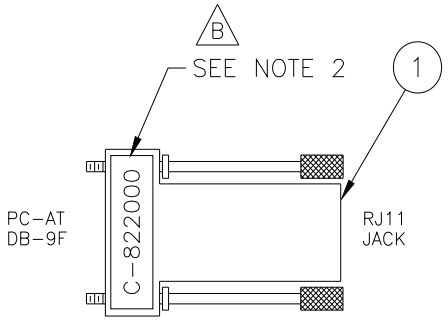
DATE	SYM	REVISION RECORD	DR	CK	CK
13MAR01	C	PER ECN 01-070	EB	EB	CDR

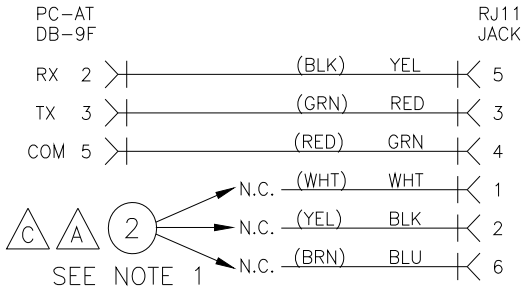
NOTES:

1.) INSULATE UNUSED WIRES.

2.) MARK PER QP-08-0001.

3.) COLORS IN (*) ARE ALTERNATE COLORS.





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CHECKED BY	DATE	
APPROVED BY: ELS	DATE: 15AUG96	
APPROVED BY: ELS	DATE: 10MAY96	
MATERIAL: ---------		
FINISH: ---------		

TITLE: CABLE ADAPTOR, 9P, FE, STANDARD

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

DRAWN BY: BOWMAN
AutoCAD FILE LOCATION: Q:\DFTG\CABLES\C-8XX

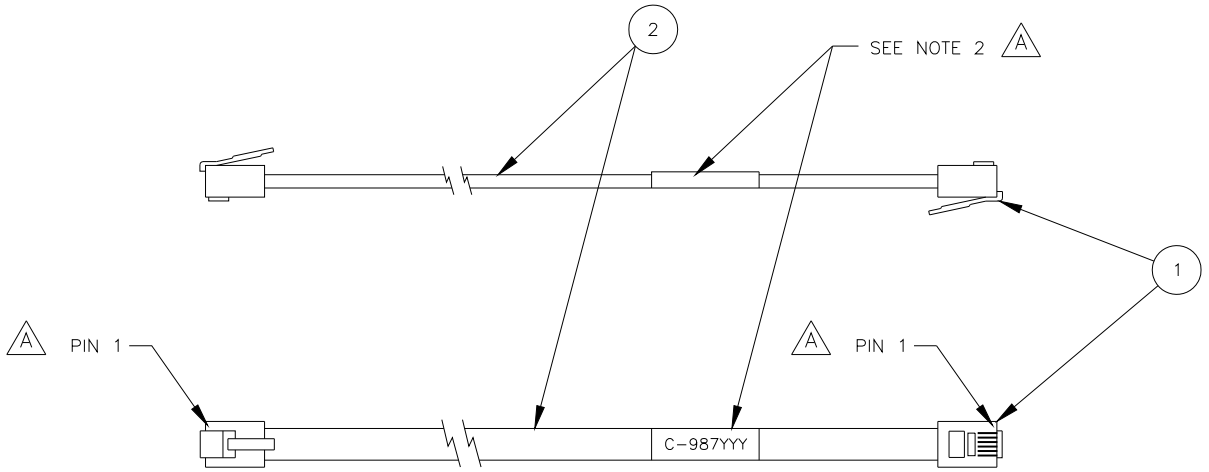
DRAWING NUMBER: C-822000

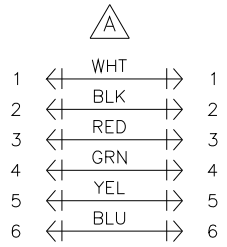
B | DATE: 09MAY96 | SCALE: NTS | SHEET NO.: 1 OF 1 | REVISION: C

DATE	SYM	REVISION RECORD	DR	CK	CK
29JAN99	A	PER ECN 98-270/99-027	CWB	EB	CDR

NOTES:

1) CRIMP CABLE (ITEM 2) TO ENDS (ITEM 1) WITH MODULAR CRIMP TOOL, PART No. 1005-6P6C.
2) MARK PER OP-08-0001.





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APPROVED BY: J.C.	DATE: 8/31/92				
APPROVED BY:	DATE:	TITLE: CABLE, DATA, MODULAR			
MATERIAL: ----------		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE INCHES (mm)	DRAWN BY: ERTURK		DRAWING NUMBER: C-987YYY
		TOLERANCES	AutoCAD FILE LOCATION: Q:\DFTG\CABLES\C-9XX		
FINISH: ----------		X.X± --- ANGULAR ± ---	B	DATE: 13AUG92	SCALE: ---	SHEET NO.: 1 OF 1	REVISION: A
		X.XX± ---			
		X.XXX± ---			

APPENDIX B - ESD-I/O16 & ESD-IO16-DC I/O EXPANDER

B.1 OVERVIEW

This manual is organized so that information is easy to find and easy to use. It begins by giving a general description of the ESD-I/O16 and the ESD-IO16-DC. Next, a comprehensive hardware specification is provided followed by connector wiring diagrams, and finally the status indicators.

B.2 DESCRIPTION

The ESD-I/O16 and the ESD-IO16-DC are I/O for the Industrial Indexing Systems E-Series and is a DIN rail mounted assembly. Power supplied to the ESD-I/O16 devices is 24V DC. See **Section 3** on specifications. The ESD-I/O16 may be configured to have 16 I/O in any configuration with multiple voltage ranges using the I/O modules described in **Section B.3.4**. The ESD-IO16-DC may be configured to have 16 I/O in any configuration but is limited to 24V DC voltage range. Each E-Series device can support up to 2 ESD-I/O16's or 2 ESD-IO16-DC's or 1 ESD-I/O16 and 1 ESD-IO16-DC. The ESD-I/O16 and the ESD-IO16-DC must be configured through the EDE (Emerald Development Environment) to function as needed.

The ESD-I/O16 and the ESD-IO16-DC are connected to an E-Series device using an IIS EXC-XYZMMM cable (See **Appendix A**). Two ESD-I/O16 or ESD-IO16-DC can be connected together using two EXC-XYZMMM cables (See **Appendix A**).

The ESD-I/O16 and the ESD-IO16-DC read the switch SW1 to determine its' address. If the address is valid, it starts trying to establish a connection with the E-Series device. When the E-Series device receives the request for a connection from the ESD-I/O16 or the ESD-IO16-DC it responds by sending over the I/O configuration. After the ESD-I/O16 or the ESD-IO16-DC receives the configuration the status returned to the E-Series device is changed indicating that the ESD-I/O16 and the ESD-IO16-DC is configured correctly. The E-Series device then begins requesting data and setting the output state every 1 millisecond. If something causes the update rate to be greater than 1 millisecond, then the ESD-I/O16 or the ESD-IO16-DC will return to the not configured state. The E-Series device will fault when this occurs.

B.3 SPECIFICATIONS

B.3.1 POWER REQUIREMENT

Control Voltage	24V DC +/- 10% .25 Amps

B.3.2 ENVIRONMENT

Storage Temperature	-10 to 70°C/14-158°F
Operating Temperature	0 to 55°C/32-131°F
Humidity	35 to 90% Relative Humidity, non-condensing
Shock and Vibration	1 G or less
Operating Conditions	Free of dust, liquids, metallic particles and corrosive gases. Use in a pollution degree 2 environment.

B.3.3 SIZE

B.3.3.1 ESD-I/O16 SIZE

Length	11.54 in.
Width	3.00 in.
Height	4.00in. ref. Depending on I/O height.

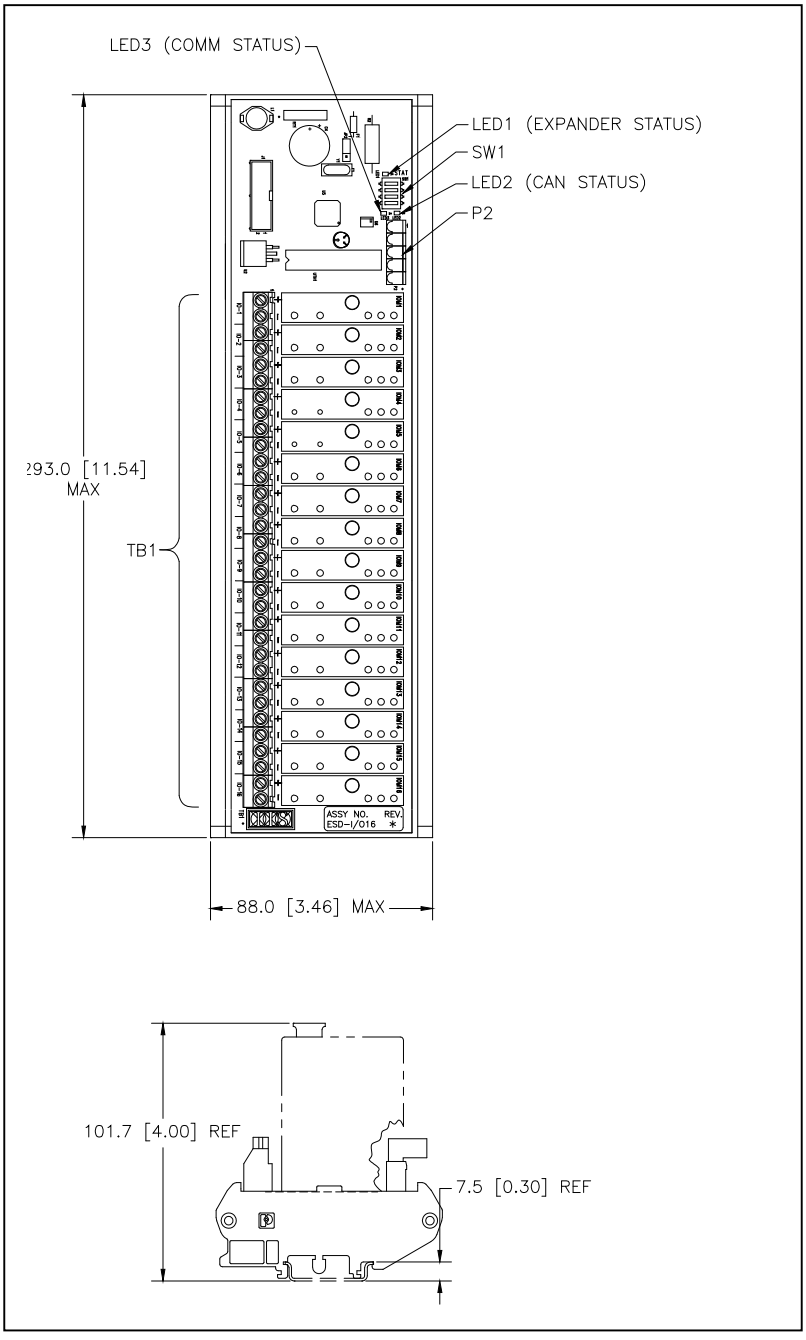


Figure B.1 - ESD-I/O16 Layout

B.3.3.2 ESD-IO16-DC SIZE

Length	7.88 in.
Width	3.47 in.
Height	3.06 in.

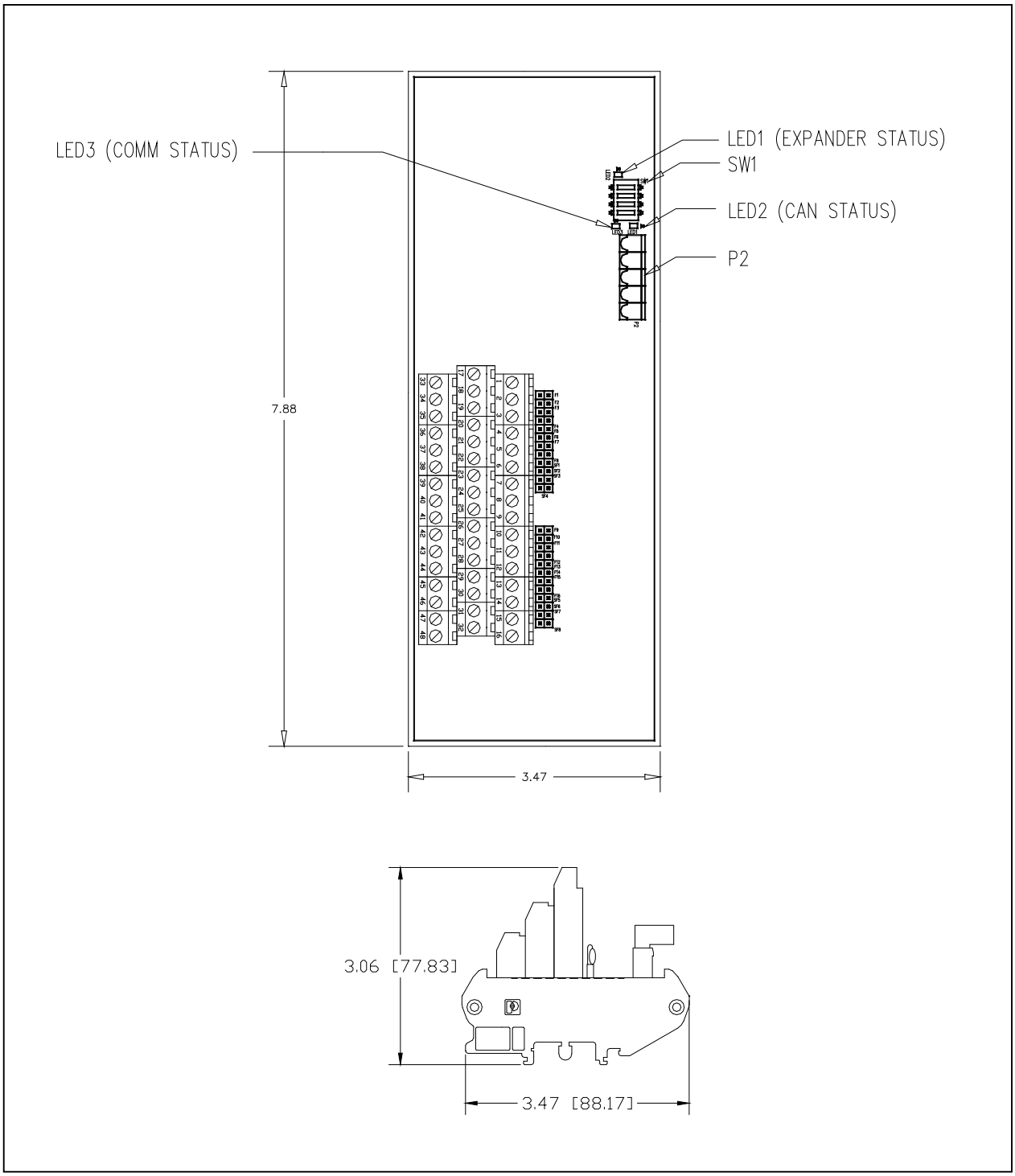


Figure B.2 - ESD-IO16-DC Layout

B.3.4 DIGITAL INPUTS/OUTPUTS

B.3.4.1 ESD-I/O16

PART NUMBER	DESCRIPTION
GIAC5	90 to 140 VAC Input Module
GIAC5A	180 to 280 VAC Input Module
GIDC5	10 to 32 VDC/15 to 32 VAC Input Module
GIDC5LOW	3 to 32 VDC Input Module
GOAC5A	24 to 280 VAC Output Module
GODC5	5 to 60 VDC Output Module

NOTE: Be sure to check the current requirements, timing, size, and voltage levels when selecting modules. The modules must be 5 Volt Logic.

B.3.4.2 ESD-IO16-DC

Input Rating	24V DC, 5mA, Guaranteed ON at 20V, Guaranteed OFF at 2V.		
Output Rating	24V DC, 500mA maximum		
Output Voltage Drop (ON state)	Minimum	Typical	Maximum
Sinking Mode	300mV	800mV	1.4V
Sourcing Mode	300mV	1V	1.4V

B.4 WIRING

B.4.1 POWER & COMMUNICATION WIRING

See **Appendix B** for details.

CONNECTOR P1	COMMUNICATION	POWER
PIN #	FUNCTION	FUNCTION
1	V-	24V GND
2	CAN_L	Termination Resistor
3	DRAIN/SHIELD	Earth Ground
4	CAN_H	Termination Resistor
5	V+	24VDC

B.4.2 I/0 WIRING

I/O is wired to the ESD I/O-16 using TB1 as shown in **Figure B.2**. **Figure B.3** shows how the different modules should be wired.

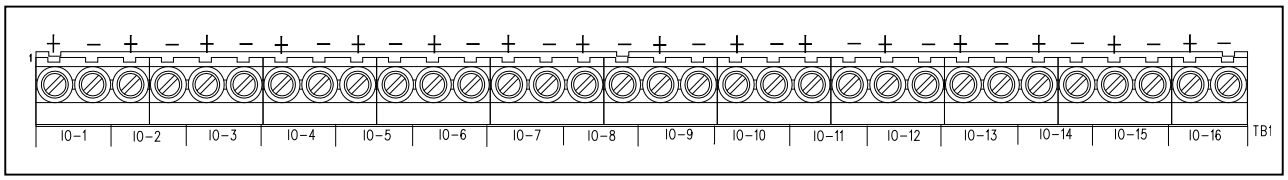


Figure B.3 - ESD-I/O16 Wiring Using TB1

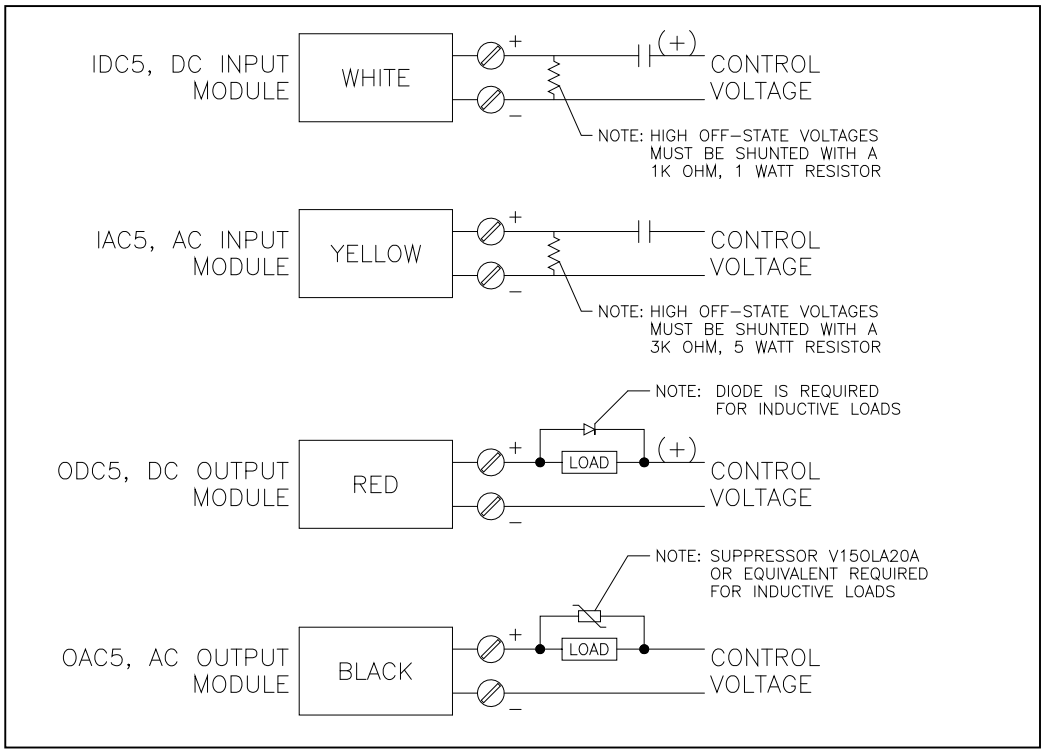


Figure B.4 - ESD-I/O16 Wiring for Modules

B.4.2 I/O WIRING (cont'd)

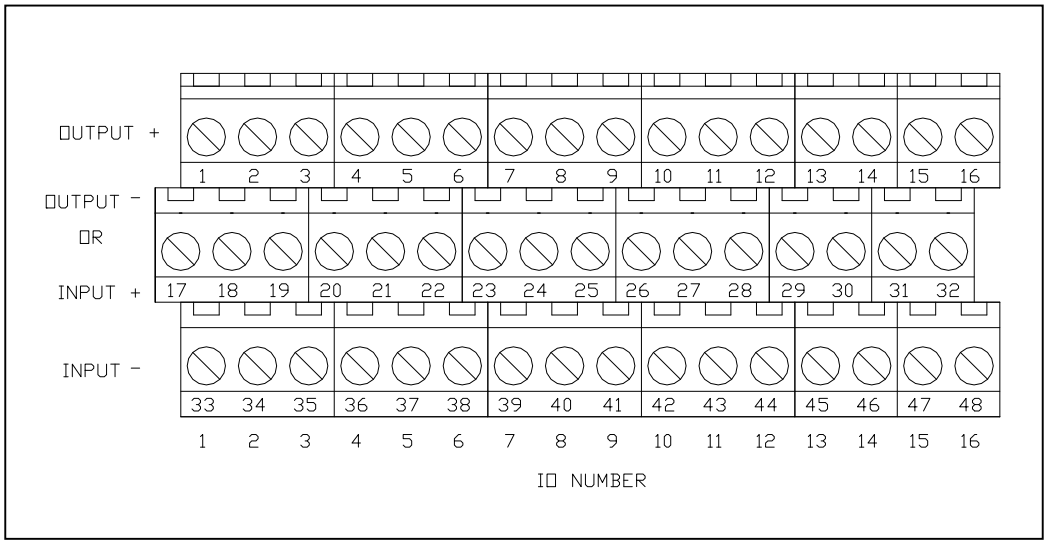
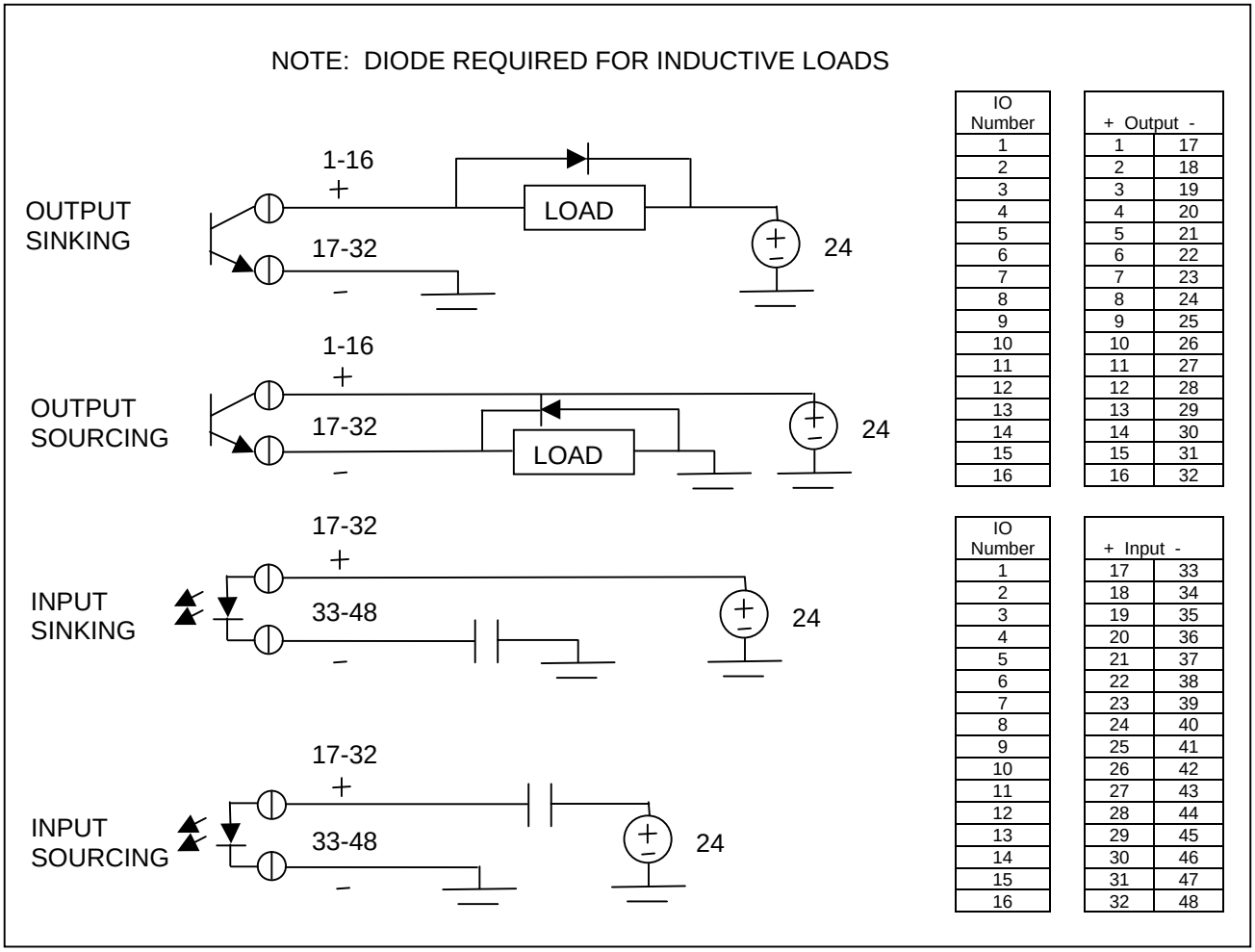


Figure B.5 - ESD-IO16-DC Wiring Using TB1



IO Number	+ Output -	
1	1	17
2	2	18
3	3	19
4	4	20
5	5	21
6	6	22
7	7	23
8	8	24
9	9	25
10	10	26
11	11	27
12	12	28
13	13	29
14	14	30
15	15	31
16	16	32

IO Number	+ Input -	
1	17	33
2	18	34
3	19	35
4	20	36
5	21	37
6	22	38
7	23	39
8	24	40
9	25	41
10	26	42
11	27	43
12	28	44
13	29	45
14	30	46
15	31	47
16	32	48

Figure B.6 - ESD-IO16-DC Wiring

B.5 HARDWARE CONFIGURATION, DIP SWITCH SETTING

SW1 is located between P1 and P2. The 4 switches in the DIP determine the address of the ESD I/O-16. The table below lists the settings and the resulting DINT addresses. All other settings will cause the ESD I/O-16 to not function.

