Brushless AC Servo Controls

Baldor's FlexDrive^{II} series are designed to provide reliable and durable operation. Options are available to operate either resolver based motors (Brushless Servo Motors) or encoder based motors (either rotary or linear motors). The FlexDrive^{II} interfaces easily with existing programmable motion controllers. Optional factory installed bus communication cards are available to allow a host to monitor control status, modify control parameters, and command motor output. The FlexDrive^{II} series are designed for easy setup and include autotuning features.

FlexDrive^{II} Series

- Direct line operation and easy-to-use auto-commissioning and auto-tune wizards make the FlexDrive^{II} series a breeze to use.
- 2.5 to 7.5 Amp Continuous 115/230 VAC 1ϕ Input
- 2.5 to 27.5 Amp Continuous 230-400/460 VAC 3ϕ Input
- Digital Design with PC setup
- Readily Interfaces with Existing Programmable Motion Controllers
- Variety of Field Bus Option Cards – CAN, Profibus DP, DeviceNet
- 8 Digital Inputs/3 Digital Outputs
- Optional Customer Supplied +24 VDC Logic Supply
- Fully Protected Unit
- UL, cUL and CE

Design Characteristics

Specification	Description
Power	Direct 115, 230, 400/460 VAC input power - flexibility for machine design needs.
Command Signal	± 10 VDC, ±5 VDC & +24 VDC pulse and direction, electronic handwheel (pulse follower), or with FLEX+Drive
	16 Programmable Pre-set Positions (Expandable to 256) - wide selection for customer choices.
Feedback	Standard commutation resolver, simulated encoder output. Optional incremental encoder or absolute encoder.
	- choose the optimum for the application.
Efficiency	Greater than 95% - save energy, save money.
Protection	Short circuit, over voltage, over current, over temperature, electronic fusing,
	I^2t, under voltage and feedback loss - fully protected for reliable service over the life of the product.
Communication	Customer selectable RS232/RS485 - choose the best for the application needs.
Environment	Wide operating temperature range to + 40°C - quality over wide range.
	Humidity 10-90% non-condensating - product durability.
Agency Approvals	UL, cUL and CE - proven designs, proven quality.

Easy FlexDrive^{II} Setup

The FlexDrive^{II} is setup via software which is provided with the control. Insert the software into the computer, boot it up, and you are off and running…

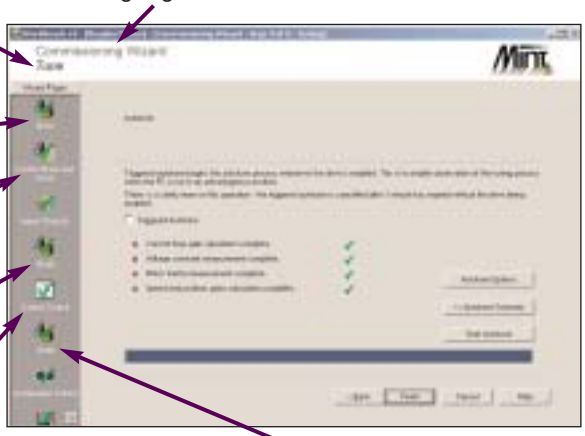
Tuning – There are two methods of tuning. 1) Triggered Auto-tune is used when you cannot see the motor. It delays the tuning process for one minute to allow you to go to the machine and activate the enable.
2) Standard Auto-tune is used when you can see the motor. In both, the motor moves the load to auto-tune the package.

Select Motor – Allows you to enter the exact motor parameters that you will be using in your application. There are three different ways to enter data, from the motor's 1) catalog number, 2) spec number, and 3) enter motor parameters manually.

Confirm Motor and Drive – Allows you to confirm data entered.

Mode – Sets velocity or current mode of operation.

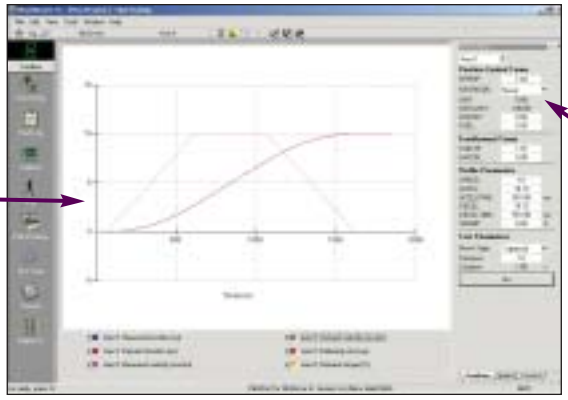
Commissioning Wizard – Provides a simple, structured way to configure the control for your application. It will take you through all the steps necessary to get your control and motor working together.



