MaxPlus® SERIES

PRODUCT SPECIFICATION

MaxPlus® Digital Servo Drive

MP-FLX 230 Series

MP-FLX 230 Series
•
Single- and Dual-Axis

At two times the standard industry speed for digital current loop update rates, the new MaxPlus® FLX Series amplifiers are the industry's fastest. Featuring a 25 micro-second loop update rate and low current noise capabilities, this multi-patented, flexible family of digital drives offers increased machine throughput and productivity.

The Single-Axis digital drives are capable of simple torque or velocity loop modes or point-to-point position loop mode including pulse and direction control. They offer continuous output current from 3 to 35 Amps RMS.

The Dual-Axis amplifiers are packaged in one enclosure and share common circuitry such as the DSP, DSP support circuits, power supply and other power stage circuits. This extremely cost-efficient use of space and technology translates to a substantial cost savings of approximately 35% or more in multi-axis applications. Available in a variety of power levels with up to 230 VAC line input voltages, the dual-axis models range from 3/3 to 25/12 Amps RMS of continuous output current.

Based on third generation digital technology, the stand-alone, fully digital amplifiers also feature an intelligent drive option (MP-FLXi) for Single- and Dual-Axis coordinated motion control that's built directly into the drives.

MaxPlus® Digital Servo Drive

MP-FLX 230 Series

Standard Features

- High Speed (25µS) Current Loop Update Rate
- Patent Pending 1/T Velocity Estimation for Smooth Low-Speed Performance
- Cost Saving Dual-Axis Package
- CE, CUL and UL508C Certifications
- Internal and/or External Shunt Regulation
- ± 10 VDC Analog Command Input (14 bit A/D)
- RS-232 or RS-485 Serial Port Communications
- Windows®-based HMI (Human Machine Interface)
- Up to 240 VAC Nominal (264 VAC max) Line Input
- Up to 35 Amps RMS of Continuous Output Current for Single-Axis Units
- 3/3 to 12/25 Amps RMS of Continuous Output Current Per Axis for Dual-Axis Units
- Drive Enable Input
- ± Limit Switch, Home Inputs
- Fault Relay, Warning/Brake Relay
- Status Indicators (7 Segment Display and Bi-Colored LEDs)
- Resolver or Encoder/Hall Feedback
- Simulated Encoder Output
- Sinusoidal Commutation
- Pulse and Direction Input (Stepper Emulation)
- Extensive Fault Protection
- Simple Screw-Type Terminal Interface
- User Supplied AC/DC Inputs for Maintaining Control Circuits During Main Power Loss
- EEPROM to Store Tuning and Setup Parameters
- Programmable Current Limit (0 to 100%)
- Programmable Current Scaling (0 to 100%)

Optional Features

- Intelligent Drive Option with Full Motion Control Programmability (Coordinated Motion, Master/Slaving, Electronic Gearing, Camming, Math Functions, Logic Functions)
- Expanded I/O, 15 User I/O Per Axis (Opto-Isolated, 24VDC)
- Dual Encoder Inputs Per Axis for Master/Slaving or Commutating Encoder with Additional Positioning Feedback Encoder
- MACRO® Digital Network Interface (Type I Compatible, Fiber-Optic or RJ45 Twisted Pair)
- D-Type Connectors for High Volume Applications
- 4-20mA Command Input

Fault Protection

- Phase-to-Phase Shorts
- Phase to Vbus
- Phase to Vbus Return
- Phase to Chassis (Earth) Ground
- Over Temperature
- Over Voltage
- Locked Rotor Over Current
- Shunt Over Power
- Logic Supply Under Voltage
- Processor Fault
- Application Program Fault

User Programmable Faults and Warnings

- Motor Temperature
- User RMS Current Limit
- Bus Under Voltage
- Amplifier Temperature Warning
- Position Following Error
- Resolver Fault
- Hall Sensor Fault

Single Axis Power Specifications

Amplifier Model	X Axis Current		Enclosure Width	
	$I_c$rms	I_p	in	cm
MP-FLX-230/X03	3	6	3.7	9.7
MP-FLX-230/X06	6	12	3.7	9.7
MP-FLX-230/X10	10	20	3.7	9.7
MP-FLX-230/X20	20	40	5.8	14.8
MP-FLX-230/X35	35	70	7.8	19.9

Peaks can be sustained for at least two seconds.