SW1				Address
1	2	3	4	
ON	OFF	OFF	OFF	1
OFF	ON	OFF	OFF	2

B.6 STATUS LEDS

The Tables below list all the Staus LEDs on the board and their purpose.

LED	COLOR	DESCRIPTION	
1	Green	Expander Status	Flashing - WatchDog failure Solid on - Power on
2	Red	Can Status	Flashing - Invalid address Solid on - Invalid Configuration
3	Green	Comm Status	Flashing -Trying to connect to drive. Solid On - Communicating with drive

APPENDIX C - EMC INSTALLATION GUIDELINES FOR EMERALD SERIES MOTORS AND DRIVERS

C.1 INTRODUCTION TO EMC GUIDELINES

This chapter provides guidance and requirements when installing IIS Emerald Series motors and drivers into industrial control machinery required to be CE marked. These guidelines are intended to provide the machine builder with the necessary EMC information, including parts and wiring techniques to comply with the European Community Standards for industrial control equipment. The final conformance to the standards for the overall machine remains the sole responsibility of the machine builder.

C.2 EMC REQUIREMENTS

In 1996, the European Community enacted standards concerning conducted and radiated emissions and immunity to various types of interference for industrial control equipment. The EMC Directive 89/336/EEC and harmonized standards define specific EMC levels and test procedures to gain conformance.

Emission Standards provide maximum levels of noise permitted to be generated by the equipment. Immunity Standards subject the equipment to various types of disturbances and verifies that the equipment continues to perform in a safe manner.

The IIS Emerald Series motors and drivers have been tested and have been shown to comply with the following standards when installed per the guidelines in this section.

EMISSIONS STANDARDS:

EN55011 Class A	Power line conducted noise
EN55011 Class A	Radiated noise

IMMUNITY STANDARDS:

EN61000-4-2	Static discharge
ENV50140 & ENV50204	Electromagnetic irradiation
EN61000-4-4	Burst noise injected into power and signal wiring
EN61000-4-5	Lightning surge into power line
ENV50141	RF frequency injection into power and signal wiring
EN61000-4-8	Power frequency magnetic field
EN61000-4-11	Power line fluctuation and drop out

C.3 CONTROL ENCLOSURE

The Emerald Series drivers must be installed in a suitable control enclosure that provides a good quality ground system and tight construction. The cabinets can be of welded construction, metal to metal conductive joints or have overlapping EMC gasketed joints. All joints and removable panels must have metal-to-metal ground contact. All hinged panels or doors must have a bonded ground wire from the hinged panel to the main body of the enclosure.

C.4 ENCLOSURE MOUNTING PANEL

It is highly recommended that a galvanized panel be used. Galvanized panels provide a continuous conductive surface that provides a low impedance ground plane for mounting the servo components.

The mounting panel must be grounded to the control enclosure with metal to metal joints, bolted together with external tooth lock washers or have multiple short ground jumper wires between the panel and the enclosure.

Painted panels can be used if the mounting area for the servo components and all grounding points have been masked off or have the paint removed.

All servo components that require grounding must use fasteners with external tooth lock washers.

C.5 POWER WIRING SHIELDING AND FILTERING

Proper shielding and filtering methods must be followed to prevent high frequency noise from exiting the control panel via the wiring to the driver. This section illustrates the recommended guidelines for the Emerald Driver.

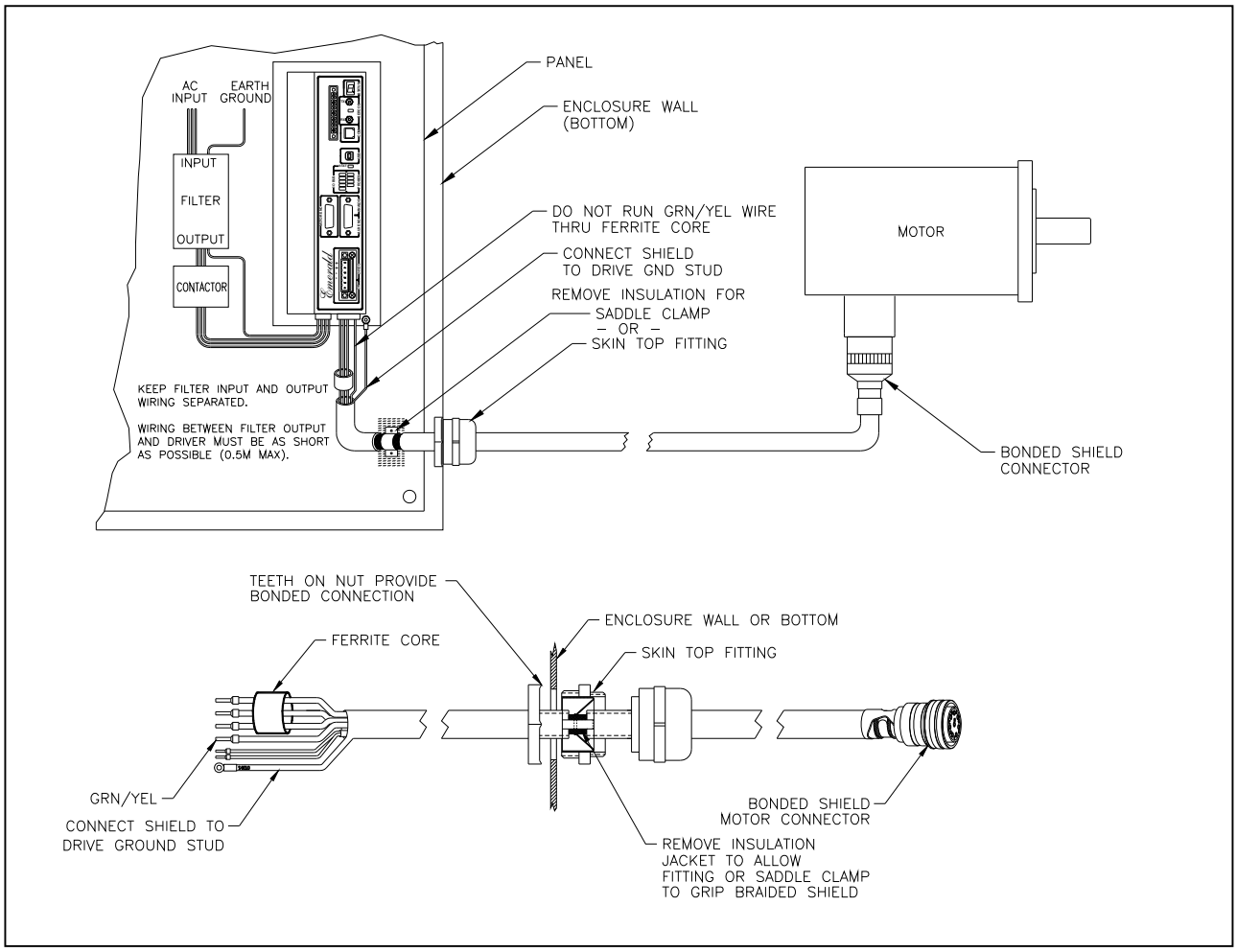


Figure C.1 - Power Wiring Shielding and Filtering

C.5.1 POWER LINE FILTER

A filter must be installed between the Emerald Series Driver and the incoming power line to prevent conducted noise for getting onto the power line. It is recommended that a separate filter be used for each driver but it is possible to use a single larger filter to supply multiple drivers if the wiring between the filter and drivers is kept as short as possible. See **Figure C.1**.

The following power line filters are recommended for use with the Emerald Series motors and drivers:

Total Motor Capacity	Phase	SCHAFFNER ELECTRONIC AG
500W max.	1	FN 2070-3
500W -> 1000W	1	FN 2070-6
1000W ->2200W	3	FN 258-16
2200W -> 3700W	3	FN 258-30
3700W -> 6500W	3	FN 258-42
6500W -> 11000W	3	FN 258-55

C.5.2 DRIVER OUTPUT (MOTOR ARMATURE) FILTER

The Emerald Series Driver uses pulse width modulation (PWM) control of the motor windings. The PWM switching of the motor output generates transient voltages that must be suppressed before exiting the control enclosure. A simple ferrite core can be used as shown in **Figure C.1**.

The following ferrite core filters are recommended for use with the Emerald Series motors and drivers:

Drive Size	Manufacturer	Part Number
ESD-5/AEP -> ESD-60/AEP	Fair-Rite	0431176451

C.5.3 SHIELDED MOTOR CABLE

The motor armature cable between the driver and motor must be shielded and grounded at both the driver and motor end. The motor armature cable length between the control enclosure and motor must be less than 50 meters or additional shield is necessary. The shielded motor armature cables specified in **Appendix B** wire are recommended. Either SKINTOP or saddle clamp method of grounding must be used as shown in **Figure C.1**.

C.5.4 REGENERATION RESISTOR WIRING SHIEILDING (OPTION)

If the regeneration resistor is located in the same enclosure as the driver, shielded wire is not necessary if the wiring is kept as short as possible. If the regeneration resistor is located in another enclosure, the regeneration resistor wire must be shielded and grounded in both enclosures. The SKINTOP ground fittings or saddle clamp method of grounding must be used as shown in **Figure C.2**.

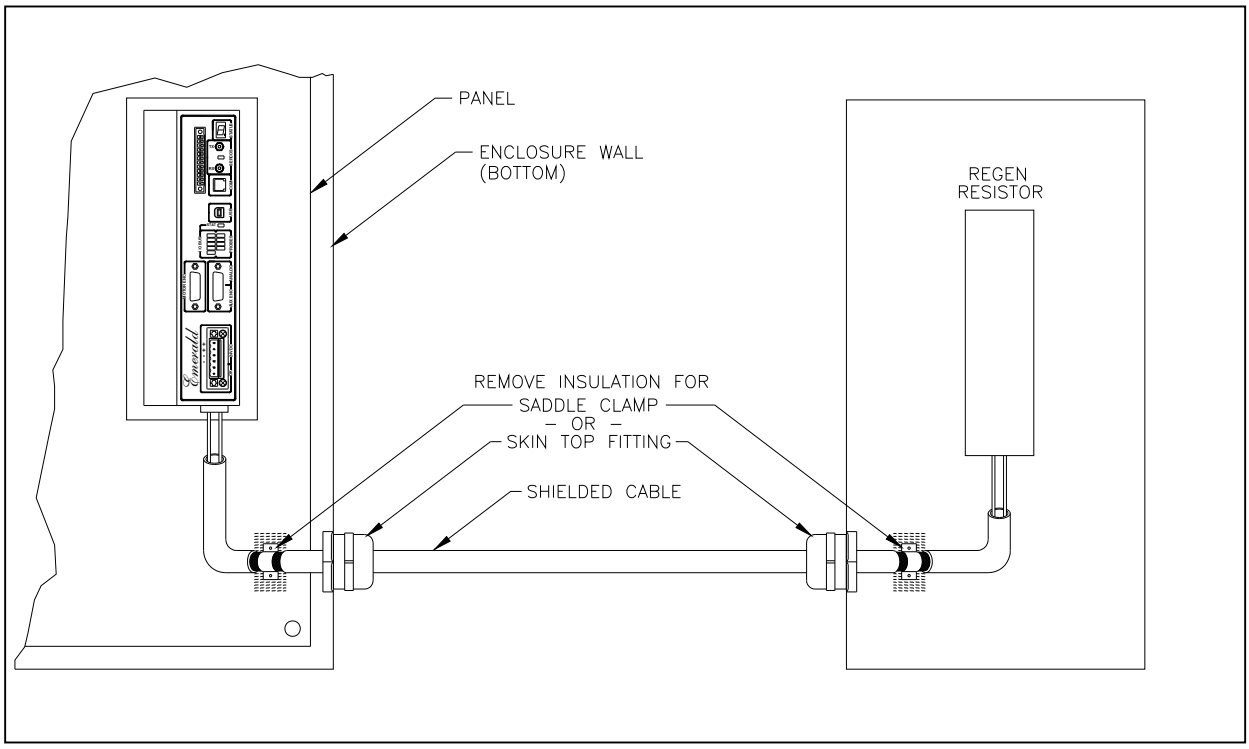


Figure C.2 - Regeneration Resistor Wire Shielding

C.6 DIGITAL CONTROL SIGNALS

High speed, fast rise time signals used with the Emerald driver, such as encoder inputs or pulse outputs, radiate high frequency noise. This noise must be suppressed to prevent excessive EMC radiation.

If the positioning controller and Emerald driver are in the same control enclosure, the cable between the two must be shielded and grounded at both ends. If the positioning controller is located in a separate control enclosure, the cable between enclosures must be a braided shielded cable with both enclosure entries grounded with SKINTOP fittings or saddle clamps.

APPENDIX D – ESD ANALOG I/O OPTION CARD

D.1 OVERVIEW

This appendix contains all of the information for the Analog I/O option card. There is a comprehensive hardware specification provided and is followed by connector wiring diagrams. Then there are the programming IDNs for setting up the card with examples on how to use it. This appendix is finished with the fault information.

D.2 DESCRIPTION

The Analog I/O card upgrades any of the Emerald Drives to have expanded number of analog inputs and outputs. The card adds 4 analog outputs and 2 differential analog inputs ±10V swing. The option card is powered by 24V DC, see **Section D.3** for the full specifications. The inputs and outputs are set using SERCOS IDNs, and each input and output has an offset for added configurability. The card also has voltage feedback monitoring to make sure the output voltage is the expected voltage.

D.3 SPECIFICATIONS

D.3.1 POWER REQUIREMENT

Control Voltage	24V DC +/- 10% 0.500 A. Inrush: 2.5A for 5 ms.

D.3.2 ANALOG INPUTS/OUTPUTS

Analog Input	Maximum Input Voltage: ±10VDC Input Impedance: 60.4K A/D resolution: 12 bit
Analog Output	Maximum Output Voltage: ±10VDC 25 mA maximum Output PWM Duty Cycle Resolution: 1/9372 @ 8kHz 1/4686 @ 16kHz

D.4 WIRING

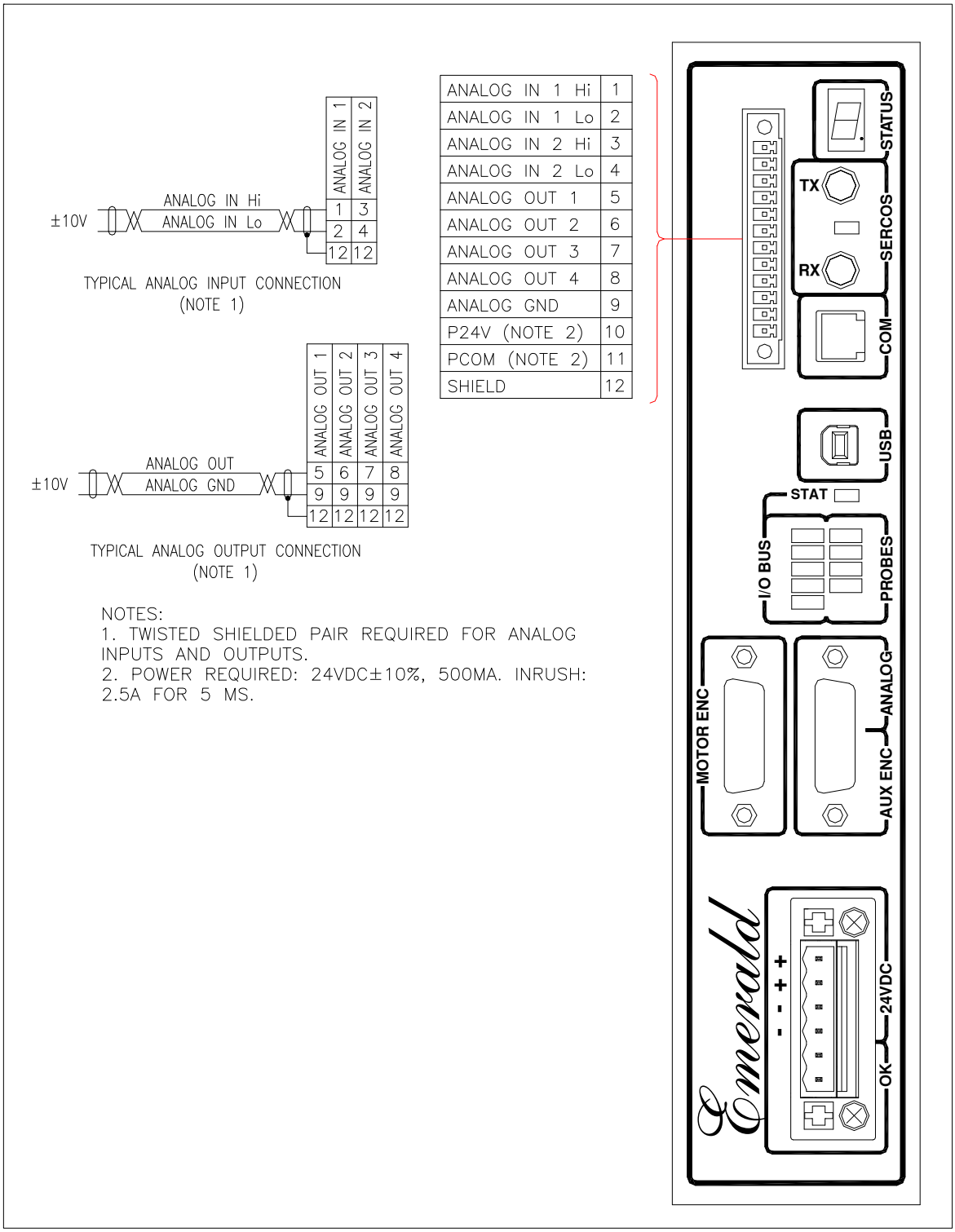


Figure D.1 - Wiring for Analog Card

D.5 PROGRAMMING

D.5.1 IDN DESCRIPTION - STANDARD PARAMETERS

Here are the IDNs that solely affect the Analog I/O option card.

