

# XD INDEXER

ORMEC's Indexing Servo Drives, the XD-Series, is anything but ordinary. The XD Indexer is a high performance, single axis servo drive full of advanced motion control features that are typically only found in multi-axis integrated products.

MotionSet software provides intuitive tools that reduce commissioning time down to just minutes. Drag and drop I/O assignments and familiar menu driven programming environment make the XD Indexer easy to configure. Application specific features are quickly configured.

ORMEC's industry leading Motor Wizard simplifies non-standard motor configuration and enables seamless integration of most third party motors with the XD Indexer. Once the user program and motor data are loaded onto the indexer, the configuration is stored both in the indexer and on a removable flash memory card<sup>1</sup>, providing application data backup, axis cloning, and machine documentation storage. MotionSet's digital scope and monitor utility make application testing and optimization easy.

## Motion Features

- 32 independent motion profiles including Incremental and Absolute Indexing, Gearing, Registration<sup>1</sup>, Camming<sup>1</sup>, & Blended Moves. Flexible Homing routines and Jogging are also available in addition to these 32 motions
- Motion profiles can be mapped to I/O, initiated via Modbus TCP, chained and/or looped
- Synchronize motion with machine I/O (i.e. Start, Stop, or Trigger speed changes with I/O at any point in the chain)
- On-the-fly transitions between Position, Velocity, Torque or Tension modes
- Easy-to-define user units for axis position, speed, acceleration, and deceleration further simplify programming
- Resolution scaling of quadrature output

## Communication

- Modbus TCP is standard. One other Fieldbus (Ethernet/IP, Profinet) may be added.
  - Adjust motion parameters (speed, distance, etc) as needed
  - Access all system variables
  - Trigger motion with a PLC or HMI
  - Read real-time axis status
- USB and Ethernet Connectivity
  - Quick and reliable commissioning
  - Available on all modern laptop and desktop computers
- Flexible I/O: 14 inputs, 8 outputs, 1 analog input
  - Optional 2<sup>nd</sup> analog input and 1 analog output
  - Outputs can be used for basic logic control

## Wide Power Range

- Available in 115, 230 and 460 VAC input power
- Continuous current ratings from 3 to 60A rms

## Features for Typical and Challenging Applications

The features of the XD Indexer have been developed to meet a wide range of applications. Intelligent Conveyor Control, Pick and Place, Ultrasonic Welding, Stamping, Pin Insertion, Drilling, Grinding, Labeling, Flying Shear, Rotary Knives, Scanning, High Speed Printing, Part Storage and Retrieval, and others are easily configured. The XD-Series Indexer family has many built-in features to support otherwise difficult application requirements such as Tension Control, Dual Loop Feedback, Registration<sup>1</sup>, Gearing and others. ORMEC offers a wide range of standard motors and cables to fit most applications and the XD Indexer is compatible with nearly all industrial servo motor technologies.



# Specifications

## Control Circuit Power

### Models 203, 205, 210, 215, 225, 235, 260, 417, 425

- 24VDC +/- 10% @ 0.7A (typical) or
- 115 – 230 VAC +15%, -20% @ 0.5A (typical)
- When using VAC input, 24VDC @ 1A, is output for use on drive I/O or for powering an HMI

### Models 403, 405, 410

- 24VDC +/- 10% @ 0.7A (typical)

### Models 435, 450

- 230 VAC +15%, -20%, single phase @ 0.5A (typical)

## XD 200V Series

### Main Circuit Power

- 115 – 230 VAC +15%, - 20%, 50/60 Hz, single phase (3 & 5A) or 3-phase

### Output Power and Current

- 600 to 15,000 watts of motor output power
- Models: 3A, 5A, 10A & 15A rms / phase continuous w/ 3x peak
- Models: 25A, 35A & 60A rms / phase continuous w/ 2x peak

## XD 400V Series

### Main Circuit Power

- 230 - 480 VAC +10%, - 20%, 50/60 Hz, 3-phase

### Output Power and Current

- 1,400 to 24,000 watts of motor output power
- Models: 3A, 5A, 10A, rms / phase continuous w/ 3x peak
- Models: 17A, 25A, 35A & 50A rms / phase continuous w/ 2x peak

### XD Indexer Dimensions (in.)

	H*	W	D		H	W	D
<b>203</b>	7.20	2.20**	6.50	<b>403</b>	7.70	2.45	7.30
<b>205</b>	7.20	2.20**	6.50	<b>405</b>	7.70	4.00	7.30
<b>210</b>	7.20	4.25	6.50	<b>410</b>	7.70	4.20	7.30
<b>215</b>	7.20	4.45	6.50	<b>417</b>	10.90	7.35	8.45
<b>225</b>	10.90	7.35	8.45	<b>425</b>	10.90	7.35	8.45
<b>235</b>	10.90	7.35	8.45	<b>435</b>	12.90	8.43	9.45
<b>260</b>	10.90	7.35	8.45	<b>450</b>	12.90	8.43	9.45

\* mounting tabs not included

\*\* with pacer add 0.8

## 200V and 400V Features

### Motor Feedback Interface

#### Quadrature

- Standard optical encoders including Yaskawa Sigma I
- Three differential channels with 5.3v encoder power; open wire detection on A and B
- Quadrature feedback 4x decoding with data rates to 20 MHz
- Three differential or single ended commutation inputs

#### Serial

- Yaskawa Sigma II, V
- Tamagawa TS56xx
- EnDat 2.2, SSI<sup>1</sup>, BISS<sup>1</sup>

#### Resolver

- 12-bit, 14-bit or 16-bit resolution

#### Tachometer

- +/- 10 VDC velocity feedback

### Environmental

- Ambient operating 0 to 50°C
- Ambient storage -20 to 70°C
- Humidity operating / storage is 90% RH or less, non-condensing

### Built-In I/O

#### Inputs

- 12 digital inputs, debounced, scanned at 2.5 kHz rate
- 2 digital inputs, < 1 µsec accuracy on latched position, used as hardware trigger signals
- 1 Analog input, 12 bit resolution +/- 10 VDC
- 1 Optional Analog input, 14 bit resolution +/- 10 VDC

#### Outputs

- 6 Digital, 100 mA, 24 VDC
- 2 Digital, 1A, 24 VDC, can directly drive most 24 VDC brake
- 1 Optional Analog output, 12-bit resolution, +/- 10 VDC

### Auxiliary Feedback

#### Quadrature

- Three differential channels with 5.3V encoder power supplied. Open wire detection on A and B

#### Serial

- Yaskawa Sigma II
- Tamagawa TS56xx
- EnDat 2.2
- SSI<sup>1</sup>, BISS<sup>1</sup>

Note: Each serial interface type can only be used on one feedback path at a time

#### Temposonics<sup>1</sup>

- SSI, Analog and Start/Stop

### Connectors

#### Feedback

- 25-pin D-sub, motor
- 15-pin D-sub, Auxiliary

#### I/O

- 37-pin D-sub

#### Power (P/N 203, 205, 210, 215, 403, 405)

- Pluggable terminal blocks with screw terminals

#### Power (P/N 225, 235, 260, 410, 417, 425, 435, 450)

- Fixed screw terminal blocks

### Motion

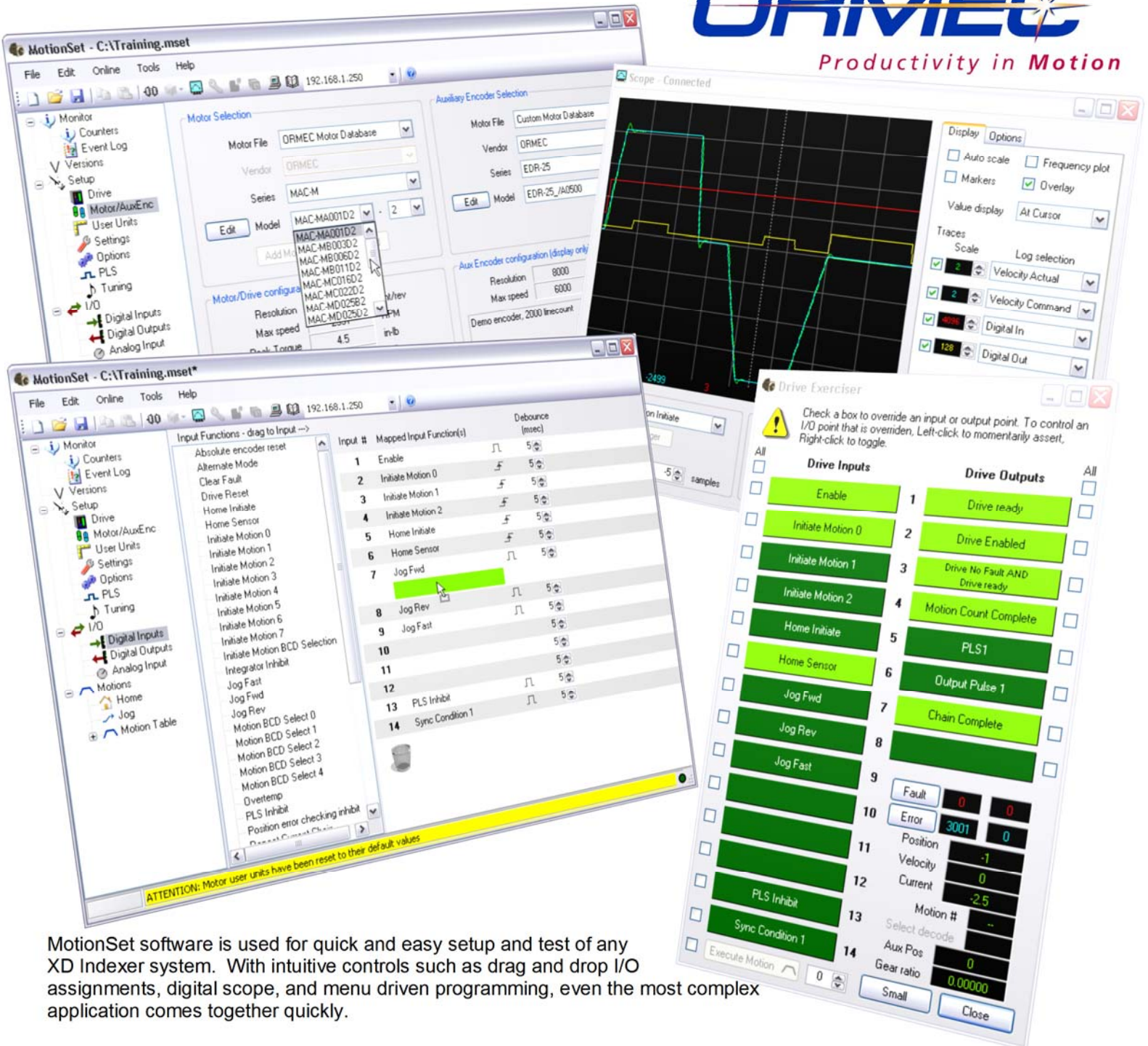
- 32 defined indexes
- Absolute position space – 32-bit
- Repeat count – 32-bit
- Gearing – 32-bit
- Types: Time based relative and absolute, homing and gearing

### Update Rates

- Position loop update rate: 10 kHz
- Velocity loop update rate: 10 kHz
- Torque loop update rate: 10 kHz

All specifications subject to change.

<sup>1</sup> Available in Future Releases



MotionSet software is used for quick and easy setup and test of any XD Indexer system. With intuitive controls such as drag and drop I/O assignments, digital scope, and menu driven programming, even the most complex application comes together quickly.

## MotionSet Features

- 32 Programmable Motion Profiles in addition to homing and jogging capability
- Step-by-step, menu driven programming
- 3<sup>rd</sup> Party motor support and easy setup with ORMEC's Motor Integration Wizard
- Four channel digital scope displays velocity, position error, current, I/O status and more
- Flexible homing routines including 'Home to Limit' and 'Home to Hard Stop'
- Advanced motion control programming (3 PLS Functions, Gearing, Camming<sup>1</sup>, Blended Motion)
- Quick commissioning tools (Software I/O Exerciser, Digital Scope, Quick Motor Test Window)
- Easy troubleshooting with Digital Scope, Axis Monitors, and Event Log

Software Training Videos  
available at  
[www.ormec.com/videos](http://www.ormec.com/videos)

# XD INDEXER

# MotionSet Software

Many of the features that make the XD Indexer the single axis drive/controller of choice are right on the front of the drive. A comprehensive mix of digital and analog I/O is available to satisfy diverse application requirements. Industry leading innovations such as USB communication and an onboard 24Vdc power supply output make the XD Indexer easy to commission quickly.

***“Hardware Features  
Designed for Fast Integration  
and Easy Troubleshooting”***



### Status Display

This display, along with several status LEDs, communicates vital axis information at a glance. Fault code, drive IP address, and motion execution information (“J” for jogging, “H” for homing) is displayed here.

### USB Communication

This USB connection uses the easiest and most prevalent communication method available on PCs. Set up your drive and exercise motion easily with no IP configuration required and no serial communication converter.



### 24 VDC Power Supply

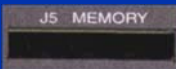
Use as input for control power, as output to power digital inputs and outputs, or to supply power to an operator interface (HMI).

### Ethernet Communication

Ethernet connectivity provides fast and easy communication with the XD Indexer whether commissioning the drive from your laptop, or communicating with other control devices in a system such as an operator interface or PLC.



### Flash Memory Storage<sup>1</sup>



Every drive has a flash memory card slot for storing drive parameters and programs on removable media. Cloning an axis and storing important machine related files is simple.

### Safety Circuit (Optional)

For machines that require low level, redundant safety circuitry, an internal safety relay is available. This supports a cost-effective implementation of the EN13849-1 standard. Two contacts must be closed to allow the motor to be energized.



## XD-Indexer Servo Drive System Components

The XD-Series Indexer, a single axis integrated controller and servo drive delivers high performance motion control. Typical system components:

### Servo Drive

- DC Power supply & cables
- Input power & cables
- Optional
  - E-Stop device
  - Regen resistor (SAC-SWRR)
  - Line Filter (SAC-LF)

### Servo Motor (MAC-M)

- Power cable
- Feedback cable

### Pacer Encoder (optional)

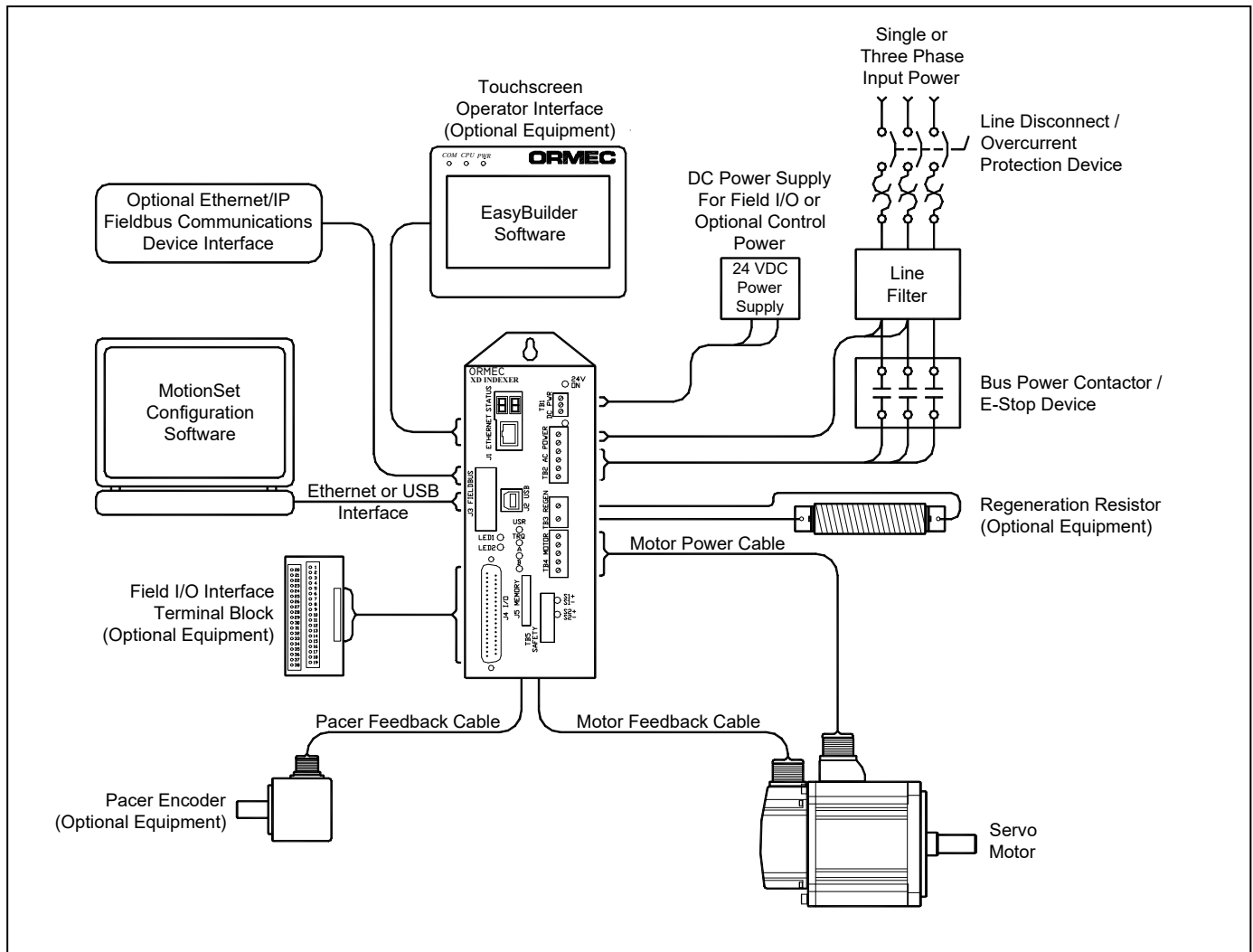
- Pacer cable

### PC for Configuration Software

- Ethernet interface (preferred) or USB interface
- Motion Set software included

### Operator Interface (HMI)

- MMI-MT8xx0iE series
- Easy Builder software included
- Ethernet crossover cable



# XD-Indexer Configuration

## Ordering Guidelines – From Indexer Reference Manual SAC-XD-01m

Rated Power		Series	Motor Voltage	Output Current	Feedback	Control Power <sup>1</sup>	Pacer (Aux) Feedback	I/O & Fieldbus	Regen <sup>3</sup>	Safety Circuit
		SAC-XD	V	AA	- F	C	P	F	R	S
KW	HP									
0.7	1.0		2 (200V)	03	N  (quad encoder, serial, EnDat)	D A	0 (none) 1 (encoder)	0 (digital: 14 in, 8 outs)  1 (digital I/O plus Ethernet I/P)	0 R	0 (none) S (STO)
1.2	1.6			05		D A			0 R	
2.4	3.2			10		D A			0 R	
3.6	4.8			15		D A			0 R	
6.0	8.0			25		D A			R	
8.4	11			35		D A			R	
14.0	19			60		D A			R	
1.4	2.0		4 (400V)	03	R  (Resolver, SinCos)	D	A (controller/ analog)	R		
2.4	3.2			05		D		R		
4.8	6.4			10		D		R		
8.1	10.9			17		D A		R		
12	16			25		D A		R		
17	22			35		D A <sup>2</sup>		R		
24	32			50		D A <sup>2</sup>		R		

Notes:

<sup>1</sup> Control power: D = 24 VDC, A=115-240 VAC

<sup>2</sup> AC Control power limited to 208-240 VAC

<sup>3</sup> Regen: R = Regen support circuit present. External resistor required. 0 = no circuitry installed.

### Application description:

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# XD-Indexer Configuration

## Motor

### Voltage/Current

- 230 VAC motor requires Indexer 200V series at \_\_\_\_ amps
- 460 VAC motor requires Indexer 400V series at \_\_\_\_ amps
- ORMEC Model MAC-M \_\_\_\_\_ - \_\_\_\_\_
- Other motor. Make and model \_\_\_\_\_
- Cable for power
- Cable for feedback

## XD Indexer

### Options

#### Feedback

- Encoder, Quadrature, Sigma II, Tamagawa, TS56xx
- EnDat 2.1, 18 bit
- Resolver

#### DC/AC Logic for Control power

- 115/230 AC Indexer model XD\_\_ \_\_ \_\_ - \_\_ A
- 24 VDC Indexer model XD\_\_ \_\_ \_\_ - \_\_ D

#### Pacer

- none
- include

#### Fieldbus Protocol

- MODbus/TCP (included)
- Ethernet/IP
- Profinet (forthcoming)

#### Regen

- none
- include

#### Safety

- none
- include

Indexer base part number: SAC-XD \_ \_ \_ - \_ \_ \_ \_ \_

## I/O connections

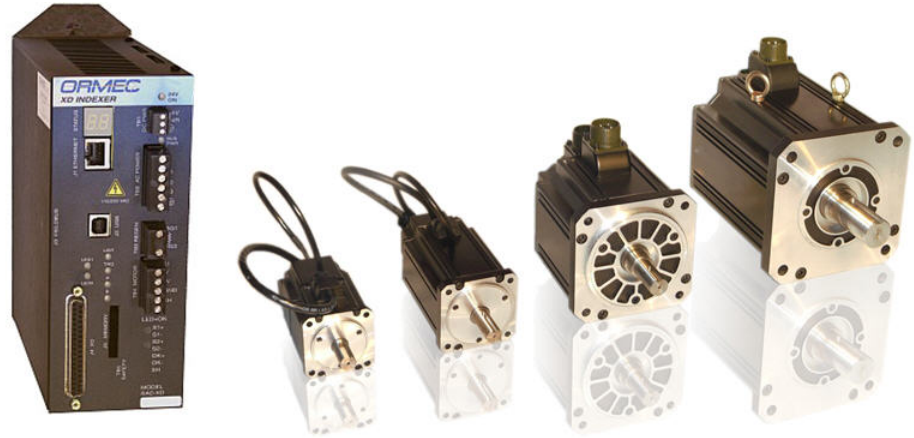
- Terminal block plugs on Indexer. Order CON1110
- Only a few connections. Recommend CBL-XD-IO-X. Replace X with number of positions.
- I/O power supply. 1A included with Indexer with AC control power.