Current Control – You select the current limits for the application. The known parameters for the selected motor are already entered, however, you have the option of modifying these.

Define Scale – Allows you to select the scaling factors in meaningful units, i.e. your terms or definitions.

6 Channel Scope – Fine tuning and auto-tuning of controls, the digital capture scope allows you to capture up to 6 channels simultaneously. Displays commanded and actual values for velocity and position, also following error, torque demand, etc.

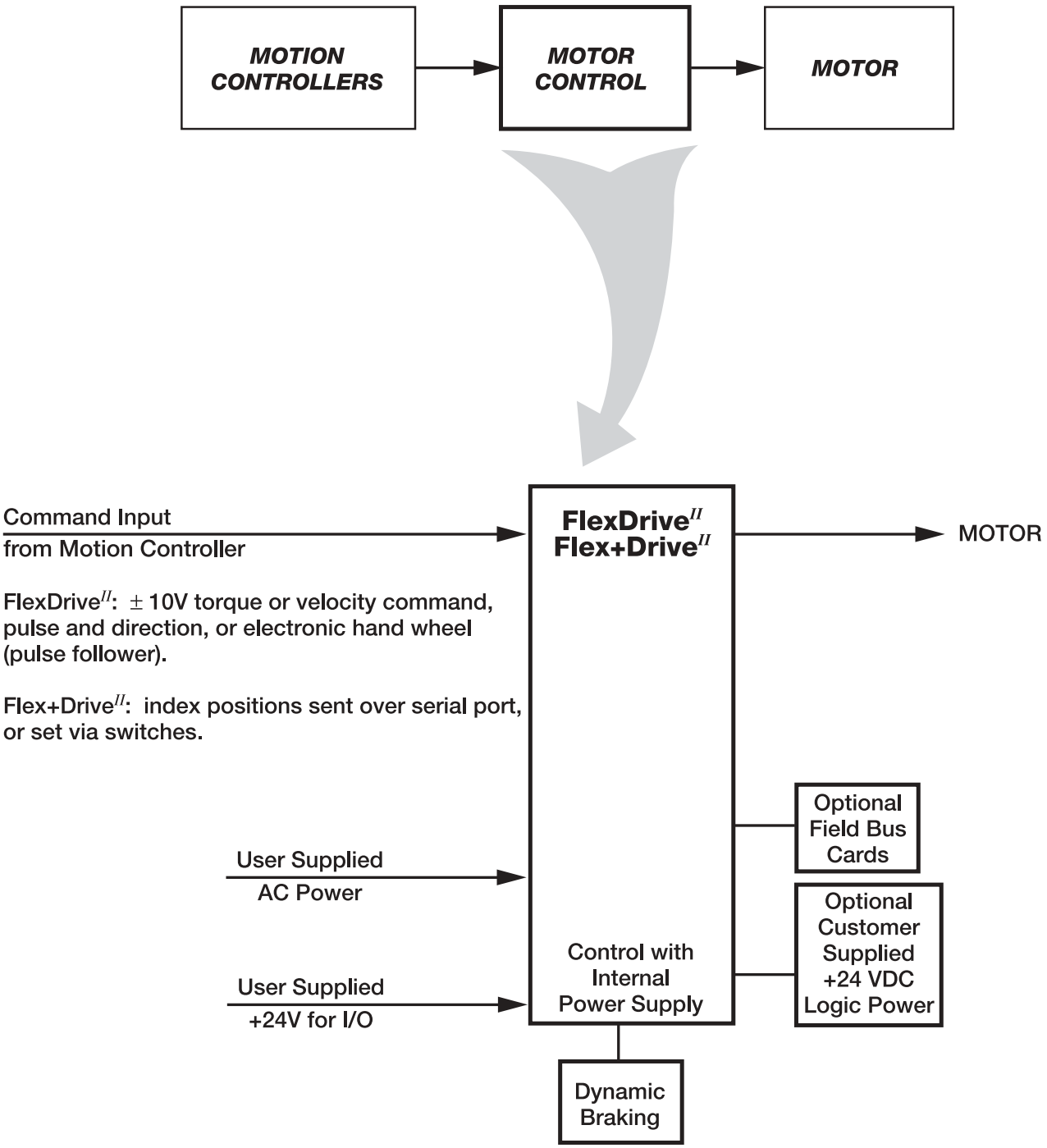


Software Scope – User configurable color scheme. Save and print traces, re-open traces for comparison.