IDN	NAME
(STANDARD PARAMETERS)	
35025	Analog I/O Option Card Input 1
35026	Analog I/O Option Card Input 2
35027	Analog I/O Option Card Input 1 Offest
35028	Analog I/O Option Card Input 2 Offset
35029	Analog I/O Option Card Output 1
35030	Analog I/O Option Card Output 2
35031	Analog I/O Option Card Output 3
35032	Analog I/O Option Card Output 4
35033	Analog I/O Option Card Output 1 Offset
35034	Analog I/O Option Card Output 2 Offset
35035	Analog I/O Option Card Output 3 Offset
35036	Analog I/O Option Card Output 4 Offset

35025: ANALOG I/O OPTION CARD INPUT 1

Read the counts from the first Analog Input. This IDN is only valid with the EDAN-100 ANALOG I/O option card installed.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Signed Decimal	2 bytes		-2^{15} - $+2^{15}$ – 1 = -10V - +10V	Phases 2, 3 and 4	None	

35026: ANALOG I/O OPTION CARD INPUT 2

Read the counts from the second Analog Input. This IDN is only valid with the EDAN-100 ANALOG I/O option card installed.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Signed Decimal	2 bytes		-2^{15} - $+2^{15}$ – 1 = -10V - +10V	Phases 2, 3 and 4	None	

35027: ANALOG I/O OPTION CARD INPUT 1 OFFSET

This IDN is used to set a voltage offset (in bits) for the first Analog Input. This IDN is only valid with the EDAN-100 ANALOG I/O option card installed.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Signed Decimal	2 bytes	-32768 - 32767	-2^{15} - $+2^{15}$ – 1 = -10V - +10V	Phases 2, 3 and 4	Phases 4	0

D.5.1 IDN DESCRIPTION - STANDARD PARAMETERS (cont'd)

35028: ANALOG I/O OPTION CARD INPUT 2 OFFSET

This IDN is used to set a voltage offset (in bits) for the second Analog Input. This IDN is only valid with the EDAN-100 ANALOG I/O option card installed.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Signed Decimal	2 bytes	-32768 - 32767	-2^{15} - $+2^{15}$ – 1 = -10V - +10V	Phases 2, 3 and 4	Phases 4	0

35029: ANALOG I/O OPTION CARD OUTPUT 1

This IDN is used to set the voltage (in bits) for the first Analog Output. This IDN is only valid with the EDAN-100 ANALOG I/O option card installed.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Signed Decimal	2 bytes	-32768 - 32767	-2^{15} - $+2^{15}$ – 1 = -10V - +10V	Phases 2, 3 and 4	Phases 4	0

35030: ANALOG I/O OPTION CARD OUTPUT 2

This IDN is used to set the voltage (in bits) for the second Analog Output. This IDN is only valid with the EDAN-100 ANALOG I/O option card installed.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Signed Decimal	2 bytes	-32768 - 32767	-2^{15} - $+2^{15}$ – 1 = -10V - +10V	Phases 2, 3 and 4	Phases 4	0

35031: ANALOG I/O OPTION CARD OUTPUT 3

This IDN is used to set the voltage (in bits) for the third Analog Output. This IDN is only valid with the EDAN-100 ANALOG I/O option card installed.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Signed Decimal	2 bytes	-32768 - 32767	-2^{15} - $+2^{15}$ – 1 = -10V - +10V	Phases 2, 3 and 4	Phases 4	0

35032: ANALOG I/O OPTION CARD OUTPUT 4

This IDN is used to set the voltage (in bits) for the fourth Analog Output. This IDN is only valid with the EDAN-100 ANALOG I/O option card installed.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Signed Decimal	2 bytes	-32768 - 32767	-2^{15} - $+2^{15}$ – 1 = -10V - +10V	Phases 2, 3 and 4	Phases 4	0

D.5.1 IDN DESCRIPTION - STANDARD PARAMETERS (cont'd)

35033: ANALOG I/O OPTION CARD OUTPUT 1 OFFSET

This IDN is used to set a voltage offset (in bits) for the first Analog Output. This IDN is only valid with the EDAN-100 ANALOG I/O option card installed.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Signed Decimal	2 bytes	-32768 - 32767	-2^{15} - $+2^{15}$ – 1 = -10V - +10V	Phases 2, 3 and 4	Phases 4	0

35034: ANALOG I/O OPTION CARD OUTPUT 2 OFFSET

This IDN is used to set a voltage offset (in bits) for the second Analog Output. This IDN is only valid with the EDAN-100 ANALOG I/O option card installed.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Signed Decimal	2 bytes	-32768 - 32767	-2^{15} - $+2^{15}$ – 1 = -10V - +10V	Phases 2, 3 and 4	Phases 4	0

35035: ANALOG I/O OPTION CARD OUTPUT 3 OFFSET

This IDN is used to set a voltage offset (in bits) for the third Analog Output. This IDN is only valid with the EDAN-100 ANALOG I/O option card installed.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Signed Decimal	2 bytes	-32768 - 32767	-2^{15} - $+2^{15}$ – 1 = -10V - +10V	Phases 2, 3 and 4	Phases 4	0

35036: ANALOG I/O OPTION CARD OUTPUT 4 OFFSET

This IDN is used to set a voltage offset (in bits) for the fourth Analog Output. This IDN is only valid with the EDAN-100 ANALOG I/O option card installed.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Signed Decimal	2 bytes	-32768 - 32767	-2^{15} - $+2^{15}$ – 1 = -10V - +10V	Phases 2, 3 and 4	Phases 4	0

D.5.2 PROGRAMMING EXAMPLES

```
ANALOG_INPUT1       long_equ            35025
ANALOG_INPUT2       long_equ            35026
AN_IN1_OFFSET       long_equ            35027

ANALOG_OUTPUT1      long_equ            35029
ANALOG_OUTPUT2      long_equ            35030
AN_OUT1_OFFSET      long_equ            35031



input1Value         long
input2Value         long
input1Offset        long


output1Value        long
output2Value        long
output1Offset       long


                    set_sercos_ring     _UP
wt_ring             if_sys_status       SERCOS_RING_UP,_OFF,wt_ring

                    let                 output1Value = 16384 ! = 5V
                    let                 output2Value = 8192 ! = 2.5V

                    let                 input1Offset = 8192   !2.5V
                    let                 output1Offset = 4096 !1.25V

!this will set the analog input 1 offset to 2.5V, so any read will have a 2.5V added to it
                    set_sercos_idn      E-MAX,AN_IN1_OFFSET,2,input1Offset
wt_pm1              if_device_status    EMAX_COM_BSY,_ON,wt_pm1

!this will set the analog input 1 offset to 2.5V, so any write will have a 2.5V added to it
                    set_sercos_idn      E-MAX,AN_OUT1_OFFSET,2,output1Offset
wt_pm2              if_device_status    EMAX_COM_BSY,_ON,wt_pm2



main                set_sercos_idn      E-MAX,ANALOG_OUTPUT1,2,output1Value !wil set analog output 1 to 5V
wt_m1               if_device_status    EMAX_COM_BSY,_ON,wt_m1

!this will read analog input 1, if output1 was wired to input1, this would return  16384 + 8192 + 4096 or 8.75V
                    get_sercos_idn      E-MAX,ANALOG_INPUT1,2,input1Value
wt_m2               if_device_status    EMAX_COM_BSY,_ON,wt_m2

                    goto                main
```

D.6 ANALOG CARD FAULTS

FAULT CODE	DESCRIPTION	REMEDY
F25 Option Card Fault	Self-diagnostic checks of options failed, wrong option card installed or analog outputs are overloaded.	Verify 24VDC is applied to the card. Confirm that all of the Analog outputs are not being over loaded. Return to Factory.

APPENDIX E – ESD ANALOG CONTROL OPTION CARD

E.1 OVERVIEW

This manual is organized so that information is easy to find and easy to use. It begins by giving a general description of Analog Control Option card. Next, a hardware specification is provided followed by connector wiring diagrams, then the programming information and exampled and is finished with the fault information.

E.2 DESCRIPTION

The Analog Control Option card augments the Emerald Drive to act as an analog controlled drive. The drive operates in a closed loop velocity mode with custom sinking I/O using an encoder, resolver or a brushless tachometer resolver as its feedback. With this configuration, the ESD can be applied as a Delta Series drive retrofit as well as many other analog drives. An offset voltage can be applied to boost or decrease the velocity command given to the drive. The drive's setup parameters are configured via the eDrive toolkit.

If more I/O functionality is required, please contact the IIS sales team.

E.3 SPECIFICATIONS

E.3.1 POWER REQUIREMENT

Control Voltage	24V DC +/- 10% 0.500 A. Inrush: 2.5A for 5 ms.

E.3.2 CONTROL SIGNALS

Resolver Reference Voltage	Frequency: 2600 Hz Voltage: 4 Vrms
Control Voltage	+/- 10VDC

E.3.3 ANALOG INPUT SIGNALS

Tachometer	+/- 10VDC
Auxiliary Command	+/- 10VDC

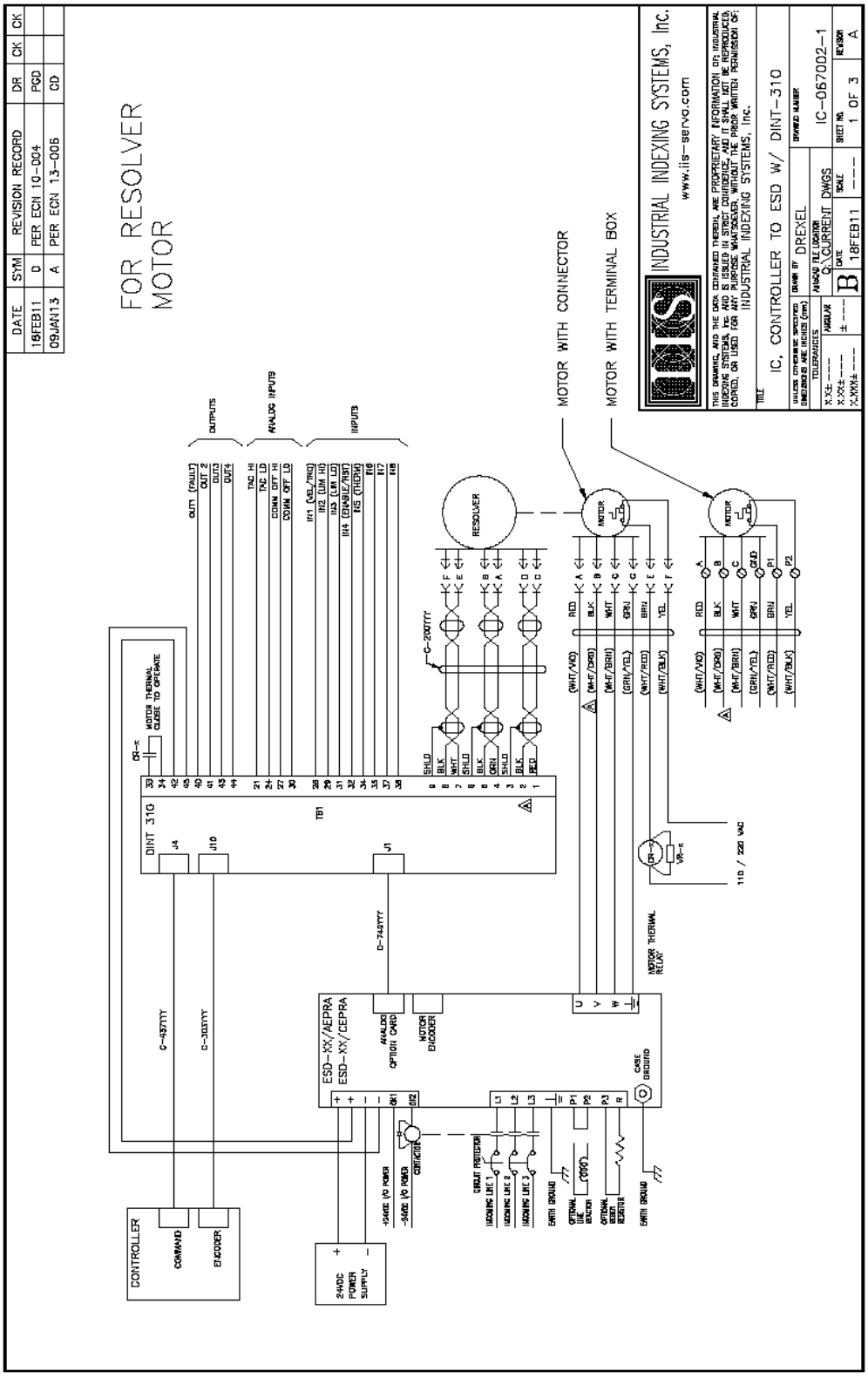
E.3.4 DIGITAL SINKING I/O SIGNALS

Input Rating	24V DC, 5mA,		
Output Rating	24V DC, 20mA maximum		
Output Voltage Drop (ON state)	Minimum	Typical	Maximum
Sinking Mode	300mV	800mV	1.4V

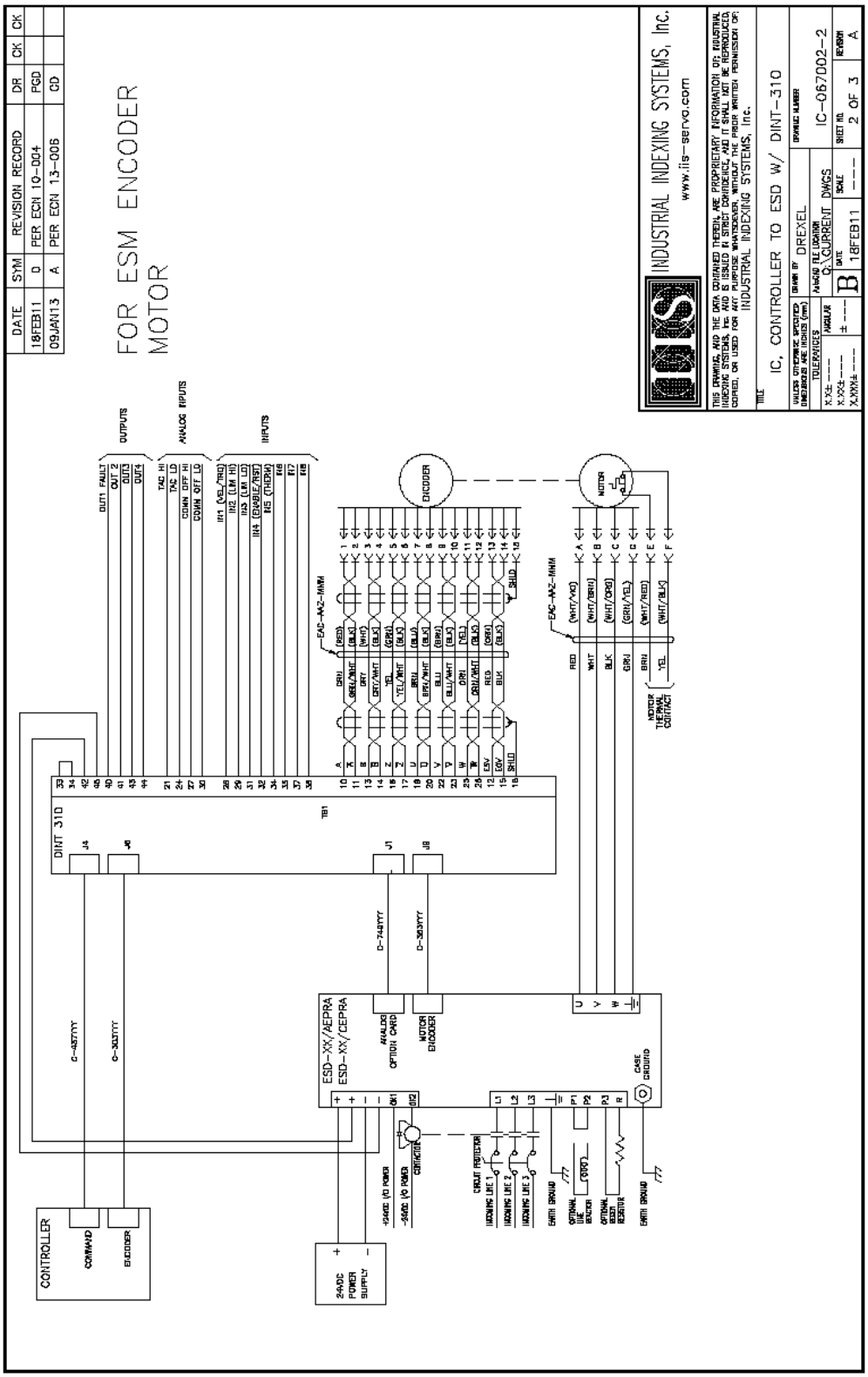
See IDNs 34352-34355 for a full description of the I/O functionality.

E.4 WIRING

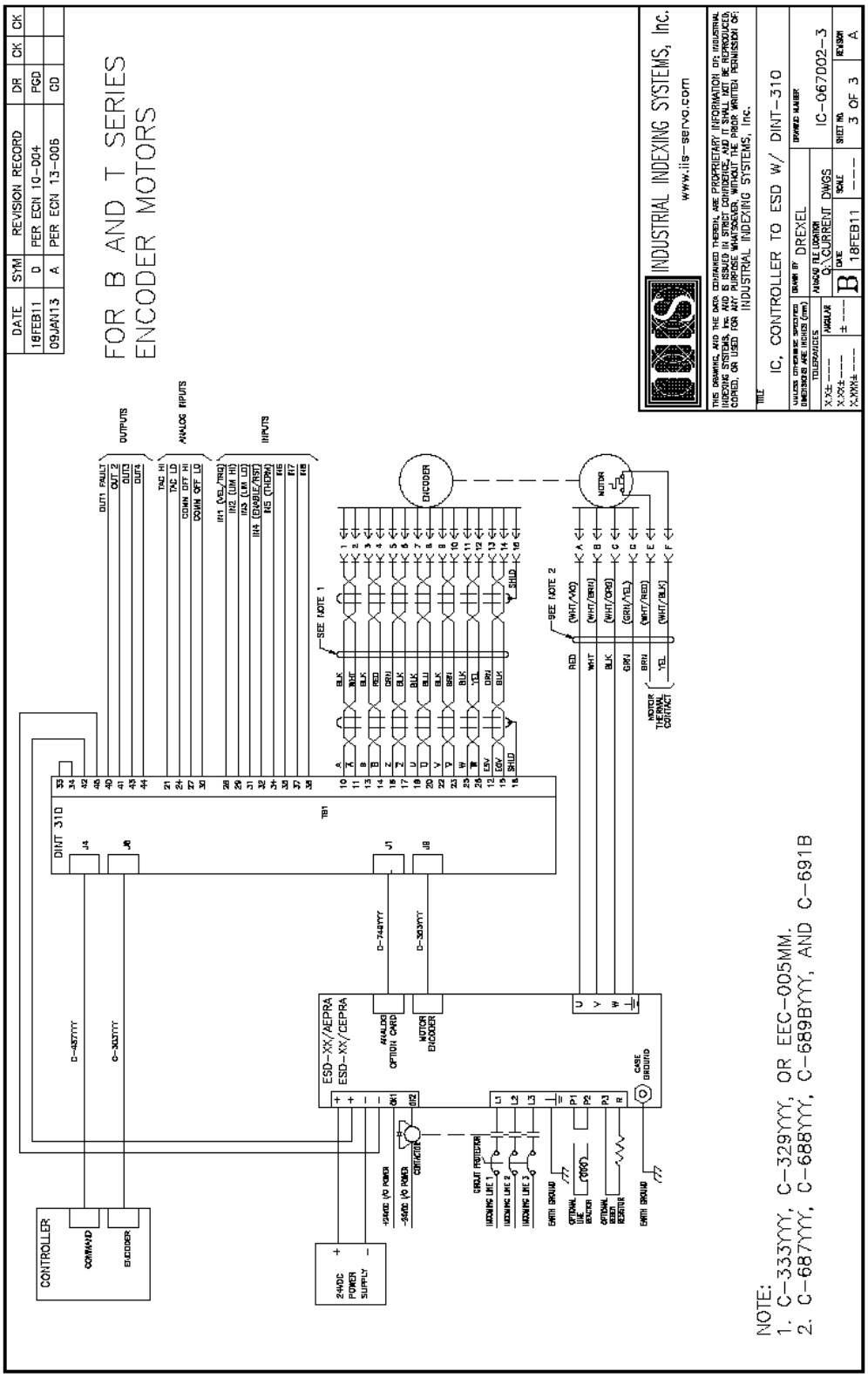
IC 067002-1 for use with a resolver motor.



IC 067002-2 for use with a ESM encoder motor.



IC 067002-3 for the B and T series encoder motors.



E.5 PROGRAMMING THE EMERALD DRIVE WITH ANALOG OPTION CARD

E.5.1 IDENTIFICATION NUMBERS

The Emerald Drive has an extensive list of Identification Numbers (IDN) to access the Operation Data and Procedure Commands. Below are the IDNs that are significant to configuring the Analog Control card.

E.5.1.1 IDN LIST IN NUMERICAL ORDER

IDN	NAME
00091	Bipolar Velocity Limit Value
00092	Bipolar Torque Limit Value
00100	Velocity Loop Proportional Gain
00101	Velocity Loop Integral Action Time
00102	Velocity Loop Differential Time
00106	Current Loop Proportional Gain 1
00107	Current Loop Integral Action Time 1
00109	Motor Peak Current
00113	Maximum Motor Speed
00119	Current Loop Proportional Gain 2
00120	Current Loop Integral Action Time 2
00138	Bipolar Acceleration Limit Value
00196	Motor Rated Current
33801	PWM Frequency
34003	Motor Poles
34004	Feedback Type
34005	Resolver Cycles
34007	Motor Rated Speed
34009	Overload Time
34011	Encoder Line Count
34278	Velocity Command Low Pass Filter Frequency
34279	Velocity Feedback Low Pass Filter Frequency
34280	Current Command Filter Rejection Frequency
34281	Current Command Filter Bandwidth
34350	Resolver Angle Offset
34351	Pulse Output Line Count
34352	Drive Inputs Inversion
34353	Drive Outputs Inversion
34354	Output Override
34355	Alternative Fault Reset
34356	Analog Velocity Scaling
34357	Enable Brushless Tach
34358	Analog Tach Scaling
34359	Operation Mode
34370	Analog Command Value
34371	Analog Command Offset
34372	Analog Command Gain
34373	Analog Aux Value
34374	Analog Aux Offset
34375	Analog Aux Gain
34376	Analog Tach Value
34377	Analog Tach Offset
34378	Analog Tach Gain

E.5.1.1 IDN LIST IN NUMERICAL ORDER (cont)

IDN	NAME
34379	Input 1 State
34380	Input 2 State
34381	Input 3 State
34382	Input 4 State
34383	Input 5 State
34384	Input 6 State
34385	Input 7 State
34386	Input 8 State
34387	Output 1 State
34388	Output 2 State
34389	Output 3 State
34390	Output 4 State

E.5.1.2 IDN DESCRIPTION

00091: BIPOLAR VELOCITY LIMIT VALUE

The bipolar velocity limit value describes the maximum allowable velocity in both directions. If the velocity limit value is exceeded, the drive responds by setting the status '$n_{command} > n_{limit}$' in C3D (IDN 00013).

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Signed Decimal	4 bytes	0 - 32768	32768 bits = 6000 RPM	Phases 2, 3 and 4	Phases 2, 3 and 4	32768

00092: BIPOLAR TORQUE LIMIT VALUE

The bipolar torque limit value limits the maximum torque symmetrically in both directions. If the torque limit value is exceeded, the drive sets the status '$T \geq T_{limit}$' in C3D (IDN 00013).

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Signed Decimal	2 bytes	0 - +100.00	0.01%	Phases 2, 3 and 4	Phases 2, 3 and 4	100.00

00100: VELOCITY LOOP PROPORTIONAL GAIN

Sets the proportional gain for the velocity loop controller.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	4 bytes	0.000 - 65.535	0.001 Amp/(rad/sec)	Phases 2, 3 and 4	Phases 2, 3 and 4	0.400

E.5.1.2 IDN DESCRIPTION (cont)

00101: VELOCITY LOOP INTEGRAL ACTION TIME

Sets the integral time constant for the velocity loop controller.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes	0.0 - 6553.5	0.1 msec	Phases 2, 3 and 4	Phases 2, 3 and 4	0.0

00102: VELOCITY LOOP DIFFERENTIAL TIME

Sets the derivative time for the velocity loop controller.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes	0.0 - 6553.5	0.1 msec	Phases 2, 3 and 4	Phases 2, 3 and 4	0.0

00106: CURRENT LOOP PROPORTIONAL GAIN 1

Sets the proportional gain for the torque/force-producing current loop.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	4 bytes	0.000 - 100.000	0.001 V/A	Phases 2, 3 and 4	Phases 2, 3 and 4	0.0

00107: CURRENT LOOP INTEGRAL ACTION TIME 1

Sets the integral time constant for the torque/force-producing current loop.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes	0 - 65535	1 μsec	Phases 2, 3 and 4	Phases 2, 3 and 4	0

E.5.1.2 IDN DESCRIPTION (cont)

00109: MOTOR PEAK CURRENT

If the motor peak current is less than that of the amplifier, the amplifier is automatically limited to the level of the motor peak current. The setting range for this IDN is dependant on drive size and PWM frequency.