## HMI

- MMI-MT8 \_ \_ \_ Screen size \_\_\_\_\_

ORMEC's XD-Indexer integrates with the cost-effective M-series AC brushless servo motors. The motors provide high torque-to-inertia ratios and **excellent** continuous torque and peak torque performance in a compact design. These industrial quality servo motors incorporate high performance neodymium magnets and a highly efficient stator winding design which results in excellent power density.

The M-series servo motors' compact design with high power density feature extremely durable construction with heavy duty bearings.



*The XD-Indexer integrates with the cost-effective M-Series of motors.*

**Motor Features**

- 230 or 460 VAC versions
- UL certified and CE marked
- Continuous stall torques from 1.4 to 845 in-lb (0.16 to 95.5 N-m)
- Peak torques up to three times the rated torque
- Output power from 50 to 16,000 watts ( 0.07 to 21.5 HP)
- High maximum speeds from 3,000 to 5,000 RPM
- Standard incremental encoder resolution 12,000 counts
- Class F insulation over Class B temperature rise provides additional thermal headroom for longer winding life under rated operating conditions
- Minimum torque ripple & cogging for smooth low-speed performance
- Totally Enclosed Non-Ventilated (TENV) standard IP-65 except shaft opening, optional shaft oil seal is available.
- Optional fail-safe holding brakes

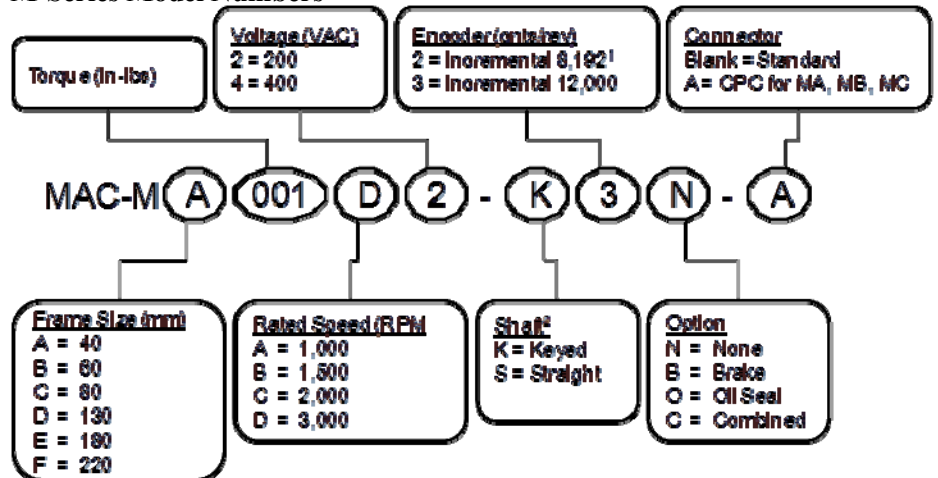
**Performance**

The performance of these servo motors is a direct function of the factory-matched servo motor/drive combination.

ORMEC's XD-Indexer provides software controlled all-digital performance for consistent operation that totally eliminates analog potentiometer adjustments. High bandwidth operation and a quality high resolution encoder

provide the accuracy and response required for demanding applications. Peak torques, up to three times the rated torque, are available for a few seconds, allowing the motor/drive to handle high inertial loads and heavy duty cycle requirements. The motor parameters are configured in software for high performance and RMS current limiting.

**M-Series Model Numbers**



<sup>1</sup> The 8,192 Encoder is only available with the MA-Series Motor, all other motors will have the 12,000 Incremental encoder.  
<sup>2</sup> Other shaft options may be available with special order.

MAC-MA, MAC-MB, MAC-MC and MAC-MD motors are UL approved. All motors carry the CE mark and are RoHS compliant.

The available encoder resolutions [shown post quadrature] for each motor family are noted in this chart:

MA	MB	MC	MD	ME	MF
8,192					
	12,000	12,000	12,000	12,000	12,000



# XD-Indexer – M-Series Motor Selection Charts

ORMEC's all-digital drive technology provides the ability to control a range of servo motors with the XD-Indexer Servo Drive. The chart (below) provides the recommended Indexer/M-Series motor combination.

The recommended Indexer (☼) provides sufficient power to provide the continuous torque specified for the corresponding servo motor.

XD-Indexer SAC -XD Servo Motor	230VAC							Motor Cable	Encoder Cable
	203	205	210	215	225	235	260		
MAC-MA001D2	☼							CBL-MM1*	CBL-ME1*
MAC-MB003D2	☼								
MAC-MB006D2	☼								
MAC-MB011D2	☼								
MAC-MC016D2		☼						CBL-MM2	CBL-ME2
MAC-MC022D2		☼							
MAC-MC028D2			☼						
MAC-MD025B2		☼							
MAC-MD025D2		☼						CBL-MM2	CBL-ME2
MAC-MD028D2			☼						
MAC-MD050B2			☼						
MAC-MD050D2			☼						
MAC-MD070B2			☼					CBL-MM2	CBL-ME2
MAC-MD070D2				☼					
MAC-MD095B2				☼					
MAC-MD095D2					☼				
MAC-ME100B2				☼				CBL-MM3	CBL-ME2
MAC-ME160B2					☼				
MAC-ME250B2						☼		CBL-MM4	CBL-ME2
MAC-ME335B2							☼		
MAC-ME420B2							☼	CBL-MM5	CBL-ME2
MAC-MF475B2							☼		
MAC-MF620B2							☼		

XD-Indexer SAC -XD Servo Motor	460 VAC							Motor Cable	Encoder Cable
	403	405	410	417	425	435	450		
MAC-MD025B4	☼							CBL-MM6	CBL-ME2
MAC-MD025D4	☼								
MAC-MD050B4		☼							
MAC-MD050D4		☼							
MAC-MD070B4		☼						CBL-MM6	CBL-ME2
MAC-MD070D4			☼						
MAC-MD095B4			☼						
MAC-MD095D4			☼						
MAC-ME100B4			☼					CBL-MM7	CBL-ME2
MAC-ME160B4				☼					
MAC-ME250B4				☼				CBL-MM3	CBL-ME2
MAC-ME335B4					☼				
MAC-ME420B4					☼			CBL-MM3	CBL-ME2
MAC-MF475B4						☼			
MAC-MF620B4						☼		CBL-MM5	CBL-ME2
MAC-MF845B4							☼		

\*Optional connector available.

Note: Flexible Cable options are available. Consult ORMEC Sales Support at (585) 385-3520 or email: [sales@ormec.com](mailto:sales@ormec.com)

ORMEC's XD-Indexer integrates N-series AC brushless servo motors provide high torque-to-inertia ratios and excellent continuous torque and peak torque performance. With a compact design, these industrial-quality servo motors incorporate high performance permanent magnets and a highly efficient stator winding design. This provides excellent power density.

The N-series servo motors completely eliminate brush wear maintenance problems and feature extremely durable construction. They include heavy duty bearings.



*The XD-Indexer integrates with the cost-effective N-Series of motors.*

### Motor Features

- Continuous stall torques from 28 to 620 in-lb (3 to 70 N-m)
- High peak torques from 85 to 1550 in-lb (10 to 175 N-m)
- Output power from 1000 to 11,000 watts (1 to 15 HP)
- High maximum speeds from 2,000 to 6,000 RPM
- 200 VAC and 400 VAC operation
- Incremental and absolute encoder resolutions up to one million counts per revolution
- Class F insulation provides additional thermal headroom for longer winding life under rated operating conditions
- Minimum torque ripple & cogging for smooth low-speed performance
- Totally Enclosed Non-ventilated (TENV) standard IP-67 rating except shaft opening, optional shaft oil seal is available.
- Optional fail-safe holding brakes.

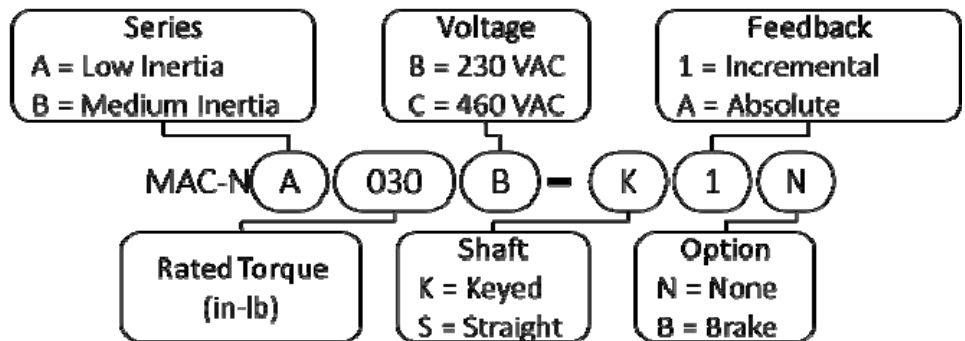
### Performance

The performance of these servo motors is a direct function of the factory-matched servo motor/drive combination.

ORMEC's XD-Indexer provides software controlled all-digital performance for consistent operation that totally eliminates analog potentiometer adjustments. High bandwidth operation and a high-resolution serial pulse encoder

provide the accuracy and response required for demanding applications. Peak torques, up to three times the rated torque, are available for a few seconds, allowing the motor/drive to handle high inertial loads and heavy duty cycle requirements. The motor parameters are configured in software for high performance and RMS current limiting.

### N-Series Model Numbers



# XD-Indexer – N-Series Motor Selection Charts

ORMEC's all-digital drive technology provides the ability to control a range of servo motors with the XD-Indexer Servo Drive. The chart (below) provides the recommended Indexer/M-Series motor combination.

The recommended Indexer (☼) provides sufficient power to provide the continuous torque specified for the corresponding servo motor.

Motor Model Numbers	SAC-XDxxx-N												Input Power <sup>(1) (2)</sup> Watts/amps
	230 VAC Drives					460 VAC Drives							
	210	215	225	235	260	403	405	410	417	425	435	450	
MAC-NA030B	☼												1,100 / 4.8
MAC-NA030C						☼							1,100 / 2.4
MAC-NA055B		☼											2,100 / 9.1
MAC-NA055C								☼					2,100 / 4.6
MAC-NA090B			☼	✓									3,300 / 14
MAC-NA090C								☼					3,300 / 7.2
MAC-NA110B			☼	✓	✓								4,290 / 19
MAC-NA110C									☼	✓			4,290 / 9.3
MAC-NA140B				☼	✓								5,390 / 23
MAC-NA140C									☼	✓			5,390 / 12
MAC-NB055B	☼												940 / 4.1
MAC-NB055C							☼						940 / 2.0
MAC-NB080B		☼											1,430 / 6.2
MAC-NB080C								☼					1,430 / 3.1
MAC-NB100B			☼										1,980 / 8.6
MAC-NB100C								☼					1,870 / 4.1
MAC-NB200B			☼	✓									3,190 / 14
MAC-NB200C									☼				3,190 / 7
MAC-NB300B				☼	✓								4,840 / 21
MAC-NB300C									☼	✓			4,840 / 11
MAC-NB330B					☼								6,050 / 26
MAC-NB330C										☼			6,050 / 13
MAC-NB465B					☼								8,250 / 36
MAC-NB465C										☼	✓		8,250 / 18
MAC-NB700B					☼								12,100 / 53
MAC-NB700C											☼		12,100 / 26
MAC-NB840C												☼	16,500 / 35.9
MAC-N1200C												☼	24,200 / 52.6

☼ Recommended drive model      ✓ Compatible drive model

Note: Flexible Cable options are available. Consult ORMEC Sales Support at (585) 385-3520 or email: [sales@ormec.com](mailto:sales@ormec.com)

## MMI-MT8000iE Series MMI-cMTX Series Touch Screens

ORMEC's Human Machine Interface Models MMI-MT8000iE & MMI-cMTX flat panel touch screens are available to ORMEC Motion Controllers such as the SMLC and XD-Series Indexer Drives.

Available in 4 sizes of 4.3", 7.0", 10.1", 12.1", and 15", the TFT LCD Display can be used to present machine functions such as:

- Setup
- Maintenance
- Product run changes
- Operational status
- Operational control
- Fault conditions

These easy-to-use graphical operator displays provide alerts for machine alarms and status conditions.

Operator control can be built into the ORMEC HMI representing a conventional factory operator panel, without additional bulky hardware, I/O modules, and wiring.

Each individual display can be designed and built quickly using the "drag and drop" graphical objects found in the EasyBuilder Pro application development utility, downloaded at no charge at:

<https://www.ormec.com/Support/Support-Library/HMI-Software>



*ORMEC's touch screen operator interfaces provide a fully graphical, easy-to-use human-machine interface.*

Depending upon the HMI selected, up to 4GB on-board FLASH memory is available. An SD Card Slot is also available on 12.1" and 15" displays.

HMI's with SD Cards can be used for storage and retrieval of both machine set-up parameters and product recipes. Refer to the Ordering guide below for specific features and options for each HMI.

Communication with an ORMEC motion control device such as an SMLC or XD-Indexer Drive is through Ethernet using Modbus/TCP.

**Operation: SMLC and SMLCe**  
Screen objects are assigned to input and output registers that are mapped

to input and output variables in the application program running on the controller. They can also be used to set values for motion parameters, triggering motions from the motion table, jogging the motor, homing the motor, turning on drive outputs, clearing fault conditions, and more.

**Operation: XD-Series Indexer Drive**  
Screen objects are assigned to registers in the Indexer and can display current values from the servo drive. They can also be used to set values in the drive's registers for motion parameters, triggering motions from the motion table, jogging the motor, homing the motor, turning on drive outputs, clearing fault conditions, and more.

## Ordering Guide

### Operator Interface Terminals

MMI-MT8051E**	HMI 4.3" Diagonal, 480W X 272H Resolution, TFT Color, 10/100 Base-T Ethernet x1, 128MB Flash Storage 24VDC
MMI-cMT2078X**	HMI 7" Diagonal, 800W X 480H Resolution, TFT Color, 10/100 Base-T Ethernet x2, 4GB Flash Storage 24VDC
MMI-cMT2108X2**	HMI 10" Diagonal, 1024W X 600H Resolution, TFT Color, 10/100/1000 Base-T Ethernet x2*, 4GB Flash Storage 24VDC
MMI-MT8121XE3	HMI 12" Diagonal, 1024W X 768H Resolution, TFT Color, 10/100 Base-T Ethernet x1, 256MB Flash Storage 24VDC
MMI-cMT2158X	HMI 15" Diagonal, 1024W X 768H Resolution, TFT Color, 10/100/1000 Base-T Ethernet x2*, 4GB Flash Storage 24VDC

\*Second Ethernet Port is only 10/100 Base-T

\*\*16 X 9 Wide Screen Format

### Cables and Accessories

EISKx-100T	Ethernet Switch, 100 Base-T 5, 8 or 16 Port, 24VDC Din Rail Mount
CBL-ENET/x	Ethernet Cable RJ45, 3, 7, 10, 25, 50 75 and 100 ft lengths
CBL-QPPWR/x	24VDC Power Cable to HMI

### Graphical Panel Objects

- Pilot Light (Bit Lamp)
- Word Lamp
- Force Coil (Set Bit)
- Write Register (Set Word)
- Toggle Switch
- Multi-State Switch
- Function Key
- Numeric Input
- Numeric Display
- ASCII Data
- ASCII Display
- Moving Shape
- Animation
- Indirect Window
- Direct Window
- Alarm Display
- Trend Display
- XY Plot
- Bar Graph
- Meter Display
- Alarm Bar
- Recipe Upload/Download
- Event Display

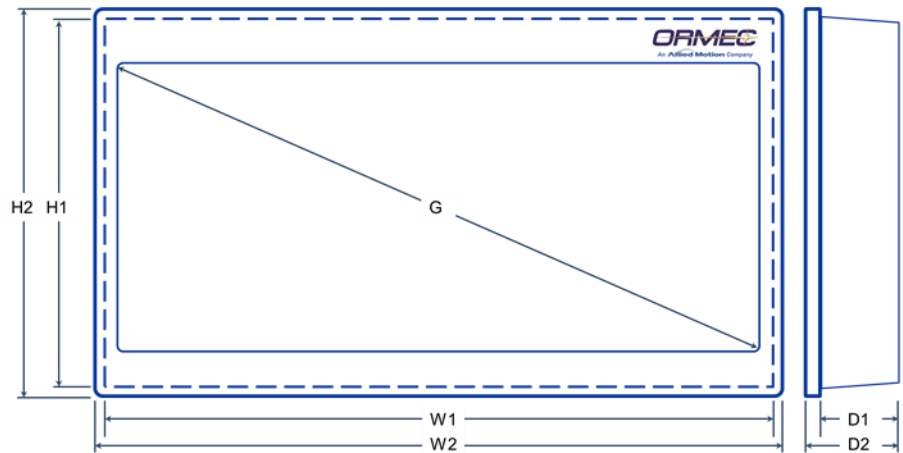
### LED Indicators

Each unit has three status indicator LEDs to assist with installation and troubleshooting.

**PWR** - Indicates the unit has power.

**CPU** - Indicates that the processor is operating properly.

**COM** - Flashes during Ethernet communications.



Dimensions	MT8051iE	cMT2078X	cMT2108X2	MT8121XE3	cMT2158X
G	109 mm 4.3"	178 mm 7"	254 mm 10"	307 mm 12.1"	381 mm 15"
H1	93 mm 3.7"	138 mm 5.4"	202 mm 8"	231 mm 9.1"	279 mm 11"
W1	119 mm 4.7"	192 mm 7.6"	260 mm 10.2"	305 mm 12"	352 mm 13.9"
D1	25.3 mm 1"	27.6 mm 1.1"	32 mm 1.3"	36.5 mm 1.4"	41 mm 1.6"
H2	102 mm 4"	146 mm 5.7"	213 mm 8.4"	241 mm 9.5"	293 mm 11.5"
W2	128 mm 5"	200 mm 7.9"	271 mm 10.7"	317 mm 12.5"	366 mm 14.4"
D2	32 mm 1.3"	35 mm 1.4"	38 mm 1.5"	41 mm 1.6"	48 mm 1.9"

### Mounting & Sealing

MMI units are cabinet mounted and feature a gasket and four or six mounting brackets to maintain a NEMA 4 rating.

### CE Mark

All MMI units are CE Marked, indicating compliance with European Union directives EN 55081-2 and EN50082

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## General Specifications

	Display Resolution	Weight	Current	Environment*	Operating Temperature
MMI-MT8051iE**	480W X 272H Pixels	0.3 kg 0.6 lb	0.45 Amp	NEMA4/IP65	0° to 45° C 32° to 113° F
MMI-cMT2078X**	800W X 480H Pixels	0.6 kg 1.3 lb	0.82 Amp	NEMA4/IP66	0° to 55° C 32° to 131° F
MMI-cMT2108X2**	1024W X 600H Pixels	1.2 kg 2.6 lb	1.00 Amp	NEMA4/IP66	0° to 50° C 32° to 122° F
MMI-MT8121XE3	1024W X 768H Pixels	1.7 kg 3.7 lb	1.50 Amp	NEMA4/IP65	0° to 50° C 32° to 122° F
MMI-cMT2158X	1024W X 768H Pixels	2.74 kg 6.0 lb	1.30 Amp	NEMA4/IP66	0° to 50° C 32° to 122° F
<b>Touch Panel Type:</b>	4-Wire Resistive	<b>Storage Temperature:</b>	-20° to 50° C	-4° to 140° F	
<b>Color Type:</b>	TFT +16M Color	<b>Relative Humidity:</b>	10% to 90% Non-Condensing		
<b>Installation:</b>	Cabinet Mount	<b>*Environment:</b>	Front Panel		
<b>Vibration:</b>	10 - 25 Hz. 2Gs X, Y, Z Plane for 30 Minutes				

ORMEC-MKT-0400-00

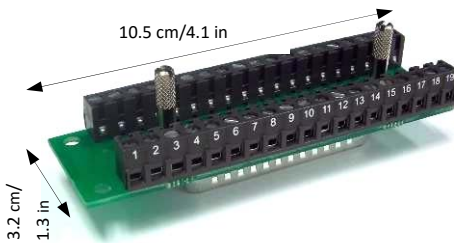
**The XD-Indexer offers three approaches for I/O connectivity:**

- Drive Mounted Connector
- Panel Mounted I/O Cable Assembly
- Custom Panel Connection Kit

Each is easy to implement, operate and maintain.