On-Line Help – Fully integrated on-line reference. Context sensitive help. Simply position the cursor over the keyword and hit F1 to view keyword specific information.

FlexDrive^{II}/Flex+Drive^{II} Controls

Baldor has a variety of controls to suit many application requirements. The FlexDrive^{II} and Flex+Drive^{II} series is a very “flexible” drive. It has versions which accept the standard ±10 VDC input, or pulse and direction, or electronic handwheel, and as with the Flex+Drive^{II} of 16 pre-set positions. An option is available to expand the pre-set positions up to 256. An encoder option is available, to drive either encoder based motors or linear motors.



FlexDrive^{II}

The FlexDrive^{II} series is a "flexible" versatile drive. It is flexible, so you can tailor it to your application… it is flexible to accept the standard ±10 VDC input, or pulse and direction input, or electronic handwheel input… it is flexible so you can get it configured with various bus options (such as CAN, DeviceNet and Profibus), or with external +24 VDC to maintain logic power… flexible so you can configure it manually or via autotuning.

Ideally suited to operate
Brushless Motors – BSM Series
Linear Brushless – LMCF and LMBL Series

Design Specifications
- Control Brushless or Linear Motors
- Direct 115/230 1ϕ
- Direct 230-400/460 3ϕ
- Standard Resolver Feedback
- Simulated Encoder Output
- Setup via Software

Velocity
- Standard ± 10 VDC
- Velocity/Current Mode of Operation
- +5 VDC & +24 VDC Pulse and Direction Input
- Electronic Handwheel (Pulse Follower) Input
- Setup via Auto-Tuning

Special Features
- Customer selectable RS232/RS485
- 8 Digital Inputs
- 3 Digital Outputs
- 7 Segment Diagnostic Display
- Auto-Tuning

Available Options
- CAN-Bus, DeviceNet, Profibus-DP
- Encoder Feedback
- Absolute Encoder Feedback
- External Customer Supplied 24VDC Logic Supply

Protection Features
- Overvoltage
- Short Circuit Proof
- Over Temperature
- Over Current
- Resolver Fault
- Under Voltage
- Motor I^2t
- Electronic Fusing
- Drive Overload
- Loss of Feedback
- Electronic Fusing
- Over Current Protection on Digital Outputs

FlexDrive^{II} Catalog Numbers

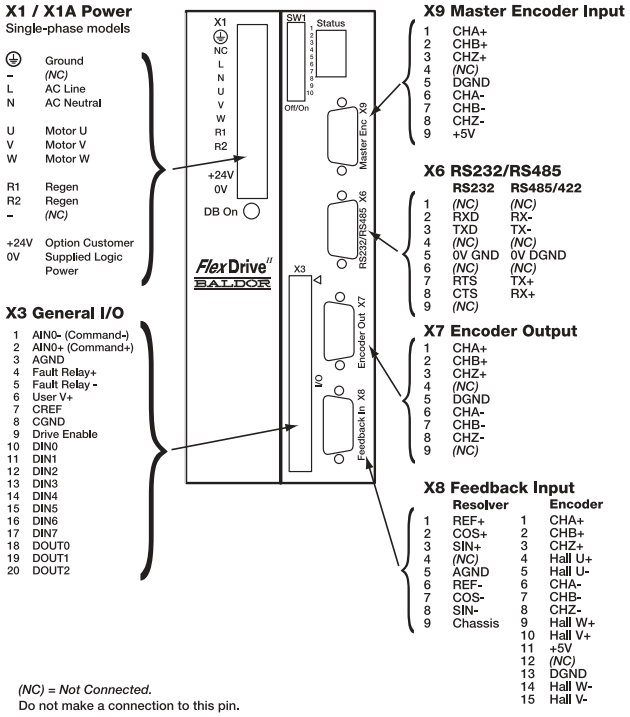
AC Input Voltage / Bus Voltage		115 VAC 1ϕ ② 160 VDC	230 VAC 1ϕ ② 300 VDC			400/460 VAC 3ϕ ②⑥ 565/650 VDC		
Output Amps ①		Catalog	Catalog	Pkg.	Pkg.⑤	Catalog ④	Pkg.	Pkg.⑤
Cont.	Peak	Number	Number	Size	Size	Number	Size	Size
2.5	5	FDH1A02TB-RN20 ③	FDH2A02TB-RN20 ③	A	B	FDH4A02TB-RN23 ③	G	G
5	10	FDH1A05TB-RN20 ③	FDH2A05TB-RN20 ③	C	D	FDH4A05TB-RN23 ③	G	G
7.5	15	FDH1A07TR-RN20	FDH2A07TR-RN20	D	D	FDH4A07TR-RN23	G	G
15	30	–	–	–	–	FDH4A15TR-RN23	H	H
20	40	–	–	–	–	FDH4A20TR-RN23	H	H
27.5	55	–	–	–	–	FDH4A27TR-RN23	H	H

