AC Drive Options

AC Drives

AC DRIVE OPTIONS AT-A-GLANCE

Options & Accessories	Description	Commander Series SL	Commander Series SX	Commander Series SK	Commander Series GP20	Unidrive SP	Order Code
Base Drive Configuration and Programming	Cloning and Parameter Storage		✓	✓	✓	✓	SX=XPRESS-KEY, SK=SMARTSTICK GP20=GP20-SMARTCARD, SP=SMARTCARD
	Configuration Software		✓	✓	✓	✓	SX=SXSOFT SK, GP20, SP=CTSOFT
	PC Configuration Tool / Cloning	✓					9500-0078
	Communications Cable - RS232/485	✓	✓	✓	✓	✓	CT-COMMS-CABLE
	Communications Cable - USB	✓	✓	✓	✓	✓	CT-USB-CABLE
Operator Interface	No Keypad Option					✓	-NKP
	LED Keypad			✓		✓	SK=SK-KEYPAD-REMOTE SP=SM-KEYPAD SP SIZE ZERO=KEYPAD-SP0
	LCD Keypad			✓	✓	✓	SK, SP=SM-KEYPAD-PLUS GP20=CGP-KEYPAD-PLUS
	Programmable HMI Panels		✓	✓	✓	✓	See Options & Accessories
Power Accessories	Zero-Space Brake Resistor		✓	✓	✓	✓	Based on Drive
	E-Stop Duty Braking Resistor		✓	✓	✓	✓	See Options & Accessories
	Cyclic Duty Braking Resistor		✓	✓	✓	✓	See Options & Accessories
Environmental Protection and Cable Management Options	Internal EMC Filter		✓	✓	✓	✓	Standard
	External EMC Filters	✓	✓	✓	✓	✓	See Options & Accessories
	Top Cover and Conduit Entry - NEMA Kit	✓		✓	✓	✓	See Options & Accessories
	Conduit boxes	✓	✓	✓	✓	✓	See AC Drive Options & Accessories
Feedback Solutions Modules	Universal Encoder Feedback SM-UNIVERSAL ENCODER PLUS					✓	SM-UNI-ENCODER
	Incremental Encoder Input SM-ENCODER PLUS					✓	SM-ENCODER-PLUS
	Incremental Encoder Input & Output SM-ENCODER OUTPUT PLUS					✓	SM-ENCODER-OUT
	Resolver Feedback					✓	SM-RESOLVER
	Screw Terminal Connector					✓	SM-ETC
I/O Solution Modules	Extended Analog and Digital I/O				✓	✓	SM-I/O-PLUS
	Extra I/O with Encoder Reference			✓	✓	✓	SM-I/O-LITE
	32 Point Digital I/O			✓	✓	✓	SM-I/O-32
	Extra I/O with Real-Time Clock/Calendar			✓	✓	✓	SM-I/O-TIMER
	120/240 Volt AC I/O			✓	✓	✓	SM-I/O-120V
	Double Insulated Extended I/O			✓	✓	✓	SM-I/O-PELV
	Remote Network I/O					✓	See Options & Accessories
	24 Volt Protected I/O			✓	✓	✓	SM-I/O-24V
	Bipolar Analog Input for Direction Control			✓			SM-BIPOLAR

* For complete product descriptions please refer to the Options and Accessories section.

CTi Automation - Phone: 800.894.0412 - Fax: 208.368.0415 - Web: www.ctiautomation.net - Email: info@ctiautomation.net