**Drive Mounted Connector**

A single piece D-Sub to terminal block mounts directly to the top of the Indexer drive. This provides terminal block access to the 37 I/O points.



**Ordering Number:**  
CON1110  
I/O connector, Indexer mounted terminal block

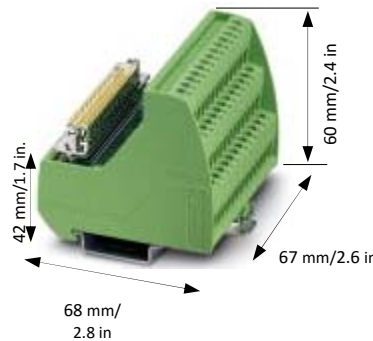
**Panel Mounted I/O Cable Assembly**

A fully tested cable assembly takes all the I/O connections to the panel.

Assembly includes:

- Terminal block that mounts on a 35mm standard DIN rail, with screw style terminals for field wiring
- One of two cables:

**3B** - Standard current capability (6 ft.)



**Ordering Number:**  
CBA-XD-IO-3B-37/6

Cable assembly, I/O with panel mounted terminal block

**Cable Specifications**

	<b>Current Rating</b>	<b>Length</b>
<b>Standard (3B)</b>	150 mA*	6 ft..

\*Does not support full current capabilities of the Indexer's digital outputs.

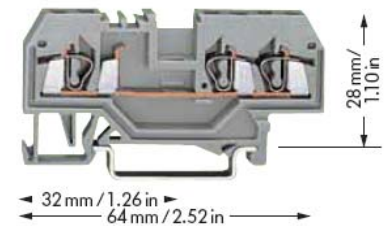
**Custom Panel Connection Kit**

A cable is customized to connect a subset of I/O connections to the panel. This is for applications that do not require the full complement of 37 I/O points.

Kit includes:

- Solder cup D-Sub that connects to the J4 I/O connector on the Indexer. (includes a shell)
- Specified number of DIN rail mounted terminals.
- Two terminal end blocks

The single terminals are wire-to-wire, spring contact connection devices.



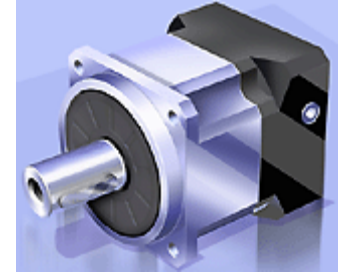
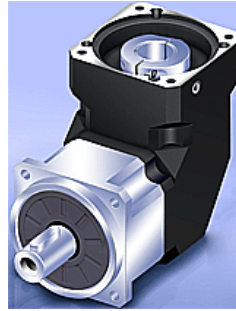
**Ordering Numbers :**

CBK-XD-IO-5  
CBK-XD-IO-10  
CBK-XD-IO-15  
CBK-XD-IO-20  
CBK-XD-IO-25  
CBK-XD-IO-30  
CBK-XD-IO-35  
CBK-XD-IO-37  
I/O Kit, D sub connector with panel mount terminal block, no wire

Additional options are available. Consult ORMEC sales at: (585) 385-3520 or email sales@ormec.com

The GBX servo gearbox family is designed for direct connection to the ORMEC servomotors used with the XD-Indexer. They are high precision, low backlash servo gearboxes for industrial motion control applications.

The GBX-AB-Series and the cost effective GBX-AE-Series are helical planetary gearboxes. They are designed for continuous (S1) or cyclic (S5) duty operation. Both the GBX-AB and GBX-AE families have inline shafts and right angle models.



*The AB-Series are the standard option.*

## Gear Box Features

- Five Year Warranty
- Stainless steel construction
- Mount in any position:  
Synthetic gear grease
- 7 Frame sizes: from 42mm – 235 mm
- Other models available for drop-in replacement of competitor products
- Output torque: 14 Nm - 2000 Nm (124 in-lb – 17,700 in-lb)
- High Input speeds up to 10,000 RPM (depending on application)
- Easy mount: Standard metric or NEMA frames with simple mounting adapters
- Low noise: 56 dB - 74 dB, depending on model



*The AE-Series are the cost-effective option.*

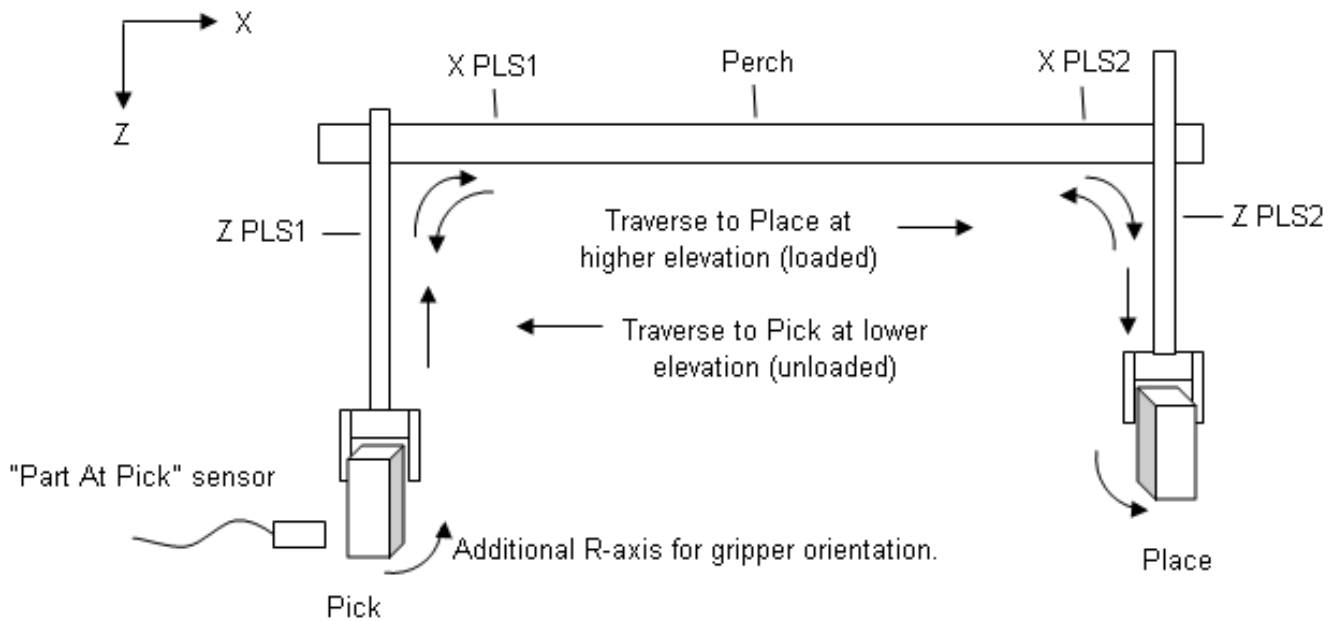
## Fundamental Planetary Design

The power is transmitted from the motor to sun gear. The sun gear drives three planet gears, which are contained within an internal toothed ring gear. The planet gears are mounted on the planet carrier with double wall supports. The planet carrier is part output shaft. When the sun gear rotates, it drives the three planet gears inside the ring gear, and as the planet gears rotate automatically the output shaft rotates

Due to load sharing into multiple tooth contacts, the planetary gearbox (gear heads) provides the highest torque and stiffness for a given envelope. The other significant advantages are simple and efficient lubrication and a balanced system at high speeds. The balanced planetary kinematics and the associated load sharing make planetary-type gearboxes ideal for servo applications.

For further information call ORMEC Sales at 585 385-3520 or email [sales@ormec.com](mailto:sales@ormec.com)

## Pick and Place—Indexer Configuration



### Description of Application

This pre-engineered Indexer configuration is designed for a Pick and Place application.

Pick and Place mechanisms are used to transfer parts between two or more locations. There are many different implementations of Pick and Place mechanisms including Cartesian, SCARA, Delta robots and others. The ORMEC configuration consists of horizontal (X) and vertical (Z) linear actuators with an attached gripper. When a part is detected at a Pick position, the gripper will move to that position and grip the part. It then traverses to the Place position where part is released. Pick and Place systems are often required to operate at fast cycle rates. For this reason, the motion of the X and Z axes are 'overlapped' at the corners of XZ envelope. An additional rotation axis (R) is used to control the gripper orientation.

### ORMEC Indexer Implementation

An ORMEC Pick and Place implementation consists of two or three XD-Indexers and an MMI 8000 Series touch screen panel. The MMI is used to calculate motion parameters for the Indexers based upon a set of entered parameters. The MMI also provides logic controller functionality with application logic routines (macros) written in a readable text-style language. This logic is stored in the MMI memory.

The system provides typical control functions for each axis that include: homing, jogging, diagnostics, I/O control, Manual/Auto mode, etc. All machine and process parameters are accessed via the MMI.

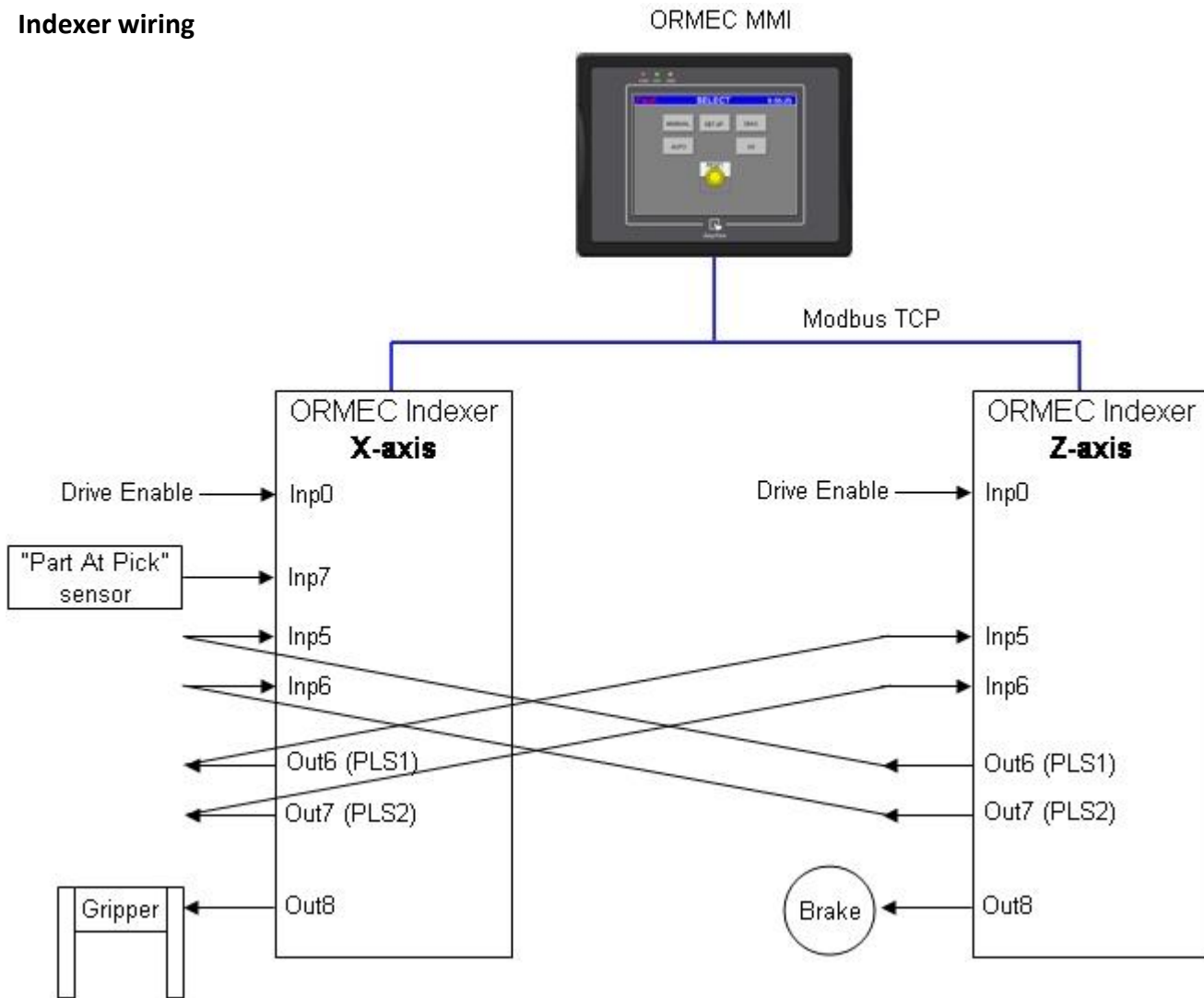
On power up, the operator homes the system in Manual mode. The Z-axis homes first followed by the X-axis. A Manual Gripper control is available in both Manual and Auto modes. It is used for purging a part from gripper.

When the cycle starts in Auto mode, the gripper moves to a Perch position where it waits for the part to present at the Pick location. When the part is ready, the gripper moves horizontally toward the Pick position and then the Z-axis descends to the Pick height. At a preprogrammed distance from the Pick height, the gripper slows down for the part approach. When the Pick position is reached, the gripper output (Out8) turns on to grip the part. After a short delay (Gripper On Delay) the gripper moves upward and then horizontally toward the Place position.

As the gripper descends towards the Place position, it slows down at the preprogrammed distance from the Place height. When at the Place position, the gripper output (Out8) turns off to release the part. After a short delay (Gripper Off Delay) the gripper moves upward and then horizontally to the Perch position. If while moving a new part is detected at Pick position, the gripper continues to the Pick position. Otherwise, it stops and



## Indexer wiring



waits at the Perch position for the next part to present at the Pick location.

For faster cycle rates, the X and Z axes motions are 'overlapped' at the ends of the axes stroke. While the X-axis moves toward the Place or Pick positions, the Z-axis starts descending before the X-axis motion is finished. Similarly, when the Z-axis moves upward, the X-axis starts its motion early. Both Indexers have two outputs (Out6 and 7) configured as Programmable Limit Switches (PLS1 and PLS2). The PLS controlled outputs pulse at preprogrammed positions. These outputs are connected

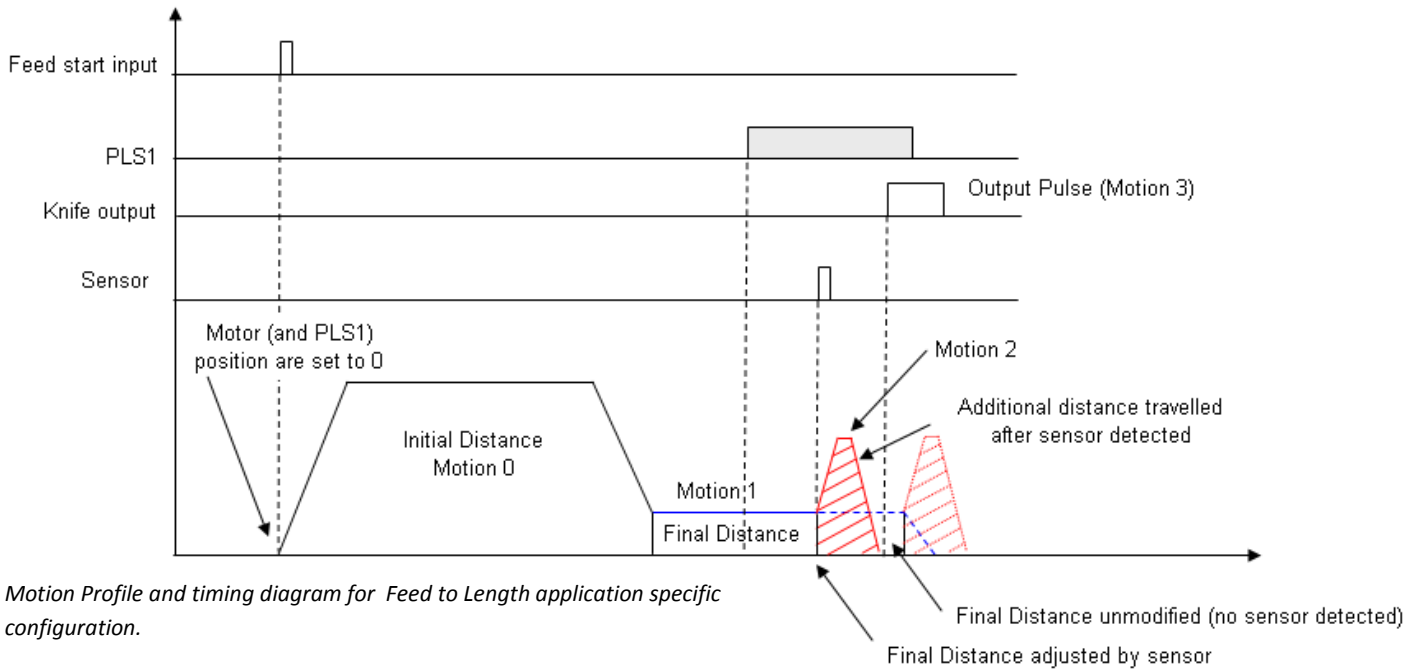
to the inputs (Inp5 and 6) of the other Indexer. These inputs are configured to execute specific motions - 'Pick' and 'Place' on the X-axis and 'Height Loaded' and 'Height Empty' on the Z-axis. The amount of X and Z axes motion 'overlap' is controlled by adjusting the PLS On positions for each actuator via the MMI.

If gripper orientation control is required, a third Indexer is added to the configuration for the R-axis. While the X-axis traverses between the Pick and Place locations, the gripper orientation is adjusted based upon the Pick Angle and Place Angle parameters.

### Download Configurations

The configuration files for the XD-Indexer and the MMI 8000 Series project files for this application may be downloaded from the XD-Series Software area of the ORMEC website. For additional information, consult ORMEC sales support at (585) 385-3520 or email [sales@ormec.com](mailto:sales@ormec.com)

## Feed to Length—Indexer Configuration



### Description of Application

This pre-engineered XD-Indexer configuration is designed to implement a Feed (Cut) to Length application.

Feed to length applications typically feed material using a nip-roll at a high initial speed for a defined initial distance. The rolls are slowed down to a final speed and continue feeding at the lower speed for a set final distance or until an external high-speed sensor input becomes true. Optionally, an additional fixed distance is moved after a sensor signal is detected.

### ORMEC Indexer Implementation

The digital I/O functions described can be used on any Indexer input or output.

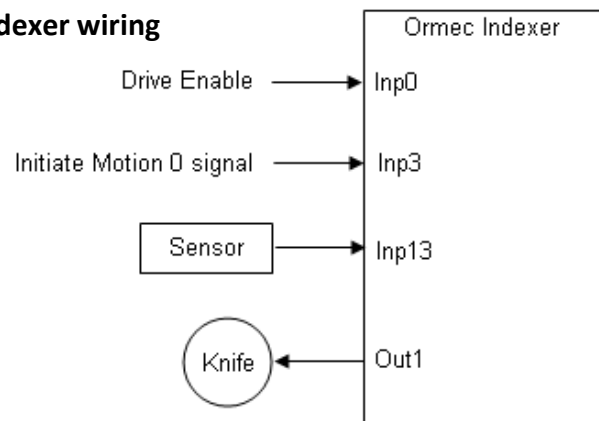
Input 3 is triggered by an external signal (PLC, pushbutton, contact, etc.) This input initiates the initial distance motion configured as 'Initiate Motion 0'.

A sensor is wired to Indexer Input 10 which is configured as 'Sync Condition 1' function. The knife solenoid is wired to Output 1. A sensor signal is gated with the PLS1 output such that it is read only with a position range of 'PLS1 First On' to 'PLS1 Last On'. The motor position is set to 0 at the start of Motion 0. This is done by attaching a second function of 'Set Position to 0' to Input 3 which is configured as 'Initiate Motion 0' (each input allows two

functions). The 'PLS1 First On' position is set to the position from which the sensor signal needs to be watched. The 'PLS1 Last On' position is set to the total distance of Motion 0 and unmodified Motion 1.

\*note: To create a Feed to Length configuration for an Indexer electronically geared to a master encoder use the GearRelativeInMasterDistance motion type.