NOTE: ① RMS Current
② 24V required for operation of I/Os (customer supplied).
③ 2.5 amp models have internal 20W 175 ohm (115/230 VAC) or 300W 200 ohm (400/460 VAC) regen resistor.
5 amp models have internal 40W 90 ohm (115/230 VAC) or 300W 200 ohm (400/460 VAC) regen resistor.
④ Logic supply code = 3. Customer must supply +24 VDC for logic supply.
⑤ Package Size with Bus Option Card.
⑥ Nominal input voltage range 230 - 460 VAC.
7) Order encoder model for operation with linear motors.
8) Order regen resistor for appropriate models, and motor and feedback cables separately.

FlexDrive^{II} Technical Data

Description		Unit	Specifications	
			1ϕ Models	3ϕ Models
Input Voltage Range	115	VAC	97-125	–
	230	VAC	220-250	–
	230-400/460	VAC	–	180-528
Input Frequency		Hz	50/60 ± 5%	
Efficiency		%	>95	
Minimum Load Inductance		µH	100	
Command Input		VDC	± 10	
Signal Resolution		bits	12	
Velocity Feedback Resolution		bits	12	
Simulated Encoder Output		ppr	512/1024/2048/4096 - RS422	
Pulse & Direction Input		VDC	+5 VDC & 24 VDC galvanically isolated (Max 1MHz)	
Handwheel Input		–	Encoder (A and B) RS422/5V (Max 4 MHz)	
Interface Bit Rate		Baud	9600, 19200, 38400, 57600, 115200	
Operating Altitude		Feet	3300 (Above derate 1.1% per 330)	
		Meters	1000 (Above derate 1.1% per 100)	
Operating Temperature		°C	0 to +40	
Storage Temperature		°C	-25 to +70	
Humidity		%	10-90 non-condensating	
Shock		G	10G	
Vibration		G	1G; 10-150 Hz	
Optional Customer	Supplied 24V Logic Input	VDC	20.4 to 28.8	
	Current @ 24Volts	Amps	1.75, 4.0 Surge	

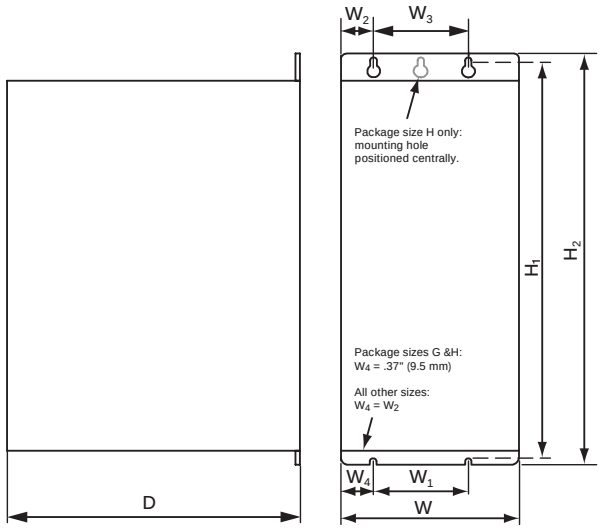
Typical Connections



(NC) = Not Connected.
Do not make a connection to this pin.