Emerald Driver	ESD-5		ESD-10		ESD-20		ESD-40		ESD-60	
PWM Frequency	8 KHz	16 KHz	8 KHz	16 KHz	8 KHz	16 KHz	8 KHz	16 KHz	8 KHz	16 KHz
Min. Setting	0 A peak	0 A peak	0 A peak	0 A peak	0 A peak	0 A peak	0 A peak	0 A peak	0 A peak	0 A peak
Max. Setting	17.675 A peak	14.140 A peak	35.350 A peak	28.280 A peak	70.700 A peak	56.560 A peak	141.40 A peak	113.12 A peak	169.68 A peak	135.74 4 A peak

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	4 bytes	See table above	0.001 A	Phases 2, 3 and 4	Phases 2 and 3	0.000

00113: MAXIMUM MOTOR SPEED

The maximum motor speed is listed in the motor spec sheet provided by the manufacturer.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	4 bytes	0.0000 - 6000.0000	0.0001 RPM	Phases 2, 3 and 4	Phases 2 and 3	0.0000

00119: CURRENT LOOP PROPORTIONAL GAIN 2

Sets the proportional gain for the flux-producing current loop.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	4 bytes	0.000 - 100.000	0.001 V/A	Phases 2, 3 and 4	Phases 2, 3 and 4	0.000

00120: CURRENT LOOP INTEGRAL ACTION TIME 2

Sets the integral time constant for the flux-producing current loop.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes	0 - 65535	1 μsec	Phases 2, 3 and 4	Phases 2, 3 and 4	0

E.5.1.2 IDN DESCRIPTION (cont)

00138: BIPOLAR ACCELERATION LIMIT VALUE

The bipolar acceleration parameter limits the maximum acceleration ability of the drive symmetrically to the programmed value in both directions.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	4 bytes	0 - 25000.000	rad/sec/sec	Phases 2, 3 and 4	Phases 2, 3 and 4	25000.000

00196: MOTOR RATED CURRENT

The motor rated current is the current at which the motor produces the rated torque according to the motor spec sheet. The setting range for this IDN is dependant on drive size and PWM frequency.

Emerald Driver	ESD-5		ESD-10		ESD-20		ESD-40		ESD-60	
PWM Frequency	8 KHz	16 KHz	8 KHz	16 KHz	8 KHz	16 KHz	8 KHz	16 KHz	8 KHz	16 KHz
Min. Setting	0 A peak	0 A peak	0 A peak	0 A peak	0 A peak	0 A peak	0 A peak	0 A peak	0 A peak	0 A peak
Max. Setting	7.070 A peak	5.656 A peak	14.140 A peak	11.312 A peak	28.280 A peak	22.624 A peak	56.560 A peak	45.248 A peak	84.840 A peak	67.872 A peak

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	4 bytes	See table above	0.001 A	Phases 2, 3 and 4	Phases 2 and 3	0

33801: PWM FREQUENCY

Sets the PWM switching frequency for the motor and the general purpose PWM output. If this parameter is changed from its current value a Fault 50 will result and the drive's 24V power must be cycled.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes	8 or 16	kHz	Phases 2, 3 and 4	Phases 2	Non-volatile

34003: MOTOR POLES

This parameter sets the number of motor magnetic poles. Currently, we support 4, 6, 8 and 12.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes	4 - 12		Phases 2, 3 and 4	Phases 2 and 3	4

E.5.1.2 IDN DESCRIPTION (cont)

34004: FEEDBACK TYPE

This parameter sets the motor feedback type.

Values supported by drive:

VALUE	DESCRIPTION
0	Resolver **(Not Supported)**
1	Incremental Encoder

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes	0 or 1		Phases 2, 3 and 4	Phases 2 and 3	1

34005: RESOLVER CYCLES

The number of cycles the motor's resolver has.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes	1 or 2		Phases 2, 3 and 4	Phases 2 and 3	0

34007: MOTOR RATED SPEED

The rated motor speed is listed in the motor spec sheet provided by the manufacturer.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	4 bytes	0.0000 - 6000.0000	0.0001 RPM	Phases 2, 3 and 4	Phases 2 and 3	0

34009: OVERLOAD DELAY TIME

Reserved for future use.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Decimal	2 bytes	0.1 - 6553.5	0.1 ms	Phases 2, 3 and 4	Phases 2 and 3	0

34011: ENCODER LINE COUNT

This parameter sets the encoder line count before quadrature.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes	0 - 65535		Phases 2, 3 and 4	Phases 2 and 3	2000

E.5.1.2 IDN DESCRIPTION (cont)

34278: VELOCITY COMMAND LOW PASS FILTER FREQUENCY

This parameter sets corner frequency for a low pass filter on the velocity loop command value. A value of '0' disables the filter.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes	0 - 1000	1 Hz	Phases 2, 3 and 4	Phases 2, 3 and 4	0

34279: VELOCITY FEEDBACK LOW PASS FILTER FREQUENCY

This parameter sets corner frequency for a low pass filter on the velocity loop feedback value. A value of '0' disables the filter.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes	0 - 1000	1 Hz	Phases 2, 3 and 4	Phases 2, 3 and 4	0

34280: CURRENT COMMAND REJECTION FREQUENCY

This parameter sets rejection frequency for a notch filter on the current loop command value.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes	50 - 950	1 Hz	Phases 2, 3 and 4	Phases 2, 3 and 4	900

34281: CURRENT COMMAND REJECTION BANDWIDTH

This parameter sets bandwidth for a notch filter on the current loop command value.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS	DEFAULT
Operation Data	Unsigned Decimal	2 bytes	0 - 500	1 Hz	Phases 2, 3 and 4	Phases 2, 3 and 4	0

34350: RESOLVER ANGLE OFFSET

This value is added to the resolver raw position to generate the resolver phase angle.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS
Operation Data	Signed Decimal	2 bytes	-16383 ~ 16383	1 bit	Phases 2, 3 and 4	Phase 4

E.5.1.2 IDN DESCRIPTION (cont)

34351: PULSE OUTPUT LINE COUNT

Used for encoder simulation. Phase quadrature line count. Options include 4096 (for 14 bit data), 1024, 512, 256 and 128 (for 12 bit data). Also sets the Resolver resolution (14/12 bit).

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS
Operation Data	Unsigned Decimal	2 bytes	4096, 1024, 512, 256, 128	bits	Phases 2, 3 and 4	Phase 4

34352: DRIVE INPUTS INVERSION

The eight drive inputs can be inverted by writing a single decimal value indicating the input(s) to be inverted. Drive input 1 is the VELOCITY/TORQUE indicator. When bit 0 of the DRIVE INPUTS INVERSION value is 0 (non-inverted) and the input 1 state is ON then the drive will run in TORQUE mode. When input state 1 is OFF the drive will run in VELOCITY mode. By setting bit 0 of the DRIVE INPUTS INVERSION to 1, the exact opposite will occur regarding the modes to be run. See the chart below for further details.

		--- Input State ---			---------- Result ----------	
Input	Description	Bit	On	Off	Non-Inverted	Inverted
1	Vel/Trq	0	x		Torque	Velocity
1	Vel/Trq	0		x	Velocity	Torque
2	-Limit	1	x		Stop Motor	
2	-Limit	1		x		Stop Motor
3	+Limit	2	x		Stop Motor	
3	+Limit	2		x		Stop Motor
4	Enable/Reset	3	x		Reset	Enable
4	Enable/Reset	3		x	Enable	Reset

***** The Default Input Inversion value is 14 (decimal).**

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS
Operation Data	Unsigned Decimal	2 bytes	0 ~ 255		Phases 2, 3 and 4	Phase 4

E.5.1.2 IDN DESCRIPTION (cont)

34353: DRIVE OUTPUTS INVERSION

The four drive outputs can be inverted by writing a single decimal value indicating the output(s) to be inverted. Drive output 1 is the FAULT indicator. When bit 0 of the DRIVE OUTPUTS INVERSION value is 0 (non-inverted) and output 1 state is ON then the drive will be in a FAULT state. When output state 1 is OFF the drive will be in a READY state. By setting bit 0 of the DRIVE OUTPUTS INVERSION to 1, the exact opposite will occur regarding the current drive state See the chart below for further details.

		---------- Output State ----------	
Output Bit	Fault State	Non-Inverted	Inverted
1	1 (Fault)	1 (Faulted)	0
1	0 (Ready)	0	1 (Ready)

*** The Default Output Inversion value is 0 (decimal).

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS
Operation Data	Unsigned Decimal	2 bytes	0 ~ 15		Phases 2, 3 and 4	Phase 4

34354: DRIVE OUTPUT OVERRIDE

The DRIVE OUTPUT OVERRIDE is used to change the state of the FAULT output under certain conditions. The table below indicates the resulting FAULT output when the DRIVE OUTPUT OVERRIDE is either used or not used.

			---------- Result ----------	
Reset / Enable	Fault State	Override	Non-Inverted	Inverted
0	0	0	0	1
1	0	0	0	1
0	1	0	1	1
1	1	0	1	1
0	0	1	1	0
1	0	1	0	1
0	1	1	1	0
1	1	1	1	0

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS
Operation Data	Unsigned Decimal	2 bytes	0 ~ 1		Phases 2, 3 and 4	Phase 4

E.5.1.2 IDN DESCRIPTION (cont)

34355: ALTERNATIVE FAULT RESET

There are several options regarding the reset of drive faults.

Alternative Fault Reset	Action
0	Clear faults on power up. Clear faults when a RESET event is requested.
1	Clear faults on power up only.
2	Clear faults on power up. Clear faults when an ENABLE event is requested.
3	Clear faults on power up. Clear faults when the +LIMIT event is requested. Both +LIMIT and –LIMIT are no longer used as end-of-travel limits.

*** Fault clearing is always edge triggered except on power up.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS
Operation Data	Unsigned Decimal	2 bytes	0 ~ 3		Phases 2, 3 and 4	Phase 4

34356: ANALOG VELOCITY SCALIING

The drive output as dc voltage proportional to velocity.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS
Operation Data	Unsigned Decimal	2 bytes	1.0 ~ 10.0	.1 volts/1000 RPM	Phases 2, 3 and 4	Phase 4

34357: ENABLE BRUSHLESS TACH

Enables or disables the brushless tach option.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS
Operation Data	Unsigned Decimal	2 bytes	0 ~ 1	1	Phases 2, 3 and 4	Phase 4

34358: ANALOG TACH SCALING

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS
Operation Data	Unsigned Decimal	2 bytes	1.0 – 10.0	.1.volts/1000 RPM	Phases 2, 3 and 4	Phase 4

E.5.1.2 IDN DESCRIPTION (cont)

34359: OPERATION MODE

Reads the current operation mode of the drive; TORQUE mode or VELOCITY mode.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS
Operation Data	Text	Variable			Phases 2, 3 and 4	None

34370: ANALOG COMMAND VALUE

Reads the analog command value adjusted for the analog command offset (IDN 34371) and analog command gain (IDN 34372). The analog command should be adjusted so that 10V = 32768.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS
Operation Data	Signed decimal	4 Byte	-65536 ~ 65536	1	Phase 4	None

34371: ANALOG COMMAND OFFSET

Sets the analog command offset value, which is applied to the analog command, value as used by the drive.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS
Operation Data	Unsigned decimal	2 Byte	0 ~ 65535	1	Phases 2, 3 and 4	Phase 4

34372: ANALOG COMMAND GAIN

Sets the analog aux gain value, which is applied to the analog aux value as, used by the drive.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS
Operation +Data	Signed decimal	4 Byte	0 ~ 65536	1	Phases 2, 3 and 4	Phase 4

34373: ANALOG AUX VALUE

Reads the analog aux value adjusted by the analog command offset (IDN 34371) and analog command gain (IDN 34372). The analog command should be adjusted so that 10V = 32768.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS
Operation Data	Signed decimal	4 Byte	-65536 ~ 65536	1	Phase 4	None

E.5.1.2 IDN DESCRIPTION (cont)

34374: ANALOG AUX OFFSET

Sets the analog aux offset value, which is applied to the analog aux, value as used by the drive.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS
Operation Data	Unsigned decimal	2 Byte	0 ~ 65535	1	Phases 2, 3 and 4	Phase 4

34375: ANALOG AUX GAIN

Sets the analog aux gain value, which is the applied to the analog aux value as, used by the drive.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS
Operation Data	Signed decimal	4 Byte	0 ~ 65536	1	Phases 2, 3 and 4	Phase 4

34376: ANALOG TACH VALUE

Reads the external tach value adjusted for the analog tach offset (IDN 34377), analog tach gain (IDN 34378) and the analog tach scaling (IDN 34358). The analog command should be adjusted so that 10V = 32768.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS
Operation Data	Signed decimal	4 Byte	-65536 ~ 65536	1	Phase 4	None

34377: ANALOG TACH OFFSET

Sets the analog tach offset value, which is applied to the analog tach, value as used by the drive.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS
Operation Data	Unsigned decimal	2 Byte	0 ~ 65535	1	Phases 2, 3 and 4	Phase 4

34378: ANALOG TACH GAIN

Sets the analog tach gain value, which is applied to the analog tach value as, used by the drive.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS
Operation Data	Signed decimal	4 Byte	0 ~ 65536	1	Phases 2, 3 and 4	Phase 4

E.5.1.2 IDN DESCRIPTION (cont)

34379: INPUT 1 STATUS

This is the state of the VELOCITY/TORQUE input. The actual mode (VELOCITY or TORQUE) is a result of this input and the DRIVE INPUT INVERSION value.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS
Operation Data	Binary	2 Byte	0 ~ 1		Phases 2, 3 and 4	None

34380: INPUT 2 STATUS

This is the state of the +LIMIT input. The actual state (at +LIMIT) is a result of this input and the DRIVE INPUT INVERSION value.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS
Operation Data	Binary	2 Byte	0 ~ 1		Phases 2, 3 and 4	None

34381: INPUT 3 STATUS

This is the state of the -LIMIT input. The actual state (at -LIMIT) is a result of this input and the DRIVE INPUT INVERSION value.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS
Operation Data	Binary	2 Byte	0 ~ 1		Phases 2, 3 and 4	Nolne

34382: INPUT 4 STATUS

This is the state of the RESET input. The actual state (RESET or ENABLE) is a result of this input and the DRIVE INPUT INVERSION value.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS
Operation Data	Binary	2 Byte	0 ~ 1		Phases 2, 3 and 4	None

34383: INPUT 5 STATUS

Currently not assigned.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS
Operation Data	Binary	2 Byte	0 ~ 1		Phases 2, 3 and 4	None

E.5.1.2 IDN DESCRIPTION (cont)

34384: INPUT 6 STATUS

Currently not assigned.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS
Operation Data	Binary	2 Byte	0 ~ 1		Phases 2, 3 and 4	None

34385: INPUT 7 STATUS

Currently not assigned.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS
Operation Data	Binary	2 Byte	0 ~ 1		Phases 2, 3 and 4	

34386: INPUT 8 STATUS

Currently not assigned.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS
Operation Data	Binary	2 Byte	0 ~ 1		Phases 2, 3 and 4	

34387: OUTPUT 1 STATUS

This is the state of the FAULT / READY output. The actual state (FAULT or READY) is a result of this input and the DRIVE OUTPUT INVERSION value.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS
Operation Data	Binary	2 Byte	0 ~ 1		Phases 2, 3 and 4	

34388: OUTPUT 2 STATUS

Currently not assigned.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS
Operation Data	Binary	2 Byte	0 ~ 1		Phases 2, 3 and 4	

E.5.1.2 IDN DESCRIPTION (cont)

34389: OUTPUT 3 STATUS

Currently not assigned.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS
Operation Data	Binary	2 Byte	0 ~ 1		Phases 2, 3 and 4	

34390: OUTPUT 4 STATUS

Currently not assigned.

IDN TYPE	DATA TYPE	DATA LENGTH	SETTING RANGE	SCALING/ RESOLUTION	READ ACCESS	WRITE ACCESS
Operation Data	Binary	2 Byte	0 ~ 1		Phases 2, 3 and 4	

E.6 ANALOG CONTROL CARD FAULTS

FAULT CODE	DESCRIPTION	REMEDY
F25 Option Card Fault	Self-diagnostic checks of options failed, wrong option card installed, resolver reference over temperature or conversion error.	Verify 24VDC is applied to the card. Verify Reference wiring. Return to Factory for evaluation.

APPENDIX F – ESD RESOLVER OPTION CARD

F.1 OVERVIEW

This manual is organized so that information is easy to find and easy to use. It begins by giving a general description of Resolver option card. Next, a hardware specification is provided followed by connector wiring diagrams, then the programming information and example code and is finished with the fault information.

F.2 DESCRIPTION

The Resolver card configures any of the Emerald Drives to have an auxiliary (master) resolver interface instead of an encoder. The standard resolver reference operates at 2.6 KHz with 4 Vrms. If a different reference voltage is required, contact the IIS factory to get the different reference signal. The DINT-310 with a C-749XXX cable is recommended to allow for terminal wiring.

F.3 SPECIFICATIONS

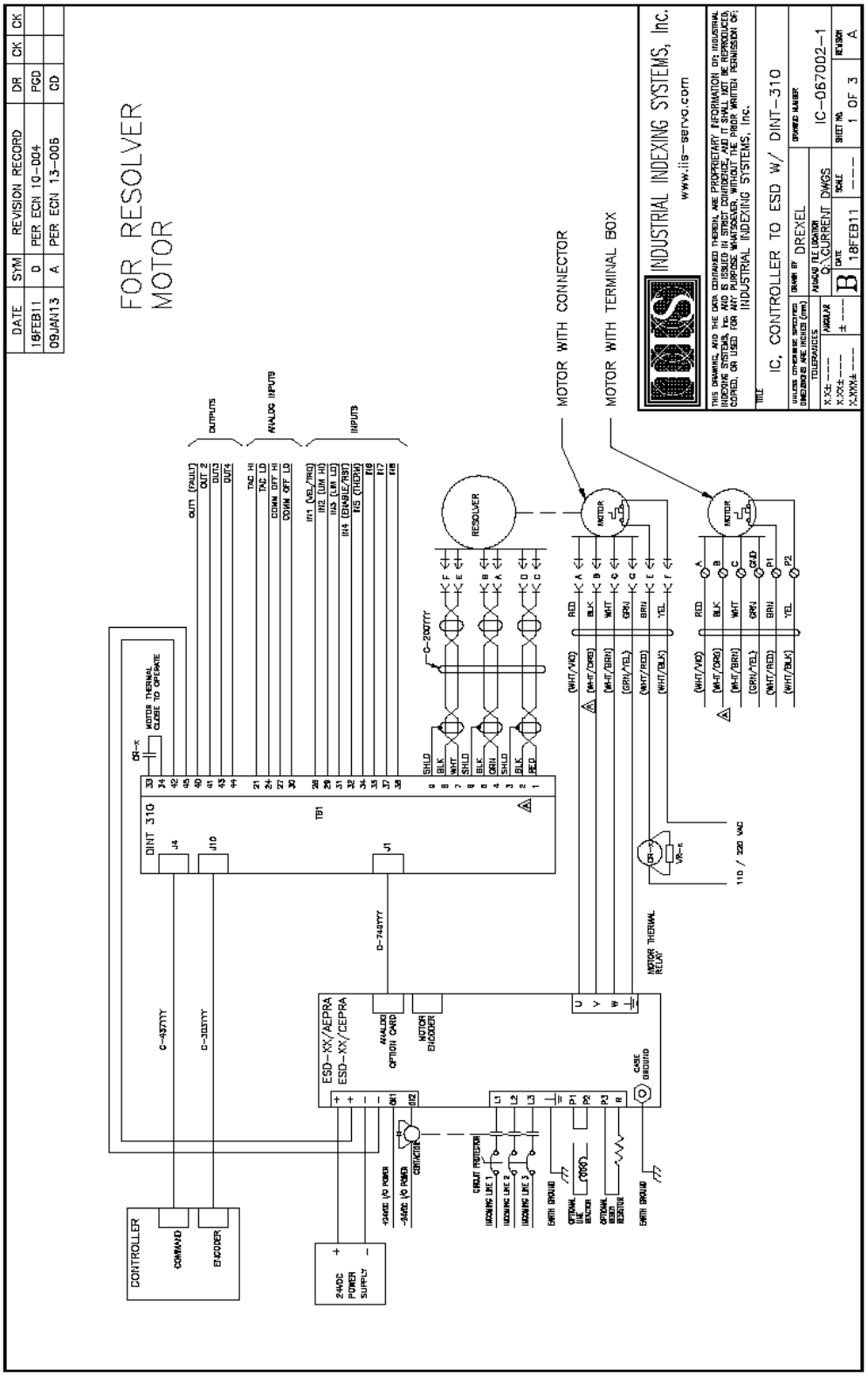
F.3.1 POWER REQUIREMENT

Control Voltage	24V DC +/- 10% 0.500 A. Inrush: 2.5A for 5 ms.

F.3.2 RESOLVER REFERENCE

Reference Voltage	Frequency: 2600 Hz Voltage: 4 Vrms

F.4 WIRING



Only the C-200YYY and the C-749YYY cables required for the resolver feedback. Swap pins 1 and 2 to change the direction of the resolver feedback.