AC DRIVE OPTIONS AT A GLANCE continued

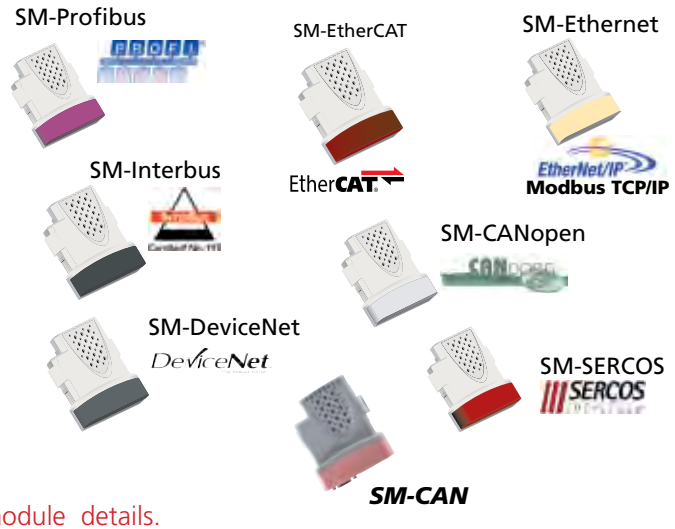
		AC Drives					
		Commander Series				Unidrive SP	
Options & Accessories	Description	SL	SX	SK	GP20		Order Code
Communications Solutions Modules	Modbus RTU Follower		✓	✓	✓	✓	Standard
	Modbus RTU Master SM APPLICATIONS PLUS					✓	SM-APPS-PLUS
	DeviceNet			✓	✓	✓	SM-DEVICENET
	PROFIBUS DP			✓	✓	✓	SM-PROFIBUS-DP
	Ethernet (Modbus TCP/IP, Ethernet IP)			✓	✓	✓	SM-ETHERNET
	Interbus-S			✓	✓	✓	SM-INTERBUS
	CANopen			✓	✓	✓	SM-CANOPEN
	CAN Interface					✓	SM-CAN
	Ethernet (EtherCAT)			✓	✓	✓	SM-ETHERCAT
	SERCOS					✓	SM-SERCOS
	CTNet (SM APPLICATIONS PLUS)					✓	SM-APPS-PLUS
	CTSync (SM APPLICATIONS PLUS)					✓	SM-APPS-PLUS
Application Solutions Modules	Systems Programming (Centralized Control) SM APPLICATIONS LITE V2					✓	SM-APPS-LITE-V2
	Systems Programming (Distributed Control) SM APPLICATIONS PLUS					✓	SM-APPS-PLUS
	High Speed Capture & Registration					✓	SM-REGISTER
	Dedicated Motion Control					✓	SM-EZMOTION[4]
Applications Module Programming Software[6]	Ladder and Function Blocks			✓	✓	✓	SYPTLITE[5]
	IEC 61131-3 (Ladder, FB, and Text Based)					✓	SYPTPRO
	"Motion Made Easy"™ Programming					✓	POWERTOOLSPRO
Miscellaneous	IP54 or IP55 Heatsink Fans			✓	✓	✓	Based on Drive

[4] Only one of these modules can be used in a Unidrive SP at a time
[5] Available via free web site download only
[6] See the Software section for complete details

Communication Modules

SM NETWORK COMMUNICATION MODULES

SM communication option modules can be inserted in a drive's option slot allowing control and monitoring of that drive on fieldbus networks. The standard Modbus-RTU port can also be used for drive configuration using CTSoft. The most popular industrial network protocols are available in the SM range of options.



See the Connectivity section for complete communication module details.

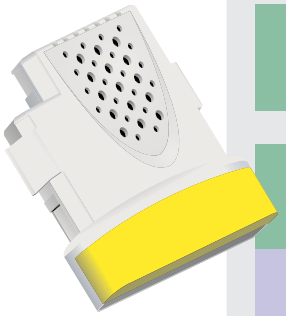
AC Drive Options & Accessories

Input/Output Modules

SM-I/O PLUS

This module provides expanded digital and analog I/O.

- 2 Analog Inputs (10-bit plus sign,±10V)
- 1 Analog Output (10-bit plus sign,±10V)
- 3 Digital Input/Outputs
- 3 Digital Inputs
- 2 Relays (2A @ 240 VAC, 4A @ 30 VDC)



PL1	
OV Common	1
Digital I/O 1	2
Digital I/O 2	3
Digital I/O 3	4
OV Common	5
Digital Input 4	6
Digital Input 5	7
Digital Input 6	8
Analog Input 4	9
Analog Input 5	10
OV Common	11
Analog Output 3	12

PL2	
Relay 1	21
Relay Common	22
Relay 2	23

SM-I/O 24V

The SM-I/O 24V is designed as an over voltage protected I/O Solution Module. The Solutions Module is able to withstand a +48V input voltage being applied to the +24V rated Digital I/O terminals.