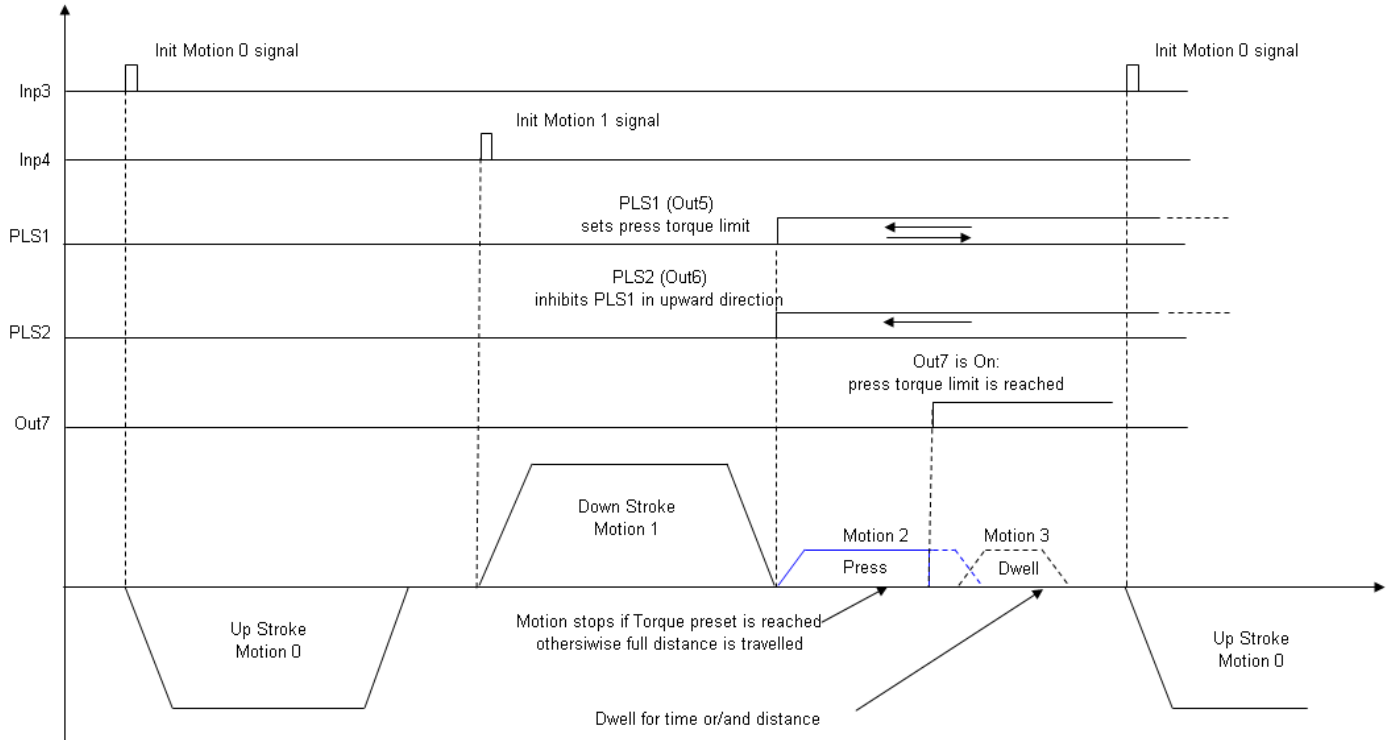
### Indexer wiring



### Download Configurations

The configurations for this application may be downloaded from the XD-Series Software area of the ORMEC website. For addition information, consult ORMEC sales support at (585) 385-3520 or email sales@ormec.com

## Hot Stamp Press—Indexer Configuration



Motion Profile and timing diagram for Hot Stamp Press application specific configuration.

### Description of Application

This pre-engineered Indexer configuration is designed for a Hot Stamp Press application.

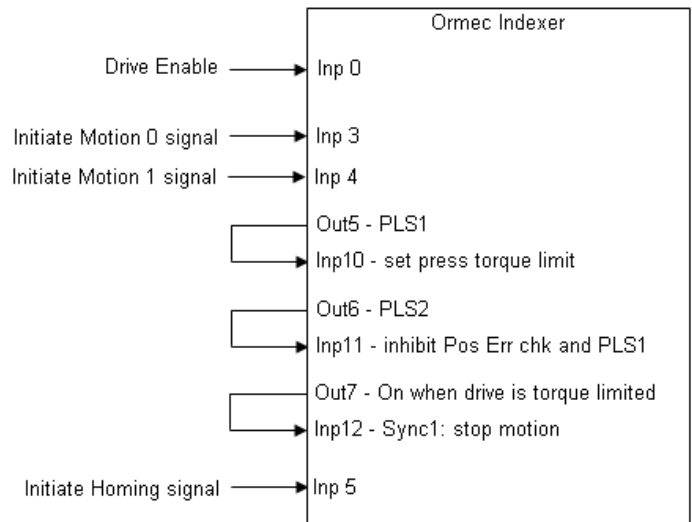
In stamping applications a (heated) die is forced into a material to form an impression. In a typical cycle, the stamp moves rapidly and slows down just before it reaches the material. It continues to move at a slower speed until a required pressure is reached. It then dwells for a fixed period of time. The stamp may be moved down a small amount during the dwell to compensate for the deformation of the material. The final step moves the die rapidly to the start position.

### ORMEC Indexer Implementation

On power up, the die is homed. Input 5 is used to trigger a built-in homing sequence using a rising edge. Homing to vertical (upper) hard-stop motion is used.

Input 3 is triggered by an external signal (PLC, push-button, etc). Input 3 initiates Motion 0 which is an absolute move to Start position. No motion occurs if the die is already at the Start position. When Input 4 is triggered (from an external signal), Motion 1 (down

### Indexer wiring



stroke) is executed. Motion 1 is an absolute move to a position directly above the point of contact with the work piece. After Motion 1 completes, it chains to Motion 2 (Press) which is a relative move for distance. At the start of this motion, PLS1 on Output 6 becomes True and Input 5 will be on. Input 5 is configured as a 'Torque limit 2' function with the Torque Limit 2 set to a drive

output level that produces the maximum desired motor torque for the press action.

Motion 2 will stop early if the drive detects that its output is at the press level limit. This turns on Output 7 configured as 'Drive Torque Limited'. Output 7 will assert Input 12 configured as 'Sync Condition 1'. It is used as a 'Stop Condition' for Motion 2. This causes Motion 2 (Press) to chain to Motion 3 (Dwell). Motion 3 is a relative move for distance in time and has an optional 'Dwell Time' parameter. If the 'Distance' is set to zero and 'Dwell' is non-zero it will simply dwell for time. If 'Distance' is non-zero and 'Dwell' is set to zero, the die will move for a set distance in a set time. This lets you configure a desired die behavior after the pressing motion is complete.

When Motion 3 is finished, the cycle is complete. A new cycle will begin when Input 3 is triggered again. This triggers Motion 0 (Up Stroke). At the start of Motion 0 PLS2 becomes True and Input 11 is on. Input 11 is configured as an 'Inhibit PLS' function. This in turn forces PLS1 to False causing Input 10 to turn off. This sets the drive torque limit back to 100% for upward motion to the Start position. PLS2 is only active in the upward direction so inhibiting the PLS1 responsible for torque limiting action is only done for upward motion. This provides full drive torque when the die is moving up.

#### Notes:

- The 'Following Error Fault' is disabled when the press torque limit is set.
- Indexer software and/or hardware travel limits should be used.
- The Indexer brake (digital output function) functionality should be used for vertical load applications.

#### Download Configurations

The configurations for this application may be downloaded from the XD-Series Software area of the ORMEC website. For addition information, consult ORMEC sales support at (585) 385-3520 or email [sales@ormec.com](mailto:sales@ormec.com)

## Rotary Knife—Cut to Length

Sam Rubin, Sr. Systems Engineer

A rotary knife cuts continuously fed material (web, extrusion, wire, etc.) to specified lengths. The feed and knife axes of motion are synchronously controlled. The solution for this application includes two Indexers, a pacer encoder and an operator touch panel. The knife blade tip must be precisely controlled and travel at a very specific tangential velocity at the point of contact with the material. A series of product recipes are required and are based upon predetermined input variables such as feed length, speed synchronization angle and over-speed coefficient.

The application software for implementation of this generic Indexer solution is available without charge from ORMEC.

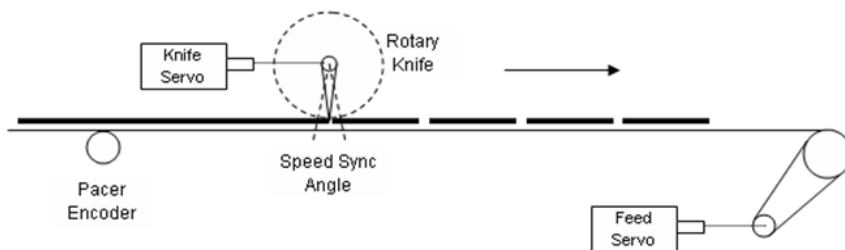
### Benefits of an ORMEC Solution

The ORMEC XD-Indexer Servo Drive system with an operator touch screen MMI is a complete system.

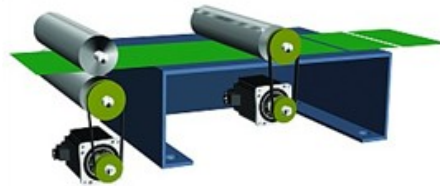
- No PLC or programmable motion controller is required to control the drives.
- Machine logic and calculations are performed within the programmable operator panel using a built-in, BASIC-like macro language.
- Recipes are stored in the MMI panel's non-volatile memory or on removable flash memory card.

ORMEC Engineers have industry expertise with this application.

### System configuration



The XD-Indexer system is comprised of a feed axis Indexer, a knife axis indexer, drives for knife and feed servomotors, a pacer encoder and an MMI touch panel.



### Application

A rotary knife cuts the continuously moving material into discrete products. While cutting, the knife must be synchronized to the material's speed. When the knife is clear of the web, it must be advanced or retarded to allow for the difference in product length and knife pitch circumference.

Continuously fed material is cut to specific lengths with a rotary knife. Industries that use this application include packaging, food processing, and printing.

### Operation

On system power up, an initial screen displays a list of recipes to be run. The desired recipe is selected and loaded by the operator.



Up to 50 unique recipes are available for selection.

Operation can be initiated in either manual or automatic mode.



In manual mode the knife motor and the feed motor can be jogged and homed.

# ORMEC Indexer System

## Hardware

- Two XD-Indexer servo drives
- Pacer encoder
- ORMEC MMI touch panel

## Software

- MotionSet - XD-Indexer
- EasyBuilder - MMI panel

## Communication Interfaces

- ModBus TCP

## Recipes

- Up to 50 unique
- Product specific variables
  - Feed length
  - Speed synchronization angle
  - Over-speed coefficient
- Set-up variables (non-product specific)
  - Knife outer diameter (OD)
  - Knife jog velocity
  - Knife home velocity
  - Knife home offset
  - Feed jog velocity
  - Feed PLS1\* ON position (used to control auxiliary devices such as valves, relays, etc.)
  - Feed PLS1 ON time

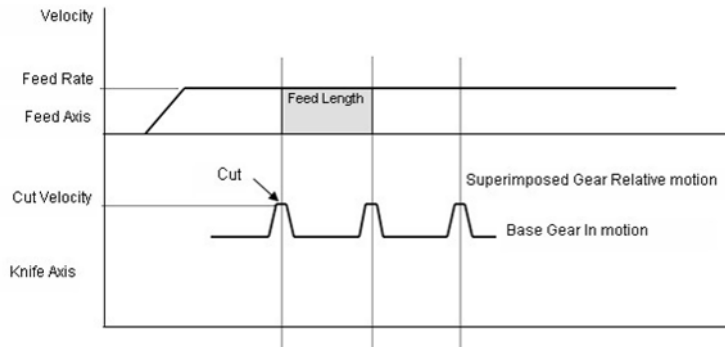
\*PLS = Programmable limit switch. It is used to control a digital output based upon position and time.



Set-up variables such as jog, home and offset velocities are specified as the system parameters.

# Operation details

Upon system power up, the initial MMI display shows the list of recipes that may be run. The operator selects and loads the recipe. Based on process variables, the system calculates a knife motion profile and determines the rotary speed of the knife as it contacts the material. This insures synchronization between the knife and the material being cut.

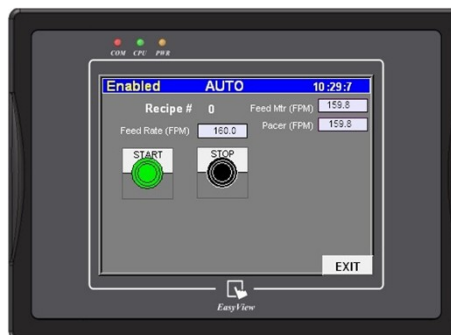


This illustrates typical velocity profiles for the feed and knife axes.

In the automatic mode, the machine sequence is initiated from a Run button on the panel. The Stop button is used to halt the feed axis while the knife axis stays geared (position-synchronized) to the Pacer encoder. The EXIT button terminates both Indexers' motion.

Fault conditions for each Indexer are continuously monitored. If one Indexer has a fault, both Indexers will be disabled. A summary of errors are reported and viewable from an Error Log screen.

Homing and jogging of the knife and feed motors can be performed from a Manual operation screen.



The real-time operating parameters are displayed and the sequencing can be halted from this display.

At ORMEC we are experts in motion control solutions, and have a wealth of experience in a wide variety of industries. As your automation partner, we offer a comprehensive range of automation integration services.

For more information on the XD-Indexer and how to download this rotary knife software please contact us by phone (585) 385-3520 or email us at [sales@ormec.com](mailto:sales@ormec.com)

## XD-Indexer Kits

The XD-Indexer is simple to program and operate. With an Indexer kit it is just as simple to purchase and get going.

The XD-Indexer kits provide all the parts you'll need for a typical industrial motion application. No need to think about all the minor parts you need or to find and purchase them all. The kit supplies all the parts you'll need.

Indexer kits come in 3 variations: parts only, panel mounted or in a full NEMA enclosure.

## XD-Indexer Kit Components

The XD-Series Indexer, a single axis integrated controller and servo drive delivers high performance motion control. Typical main system components:

- Servo Drive
- Motor
- MMI
- Input circuit breaker

- Input circuit breaker
- Line filter
- E-Stop button & reset
- E-Stop Contactor

### Optional components to consider

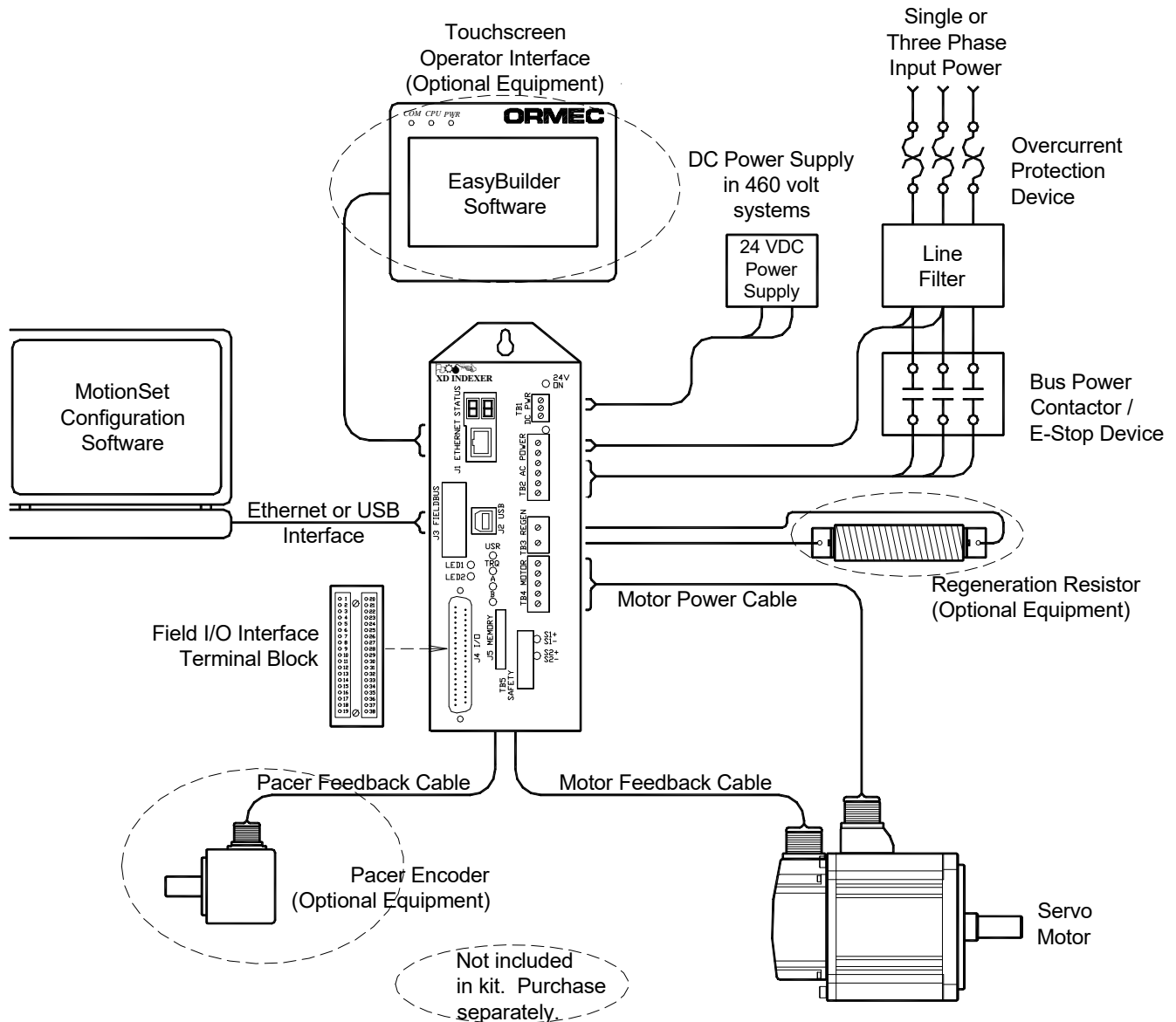
- HMI
- Pacer Encoder and cable
- Regen resistor
- Ethernet switch and cables

### Other options

- Ethernet/IP
- SMLC / PLC

### The Kit contains

- Servo Drive
- Motor
- Motor cables



# XD-Indexer - Kits Selection Guide

## What's an Indexer?

The XD-Indexer is a combination servo drive and controller in one. Performing precise motion requires brains and brawn. A servo drive provides closed loop position/velocity/torque control of a motor. It just follows the commands from some controller, being the muscle of the operation. The brains are in the controller, determining speed vs. time calculations, monitoring I/O points and providing status. The XD-Indexer builds the controller into the same package as the servo drive. This eliminates the need for another controller such as a PLC, significantly reducing costs.

The controller built into the XD-Indexer is powerful enough to perform most motions typically required yet extremely simple to program. Using ORMECs MotionSet configuration software motions are defined in a simple menu driven process and I/O using a drag and drop interface. Complete information on the XD-Indexer can be found at <http://www.ormec.com/Products/Drives/XD-Series-Indexer-Servo-Drive.aspx>.

## Application examples

Motions which require precise speeds and/or positions; fast response to an I/O point; easily adjustable speed or position are all excellent applications.

The XD-Indexer provides high resolution motion. The kits have standard rotary resolutions of 12,000 counts/rev., which is equal to 1.8 arc minutes. A driven lead screw with a 1" pitch has a linear resolution of 83.3 micro inches. A belt driven with a 6" diameter pulley has a belt position resolution of 1.57 mils. Optional motors support resolutions to 23-bits, which is equal to 0.154 arc seconds.

## Feed to Length

Feed to length applications typically feed material using a nip-roll. The feed is at a high initial speed for a defined distance. The feed rate is reduced and feeding continues to a set final distance or until an external high-speed sensor becomes true, stopping at the sensor or some fixed distance after. When the feed is complete an I/O signal is output which can be used to trigger the next motion or machine operation.

Benefits as an upgrade from a mechanical clutch/brake or a feed to hard stop system include superior accuracy and repeatability and less stress on the parts or material. Clutch/brake systems wear out reducing accuracy. Feed to stop bangs the part and machine with each cycle.

Additional details and design information can be found at [Indexer Feed to Length](#)

## Pick and Place

Pick and Place mechanisms are used to transfer parts between two or more locations. There are many different implementations of Pick and Place mechanisms including Cartesian, SCARA, Delta robots and others. A 2-axis system consisting of horizontal (X) and vertical (Z) axis can be easily designed with a pair of XD-Indexers. Linear actuators with an attached gripper are used to move parts. When a part is detected at a Pick position, the gripper will move to that position and grip the part. It then traverses to the Place position where the part is released. Pick and Place systems are often required to operate at fast cycle rates. For this reason, the motion of the X and Z axes are 'overlapped' at the corners of the XZ envelope. An additional rotation axis  $\theta$  can be used to control the gripper orientation.

Additional details and design information can be found at [Indexer Pick and Place](#)

## Rotary Knife – Cut to length

A rotary knife cuts continuously fed material (web, extrusion, wire, etc.) to specified lengths. The feed and knife axes of motion are synchronously controlled. The solution for this application includes two XD-Indexers, a pacer encoder and an operator touch panel. The knife blade tip must be precisely controlled and travel at a very specific tangential velocity at the point of contact with the material. A series of product recipes are required and are based upon predetermined input variables such as feed length, speed synchronization angle and over-speed coefficient.

Additional details and design information can be found at [Indexer Rotary Knife](#)

## Hot Stamp Press

In stamping applications a (heated) die is forced into a material to form an impression. In a typical cycle, the stamp moves rapidly and slows down just before it reaches the material. It continues to move at a slower speed until a



# XD-Indexer - Kits Selection Guide

required pressure is reached. It then dwells for a fixed period of time. The stamp may be moved down a small amount during the dwell to compensate for the deformation of the material. The final step moves the die rapidly to the start position.