F.5 PROGRAMMING EXAMPLE

Below is how to setup to the resolver card in EDE. Figure F.1 shows the code setup on how to configure the drive to read the resolver and in Figure 2 there is an example of how to configure the auxiliary feedback.

```
AUX_POS_FBK_IDN     long_equ            35021

!this will set the drive to use the resolver as the aux source
                    set_sercos_idn      E-MAX,AUX_POS_FBK_IDN,2,35001
wt_set_resolver     if_device_status    DRV_COM,_ON,wt_set_resolver
!now this will return data from the resolver connection
                    get_source_info     AUX_FEEDBACK,fbk_angle,fbk_offset
!this will set the drive to use the encoder as the aux source
                    set_sercos_idn      E-MAX,AUX_POS_FBK_IDN,2,35011
wt_set_encoder      if_device_status    DRV_COM,_ON,wt_set_encoder
!now this will return data from the encoder connection (default)
                    get_source_info     AUX_FEEDBACK,fbk_angle,fbk_offset
```

Figure F.1 - Code Example

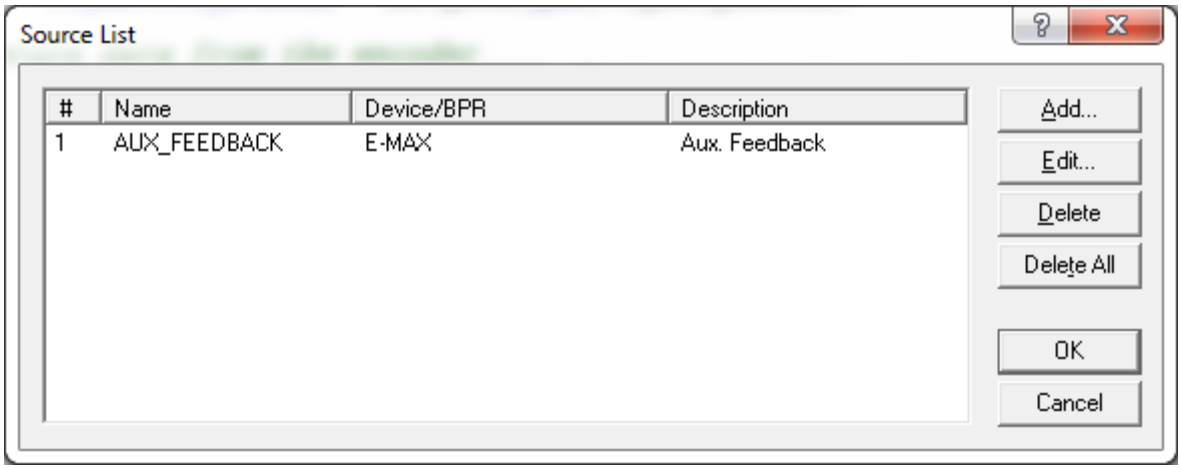


Figure F.2 - Source Setup

F.6 RESOLVER CARD FAULTS

FAULT CODE	DESCRIPTION	REMEDY
F25 Option Card Fault	Self-diagnostic checks of options failed or wrong option card installed	Verify 24VDC is applied to the card. Return to Factory for evaluation.

APPENDIX G – EMERALD DRIVES WITH "B" AND "T" SERIES ENCODER MOTORS

G.1 INTRODUCTION

Thank you for selecting Industrial Indexing Systems' Emerald Series products. You join many other companies around the world in your choice of these powerful, flexible motion control products.

In order to provide the best performance at a reasonable cost, additional motors have been added to the Emerald Drives. The increased selection provides a greater opportunity to optimize your application.

Reference materials for the Emerald Series of Motion Control Systems:

IB-20B004	EMC-2005 Emerald Multi-Axis Controller
HPB Catalog	Additional Motor Specifications
EDE	Emerald Software Development Tools
EDrive	Diagnostic Tools
SMA2000	Servo Mechanical Analysis

G.2 OVERVIEW - MOTORS WITH ENCODERS

MOTOR	RATED POWER (WATTS)	RATED SPEED (RPM)	RATED TORQUE (N-M)	ENCODER CABLE	MOTOR CABLE
DBM-800/15E	800	1500	5.10	EEC-005MMM	C-688FYYY
DBM-B800/30E	800	3000	2.60	C-333FYYY	C-687BFYYY
DBM-B1600/30E	1600	3000	5.08	C-333FYYY	C-689BFYYY
DBM-B1900/30E	1900	3000	6.21	C-333FYYY	C-689BFYYY
DBM-B3000/30E	3000	3000	9.83	C-333FYYY	C-691BFYYY
DBM-B4400/30E	4400	3000	14.36	C-333FYYY	C-691BFYYY
DBM-B5600/30E	5600	3000	18.04	C-333FYYY	C-548FYYY
DBM-B5600/30EB	5600	3000	18.04	C-333FYYY	C-548FYYY + EBC-DAAYYY

G.3 WIRING DIAGRAM

Figure G.1 shows the required interconnect to all system components.

NOTE: The Emerald series drive cannot be HI-POT tested in the field due to internal protective devices. Contact Industrial Indexing Systems, Inc. if your system needs to be HI-POT tested.

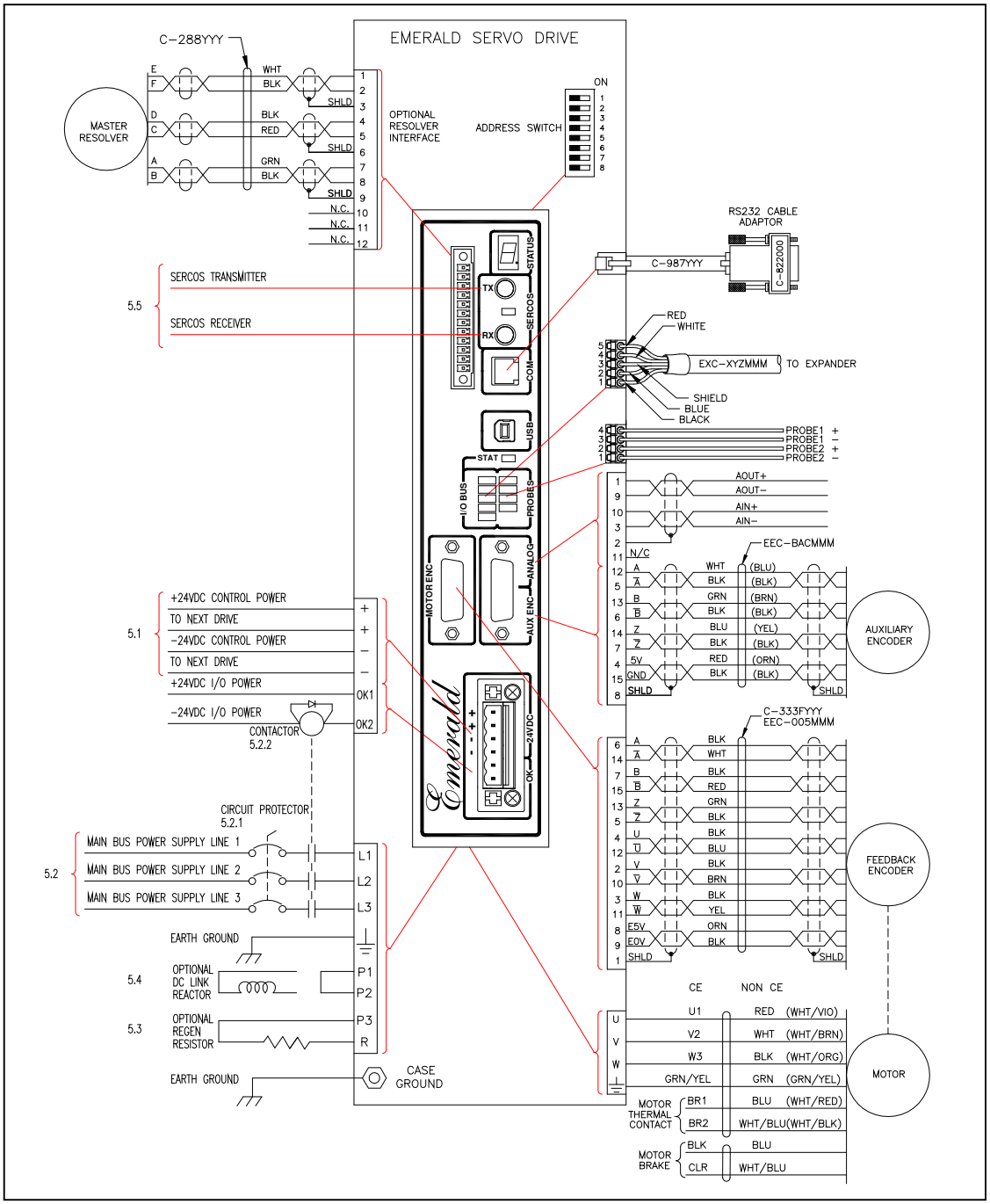


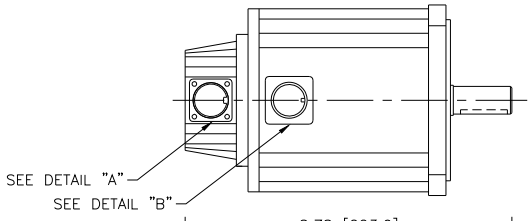
Figure G.1 - Wiring Interconnect

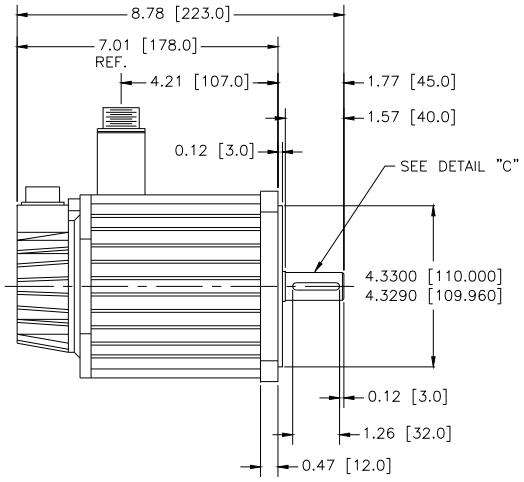
G.4 MOTOR DRAWINGS

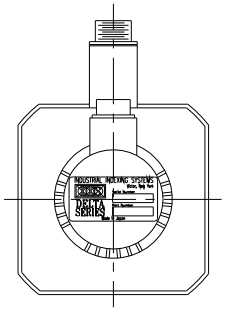
DRAWING NUMBER	DESCRIPTION
DBM-800/15E	Brushless Series Motor
DBM-B800/30E	Brushless Series Motor
DBM-B1600/30E	Brushless Series Motor
DBM-B1900/30E	Brushless Series Motor
DBM-B3000/30E	Brushless Series Motor
DBM-B4400/30E	Brushless Series Motor
DBM-B5600/30E	Brushless Series Motor
DBM-B5600/30EB	Brushless Series Motor

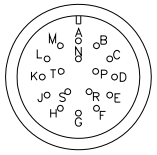
DATE	SYM	REVISION RECORD	DR	CK	CK
08APR08	0	PER ECN 08-089	JC		

NOTES:
1.) MOTOR CAN BE MOUNTED IN ANY POSITION.
2.) ALL DIMENSIONS ARE IN INCHES (MM).
3.) MOTOR WEIGHT 6.2 KG 13.7 LBS.
4.) MOTOR SHAFT SEAL IS STANDARD.
5.) THRUST LOAD 118 N 27 LBS
6.) RADIAL LOAD 647 N 145 LBS
7.) ENCODER 2048 LINE COUNT 4X 8192 PPR.
8.) IP-44 SEALING.

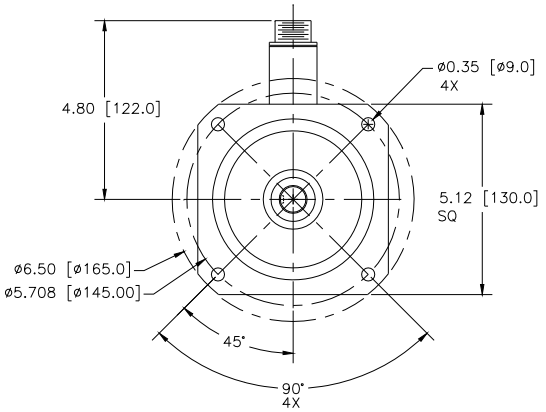




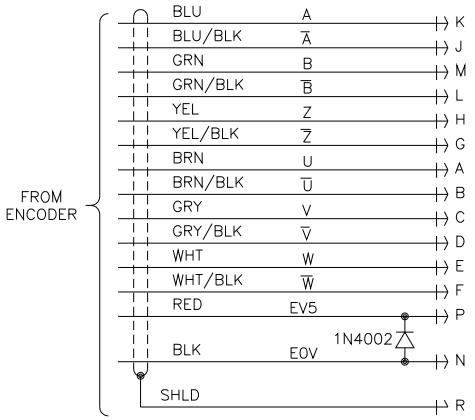




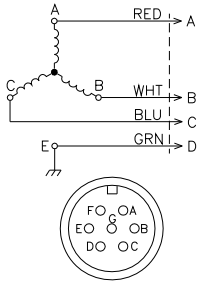
MATING VIEW OF CONNECTOR
MATING SOCKET:
ENCODER: MS3106A20-29S



DETAIL A
ENCODER CONNECTOR

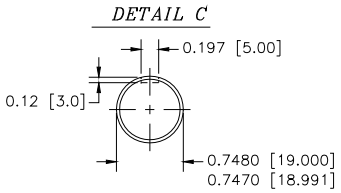


DETAIL B
ARMATURE CONNECTION
JA3102A20-15PC-F0



VIEW OF CONNECTOR
MATING SOCKET:
MOTOR: MS3106A20-15S

DETAIL C



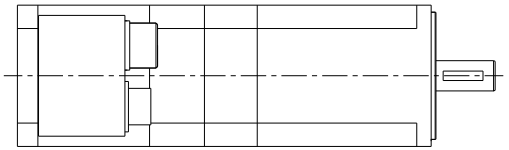
INDUSTRIAL INDEXING SYSTEMS, Inc.
www.iis-servo.com

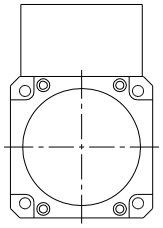
TITLE: MOTOR, BRUSHLESS, DELTA SERIES

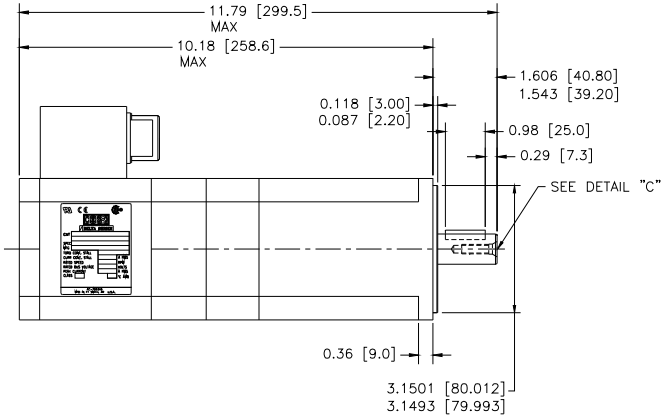
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE INCHES (mm)	DRAWN BY	DRAWING NUMBER
TOLERANCES	CAD	DBM-800/15E
X.X± --- X.XX± 0.01 X.XXX± 0.005 ANGULAR ± 0°30'	AutoCAD FILE LOCATION Q:\CURRENT DWGS	
B	DATE 08APR08 / SCALE NTS	SHEET NO. 1 OF 1 / REVISION 0

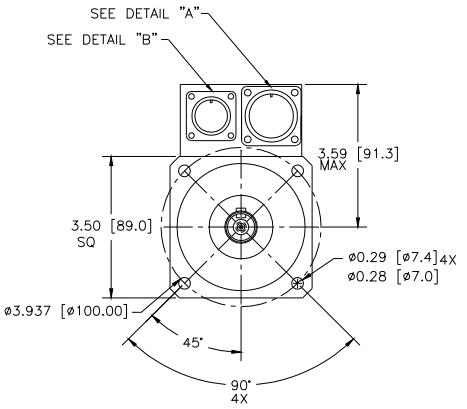
NOTES:

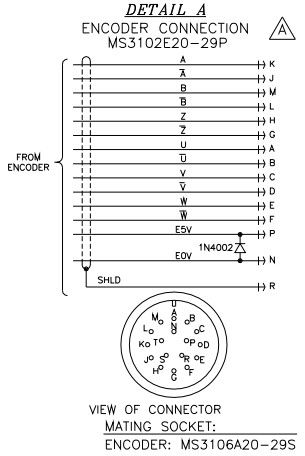
1.) MOTOR CAN BE MOUNTED IN ANY POSITION.
2.) ALL DIMENSIONS ARE IN INCHES [MM].
3.) MOTOR WEIGHT 8.6 KG 19 LBS.
4.) MOTOR SHAFT SEAL STANDARD.
5.) THRUST LOAD 289 N 64 LBS.
6.) RADIAL LOAD 267 N 60 LBS.
7.) ENCODER 2048 LINE COUNT, 8192 PPR QTY 1 ZERO MARKER.
8.) IP-65 SEALING.

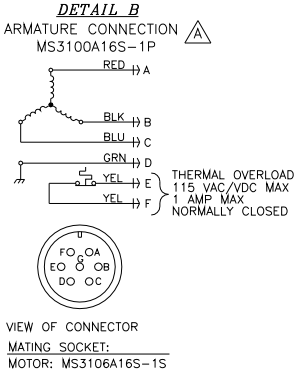


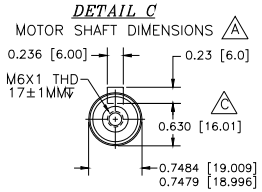












					THIS DRAWING AND THE DATA CONTAINED THEREIN ARE PROPRIETARY INFORMATION OF INDUSTRIAL INDEXING SYSTEMS. IT IS ISSUED IN STRICT CONFIDENCE AND MAY NOT BE REPRODUCED, COPIED OR USED FOR ANY PURPOSE WHATSOEVER WITHOUT THE PRIOR WRITTEN PERMISSION OF INDUSTRIAL INDEXING SYSTEMS.
11NOV13	C	PER ECN 13-183	HYC		
03AUG00	B	PER ECN 00-246	CWB	EB	
DATE	SYM	REVISION RECORD	DR	APP	PROJECTION

DRAWN BY / DATE	BOWMAN/13MAR98
APPROVED BY / DATE	
MATERIAL	---
FINISH	---

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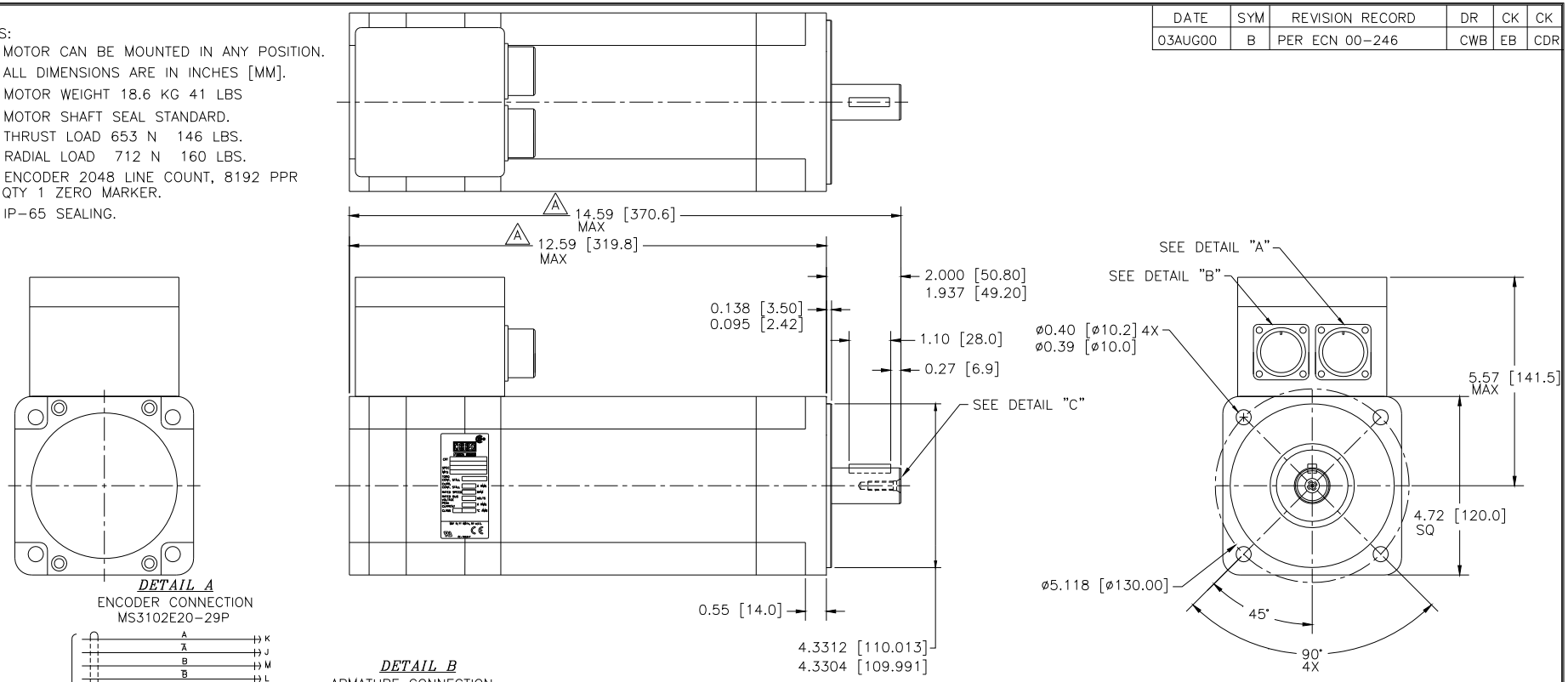
DIMENSIONS ARE INCHES [mm] | TOLERANCES X.XX±0.010 X.XXX±0.005 △ ±0°30

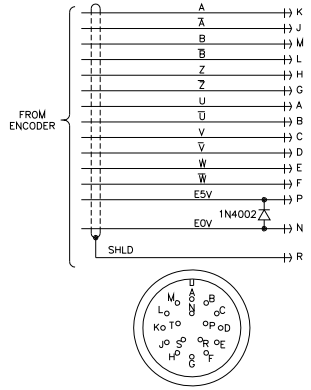
TITLE	MOTOR, DELTA SERIES
DRAWING NUMBER	DBM-B800/30E
REVC	SCALE: NTS
DATE	11NOV13
SH. 1 OF 1	

NOTES:
1.) MOTOR CAN BE MOUNTED IN ANY POSITION.
2.) ALL DIMENSIONS ARE IN INCHES [MM].
3.) MOTOR WEIGHT 18.6 KG 41 LBS
4.) MOTOR SHAFT SEAL STANDARD.
5.) THRUST LOAD 653 N 146 LBS.
6.) RADIAL LOAD 712 N 160 LBS.
7.) ENCODER 2048 LINE COUNT, 8192 PPR QTY 1 ZERO MARKER.
8.) IP-65 SEALING.