- 2 x Analog Current Outputs
- 4 x Digital Input/Outputs
- 3 x Digital Inputs
- 2 x Relays** (30 VDC contact rating)

OV Common	1
OV Common	2
Digital I/O 1	3
Digital I/O 2	4
Digital I/O 3	5
Digital I/O 4*	6
Digital Input 5	7
Digital Input 6	8
Digital Input 7	9
Analog Output 1	10
OV Common	11
Analog Output 2	12
OV Common	13
Relay 1	14
	15
Relay 2**	16
	17

* Digital Input only with Commander SK

** Not available on Commander SK

LEGEND

- Programmable Analog
- Programmable Digital
- Non-Programmable

SM-I/O 120V

This module provides digital I/O rated for 120 or 240 VAC. These I/O conform to IEC 61131-2 120 VAC standard.

- 6 Digital Inputs (120 VAC or 3 Digital Inputs @ 240 VAC)
- 2 Relays (2A @ 120 VAC, 4A @ 30 VDC)

Digital Input 1	1
Digital Input 2	2
Neutral for Digital Inputs 1 & 2	3
Digital Input 3	4
Digital Input 4	5
Neutral for Digital Inputs 3 & 4	6
Digital Input 5	7
Digital Input 6	8
Neutral for Digital Inputs 5 & 6	9
Relay 1	10
Relay Common	11
Relay 2	12

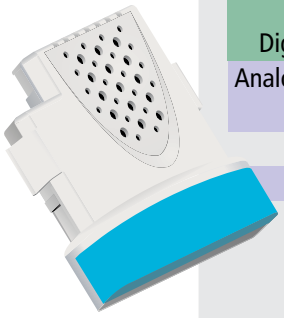
Installing Solution Modules is a SNAP!

SM-I/O PELV

This module provides PELV (Protective Extra Low Voltage) double insulated digital and analog I/O to meet IEC 61131-2, Clause 3.3.1 Type as well as NAMUR NE37 specifications for chemical industry applications.

- 1 Analog Input (bipolar 0-10V, 4-20 mA or 0-20 mA)
- 2 Analog Outputs (4-20 mA or 0-20 mA)
- 1 Digital Input with freeze function
- 4 Digital Input/Outputs
- 2 Relays (2A @ 240 VAC, 4A @ 30 VDC)

Note: SM-I/O PELV module requires an external 24Vdc power supply rated at 150mA when all outputs are loaded. See the Options & Accessories section under 'Logic and I/O Power Supplies' for 24V dc power supply listings.



0V Common	1
+24 Input	2
Digital I/O 1	3
Digital I/O 2	4
Digital I/O 3	5
Digital I/O 4*	6
Digital Input 5/Freeze Input**	7
Analog Input 1 Inverting Input***	8
Analog Output 1	9
0V Common	10
Analog Output 2	11
0V Common	12
	13
Relay 1	14
	15
Relay 2	16
	17

* Digital Input only with Commander SK
** Freeze Input not available with Commander SK
*** Current mode only

LEGEND

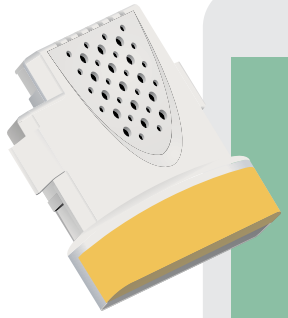
- Programmable Analog
- Programmable Digital
- Non-Programmable

SM-I/O 32

NEW

This module provides expanded digital I/O.

- 32 Digital Inputs/Outputs
- Includes Breakout Board and Cable
- Access to all I/O requires the use of SyPTLite or SyPTPro software