Additional details and design information can be found at [Indexer Hot Stamp Press](#)

## Why choose a kit?

The kit saves you time. All the recommended standard parts are selected and included. You save the time required to look at all the specs, make a selection and order the part. Save even more time by selecting panel mount or enclosure versions and the wiring is also completed for you.

The kit saves you money. The price for the kit is less than the price of the individual components.

The kit comes preconfigured. The Indexer will come preconfigured for your motor and will contain example motions. This saves startup time and your system is ready to go when it arrives.

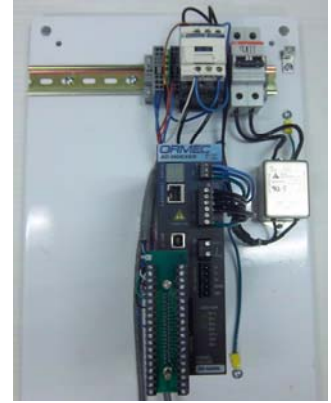


Figure 1 Panel mounted kit

Be up and running in minutes with a panel or enclosure kit. Connect input power wires. Connect the motor (< 1 minute). Turn on the power. (10 seconds). Indexer power up sequence. (7 seconds). Toggle enable switch (3 seconds). Initiate motion 1 (5 seconds). Total time to motion is under 5 minutes after power is connected.

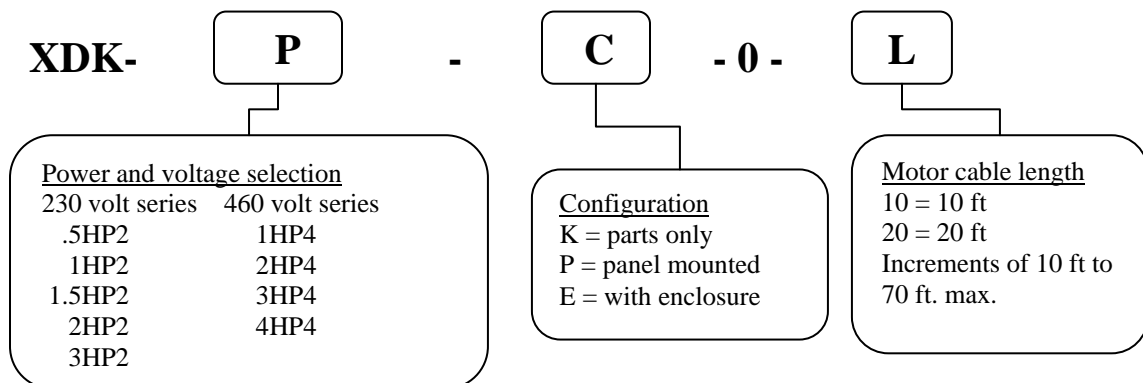
## Choosing a kit

Using the specification and ordering guide sections you should be able to build your part number.

Only a few choices are needed to select the correct kit. First, voltage – 230 or 460 nominal voltage. Second, which motor – power and speed requirements? Performance curves are included later in this document. If you need help call us at ORMEC. With that information you can determine the basic kit model. Next choice is how the parts are delivered – loose parts, mounted on a panel or on the panel and in an enclosure. The final selection is the length of the motor cables – how far from the electronics to the motor.

## Ordering Guide

### Indexer kit model numbers



Panel size is 17" x 13" and includes a 17" x 5" area for your parts.

Enclosure size is 24" x 16" x 12" (hwd)

Examples:

XDK-1HP2-P-0-30

1 HP 230 V motor kit, panel mounted parts and 30 ft motor cables.

XDK-3HP4-K-0-60

3 HP 460 V motor kit, loose parts and 60 foot motor cables.

# XD-Indexer - Kits Selection Guide

## Specifications Summary

Complete specifications for the servo drive and motor can be found in the respective datasheets.

Model	Rated power (HP)	Rated power (KW)	Rated Speed (RPM)	Max Speed (RPM)	Input Current (A)	Torque Rated/Peak in-lb	Input voltage (VAC)	Motor frame in. [mm]	Motor length in. [mm]
XDK-.5HP2	0.54	0.4	3000	5000	1.9	11.3 / 34.8	230	2.44 [62]	6.46 [164]
XDK-1HP2	1.1	0.8	3000	5000	3.8	22.5 / 69.3	230	3.15 [80]	7.81 [198.5]
XDK-1.5HP2	1.7	1.3	1500	3000	3.4	73.2 / 222	230	5.118 [130]	9.84 [250]
XDK-2HP2	2.0	1.5	3000	5000	4.0	42.3 / 128.7	230	5.118 [130]	8.9 [226]
XDK-3HP2	3.0	2.2	3000	5000	6.0	62 / 188	230	5.118 [130]	9.84 [250]
XDK-1HP4	1.2	0.9	3000	5000	1.2	25.4 / 78.7	460	5.118 [130]	7.95 [202]
XDK-2HP4	2.0	1.5	3000	5000	2.0	42.3 / 131	460	5.118 [130]	8.9 [226]
XDK-3HP4	3.0	2.2	3000	5000	3.0	62.0 / 192.1	460	5.118 [130]	9.84 [250]
XDK-4HP4	4.0	3.0	3000	5000	4.0	84.5 / 261.9	460	5.118 [130]	10.79 [274]

Rated power = output power available at rated speed

Max speed = maximum speed at which the motor can be operated. Output power derates between rated speed and max speed.

Input voltage = Nominal input voltage. Actual input voltage can range from 208-240 VAC and 440-480 VAC and still meet speed and power ratings.

## Kit Parts Summary

The components included in the kit are listed in the following table and list.

Model	Servo drive	Motor	Motor feedback cable	Motor power cable
XDK-.5HP2	SAC-XD203-SA10R0	MAC-MB011D2-K3N-A	CBL-ME1XA	CBL-MMXA1-2
XDK-1HP2	SAC-XD205-SA10R0	MAC-MC022D2-K3N-A	CBL-ME1XA	CBL-MMXA1-2
XDK-1.5HP2	SAC-XD210-SA10R0	MAC-MD070B2-K3N	CBL-ME2X	CBL-MMX2-2
XDK-2HP2	SAC-XD210-SA10R0	MAC-MD050D2-K3N	CBL-ME2X	CBL-MMX2-2
XDK-3HP2	SAC-XD215-SA10R0	MAC-MD070D2-K3N	CBL-ME2X	CBL-MMX2-2
XDK-1HP4	SAC-XD403-SD10R0	MAC-MD025D4-K3N	CBL-ME2X	CBL-MMX6-4
XDK-2HP4	SAC-XD405-SD10R0	MAC-MD050D4-K3N	CBL-ME2X	CBL-MMX6-4
XDK-3HP4	SAC-XD410-SD10R0	MAC-MD070D4-K3N	CBL-ME2X	CBL-MMX6-4
XDK-4HP4	SAC-XD410-SD10R0	MAC-MD095D4-K3N	CBL-ME2X	CBL-MMX6-4

### Additional parts in the kits

Kit	Panel		Enclosure		Ormec P/N	Description
	230V	460V	230V	460V		
X	X	X	X	X	CON-1110	Drive I/O terminal block
X		X	X		CAP160	Line filter, 200V, 0.5 and 1 HP kits,
Or X	X	Or X	X	X	CAP161	Line filter, all except above
X		X	X		DIC231	Input circuit breaker, 200V kits, 0.5 and 1 HP
or X		or X	or X		DIC059	Input circuit breaker, 200V kits, 1.5, 2 and 3 HP
	X			X	DIC123	Input circuit breaker, 400V kits
X	X	X	X	X	RLY215	Motor power contactor
X	X	X	X	X	SPP310	E-Stop button, 22.5 mm
X	X	X	X	X	SPP309	E-Stop reset push button, flush, black, 22.5 mm
	X			X	PSU-480-24-5A-D-1	24 VDC power supply on 460 VAC kits only.
		X	X	X		Wired panel
				X		Enclosure

Spare or replacement parts can be ordered using the part numbers shown.

# XD-Indexer - Kits Selection Guide

## HMI Kit -

Many systems need an operator panel. Ormec can provide an HMI as an individual component or as an HMI kit. The HMI kit includes an HMI, Ethernet and power cables. The MMI comes loaded with an example system designed to run the example programs and display some customary information.

Model numbers for the HMI kits are:

MMIK-8050	4.3" diagonal screen, cables and programming
MMIK-8070	7.0" diagonal screen, cables and programming

## Additional items

Other items you may need to complete your system and sources to purchase.

Item	Sources
Gearbox	ORMEC, <a href="http://www.ormec.com">www.ormec.com</a>
Regen resistor	ORMEC, <a href="http://www.ormec.com">www.ormec.com</a>
Pacer encoder	ORMEC, <a href="http://www.ormec.com">www.ormec.com</a>
Couplings	
Pulleys, Gears	
Sensors	

## Selecting a kit size – Performance curves -

Correctly sizing the kit – motor and drive – are required for a successful application.

Selecting the voltage rating is easy. Second is the size of the motor. You have three choices, use your estimate of the power required ~ how many HP are needed or use you estimate of the torque (force) needed or finally contact ORMEC for assistance and a more detailed analysis. Performance curves for selecting by power or torque follow.

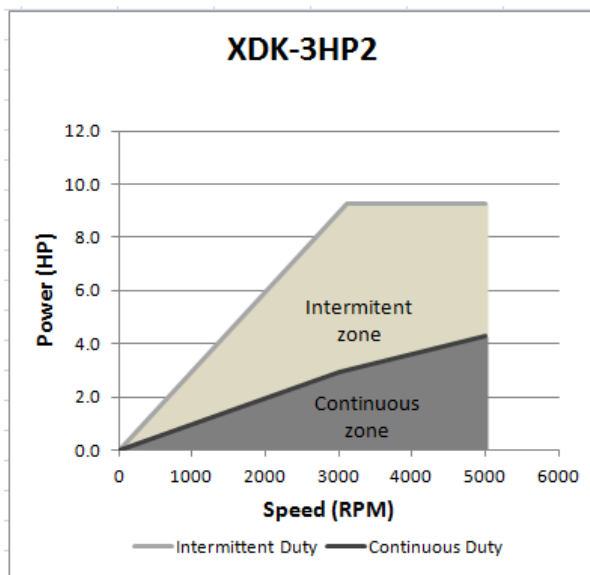
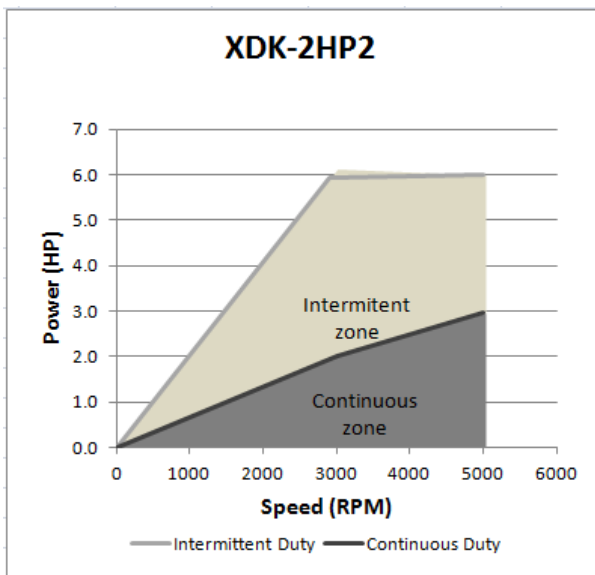
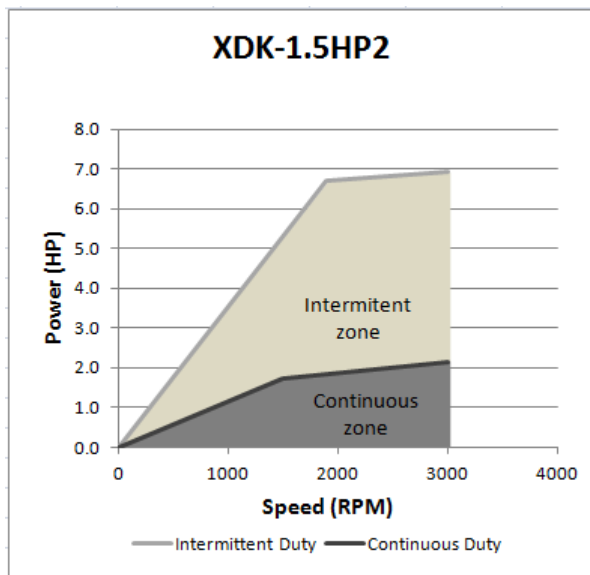
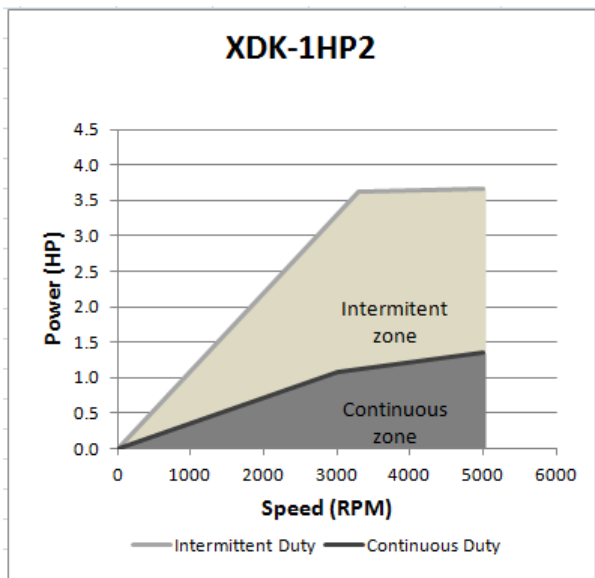
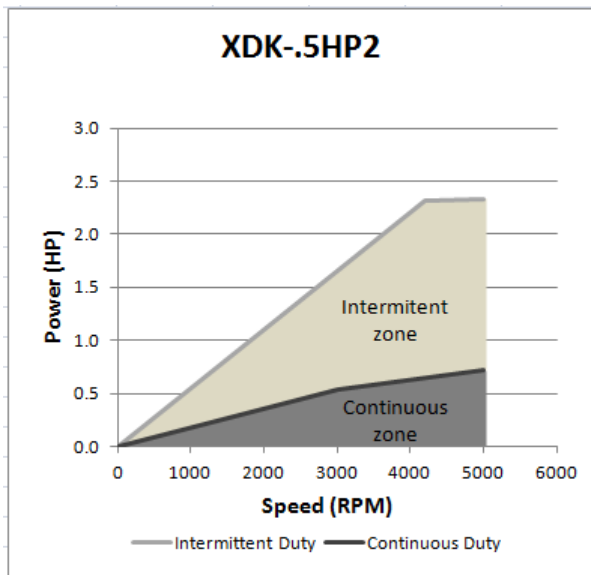
### Power – HP – ratings

The power output of a servo motor is just like the output of your car engine. The car has a certain power rating (HP) at a specific engine RPM. At slower speeds the power output (HP) is lower. It is the same for electric motors. In both cases power is related to torque times speed. At slower speeds the same torque results in a lower power. Power is the rate at which energy is delivered. At slower speeds the same torque delivers less energy.

Using knowledge of your application determine the power you need and at what speed you will need that power. Then find the kit below which best matches the requirements. Staying in the continuous zone is best. The servomotor can run there all the time. The intermittent zone is available for short periods of time to accelerate, break free or overcome some friction. Operation at the top of the intermittent zone is limited to about 2 seconds. Operation closer to the continuous zone is longer, reaching unlimited at continuous.

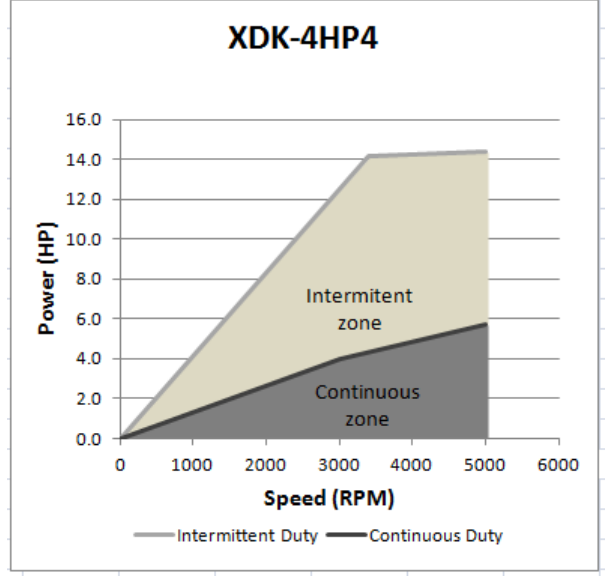
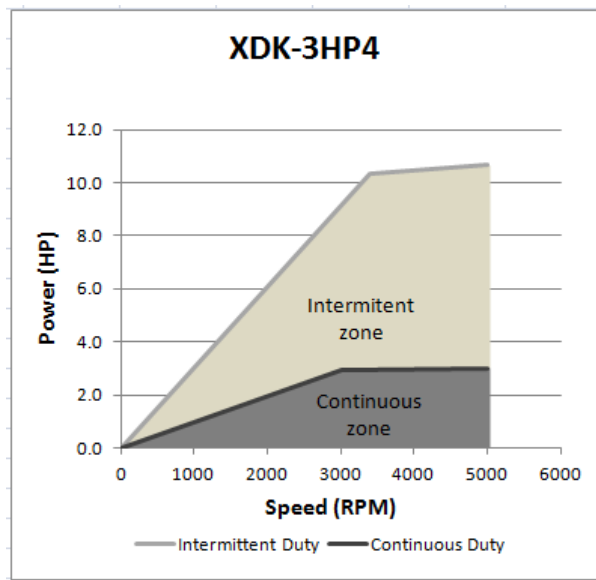
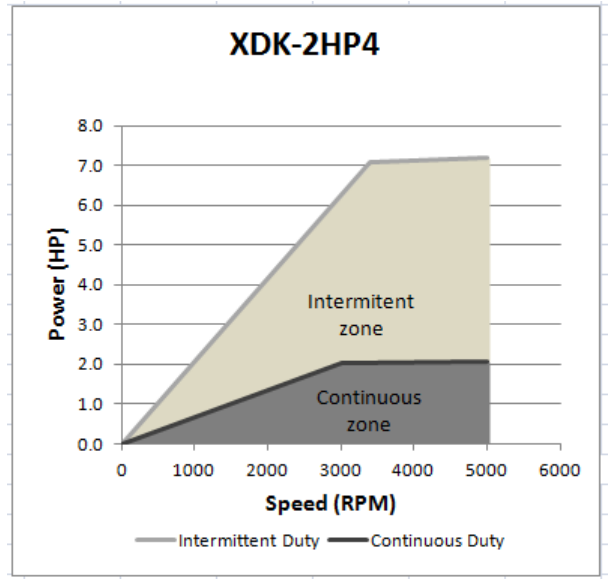
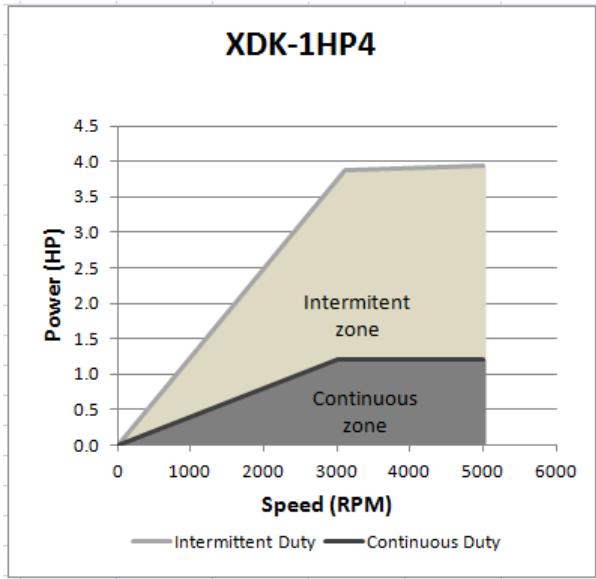
# XD-Indexer - Kits Selection Guide

Note that this page contains performance curves for motors operating with a nominal 230 VAC power supply. . The curves apply with an input voltage of 208 VAC to 240 VAC.