DATE	SYM	REVISION RECORD	DR	CK	CK
03AUG00	B	PER ECN 00-246	CWB	EB	CDR



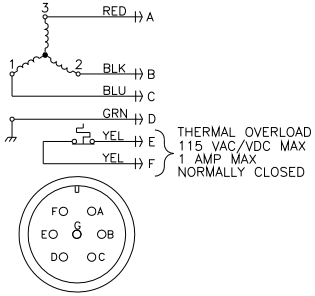
DETAIL A
ENCODER CONNECTION
MS3102E20-29P



VIEW OF CONNECTOR

MATING SOCKET:
ENCODER: MS3106A20-29S

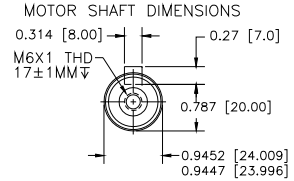
DETAIL B
ARMATURE CONNECTION
MS3102A20-15P



VIEW OF CONNECTOR

MATING SOCKET:
MOTOR: MS3106A20-15S

DETAIL C
MOTOR SHAFT DIMENSIONS



INDUSTRIAL INDEXING SYSTEMS, Inc.
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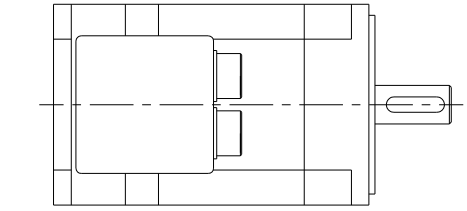
TITLE: MOTOR, DELTA SERIES

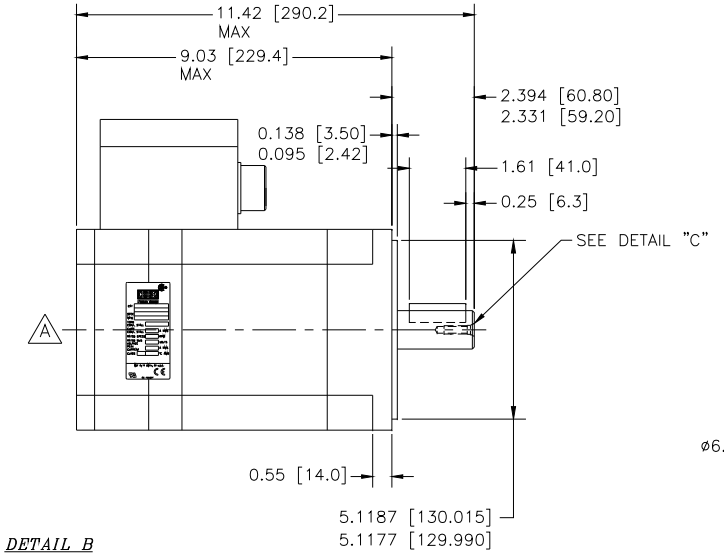
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE INCHES (mm)	DRAWN BY: BOWMAN	DRAWING NUMBER: DBM-B1600/30E
TOLERANCES	AutoCAD FILE LOCATION: Q:\CURRENT DWGS	
X.X± --- X.XX± 0.01 X.XXX± 0.005 ANGULAR ± 0°30'	B — DATE: 30DEC98 — SCALE: NTS	SHEET NO.: 1 OF 1 — REVISION: B

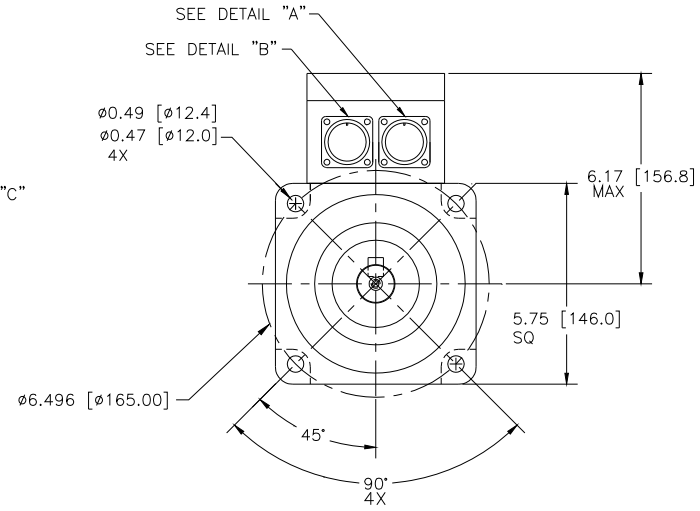
NOTES:

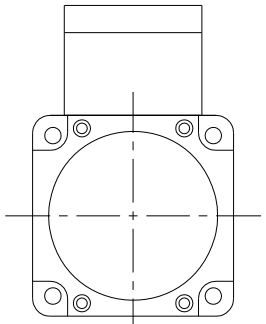
1.) MOTOR CAN BE MOUNTED IN ANY POSITION.
2.) ALL DIMENSIONS ARE IN INCHES [MM].
3.) MOTOR WEIGHT 15 KG 33 LBS.
4.) MOTOR SHAFT SEAL STANDARD.
5.) THRUST LOAD 890 N 200 LBS.
6.) RADIAL LOAD 1113 N 250 LBS.
7.) ENCODER 2048 LINE COUNT, 8192 PPR QTY 1 ZERO MARKER.
8.) IP-65 SEALING.

DATE	SYM	REVISION RECORD	DR	CK	CK
03AUG00	B	PER ECN 00-246	CWB	EB	CDR

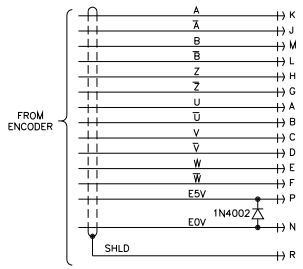






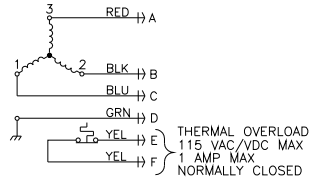


DETAIL A
ENCODER CONNECTION
MS3102E20-29P



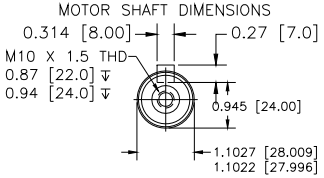
VIEW OF CONNECTOR
MATING SOCKET:
ENCODER: MS3106A20-29S

DETAIL B
ARMATURE CONNECTION
MS3102A20-15P



VIEW OF CONNECTOR
MATING SOCKET:
MOTOR: MS3106A20-15S

DETAIL C
MOTOR SHAFT DIMENSIONS



INDUSTRIAL INDEXING SYSTEMS, Inc.
www.iis-servo.com

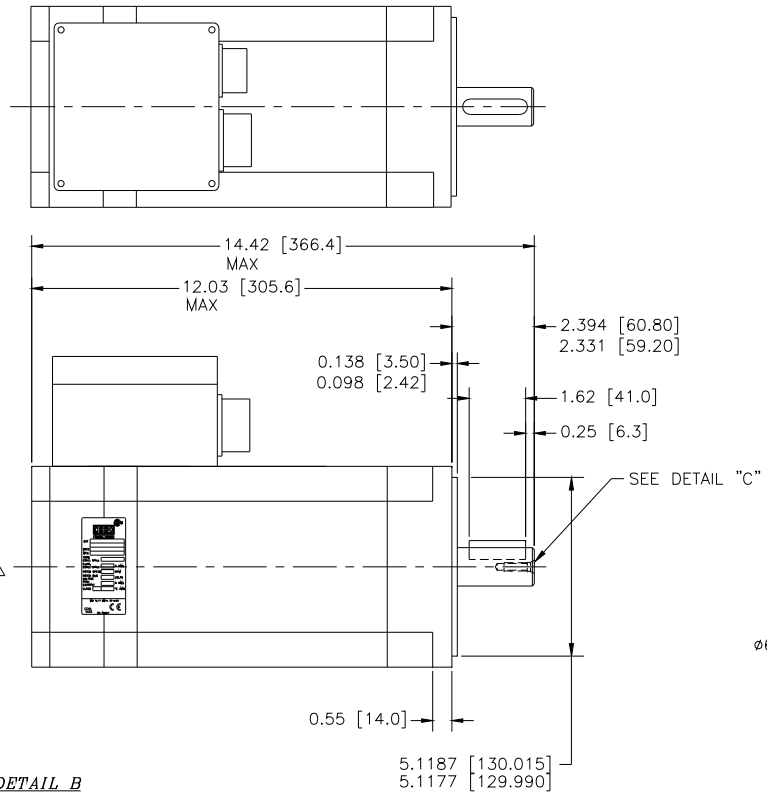
TITLE: MOTOR, DELTA SERIES

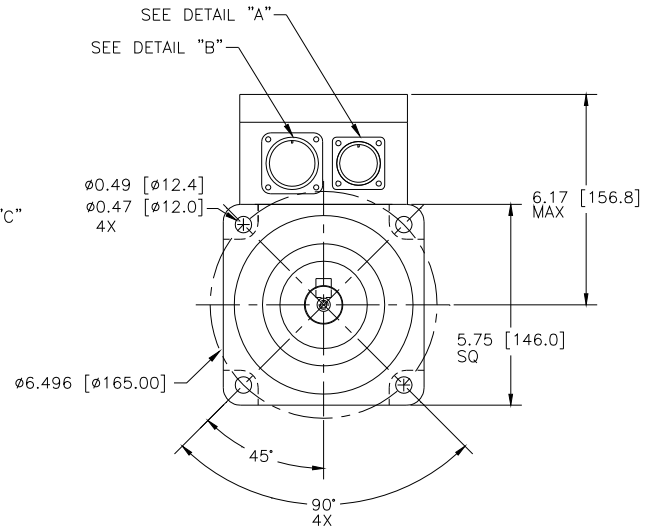
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE INCHES (mm)	DRAWN BY	DRAWING NUMBER
TOLERANCES	BOWMAN	DBM-B1900/30E
X.X± ---	AutoCAD FILE LOCATION	
X.XX±0.01	Q:\CURRENT DWGS	
X.XXX± 0.005 ANGULAR ± 0°30'	B DATE 11JAN99 SCALE NTS	SHEET NO. 1 OF 1 REVISION B

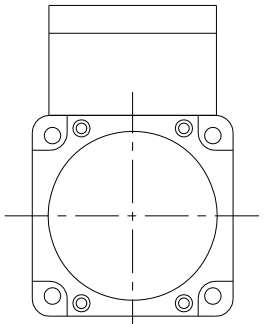
NOTES:

1.) MOTOR CAN BE MOUNTED IN ANY POSITION.
2.) ALL DIMENSIONS ARE IN INCHES [MM].
3.) MOTOR WEIGHT 23.6 KG 52 LBS.
4.) MOTOR SHAFT SEAL STANDARD.
5.) THRUST LOAD 890 N 200 LBS.
6.) RADIAL LOAD 1113 N 250 LBS.
7.) ENCODER 2048 LINE COUNT, 8192 PPR QTY 1 ZERO MARKER.
8.) IP-65 SEALING.

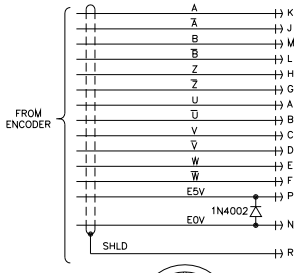
DATE	SYM	REVISION RECORD	DR	CK	CK
03AUG00	B	PER ECN 00-246	CWB	EB	CDR





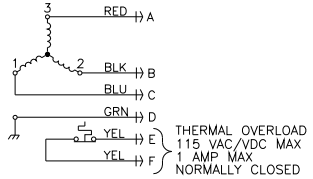


DETAIL A
ENCODER CONNECTION
MS3102E20-29P



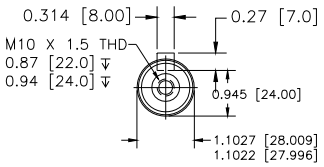
VIEW OF CONNECTOR
MATING SOCKET:
ENCODER: MS3106A20-29S

DETAIL B
ARMATURE CONNECTION
MS3102A24-10P



VIEW OF CONNECTOR
MATING SOCKET:
MOTOR: MS3106A24-10S

DETAIL C
MOTOR SHAFT DIMENSIONS



INDUSTRIAL INDEXING SYSTEMS, Inc.
www.iis-servo.com

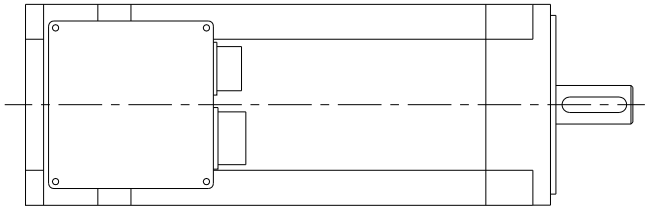
TITLE: MOTOR, DELTA SERIES

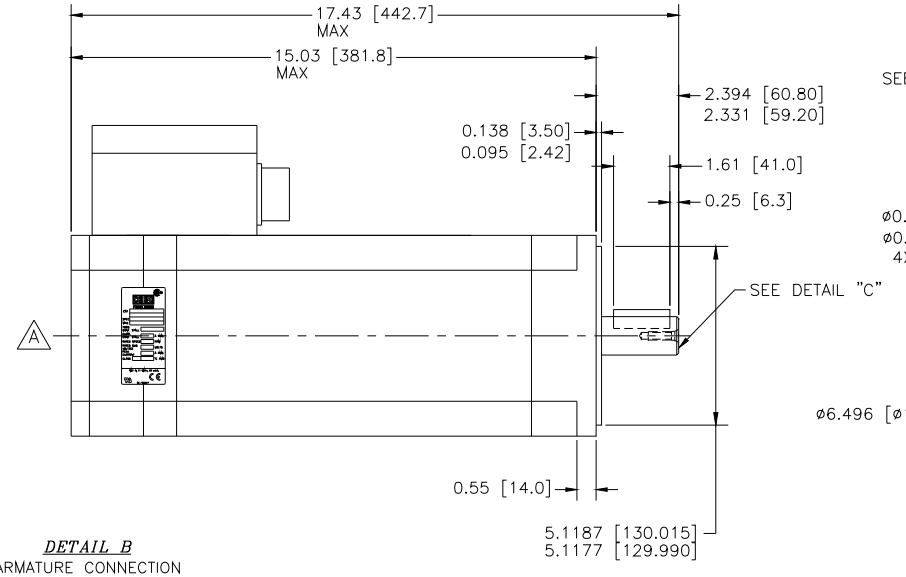
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE INCHES (mm)	DRAWN BY	DRAWING NUMBER
TOLERANCES	BOWMAN	DBM-B3000/30E
X.X± ---	AutoCAD FILE LOCATION	
X.XX± 0.01	Q:\CURRENT DWGS	
X.XXX± 0.005 ANGULAR ± 0°30'	B DATE 11JAN99 SCALE NTS	SHEET NO. 1 OF 1 REVISION B

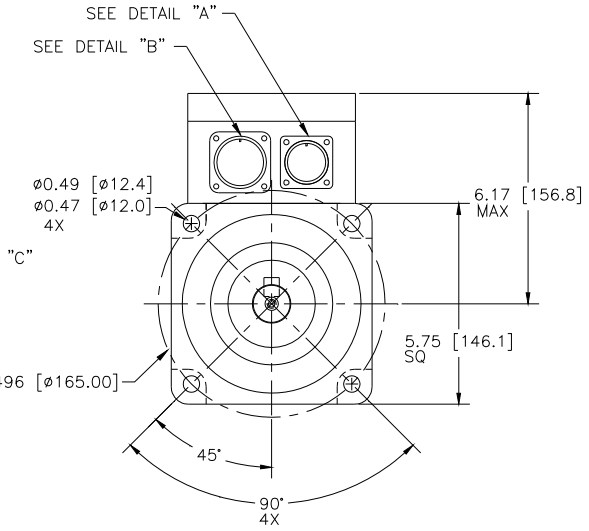
NOTES:

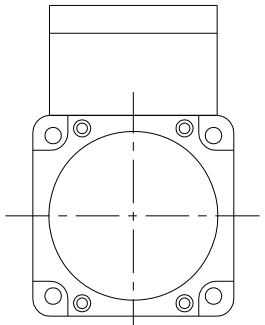
1.) MOTOR CAN BE MOUNTED IN ANY POSITION.
2.) ALL DIMENSIONS ARE IN INCHES [MM].
3.) MOTOR WEIGHT 32.3 KG 71 LBS.
4.) MOTOR SHAFT SEAL STANDARD.
5.) THRUST LOAD 890 N 200 LBS.
6.) RADIAL LOAD 1113 N 250 LBS.
7.) ENCODER 2048 LINE COUNT, 8192 PPR QTY 1 ZERO MARKER.
8.) IP-65 SEALING.

DATE	SYM	REVISION RECORD	DR	CK	CK
03AUG00	B	PER ECN 00-246	CWB	EB	CDR

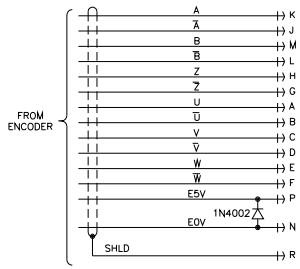






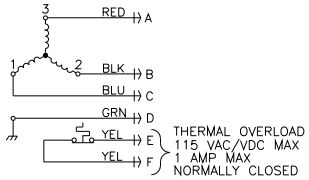


DETAIL A
ENCODER CONNECTION
MS3102E20-29P



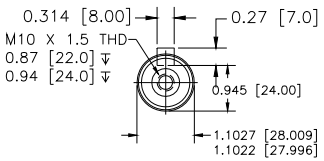
VIEW OF CONNECTOR
MATING SOCKET:
ENCODER: MS3106A20-29S

DETAIL B
ARMATURE CONNECTION
MS3102A24-10P



VIEW OF CONNECTOR
MATING SOCKET:
MOTOR: MS3106A24-10S

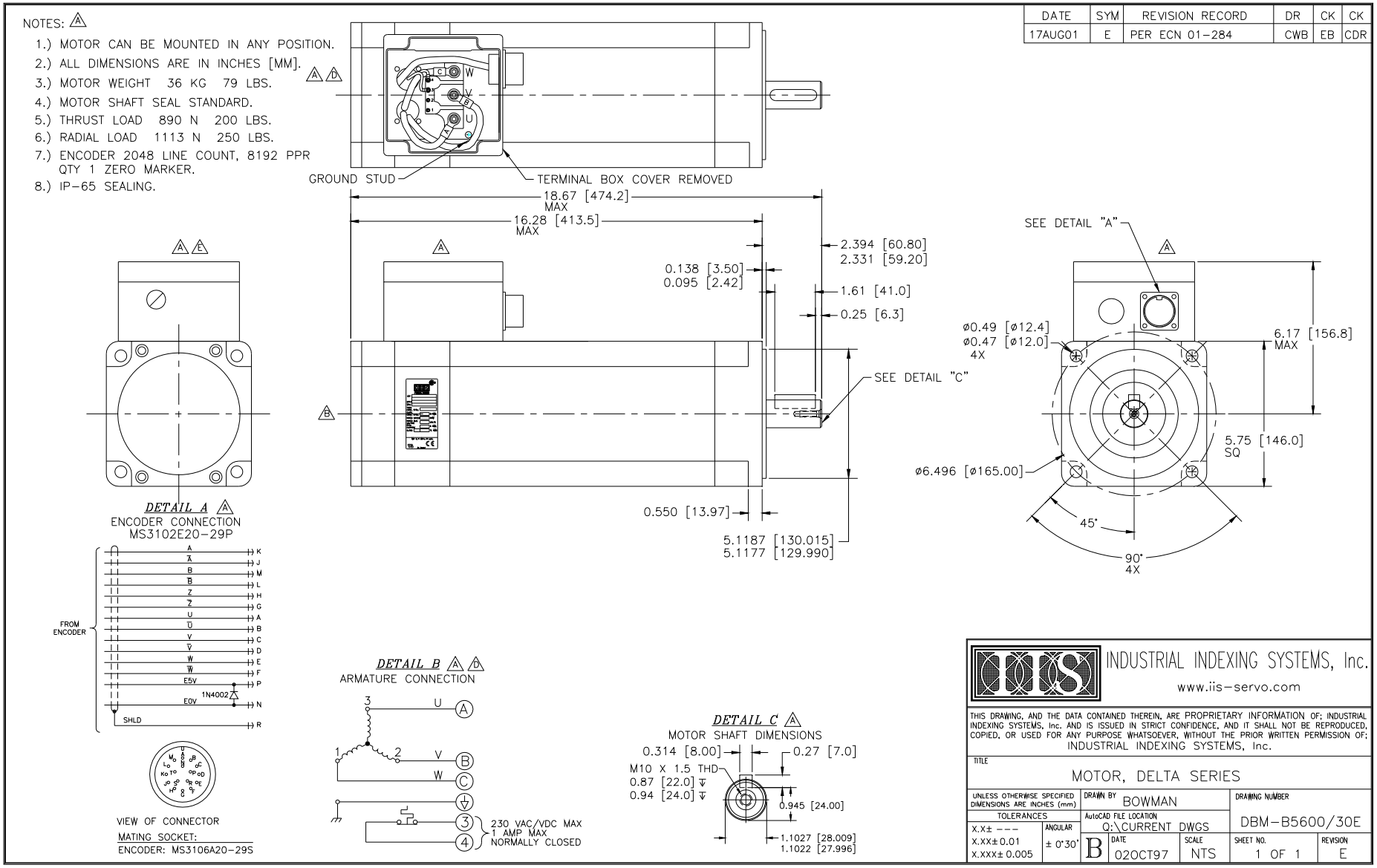
DETAIL C
MOTOR SHAFT DIMENSIONS



INDUSTRIAL INDEXING SYSTEMS, Inc.
www.iis-servo.com

TITLE
MOTOR, DELTA SERIES

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE INCHES (mm)	DRAWN BY	DRAWING NUMBER
TOLERANCES	BOWMAN	DBM-B4400/30E
X.X± ---	AutoCAD FILE LOCATION	
X.XX± 0.01	Q:\CURRENT DWGS	
X.XXX± 0.005	ANGULAR ± 0°30'	B / DATE 11JAN99 / SCALE NTS / SHEET NO. 1 OF 1 / REVISION B


NOTES: A
1.) MOTOR CAN BE MOUNTED IN ANY POSITION.
2.) ALL DIMENSIONS ARE IN INCHES [MM].
3.) MOTOR WEIGHT 36 KG 79 LBS.
4.) MOTOR SHAFT SEAL STANDARD.
5.) THRUST LOAD 890 N 200 LBS.
6.) RADIAL LOAD 1113 N 250 LBS.
7.) ENCODER 2048 LINE COUNT, 8192 PPR QTY 1 ZERO MARKER.
8.) IP-65 SEALING.
DATE SYM REVISION RECORD DR CK CK
17AUG01 E PER ECN 01-284 CWB EB CDR
GROUND STUD
TERMINAL BOX COVER REMOVED
18.67 [474.2] MAX
16.28 [413.5] MAX
2.394 [60.80]
2.331 [59.20]
0.138 [3.50]
0.095 [2.42]
1.61 [41.0]
0.25 [6.3]
SEE DETAIL "C"
0.550 [13.97]
5.1187 [130.015]
5.1177 [129.990]
SEE DETAIL "A"
ø0.49 [ø12.4]
ø0.47 [ø12.0]
4X
6.17 [156.8] MAX
5.75 [146.0] SQ
ø6.496 [ø165.00]
45°
90°
4X
DETAIL A A
ENCODER CONNECTION
MS3102E20-29P
FROM ENCODER
A K
A J
B M
B L
Z H
Z G
U A
U B
V C
V D
W E
W F
E5V P
1N4002
E0V N
SHLD R
VIEW OF CONNECTOR
MATING SOCKET:
ENCODER: MS3106A20-29S
DETAIL B A D
ARMATURE CONNECTION
U A
V B
W C
230 VAC/VDC MAX
1 AMP MAX
NORMALLY CLOSED
DETAIL C A
MOTOR SHAFT DIMENSIONS
0.314 [8.00]
0.27 [7.0]
M10 X 1.5 THD
0.87 [22.0]
0.94 [24.0]
0.945 [24.00]
1.1027 [28.009]
1.1022 [27.996]
INDUSTRIAL INDEXING SYSTEMS, Inc.
www.iis-servo.com
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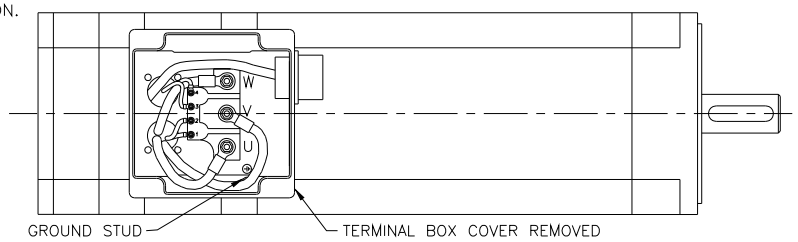
TITLE
MOTOR, DELTA SERIES
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE INCHES (mm)
TOLERANCES
X.X± ---
X.XX± 0.01
X.XXX± 0.005
ANGULAR ± 0°30'
DRAWN BY BOWMAN
AutoCAD FILE LOCATION Q:\CURRENT DWGS
DRAWING NUMBER DBM-B5600/30E
B
DATE 02OCT97
SCALE NTS
SHEET NO. 1 OF 1
REVISION E