PL1

Digital Input/Output 1	1
Digital Input/Output 2	2
Digital Input/Output 3	3
Digital Input/Output 4	4
Digital Input/Output 5	5
Digital Input/Output 6	6
Digital Input/Output 7	7
Digital Input/Output 8	8
Digital Input/Output 9	9
Digital Input/Output 10	10
Digital Input/Output 11	11
Digital Input/Output 12	12
Digital Input/Output 13	13
Digital Input/Output 14	14
Digital Input/Output 15	15
Digital Input/Output 16	16
Digital Input/Output 17	17
Digital Input/Output 18	18
Digital Input/Output 19	19
Digital Input/Output 20	20
Digital Input/Output 21	21
Digital Input/Output 22	22
Digital Input/Output 23	23
Digital Input/Output 24	24
Digital Input/Output 25	25
Digital Input/Output 26	26
Digital Input/Output 27	27
Digital Input/Output 28	28
Digital Input/Output 29	29
Digital Input/Output 30	30
Digital Input/Output 31	31
Digital Input/Output 32	32
+24V Out	33
0V	34
0V	35
0V	36
0V	37

[= output group

SM-I/O 32 digital outputs
Each group of 4 outputs can supply a total of 16mA, so each output is able to supply at least 4mA. A digital output can supply up to a maximum of 16mA as long as the total output current for the group does not exceed 16mA, (for example, one digital I/O set as an output and the other three digital I/O in the group set to inputs).

Recommended relay
TYCO Electronics Schrack ST3P2LC4

SM-I/O LITE

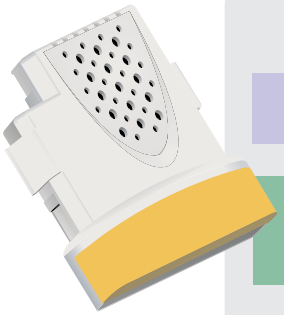
This module provides expanded digital and analog I/O plus encoder reference.

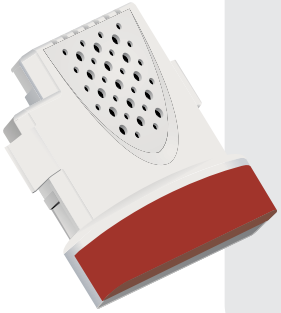
- 1 Analog Input (11-bit plus sign, ±10V, 4-20 mA, or 0-20 mA)
- 1 Analog Output (13-bit, 0-10V, 4-20 mA, or 0-20 mA)
- 3 Digital Inputs
- 1 Relay (2A @ 240 VAC, 4A @ 30 VDC)
- Quadrature encoder reference input

SM-I/O TIMER

As per SM-I/O LITE above, but with the addition of a Real Time Clock and Calendar for scheduling drive events.

- Access to Year, Month, Day, Hour, Minute, Second, and Daylight Savings Mode





PL1

0V Common	1
Analog Input	2
Analog Output	3
+24V	4
Digital Input 1	5
Digital Input 2	6
Digital Input 3 / Encoder B*	7
Encoder B\	8
Encoder A	9
Encoder A\	10
0V	11
Encoder +5V	12

PL2

Relay	21
	22
	23

LEGEND

- Programmable Analog
- Programmable Digital
- Non-Programmable

* When terminal 7 is used as an encoder input, digital input 3 is not available

COMMUNICATION CABLES

Use our RS232 or USB to RS485 cable connectors to connect a PC to the RJ45 serial port on the front of the drive. The same cable is used with other Control Techniques products that use a RS485 RJ45 connector such as the Commander SX, GP20 and SK.

Description	Order Code
PC-to-drive Comms Cable	CT-COMMS-CABLE
PC-to-drive Comms Cable	CT-USB-CABLE

IP54 AND IP55 FAN OPTIONS

For those applications using through-panel mounting, and located in demanding environments, Unidrive SP, Commander SK and Commander GP20 can be fitted with optional fans providing either IP54 or IP55 Ingress Protection Ratings. The chart below lists the available fan options.

Drive Frame Size	IP54 Fan Option Order Code	IP55 Fan Option Order Code
1	3251-4824	3251-3824
2	3251-4824	3251-3824
3	N/A	3251-1224
4	3251-7824	N/A
5	Standard	N/A
6	Standard	N/A

Drives fitted with fan options require field wiring.

EXTERNAL EMC FILTERS

EMC filters are used to minimize high frequency power supply line disturbances caused by PWM AC drives that may interfere with proper operation of sensitive electronic equipment. These specific filters have been assessed for conformance with the EMC directive by testing with the appropriate Control Techniques drives. The filters used with Unidrive SP, Commander SL, SK and GP20 have been designed to mount in either footprint or bookend dimensions, allowing the user to optimize panel space.