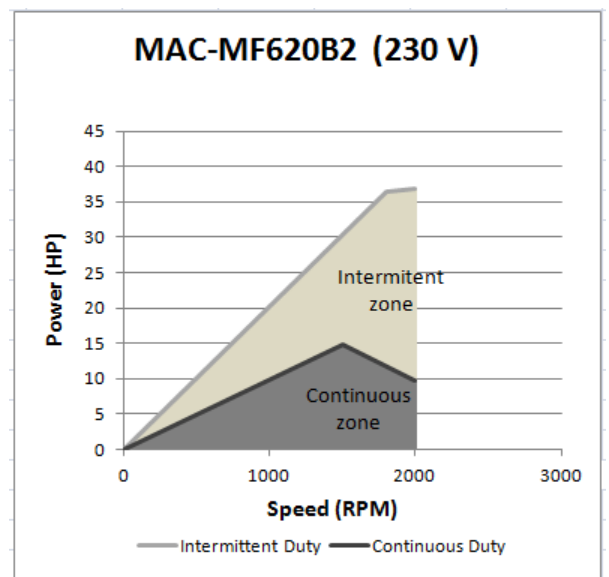
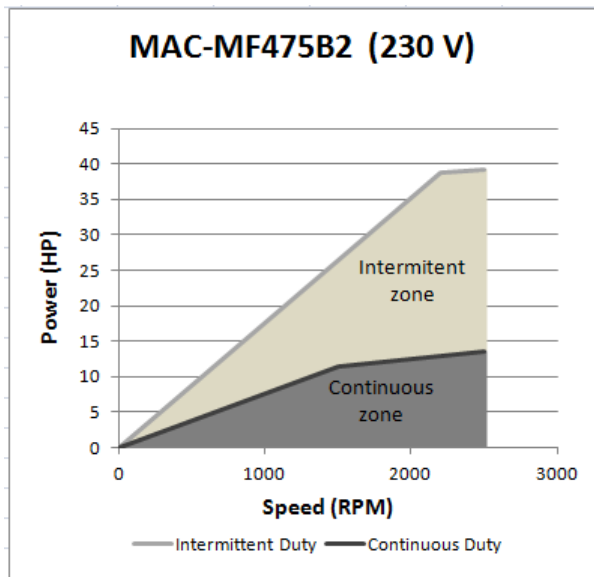
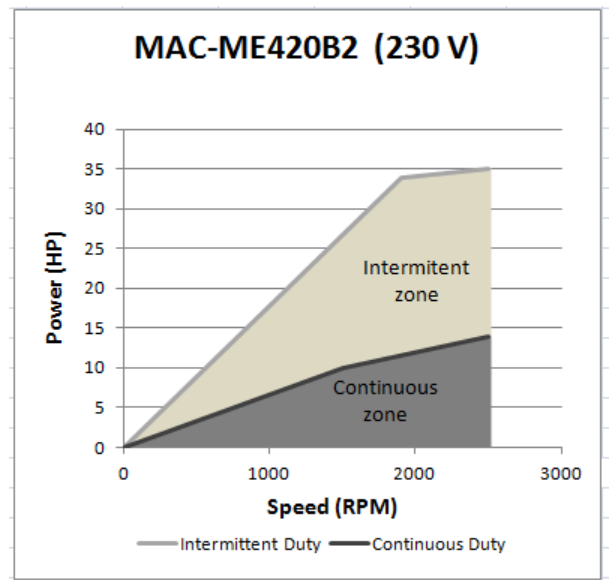
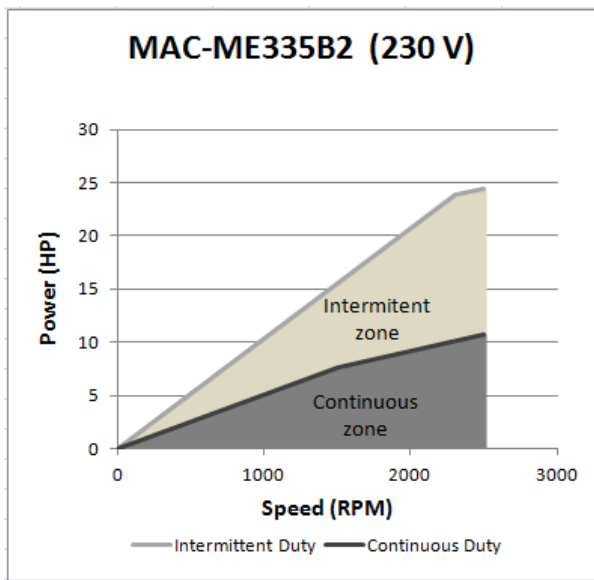
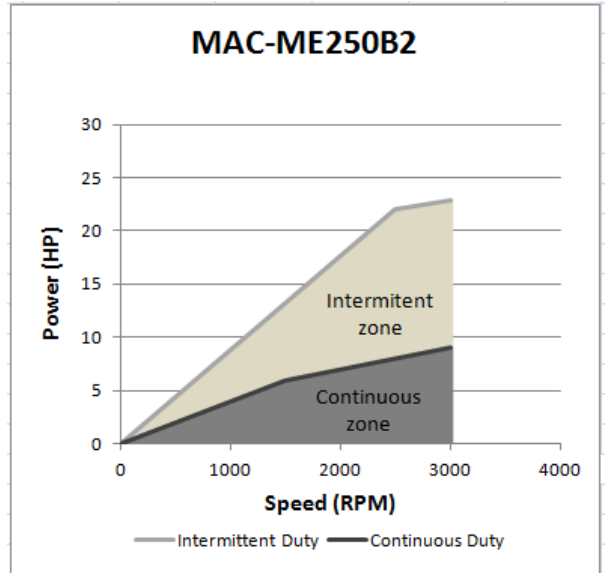
# XD-Indexer - Kits Selection Guide

Note that this page contains performance curves for motors operating with a nominal 460 VAC power supply. The curves apply with an input voltage of 420 VAC to 480 VAC.

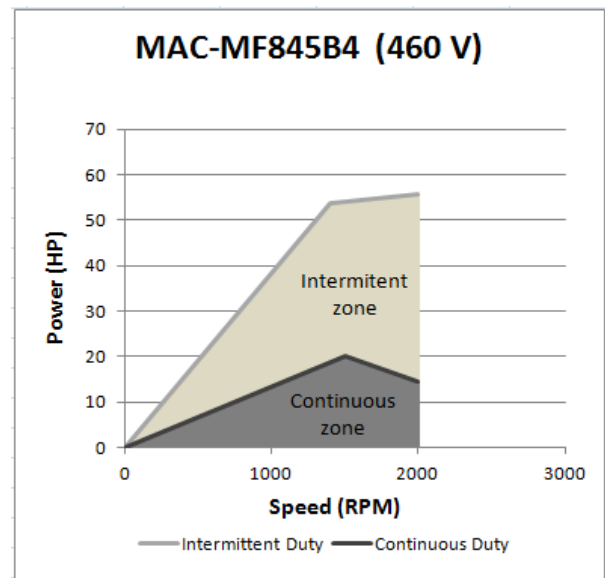
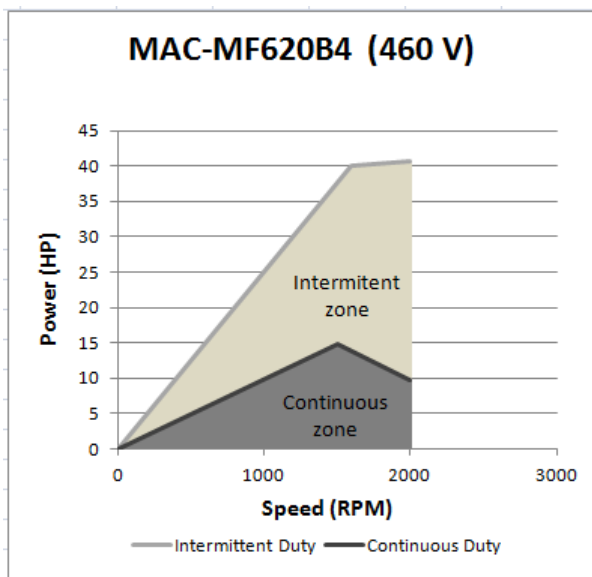
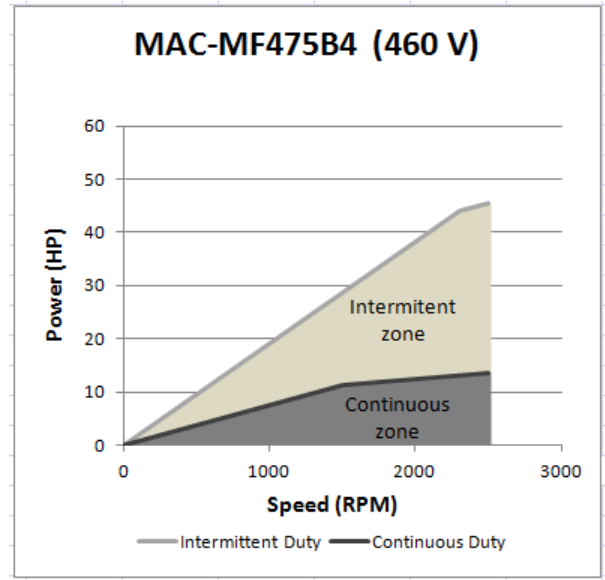
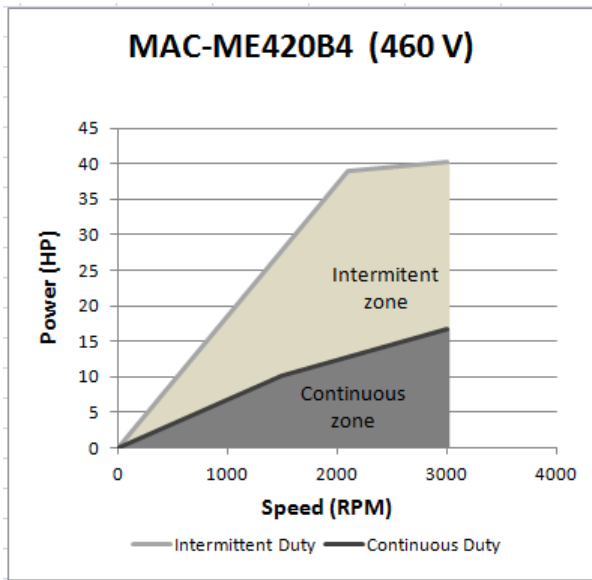
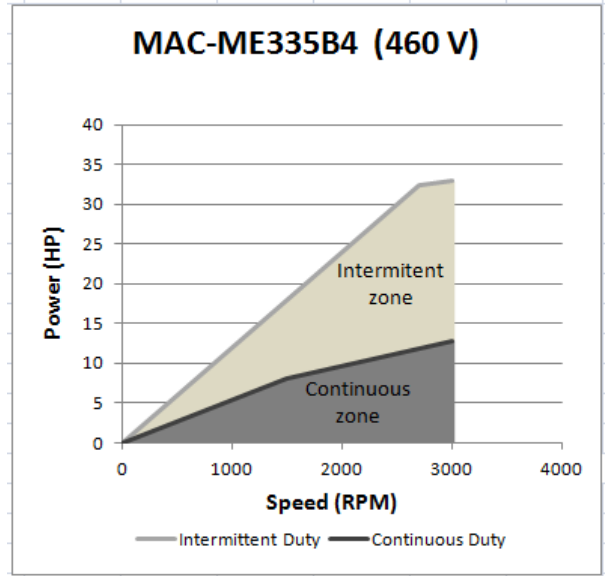
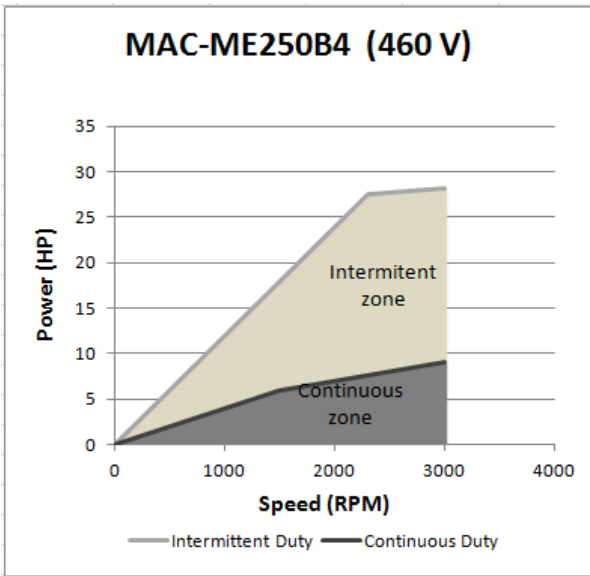


# XD-Indexer - Kits Selection Guide

Standard Indexer kits are available with up to 4 HP motors. The complete line of Indexers and motors is capable of delivering up to 19 HP in a 230 volt version and 32 HP in a 460 volt version. For your convenience those motor performance curves are shown here. Ask your distributor or contact ORMEC if one of these is required for your application.



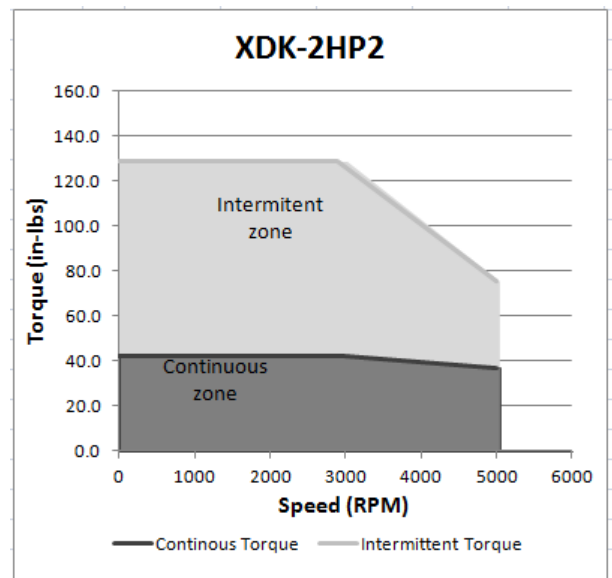
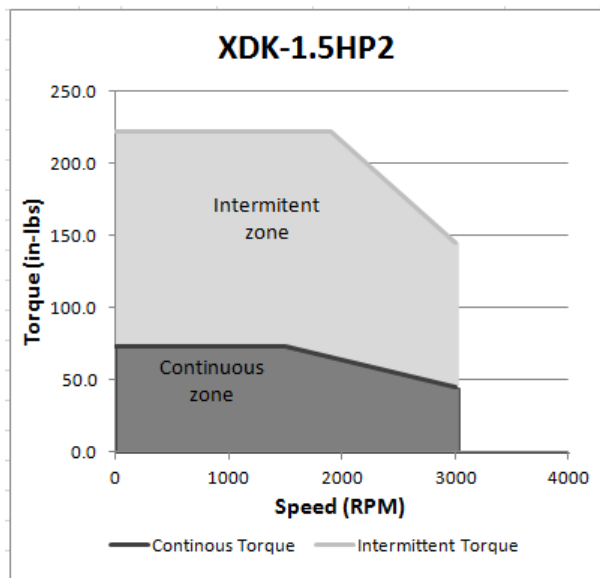
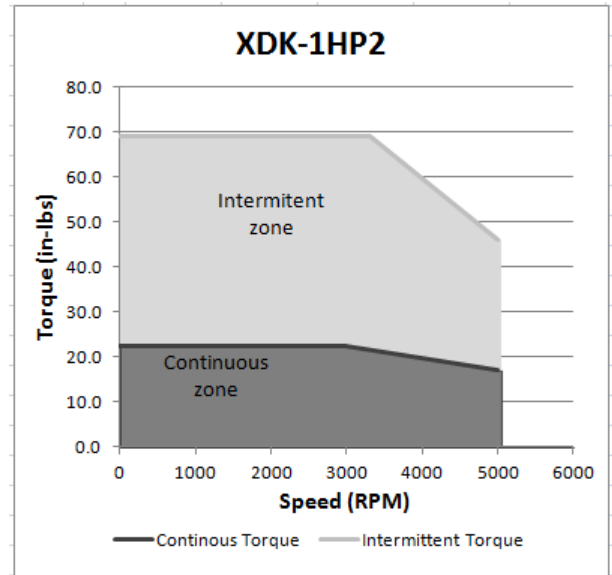
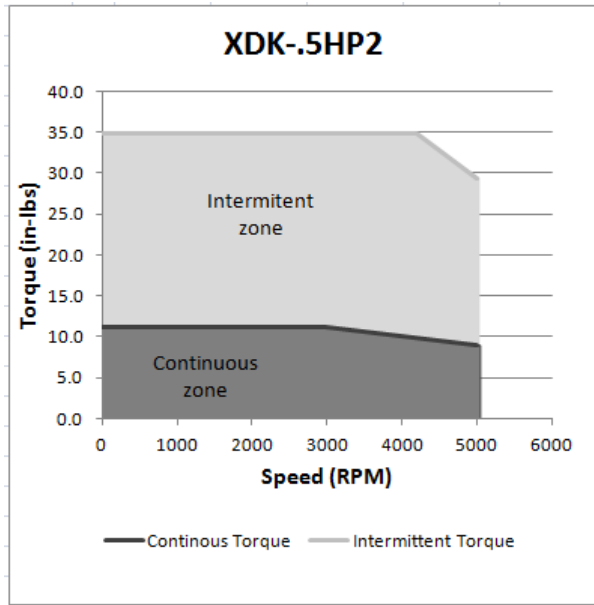
# XD-Indexer - Kits Selection Guide



## Torque – in-lb – Ratings

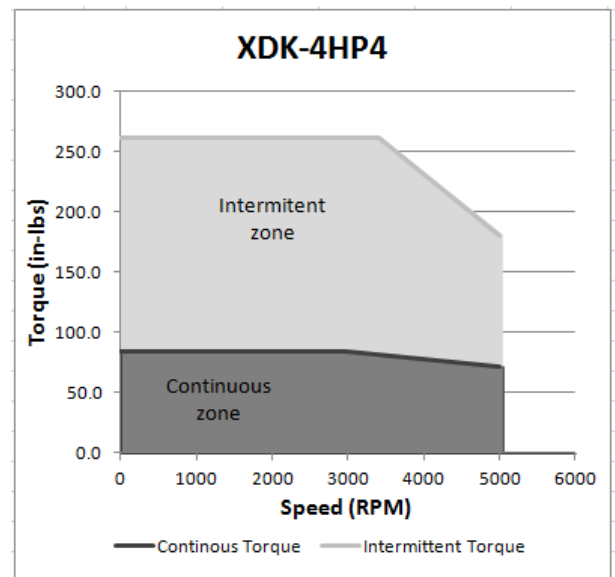
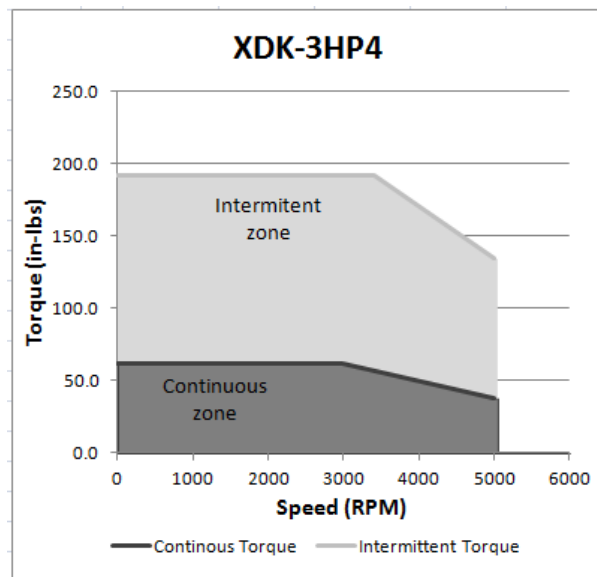
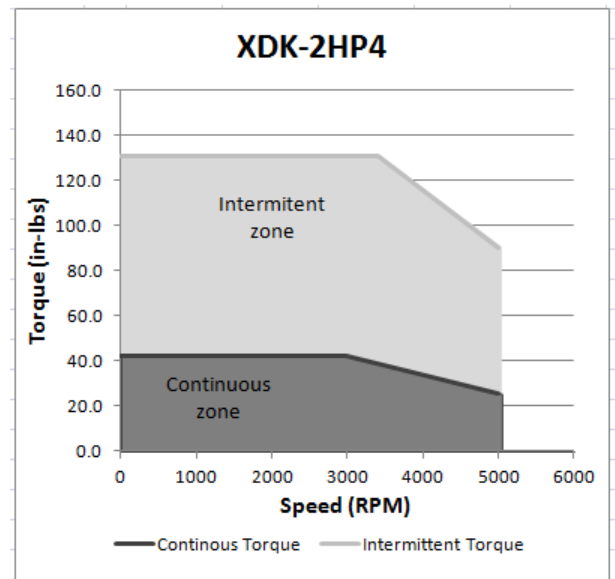
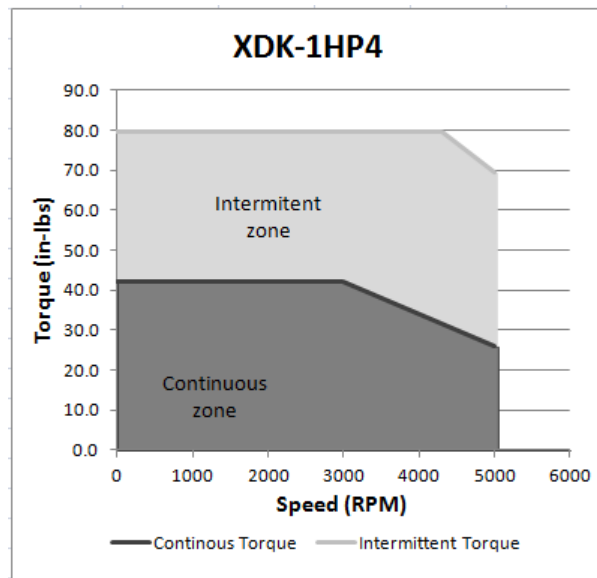
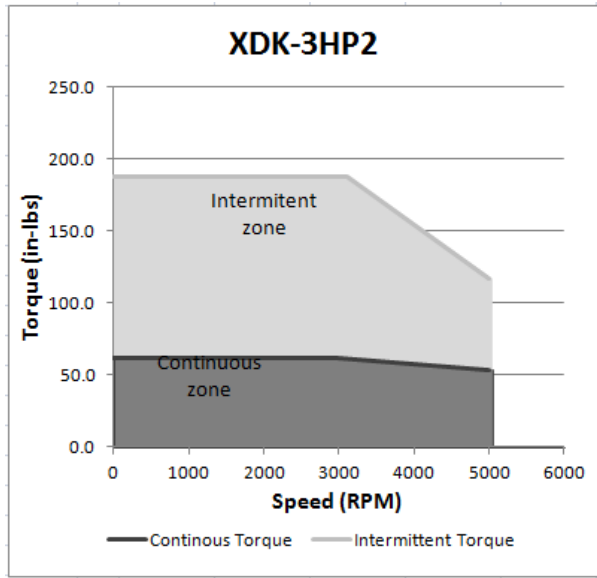
In some cases it is easier to size using torque curves. For your convenience torque curves for the standard kits are shown. Torque is the rotary force put out by a motor or other device. A servo motor usually can output the same torque from speeds of 0 RPM up to the rated speed. Above the rated speed the torque declines. This can be seen in the graphs below, the line is flat out to either 3000 or 1500 RPM.