I_p = peak of sinewave

Peak RMS = $I_p \div \sqrt{2}$

Power ratings are at 40° C ambient.

Dual-Axis Power Specifications

Amplifier Model	X Axis Current		Y Axis Current		Enclosure Width	
	$I_c$rms	I_p	$I_c$rms	I_p	in	cm
MP-FLX-230/X03/Y03	3	6	3	6	4.6	11.6
MP-FLX-230/X05/Y05	5	10	5	10	4.6	11.6
MP-FLX-230/X08/Y08	8	16	8	16	5.8	14.8
MP-FLX-230/X12/Y08	12	25	8	16	5.8	14.8
MP-FLX-230/X12/Y12	12	25	12	25	7.8	19.9
MP-FLX-230/X25/Y12	25	50	12	25	7.8	19.9

Peaks can be sustained for at least two seconds.

I_p = peak of sinewave

Peak RMS = $I_p \div \sqrt{2}$

Power ratings are at 40° C ambient.

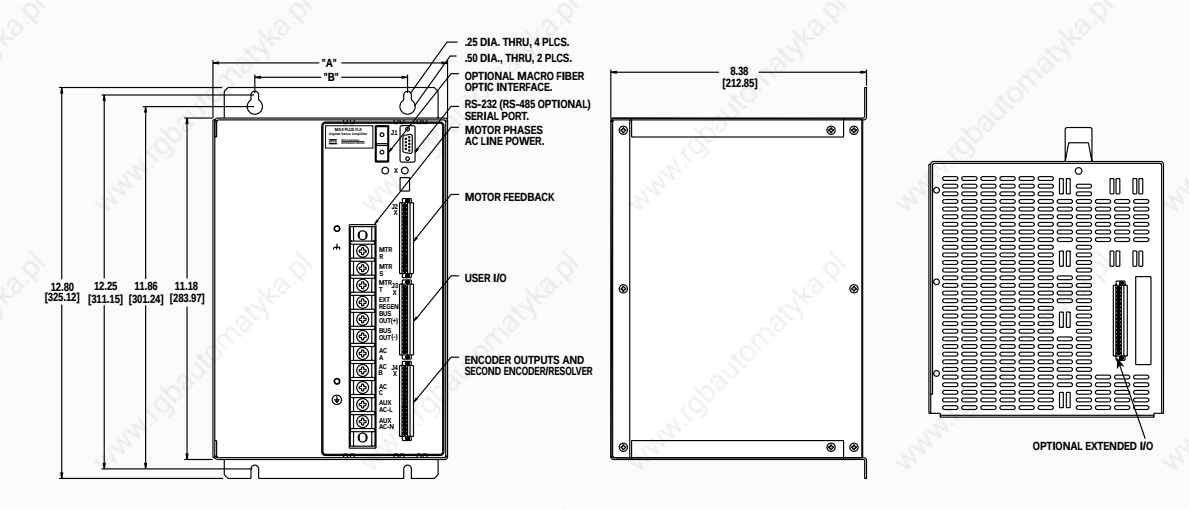
Performance Specifications

Parameter	Units	Value
AC Input Voltage (47-63 Hz, 1ϕ or 3ϕ)	VAC	90-240±10%
DC Bus Voltage	VDC	127-330±10%
Bus Over Voltage	VDC	400
Shunt Regulator Turn-On Voltage	VDC	385-395
Output Current Signal to Noise Ratio (@ zero current)	dB	>66
Offset (@ zero current, % of peak rating)	%	<0.05
Linearity	%	>95
Efficiency	%	>95
Current Loop Bandwidth (-3dB point/45 phase shift)	KHz	5/1.5
Current Loop Update Period	µS	25
Velocity Loop Bandwidth	Hz	400
Velocity Loop Update Period	µS	100
Position Loop Bandwidth	Hz	100
Position Loop Update Period	µS	100
PWM Switching Frequency	KHz	20
Maximum Encoder Frequency (edge rate)	MHz	10
Maximum Motor Speed*	RPM	30,000
Minimum Motor Inductance	µH	25
Operating Temperature Range**	°C	0-60
Storage Temperature Range	°C	-25-80