NOTE: FDH1A02TB-RN20 shown
X1 on three phase models include 2 ground pins

FlexDrive^{II}/Flex+Drive^{II} Dimensions (inches/millimeters)



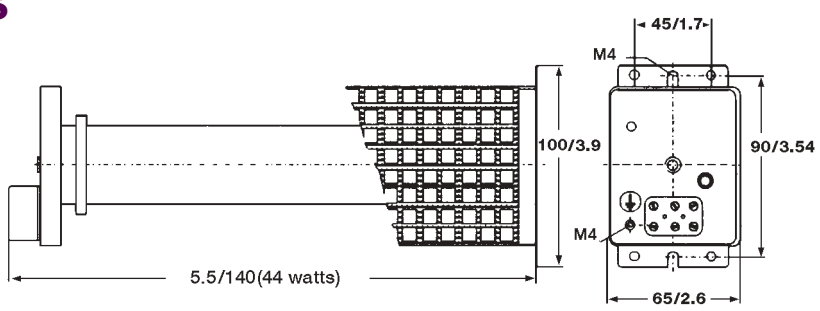
Package Size	Dimensions inches [mm]								Weight Lbs [Kg]
	W	H	D	W1	W2	W3	H1	H2	
A	2.66 [67.5]	6.81 [173]	6.00 [152]	1.57 [40]	0.59 [15]	1.57 [40]	7.70 [195.5]	8.07 [205]	2.76 [1.25]
B	3.31 [84]	6.81 [173]	6.00 [152]	1.57 [40]	0.59 [15]	1.57 [40]	7.70 [195.5]	8.07 [205]	3.42 [1.55]
C	3.64 [92.5]	6.81 [173]	6.00 [152]	1.57 [40]	0.91 [23]	1.57 [40]	7.70 [195.5]	8.07 [205]	4.63 [2.1]
D	4.29 [109]	6.81 [173]	6.00 [152]	1.57 [40]	0.91 [23]	1.57 [40]	7.70 [195.5]	8.07 [205]	5.07 [2.3]
G	2.56 [65]	14.06 [357]	10.31 [262]	1.81 [46]	1.28 [32.5]	–	15.12 [384]	15.75 [400]	10.8 [4.9]
H	5.12 [130]	14.06 [357]	12.91 [328]	4.37 [111]	1.08 [27.5]	2.95 [75]	15.12 [384]	15.75 [400]	19.95 [9.05]

Regen Resistors

115 VAC Drive			230 VAC Drive			460/400 VAC Drive		
	Regen Resistor			Regen Resistor			Regen Resistor	
Control	Catalog	Watts	Control	Catalog	Watts	Control	Catalog	Watts
FDH1A07TR-	RG22	100	FDH2A07TR-	RG39	100	FDH4A07TR-	RG68	320
						FDH4A15TR-	RG27A	320
						FDH4A20TR-	RG27A	320
						FDH4A27TR-	RG11	640

Dimensions

(millimeters/inches)



Product Identification Matrix

F	D	H		A			T		–				2	

CONTROL FAMILY
FDH = FlexDrive^{II}

CURRENT CODE
A02 = 2/2.5 amps
A05 = 5 amps
A07 = 7.5 amps
A15 = 15 amps
A20 = 20 amps
A27 = 27.5 amps

LOGIC SUPPLY VOLTAGE OPTIONS
0 = Internally generated
3 = External Customer supplied +24 VDC

SERIAL PORT OPTIONS
2 = RS232/RS485

INPUT VOLTAGE
1 = 115 Volt 1ϕ
2 = 230 Volt 1ϕ
4 = 230-400/460 Volt 3ϕ

BUS OPTIONS
N = None
C = 1 CAN channel (CANOpen)
D = DeviceNet
P = Profibus - DP

ENCLOSURE TYPE
T = Panel mount with Internal Power Supply

FEEDBACK OPTIONS
R = Resolver
E = Encoder
D = Absolute Encoder

BRAKING OPTIONS
R = Requires external resistor
B = Built in regen resistor

NOTE: Not all options are available on all controls. Contact your local Baldor office. Some options make model width wider.