Using knowledge of your application determine the torque required. Then find the kit below which best matches the requirements. Staying in the continuous zone is best. The servomotor can run there all the time. The intermittent zone is available for short periods of time to accelerate, break free or overcome some friction. Operation at the top of the intermittent zone is limited to about 2 seconds. Operation closer to the continuous zone is longer, reaching unlimited at continuous.





# XD-Indexer - Kits Selection Guide



## Component features -

**Circuit Breaker:** Protects wiring and responds to electrical problems.

**Line Filter:** limits electrical noise into and out of this system. Incoming noise from other electronics can cause interference or other problems. All servo systems produce some electrical noise due to the high speed switching. It is best practice to keep that noise from traveling to other equipment in the plant.

**E-Stop:** Though never planned sometimes things go wrong. An emergency stop push button is a best practices approach to safety. This is implemented as a push-pull switch.

**Contactor:** As part of the best practices the contactor is used to remove motor power from the servodrive when an E-Stop state exists. Without energy to the power section of the servodrive the motor cannot move.

**E-Stop reset:** Another best practice, once the E-Stop is opened and power removed then 2 actions are needed to restore power, the E-Stop button must be pulled out and then the E-Stop Reset must be pushed long enough to bring in the contactor.

**Servodrive:** The brains behind the motion. The Indexing Servodrive calculates all the velocity, position and motion parameters to perform the commanded move. During the move the servodrive continues to monitor the motor and using closed loop feedback performs current command corrections to adjust for load, friction and other disturbances. The power electronics are located inside and controlled by the servodrive.

**Motor:** The device which converts electrical energy to the mechanical energy needed on your machine.

**MMI:** A convenient and modern approach to interface with the Indexer and control your machine.

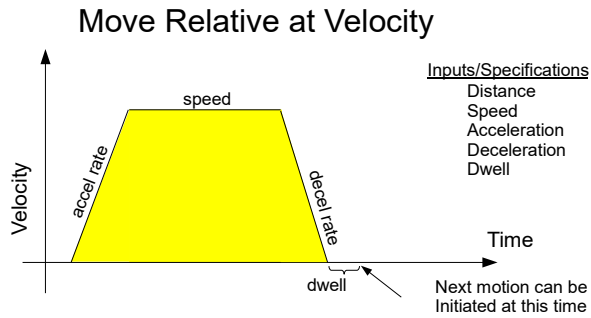
**Control switch box:** This is a diagnostic and startup convenience. This provides a few inputs so you can test the connections and get going quickly. The E-Stop and E-Stop Reset switches are fully industrial grade and expected to be used on the final equipment. The Enable and motion switches are expected to be replaced by your desired switches and push buttons on the machine, or an MMI interface.



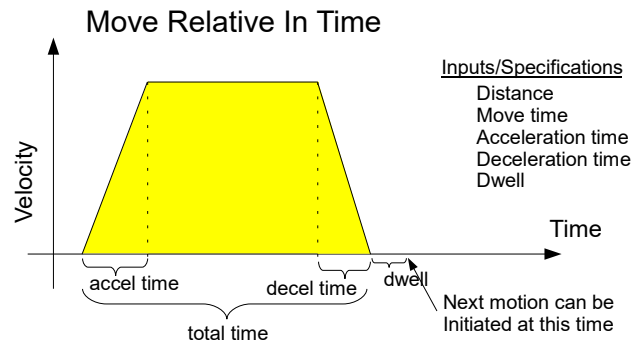
## Motions -

The Indexer can perform a wide variety of motion types. These range from, move a relative distance, move to an absolute position, gear to an external encoder or motor at an adjustable ratio to multiple home functions and jogging.

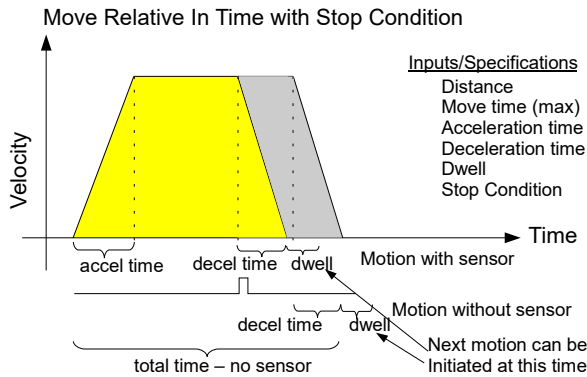
The graphs below provide an overview of the motion types. A complete list and full details can be found in the Indexer installation and operation manual.



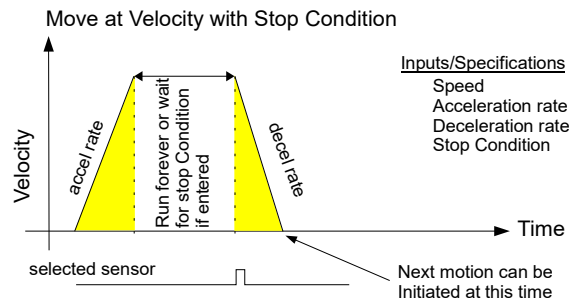
Moves a defined distance. The speed of the motion is set in the motion command.



Moves a defined distance. The motion takes the specified time ~ meaning the speed is automatically calculated so that the motion is completed in the required time..



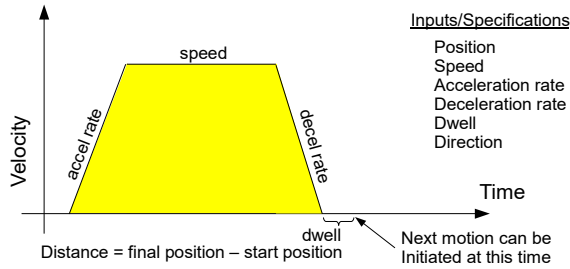
Move until sensor with a maximum distance. This motion begins to Move a given distance from the current position and stops earlier if the sensor occurs. If the sensor is missed the motor stops at the defined distance, which prevents a runaway situation.



Move until sensor. This motion is a Jog with stop on sensor. Unlike the previous motion this can run forever. If the sensor breaks or is missed the motor will continue.

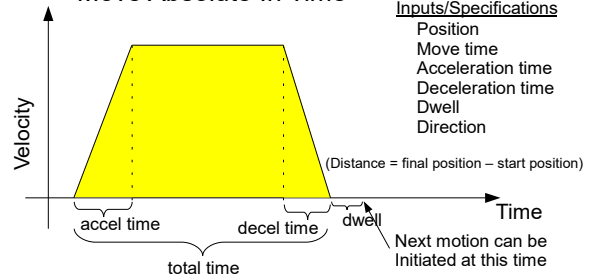
# XD-Indexer - Kits Selection Guide

## Move Absolute at Velocity



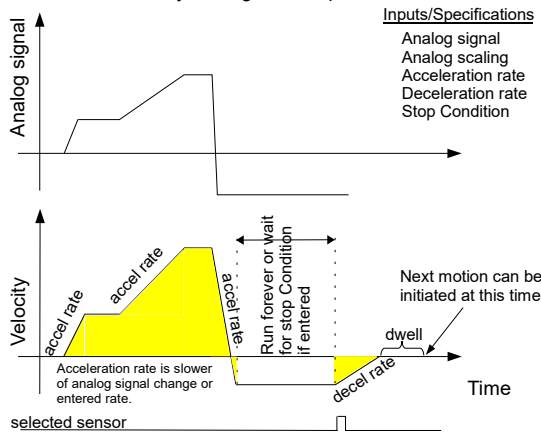
Move to a specific position. The speed is automatically calculated with a maximum speed. This motion is used to get to a specific position or angle when the starting position is unknown.

## Move Absolute In Time



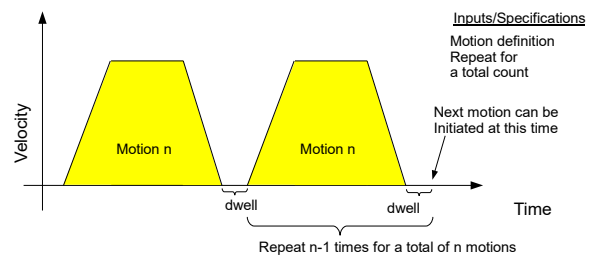
Move to a specific position taking a specific amount of time. The speed is automatically calculated with a maximum speed. This motion is used to get to a specific position or angle when the starting position is unknown.

## Move Velocity Analog with Stop Condition



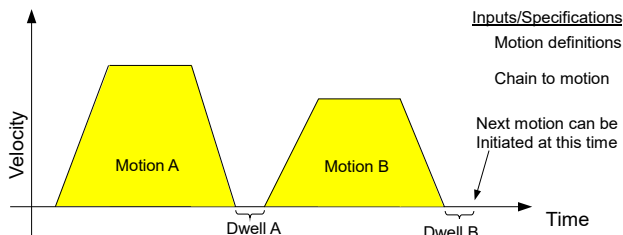
Move at a speed set by a pot. A voltage input sets the speed of the motor and can be changed at any time, including when the motor is running.

## Repeat loop on same motion



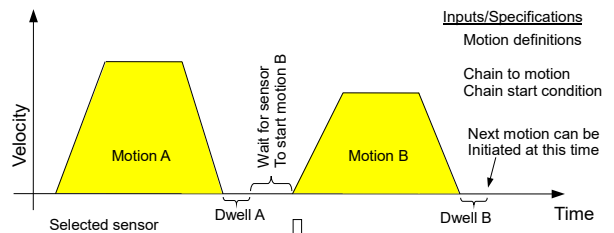
Any motion which stops can be set up to loop and repeat. The time between the repeats is configurable. The number of repeats can be set between 1 and 2,000,000,000.

## Chain 2 motions – A chains to B



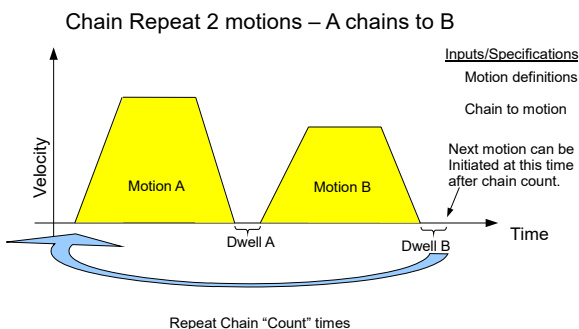
Chaining connects 2 or more different motions together. This is useful when a series of motions are always performed together and start on one signal.

## Chain 2 motions with condition – A chains to B

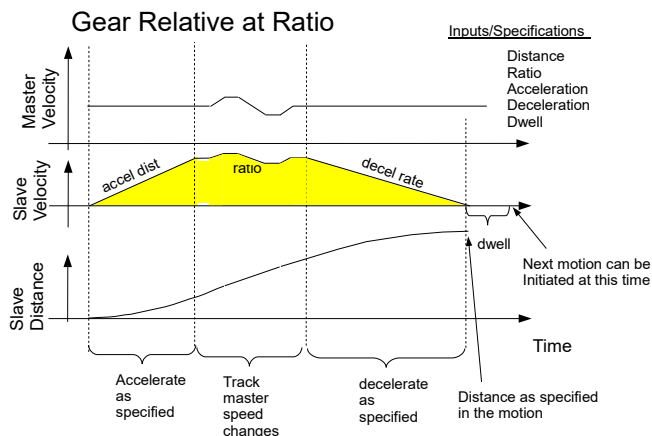


Chaining can include motions which are tied to a sensor. The motion dependent on the sensor will wait for the sensor. In this example Motion A runs when initiated then chains to Motion B which waits until the

# XD-Indexer - Kits Selection Guide

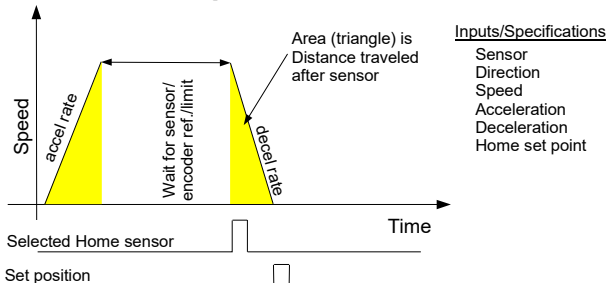


Complete chains can be repeated just like individual motions can be chained. Repeating a motion within a chain and repeating the chain can be done at the same time.



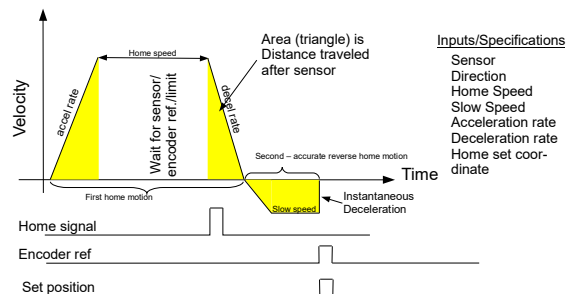
Gearing electronically allows the motor to exactly follow another motor or encoder. Often used with a pacer encoder connected to the machine or web. The motor can be geared up or down if needed. Unlike mechanical gears the gearing can be turned on and off easily and the motor can execute non-g geared motions as well.

## Home to Stop Condition



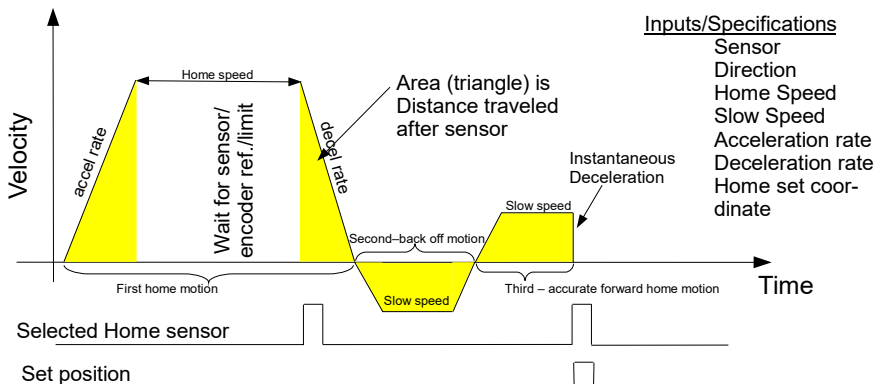
Basic home function decelerates and stops when the selected sensor becomes active. The stop position is a little past the sensor.

## Home with accurate reverse home



Home with reverse decelerates and stops when the selected sensor becomes active, then backs up to the sensor. The stop position is much closer, but on the trailing edge of the sensor.

## Home with back off and slow motion to same sensor



Home with reverse and approach decelerates and stops when the selected sensor becomes active, then backs up past the sensor and does a slow approach to the sensor. The stop position is at the original leading edge of the sensor.

## Advanced options

The kits are configured with the most common options. The XD Indexer has many options available which might improve your machine operation. These include:

<b>Option</b>	<b>Description</b>
Pacer interface	This option is included in the kits. The pacer interface provides the electronics needed to accept a pacer encoder input and to drive out position information so that the Indexer can be the master.
Factory networks	The Indexer comes equipped with an Ethernet port and as standard is a Modbus TCP server or slave. The XD Indexer also supports Ethernet IP. This allows communication to devices using Ethernet IP protocols. This factory network requires addition of an additional card.
Safety interface	For applications which need to meet European machinery safety requirements or need additional safety measures the XD Indexer can be configured with an added Safe Torque Off interlock. This feature provides redundant inputs which prevent torque from being applied to the motor.
DC control power	The XD Indexer is designed with separate control and motor power inputs. This feature keeps control power on at all times yet allows motor power to be turned off for safety. Most Indexer models allow either 115-240 VAC control power or 24 VDC control power. The 230V kits ship with AC control power selected. DC is available. The 460V kits ship with DC control power.

## Regen Resistor

During active deceleration of a motor and load, kinetic energy moves from the load to the Indexer. This energy is stored in the DC bus of the Indexer causing the bus voltage to increase. If there is too much energy the bus voltage will reach its safe limit and a fault will occur. In these cases an external regen resistor may be required. The resistor is used to dump the extra energy in the form of heat.

All XD Indexers in the kits have a built in shunt regulator to be used in conjunction with an external resistor. Regen resistor are available from ORMEC. Additional information regarding sizing and application of the resistor can be found in the XD Indexer Installation manual.

## Application support

You understand your machine and application. Sometimes it is difficult to see how servo controls can be applied to your machine or how it will benefit you. We understand servo controls. The team at ORMEC has implemented servo motion control in most major industries. We know what it takes to make your machine better.

Your distributor and the ORMEC team are here to help you succeed. All that is necessary is for you to ask.

## XD-Indexer Kit Quick Installation Guide

Congratulations on your purchase of an ORMEC XD-Indexer kit.

### WARNINGS

1. You are working with dangerous, high voltages. Only qualified persons should make connections and changes. Do not touch any live parts while the power is on.
2. **Double check all wiring. When working with high voltages mistakes can be dangerous and costly.**
3. Motors can be dangerous. The output shaft will turn and the motor may jump or move under some circumstances if not secured. Stay clear of the motor shaft. Secure the motor so that it cannot jump.

**1**

Gather tools – ¼” flat blade screwdriver and wire cutters/strippers. Remove kit from the shipping box. Note there are more instructions on reverse side. You must supply wire for connection to your plug or panel.

**2**

Remove control box by cutting shipping restraint.

Go to **Step 3 Test** on reverse side for test instructions.

**6**

**5**

Connect power to circuit breaker and ground to and lug. Safety ground is required. Follow local electrical codes.

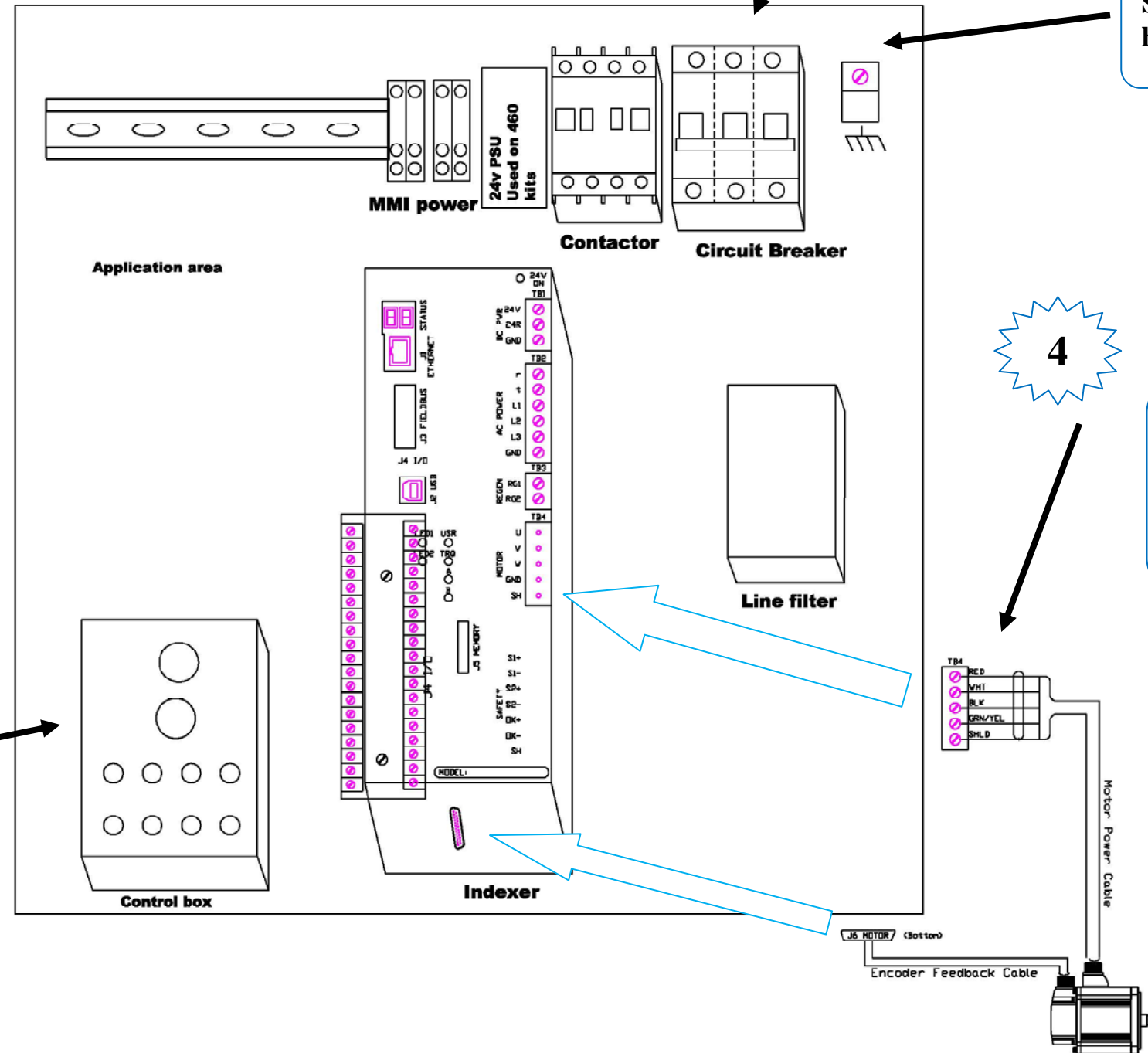
**Safety ground here.**

**4**

Connect 2 cables from motor to TB4 on front and J6 on bottom. Cables connect only one way. (Additional detail on reverse side.)