Relative Humidity (non-condensing)	%	5-95
Application Program Instruction Execution Cycle	µS	800
Application Program Profile Generator Cycle	µS	100

**Application Dependent*

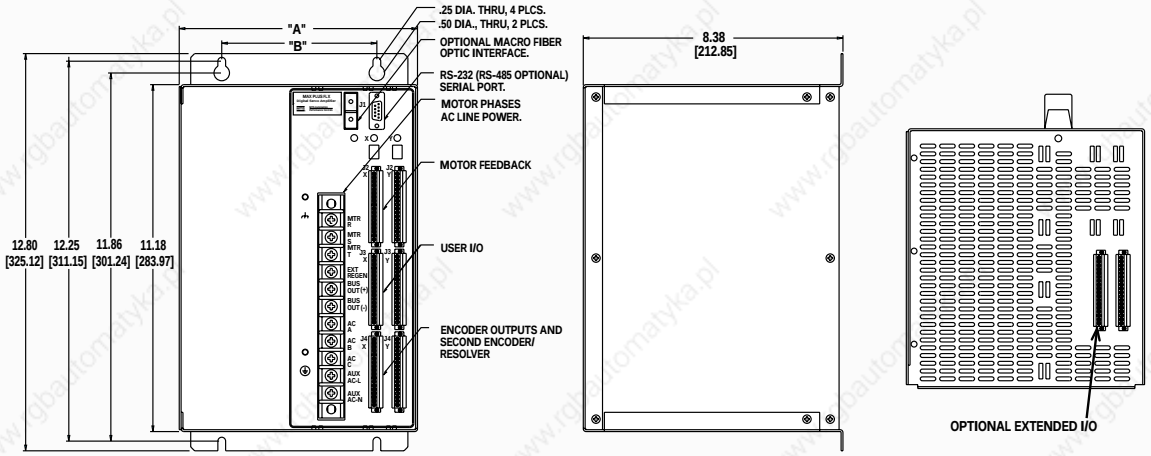
***Continuous current is derated if ambient is above 40° C.*

Mechanical Specifications, MP-FLX Single Axis Systems



Power Level	X03 in/mm	X06 in/mm	X10 in/mm	X20 in/mm	X35 in/mm
"A"	3.7/94.0	3.7/94.0	3.7/94.0	5.7/144.8	7.7/195.6
"B"	2.0/50.8	2.0/50.8	2.0/50.8	3.0/76.2	5.0/127.0

Mechanical Specifications, MP-FLX Series Dual Axis Systems



Power Level	X03/Y03 in/mm	X05/Y05 in/mm	X08/Y08 in/mm	X12/Y08 in/mm	X12/Y12 in/mm	X25/Y12 in/mm
"A"	4.6/116.8	4.6/116.8	5.8/147.3	5.8/147.3	7.8/198.1	7.8/198.1
"B"	2.0/50.8	2.0/50.8	3.0/76.2	3.0/76.2	5.0/127.0	5.0/127.0

Digital Inputs and Outputs

The MP-FLX Series comes standard with four dedicated inputs (24VDC or TTL) and two user-defined relay outputs. An additional 15 I/O can be added per axis as an option. All I/O are optically isolated with the exception of the relays, which are magnetically isolated.

Dedicated Inputs

Inputs utilize bi-directional opto-couplers and a user-provided reference. Therefore, the user determines the active state, positive or negative. Inputs are available with a 3V or 8V minimum threshold.

ENABLE

Input is active high. When high the amplifier output is enabled and when low the amplifier output is disabled. Toggling the input resets the amplifier.