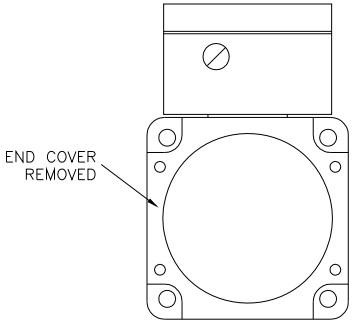
NOTES:

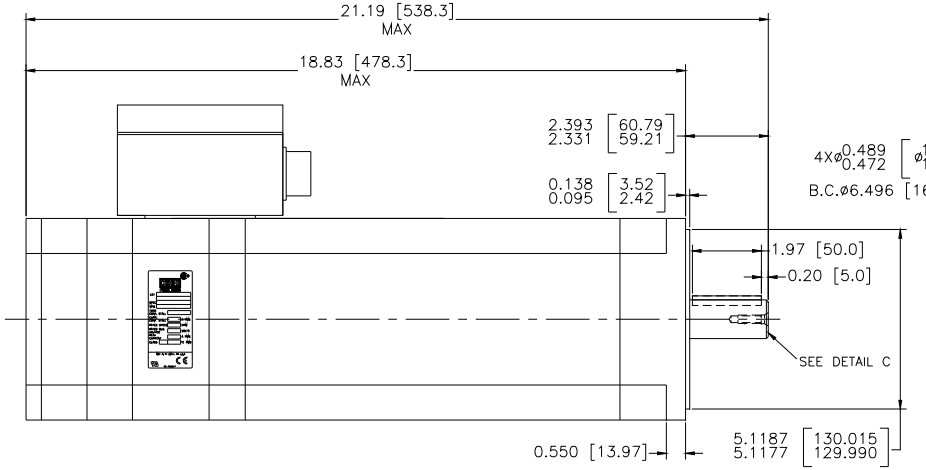
1.) MOTOR CAN BE MOUNTED IN ANY POSITION.
2.) ALL DIMENSIONS ARE IN INCHES [MM].
3.) MOTOR WEIGHT 38.6 KG 85 LBS.
4.) MOTOR SHAFT SEAL STANDARD.
5.) THRUST LOAD 890 N 200 LBS.
6.) RADIAL LOAD 1113 N 250 LBS.
7.) ENCODER 2048 LINE COUNT, 8192 PPR QTY 1 ZERO MARKER.
8.) IP-65 SEALING.
9.) BRAKE STATIC TORQUE 39.5 N-M 29.1 LB-FT

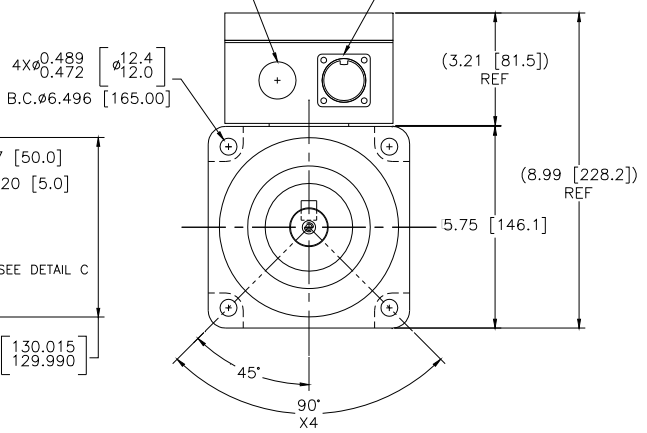
BRAKE ELECTRICAL 24 VDC 1.3 AMPS

DATE	SYM	REVISION RECORD	DR	CK	CK
03JUL12	0	PER ECN 12-120	HYC		

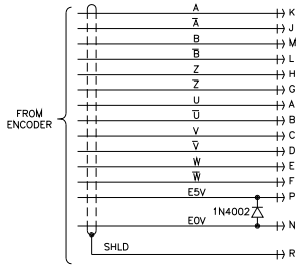






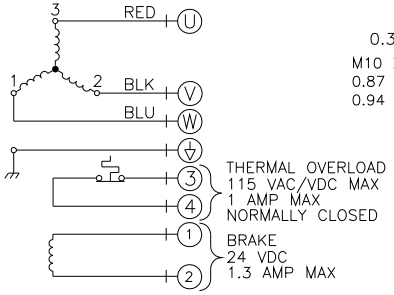


DETAIL A
ENCODER CONNECTION
MS3102E20-29P

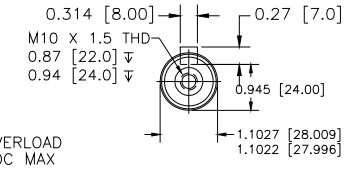


VIEW OF CONNECTOR
MATING SOCKET:
ENCODER: MS3106A20-29S

DETAIL B
ARMATURE CONNECTION



DETAIL C
MOTOR SHAFT DIMENSIONS



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TITLE: MOTOR, DELTA SERIES

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE INCHES (mm)	DRAWN BY: CAD	DRAWING NUMBER: DBM-B5600/30EB
TOLERANCES	AutoCAD FILE LOCATION: Q:\CURRENT DWGS	
X.X± --- X.XX± 0.01 X.XXX± 0.005 ANGULAR ± 0°30'	B DATE: 03JUL12 SCALE: NTS SHEET NO.: 1 OF 1 REVISION: 0	

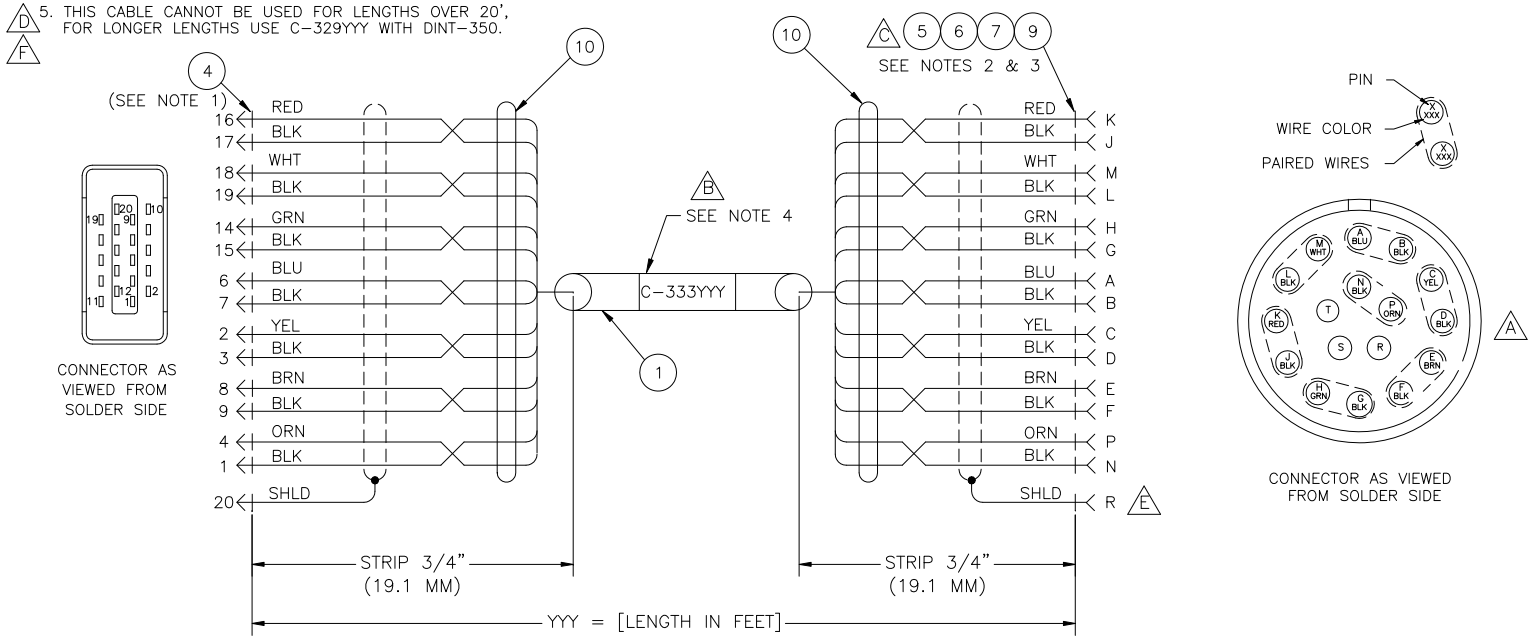
G.5 CABLE DRAWINGS

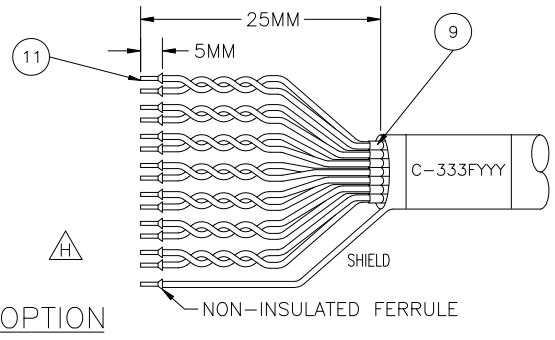
DRAWING NUMBER	DESCRIPTION
C-333YYY	Encoder Cable
C-548FYYY	Motor Cable
C-687BYYY	Motor Cable
C-688YYY	Motor Cable
C-689BYYY	Motor Cable
C-691BYYY	Motor Cable
EBC-XYZYYY	Motor Cable
EEC-005MMM	Emerald Encoder Cable

NOTES: (B)
1. HEAT SHRINK TUBING [ITEM 4] OVER SOLDER JOINTS.
2. ITEM 6 SUPPLIED AS PART OF CONNECTOR, ITEM 5.
3. IF CRIMP TYPE CONNECTOR IS USED: INSTALL ITEM 4 USING AMP TOOL #90277-1.
4. MARK PER QP-08-0001.
5. THIS CABLE CANNOT BE USED FOR LENGTHS OVER 20', FOR LONGER LENGTHS USE C-329YYY WITH DINT-350.

(D) (F)

DATE	SYM	REVISION RECORD	DR	CK	CK
17JAN05	F	PER ECN 04-529	CWB		
20FEB08	H	PER ECN 08-046	CD		





'F' OPTION

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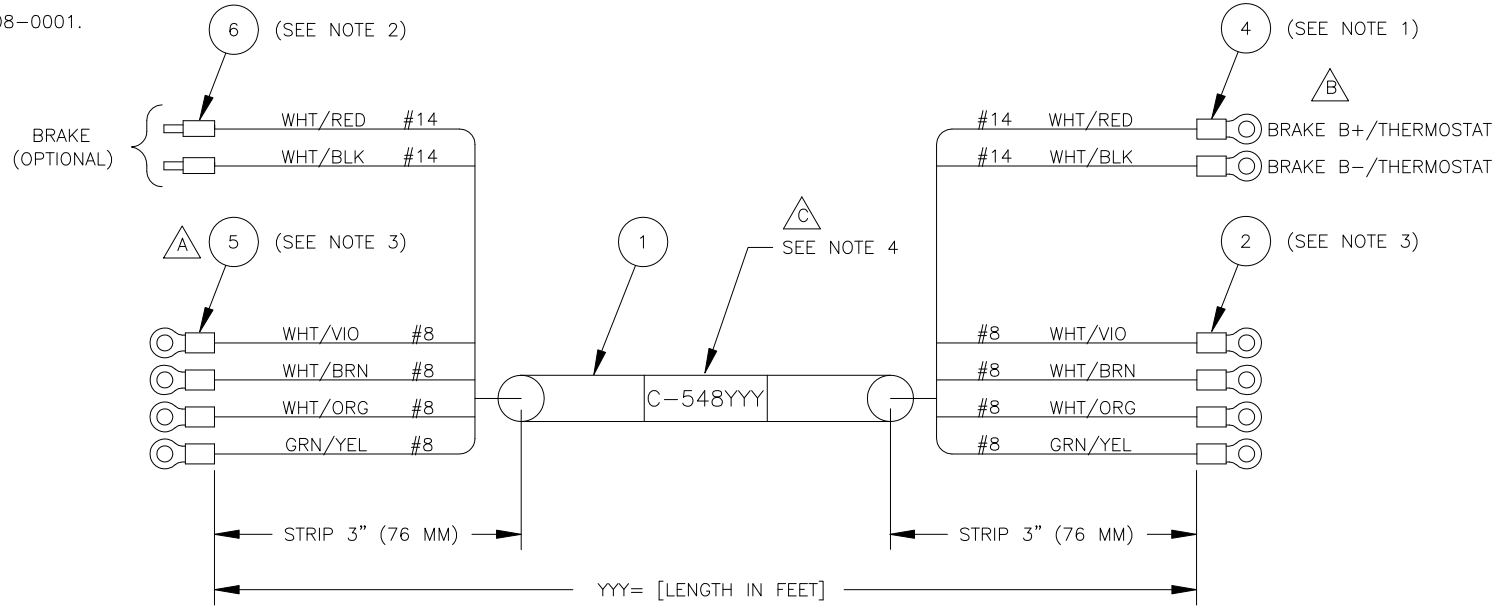
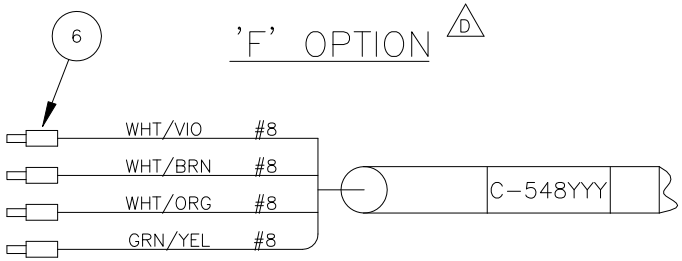
CHECKED BY: CD	DATE: 14NOV98	THIS DRAWING, AND THE DATA CONTAINED THEREIN, ARE PROPRIETARY INFORMATION OF; INDUSTRIAL INDEXING SYSTEMS, Inc. AND IS ISSUED IN STRICT CONFIDENCE, AND IT SHALL NOT BE REPRODUCED, COPIED, OR USED FOR ANY PURPOSE WHATSOEVER, WITHOUT THE PRIOR WRITTEN PERMISSION OF; INDUSTRIAL INDEXING SYSTEMS, Inc.
APPROVED BY: WES	DATE: 10AUG97	
APPROVED BY:	DATE:	TITLE: CABLE, ENCODER
MATERIAL: ----------		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE INCHES (mm) / TOLERANCES: X.X± --- ANGULAR ± ---, X.XX± ---, X.XXX± ---
FINISH: ----------		DRAWN BY: BAIER; AutoCAD FILE LOCATION: Q:\CURRENT DWGS
		DRAWING NUMBER: C-333YYY
		B; DATE: 08AUG97; SCALE: ---
		SHEET NO.: 1 OF 1; REVISION: H

DATE	SYM	REVISION RECORD	DR	CK	CK
18AUG97	C	PER ECN 00-246	CWB	EB	CDR
11APR08	D	PER ECN 08-079	CD	WES	

NOTES:

1. INSTALL ITEM 4 USING WEIDMULLER CRIMP TOOL CT-550 OR EQUIVALENT.
2. INSTALL ITEM 6 USING WEIDMULLER CRIMP TOOL PZ-4 OR EQUIVALENT.
3. INSTALL ITEMS 2 AND 5 USING PANDUIT CRIMP TOOL CT-720 OR EQUIVALENT.
4. MARK PER QP-08-0001.





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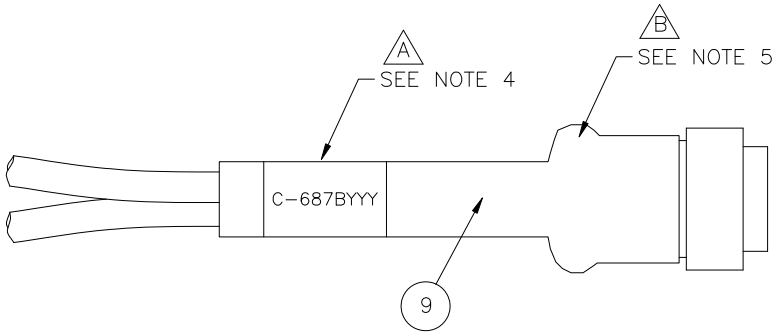
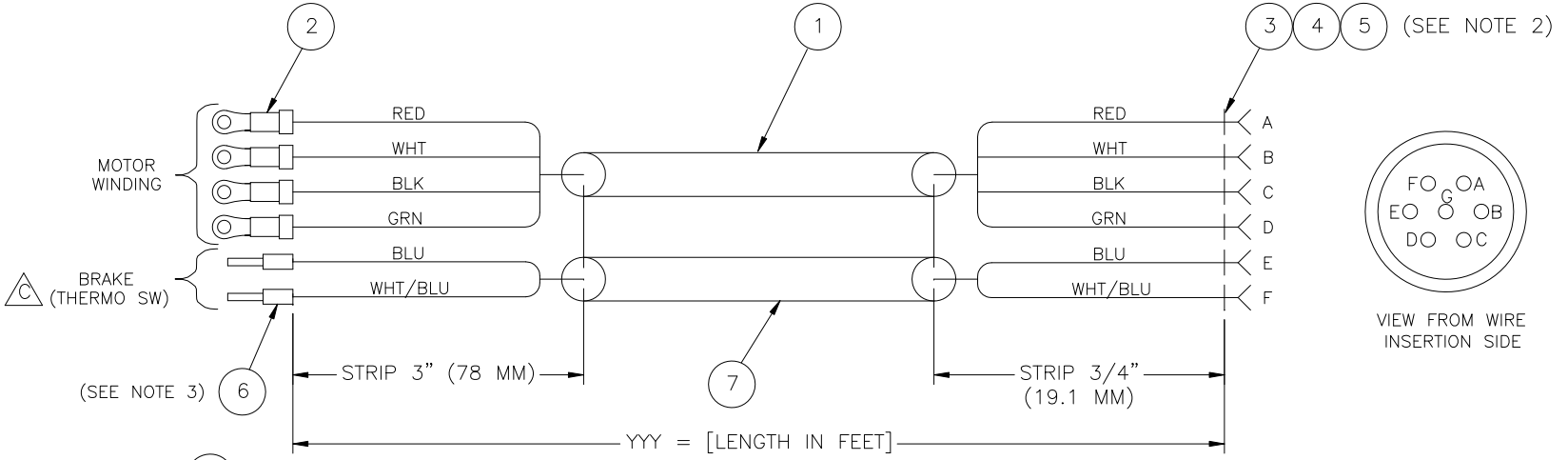
APPROVED BY 12/20/97	DATE E.BAIER	
APPROVED BY	DATE	TITLE: CABLE, MOTOR
MATERIAL: ----------		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE INCHES (mm) / TOLERANCES: X.X± --- X.XX± 0.01 X.XXX± 0.005 ANGULAR ± ---
FINISH: ----------		DRAWN BY: BOWMAN / AutoCAD FILE LOCATION: Q:\CURRENT DWGS
		DRAWING NUMBER: C-548YYY
		B / DATE 18AUG97 / SCALE --- / SHEET NO. 1 OF 1 / REVISION D

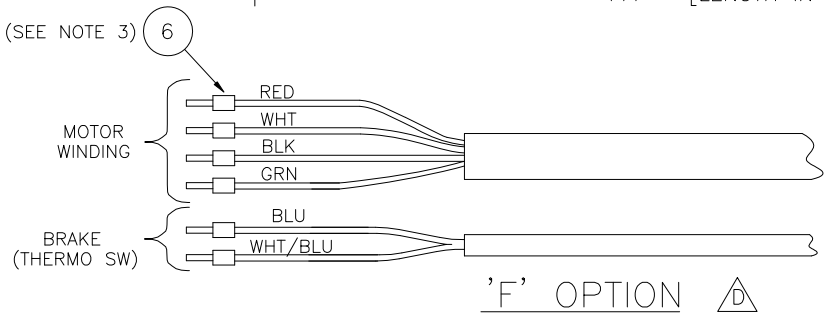
DATE	SYM	REVISION RECORD	DR	CK	CK
27MAR03	D	PER ECN 03-152	EB		

NOTES: (B)

1. INSTALL ITEM 2 USING PANDUIT CRIMP TOOL CT-550 OR EQUIVALENT.
2. HEAT SHRINK TUBING (ITEM 5) OVER SOLDER JOINT 6 PLACES.
3. INSTALL ITEM 6 USING WEIDMULLER CRIMP TOOL PZ-4 OR EQUIVALENT.
4. MARK PER QP-08-0001.
5. INSTALL 1" HEATSHRINK OVER CABLE AND BACKSHELL. REPLACE CONNECTOR SCREWS WITH HS0608MPP (6/32 X 1/2").