**3**

Secure motor for initial test.



Congratulations on your purchase of an Ormec XD-Indexer kit.

## **WARNINGS**

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2. **Double check all wiring. When working with high voltages mistakes can be dangerous and costly.**
3. Motors can be dangerous. The output shaft will turn and the motor may jump or move under some circumstances if not secured. Stay clear of the motor shaft. Secure the motor so that it cannot jump.

This kit Quick Installation Guide sheet is written for panel and enclosure versions of the kit where the wiring is complete. If you received a parts only kit it is recommended that you wire your system following the layout shown and then return to this document or reference the complete installation instructions.

## **Step 1 - Unpacking**

Throughout this explanation references are made to the layout and connection diagram. That diagram can be found on the other side of this paper.

Carefully remove the panel from box. Place on a sturdy table and orient as shown in the diagram, reverse side. Remove motor and cables and set aside.

## **Step 2 - Connections**

1. Remove the control box from the panel by carefully cutting the shipping restraint. This will allow you to step back from the panel during operation.
2. Secure the motor. While the motor is spinning it is possible for it to jump or move slightly. Securing it to the table or on the floor helps to prevent damage to the motor or your foot if it falls.
3. Connect the motor cables. There are 2 cables in the kit. One provides power to the motor. The part number on the cable begins CBL-MMX. The other cable provides motor feedback. The part number on the cable begins CBL-ME. Locate these 2 cables and connect to the motor and to the servodrive. The cables will only connect one way and in one spot.
4. Connect power to the system. Connect your incoming power to the circuit breaker (CB1) located in the upper right corner of the panel. Connect your safety ground to the lug in the upper right corner.

## **Step 3 - Test**

1. Double check your wiring before turning on power. You don't want a careless mistake to slow you down.
2. Turn on your power.
3. Turn on the circuit breaker. The XD servodrive should light up. A series of numbers will appear on the display. When complete it will display a whirligig pattern. Note: if an A3 is

displayed the Indexer has detected that main power is off. Find the control box, move the Enable switch down to the Disable position and proceed to the next step.

4. **Find the control box.**
  - a. Pull the E-Stop button out if it is pushed in.
  - b. Press the E-Stop Reset button until the contactor closes.  
→ Note that there will be a loud click or thud when the contactor closes. It's normal, and it's normal to startle the first time.
  - c. The XD drive should now have the BUS POWER LED on.
5. **Enable motion** ~ On the control box move the toggle switch to the Enable position. The XD Indexer should now turn on the right dot in the lower right corner of the display.
6. **Home test** ~ Press and release the Home button. The motor should move to its home position. While it is moving the XD Indexer will show an H in the display. Press again to repeat if you missed it.
7. **Jog Test** ~ Press and hold the JOG button. As long as you hold the button the motor should jog (spin) forward (CCW). Release when you are done.
8. **Motion 1 Test** ~ Press and release the Motion 1 button. The motor will perform a slow speed, 1 rev index motion. During that time the XD Indexer will display a 1. (1 rev in 2 sec.)
9. **Stop Test** ~ Press and release the Motion 1 button then quickly press the Stop button. A motion will start with Motion 1 and Stop with the Stop button. Repeat the test if you weren't watching the motor.
10. **Motion 2 Test** ~ Press and release the Motion 2 button. This will start a series of motions to demonstrate motion repeating and chaining. There will be a sequence of longer slow moves, fast moves, fast short moves and motion in 2 directions. During this time the display on the XD Indexer will show a number which will be changing. The number indicates the motion table entry being executed. This demonstration chains together a series of entries. It then repeats the entire chain 3 times. When complete it comes to rest. You can stop the sequence at any time using the Stop button. (The motions are ½ rev in ½ sec, repeated 3 times, 1 rev in ½ sec, ¼ rev in 100 msec repeated 5 times, reverse 100 rev at 700 rpm and repeat this entire sequence 3 times.)
11. **Congratulations.** You have successfully demonstrated operation of your XD Indexer and kit and are ready to move to your application.



## **Step 4 - Next**

The Indexer and motor are running. The next steps include:

1. Mounting and connecting to your machine.
2. Connect MotionSet configuration tool.
3. Define your motions.
4. Connect your operator interface.
5. Move the E-Stop and Reset out of the control box to your machine.
6. Test and begin using it.

You may want to consult:

- Indexer Kit Instructions
- Indexer Getting Started
- Indexer Reference Manual



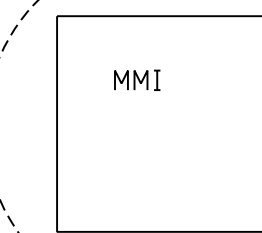
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\* mounted in control switch box.  
remove to mount on your system.

Control switch box

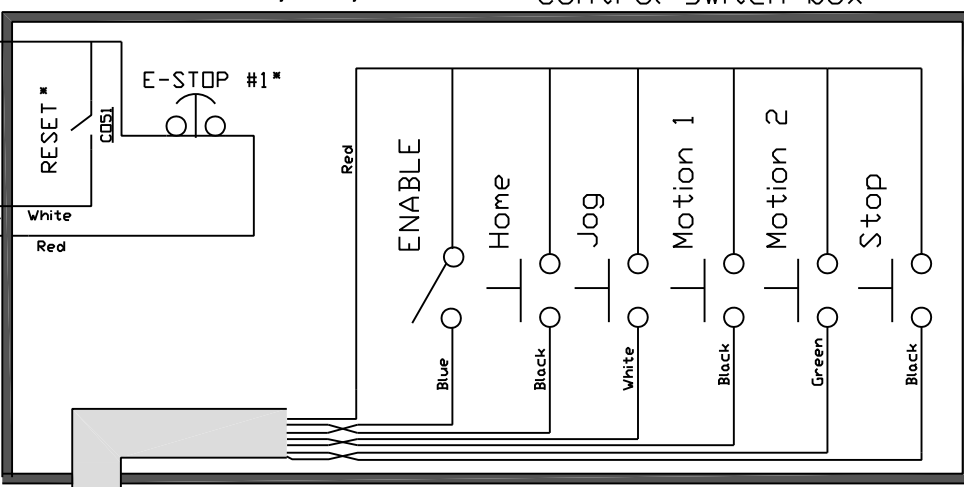
Notes:

1. All AC power wire 12 AWG black.
2. All 24 VDC wiring 18 AWG blue or blue/wht.
3. All ground wires 14 AWG green/yellow.
4. Cable color codes as indicated.
5. E-Stop and Reset are mounted in control switch box. Remove from box for use on your machine.
6. E-Stop function: When E-Stop PB open bus power contactor opens. To reset close E-Stop PB then momentarily close Reset PB, until contactor engages.



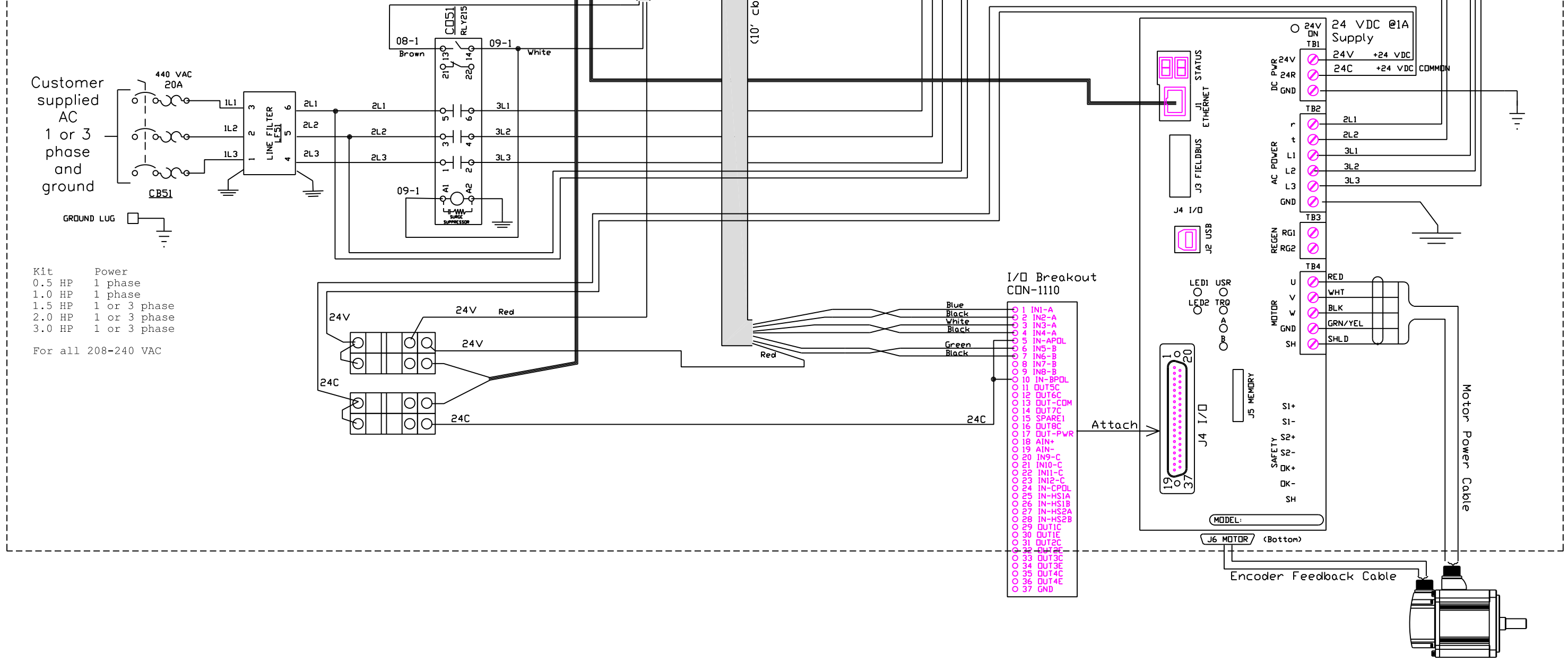
Ethernet cable  
Power cable

Note MMI and 2 cables sold separately as MMIK-8050 or MMIK-8070



Detach from panel.

Off panel  
On panel



Kit	Power
0.5 HP	1 phase
1.0 HP	1 phase
1.5 HP	1 or 3 phase
2.0 HP	1 or 3 phase
3.0 HP	1 or 3 phase

For all 208-240 VAC

NOTES

REVISIONS

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DATE	8/30/2014	DESIGNER	jwb	DRAWN BY	jwb	APPROVR		METHOD	ACAD 14	REV	A
DATE		DESIGNER		DRAWN BY		APPROVR		METHOD		REV	

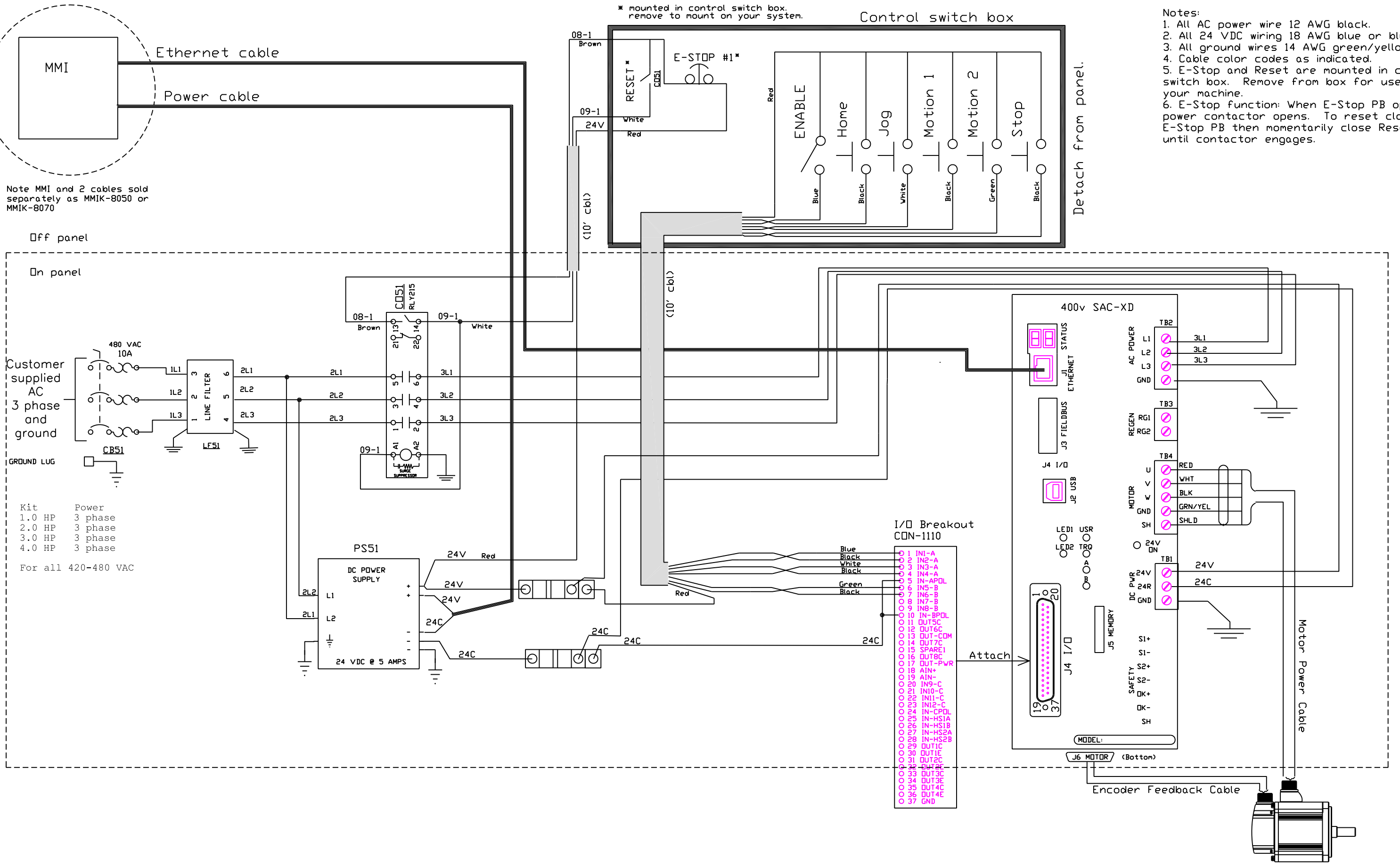
ORMEC SYSTEMS CORP  
 230V Indexer Kit  
 Rec. Wiring  
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\* mounted in control switch box.  
remove to mount on your system.

Control switch box

- Notes:
1. All AC power wire 12 AWG black.
  2. All 24 VDC wiring 18 AWG blue or blue/wht.
  3. All ground wires 14 AWG green/yellow.
  4. Cable color codes as indicated.
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Note MMI and 2 cables sold separately as MMIK-8050 or MMIK-8070

Off panel  
On panel

Customer supplied AC 3 phase and ground

Kit Power  
1.0 HP 3 phase  
2.0 HP 3 phase  
3.0 HP 3 phase  
4.0 HP 3 phase  
For all 420-480 VAC

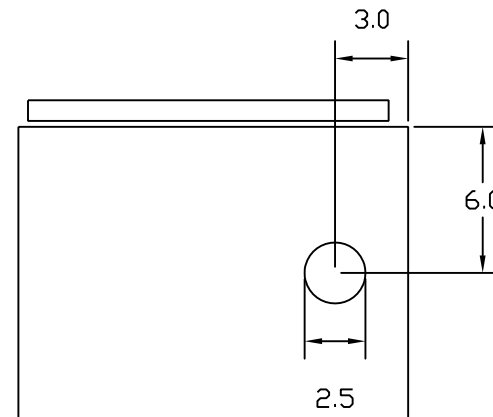
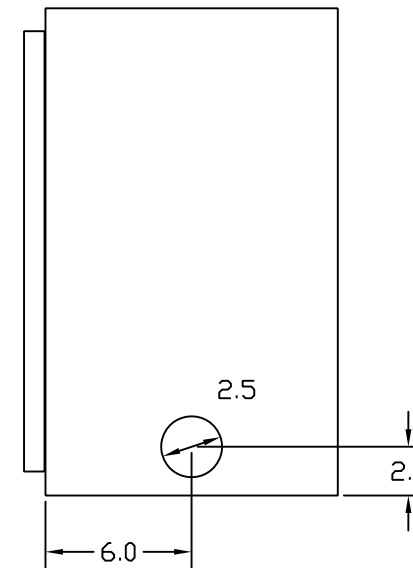
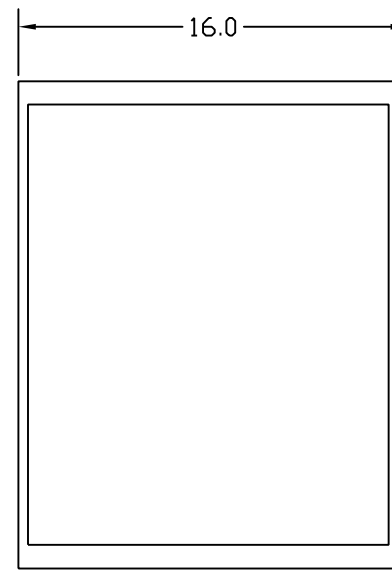
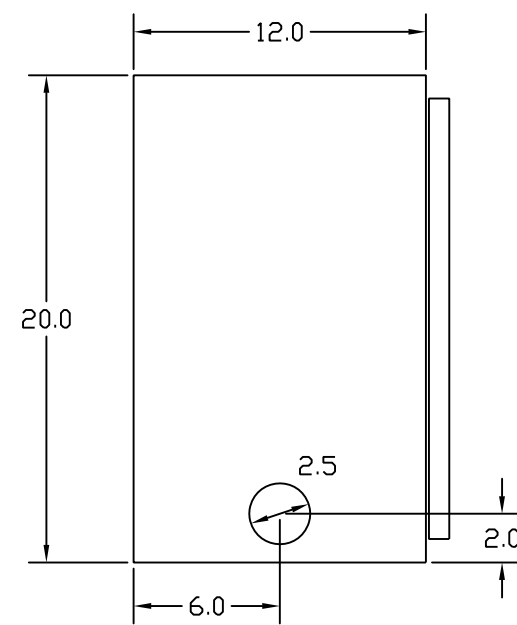
I/O Breakout CON-1110

01	Blue	IN1-A
02	Black	IN2-A
03	White	IN3-A
04	Black	IN4-A
05	Green	IN5-B
06	Black	IN6-B
07	Black	IN7-B
08	Black	IN8-B
09	Red	IN-BPOL
10	Red	OUT5C
11	Red	OUT6C
12	Red	OUT-COM
13	Red	OUT7C
14	Red	SPARE1
15	Red	OUT8C
16	Red	OUT-PWR
17	Red	AIN+
18	Red	AIN-
19	Red	IN9-C
20	Red	IN10-C
21	Red	IN11-C
22	Red	IN12-C
23	Red	IN-CPOL
24	Red	IN-HS1A
25	Red	IN-HS1B
26	Red	IN-HS2A
27	Red	IN-HS2B
28	Red	OUT1C
29	Red	OUT2C
30	Red	OUT3C
31	Red	OUT4C
32	Red	OUT5C
33	Red	OUT6C
34	Red	OUT7C
35	Red	OUT8C
36	Red	OUT9C
37	Red	GND

NOTES		REVISIONS	
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- Notes:
- 1. Indexer Kit punch pattern 1.
  - 2. Holes punched 2.5". Nominal 1.9 with included bushing.
  - 3. Hole plugs and bushings (grommet) included.
  - 4. All dimensions in inches.
  - 5. Do not scale drawing.

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2/23/2023