+LIMIT

Input is active high or low (user definable). When active the amplifier output is disabled in the positive direction.

- LIMIT

Input is active high or low (user definable). When active the amplifier output is disabled in the negative direction.

HOME

Input is active high or low (user definable). When active during the homing sequence the position counter is set to zero. The Home bit can be ANDED with any combination of the encoder index, encoder A, or encoder B.

Relay Outputs

The relays are solid state devices with normally open contacts that are rated for 100VDC and 0.5A. The power-on state is user definable as well as the function. These relays can be used for outputs such as drive ready/fault, brake, or other user defined applications.

Optional I/O

The Expansion I/O provides 8 inputs and 7 outputs per axis or 7 inputs and 8 outputs per axis.

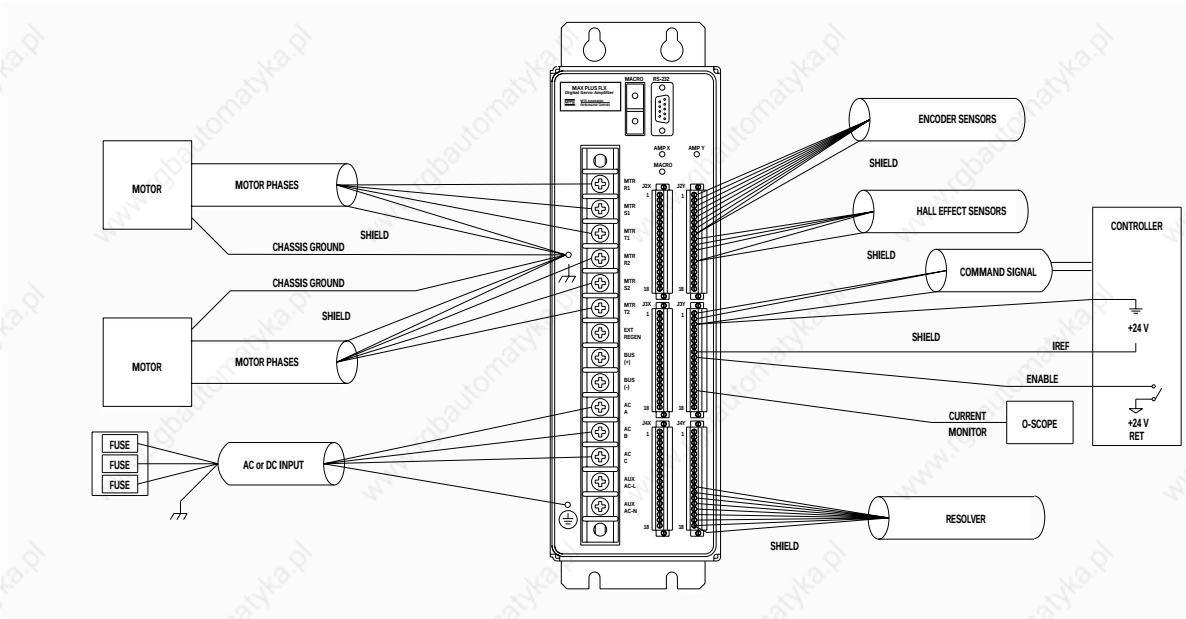
INPUTS

Inputs utilize bi-directional opto-couplers and a user-provided reference. Therefore, the user determines if the inputs are active high or active low.

OUTPUTS

Outputs utilize open-collector drivers, can sink up to 350mA, and are active low.

Signal/Wiring



MACRO® (Motion and Control Ring Optical)

MACRO® is a non-proprietary digital interface developed by Delta Tau Data Systems for connection of multi-axis controllers, amplifiers and I/O on a fiber-optic or twisted-pair copper ring (RJ45 connector).