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CHECKED BY / DATE	
APPROVED BY / DATE	ELS / 7/31/96
APPROVED BY / DATE	
MATERIAL	----------
FINISH	----------

TITLE: CABLE, MOTOR W/BRAKE

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

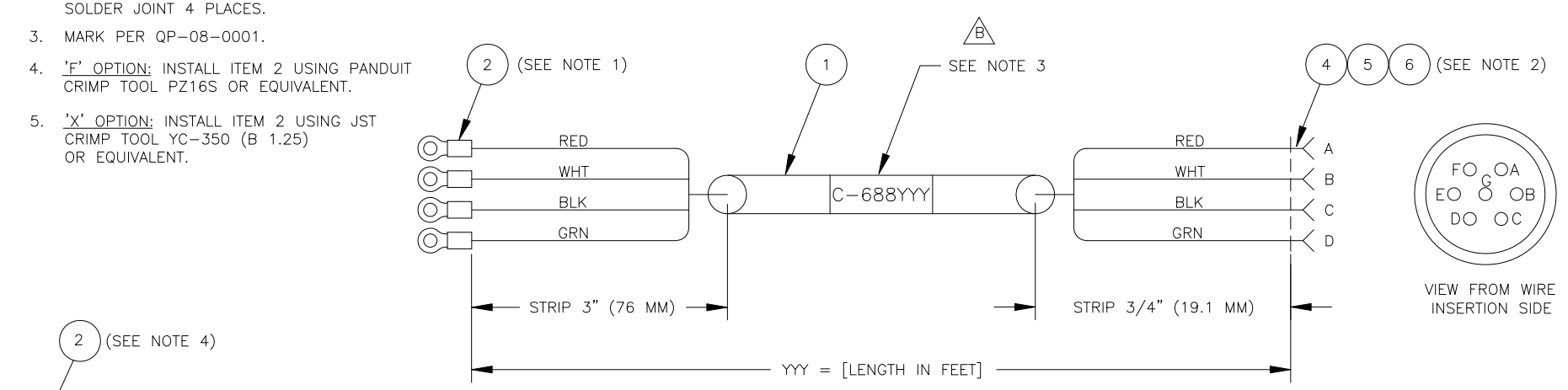
DRAWN BY: BOWMAN
AutoCAD FILE LOCATION: Q:\CURRENT DWGS
DRAWING NUMBER: C-687BYYY

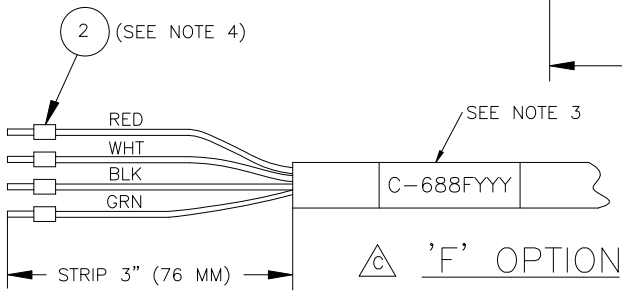
B	DATE	SCALE	SHEET NO.	REVISION
	25JUL00	---	1 OF 1	D

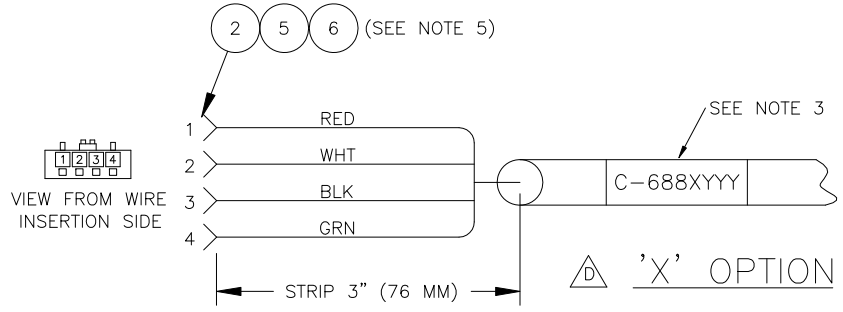
DATE	SYM	REVISION RECORD	DR	CK	CK
20APR09	D	PER ECN 09-049	TSO		

NOTES:

1. INSTALL ITEM 2 USING PANDUIT CRIMP TOOL CT-550 OR EQUIVALENT.
2. HEAT SHRINK TUBING (ITEM 5) OVER SOLDER JOINT 4 PLACES.
3. MARK PER QP-08-0001.
4. 'F' OPTION: INSTALL ITEM 2 USING PANDUIT CRIMP TOOL PZ16S OR EQUIVALENT.
5. 'X' OPTION: INSTALL ITEM 2 USING JST CRIMP TOOL YC-350 (B 1.25) OR EQUIVALENT.







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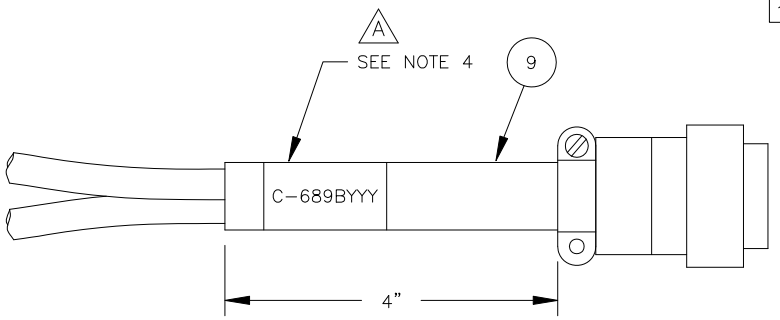
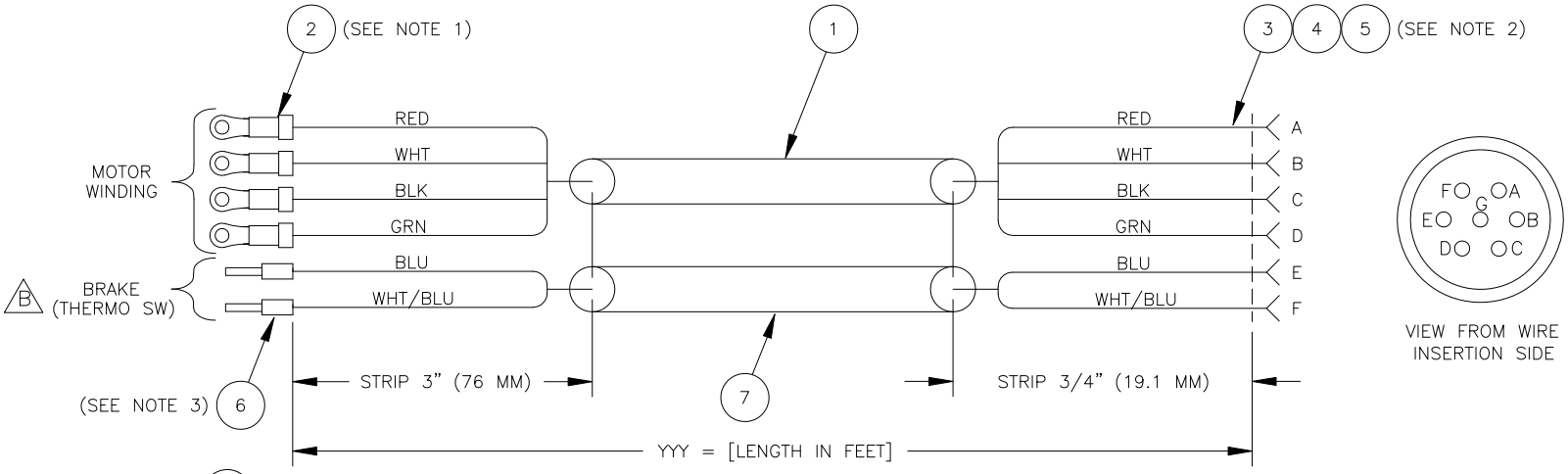
APPROVED BY ELS	DATE 26APR96	
APPROVED BY ELS	DATE 30JUL96	TITLE: CABLE, MOTOR
MATERIAL: ----------	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE INCHES (mm) TOLERANCES: X.X± --- X.XX±0.01 X.XXX±0.005 ANGULAR ± ---	DRAWN BY BOWMAN; AutoCAD FILE LOCATION Q:\CURRENT DWGS; DRAWING NUMBER C-688YYY
FINISH: ----------		B; DATE 26APR96; SCALE ---; SHEET NO. 1 OF 1; REVISION D

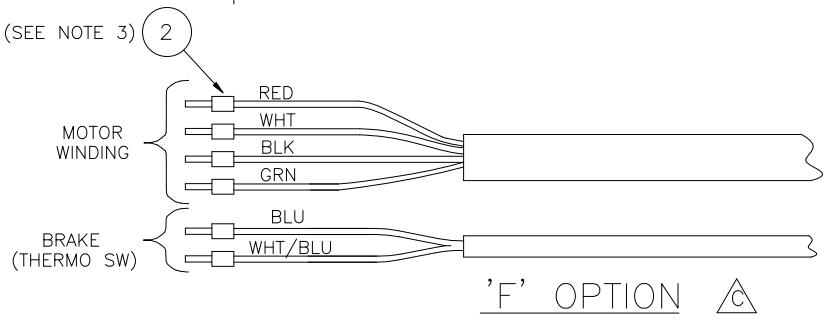
DATE	SYM	REVISION RECORD	DR	CK	CK
13JUN03	C	PER ECN 03-268	EB		

NOTES:

1. INSTALL ITEM 2 USING PANDUIT CRIMP TOOL CT-550 OR EQUIVALENT.
2. HEAT SHRINK TUBING (ITEM 5) OVER SOLDER JOINT 6 PLACES.
3. INSTALL ITEM 6 USING WEIDMULLER CRIMP TOOL PZ-4 OR EQUIVALENT.
4. MARK PER QP-08-0001.







'F' OPTION C

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CHECKED BY: BAIER	DATE: 7/26/96
APPROVED BY: ELS	DATE: 7/26/96
APPROVED BY:	DATE:
MATERIAL: ----------	
FINISH: ----------	

TITLE: CABLE, MOTOR W/BRAKE

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

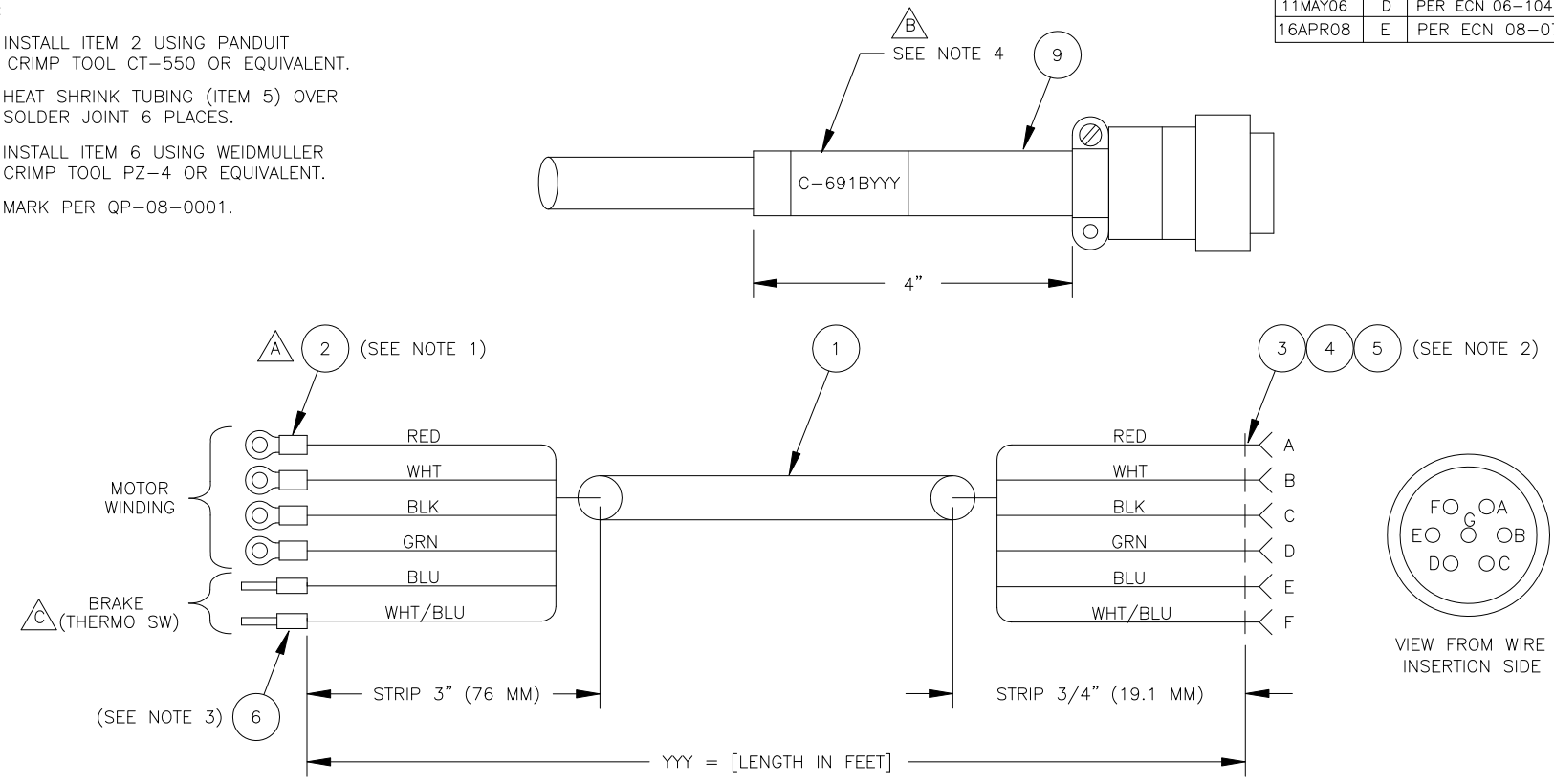
DRAWN BY: BOWMAN
AutoCAD FILE LOCATION: Q:\CURRENT DWGS
DRAWING NUMBER: C-689BYYY

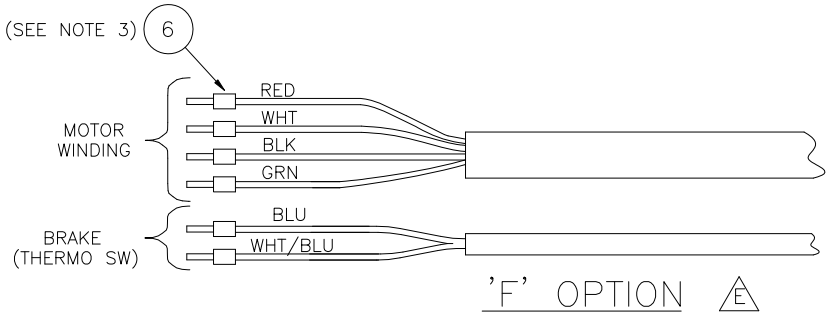
B	DATE	SCALE	SHEET NO.	REVISION
	08MAY96	---	1 OF 1	C

DATE	SYM	REVISION RECORD	DR	CK	CK
11MAY06	D	PER ECN 06-104	KY		
16APR08	E	PER ECN 08-079	CD	WES	

NOTES:

1. INSTALL ITEM 2 USING PANDUIT CRIMP TOOL CT-550 OR EQUIVALENT.
2. HEAT SHRINK TUBING (ITEM 5) OVER SOLDER JOINT 6 PLACES.
3. INSTALL ITEM 6 USING WEIDMULLER CRIMP TOOL PZ-4 OR EQUIVALENT.
4. MARK PER QP-08-0001.





INDUSTRIAL INDEXING SYSTEMS, Inc.
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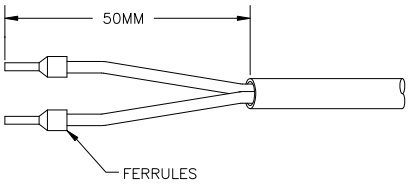
CHECKED BY	DATE
APPROVED BY T.O'BRIEN	DATE 2/20/98
APPROVED BY ELS	DATE 7/26/96
MATERIAL ----------	
FINISH ----------	

TITLE: CABLE, MOTOR W/BRAKE

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

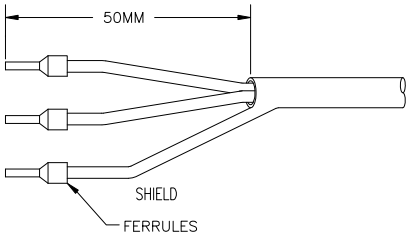
DRAWN BY: BOWMAN
AutoCAD FILE LOCATION: Q:\CURRENT DWGS
DRAWING NUMBER: C-691BYYY
B | DATE: 08MAY96 | SCALE: --- | SHEET NO.: 1 OF 1 | REVISION: E

FIG.1



DRIVE END WITH FERRULES WITHOUT SHIELD

FIG.2



DRIVE END WITH FERRULES WITH SHIELD

FIG.3

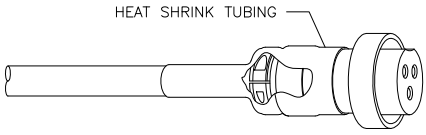
EITHER END WITH NO TERMINATION

EBC–XYZMMM

- LENGTH IN METERS
  - 301=3M [9.8 FT]
  - 601=6M [19.7 FT]
  - 102=10M [32.8 FT]
  - 152=15M [49.2]
- BRAKE CABLE TYPE
  - A=1 PAIR, 16 AWG
  - B=1 PAIR, 16 AWG, WITH OVERALL SHIELD (CE INSTALLATIONS)
- DRIVE END TERMINATION
  - A=FERRULES (FIG. 1 & 2)
  - B=NO TERMINATION (FIG. 3)
- MOTOR BRAKE END TERMINATION
  - A=PLT–163–P (FIG. 4 & 5)
  - B=NO TERMINATION (FIG. 3)
  - C=MS3116E12–4S OR EQUIV. (FIG. 6 & 7)
  - D=RING LUG (FIG. 8 & 9)
- EBC=EMERALD BRAKE CABLE

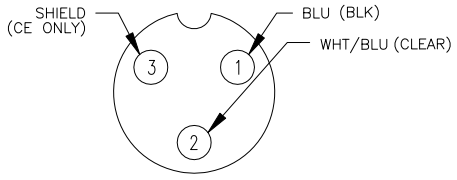
CABLE PART NUMBER TABLE

FIG.4



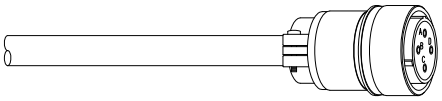
MOTOR BRAKE END WITH PLT–163–P CONNECTOR

FIG.5



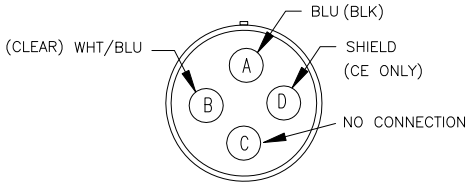
WIRING VIEW DETAILS FOR PLT–163–P CONNECTOR
COLORS IN( ) INDICATE ALTERNATE CABLE CONDUCTOR COLORS.

FIG.6



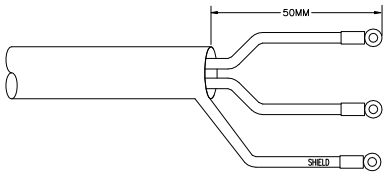
MOTOR BRAKE END WITH MS3116E12–4S CONNECTOR

FIG.7



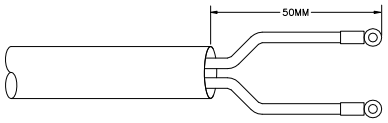
WIRING VIEW DETAILS FOR MS3116E12–4S CONNECTOR
COLORS IN( ) INDICATE ALTERNATE CABLE CONDUCTOR COLORS.

FIG.8



MOTOR END WITH RING LUGS AND SHIELD

FIG.9



MOTOR END WITH RING LUGS WITHOUT SHIELD

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TITLE: CABLE, BRAKE

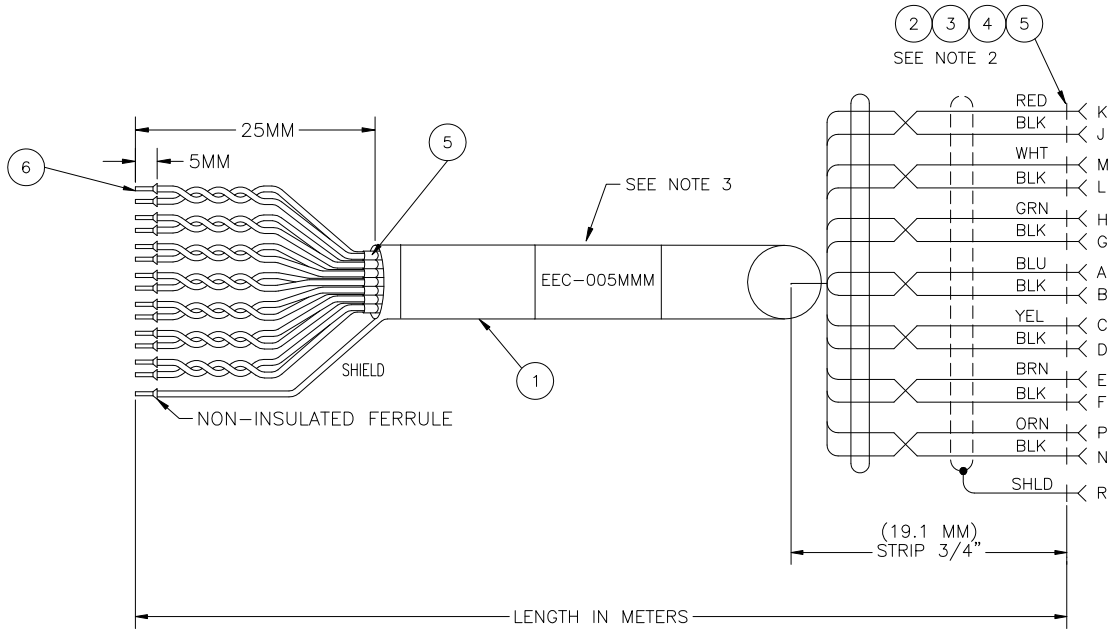
DRAWING NUMBER: EBC–XYZMMM

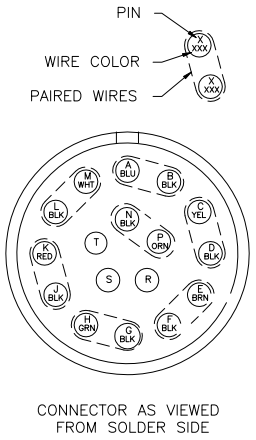
DIMENSIONS ARE MM [INCHES]	TOLERANCES X.XX±–– X.XXX±–– ∠ ±––	REV B		ECN 12–119	DATE 28JUN12	SH. 1 OF 1

NOTES:

1. HEAT SHRINK TUBING [ITEM 5] OVER SOLDER JOINTS.
2. IF CRIMP TYPE CONNECTOR IS USED:
   INSTALL ITEM 4 USING AMP TOOL #90277-1.
3. MARK PER QP-08-0001.

DATE	SYM	REVISION RECORD	DR	CK	CK
29MAY08	0	PER ECN 08-120	CD	KSR	





301 = 3 METERS
601 = 6 METERS
102 = 10 METERS

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CHECKED BY: KSR	DATE: 06/11/08
APPROVED BY:	DATE:
APPROVED BY:	DATE:
MATERIAL: ----------	
FINISH: ----------	

TITLE: CABLE, ENCODER

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

DRAWN BY: C.DRAPER
AutoCAD FILE LOCATION: Q:\CURRENT DWGS

DRAWING NUMBER: EEC-005MMM

B	DATE	SCALE	SHEET NO.	REVISION
	29MAY08	---	1 OF 1	0

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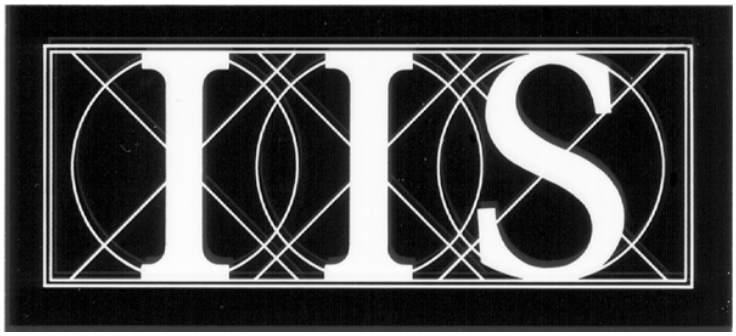

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