Features and Benefits:

- Single Plug Connections - Minimizes Wiring Complexity Between Controls and Amps
- Noise Immunity - Fiber-Optic Cable Transmits Light, Not Electricity
- Speed - One of MACRO'®s Most Impressive Features is its 125 Mbits/Sec Rate of Data Transmission
- Simplicity - Transmission Across the MACRO® Ring Requires No Software Intervention
- Improved System Performance - Digital Communications Minimizes Error in A/D and D/A Conversions and Eliminates Ground Loops and Voltage Offset/Shift Problems
- One Ring, Multiple Masters - No Need for Independent Rings for Systems with Multiple Controllers for High-Axis Count.
- Tuning and Set-up Parameters are Downloadable via MACRO®

MACRO® Data Structures Compatible with the MP-FLX

- Phase Current
- Torque
- Velocity
- Position

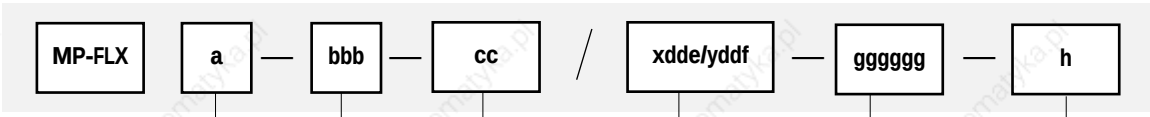
MP-FLX I/Os that are Adjustable through MACRO®

- 4 Digital Inputs
- 1 Analog Input and 1 Analog Output
- 8 Optional Inputs
- 7 Optional Outputs

The User Can Monitor in REAL-TIME Any of the Internal Variables of the MP-FLX Drive including:

- Y Current Feedback
- X Current Feedback
- Motor and Amplifier Temperature Data
- Fault Status
- Command Input
- Current Command
- Bus Voltage
- Torque
- Position/Velocity

MP-FLX Series Model Number Decode



INTELLIGENT DRIVE OPTION
i= APPLICATION PROGRAMMING (MEMORY FOR PROGRAM STORAGE, COORDINATED MOTION, MASTER/SLAVING, ELECTRONIC CAMMING, SEQUENCING, MATH FUNCTIONS, LOGIC FUNCTIONS)

blank = Base Model (torque, velocity, and pulse/direction and position modes)

NOMINAL INPUT VOLTAGE (VAC)
230

24 VDC AUXILIARY INPUT
24 = USER MUST SUPPLY 24 VDC±25%

blank = Auxilliary AC Voltage (85-264 VAC) supplied.

X AXIS CONTINUOUS/Y AXIS CONTINUOUS (ADC)
(The standard peak is twice the continuous for 2 seconds.)

SINGLE AXIS	DUAL AXIS
X03	X03/Y03
X06	X05/Y05
X10	X08/Y08
X20	X12/Y08
X35	X12/Y12
	X25/Y12

FEEDBACK OPTION PER AXIS
(Two feedback devices per axis may be indicated in the description due to either master/slaving or independent feedback for commutation and position/velocity.)

A = INCREMENTAL ENCODER
B = RESOLVER AND INCREMENTAL ENCODER
C = DUAL INCREMENTAL ENCODER
D = SERIAL ABSOLUTE ENCODER
E = SERIAL ABSOLUTE AND INCREMENTAL
F = SERIAL ABSOLUTE AND RESOLVER
G = DUAL SERIAL ABSOLUTE ENCODER
H = HYPERFACE

ADDERS
A = 4-20MA (±10VDC STANDARD)
B = D-TYPE (SCREW TERMINALS STANDARD)
C = RS-485 (RS-232 STANDARD)
D = TTL I/O LEVELS (24V STANDARD)
E = RESERVED
F = EXPANSION I/O (8 IN, 7 OUT PER AXIS)
G = FIBER-OPTIC MACRO
H = RJ-45 MACRO

CUSTOM
CONTACT FACTORY

EX: MP-FLX i-230-24/X12B/Y12B-F

At MTS Automation our experienced application engineers are ready to work with you to design motor, amplifier and motion control packages to meet your performance, size and durability requirements exactly. For specific ordering information, please visit our web site at www.mtsautomation.com, or call the factory at 1-800-967-1785.

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