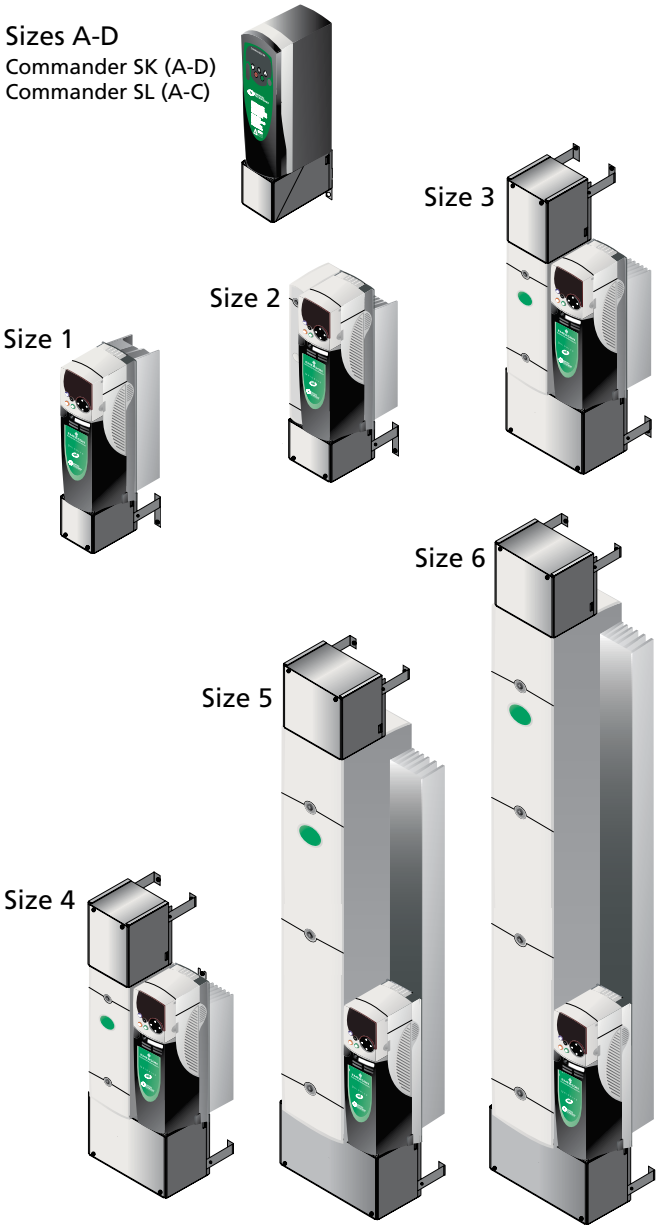
See the Options & Accessories section for details.

CONDUIT BOXES

Conduit plates for Commander SK, SL, GP20 and Unidrive SP (sizes 1-6) panel-mount drives.

Frame Size	Order Code	Overall Dimensions
Size A	SK-NEMA1-KIT-A*	2.09w x 2.4h
Size B	SK-NEMA1-KIT-B*	2.17w x 2.4h
Size C	SK-NEMA1-KIT-C*	2.78w x 2.4h
Size D	SK-NEMA1-KIT-D*	4.29w x 2.4h
Size 1	C-BOX-S1	3.94w x 17.8h
Size 2	C-BOX-S2	6.1w x 17.8h
Size 3	C-BOX-S3B** C-BOX-S3T**	9.9w x 21.7h
Size 4	C-BOX-S4	12.2w x 32h
Size 5	C-BOX-S5	12.2w x 44.2h
Size 6	C-BOX-S6	12.2w x 56.4h

* Includes plastic top and side covers
** C-BOX-S3T (Top) is only necessary when a DC input power or dynamic braking resistor is required.



Power Accessories

INTERNAL DYNAMIC BRAKING RESISTORS

During deceleration, the mechanical energy stored in the spinning mass of the motor and load is converted to electrical energy, which recharges the drive's DC bus. Dynamic braking resistors provide a means of rapidly dissipating that energy so that the drive does not fault from overcharging the DC bus. The ohmic value and power rating of the braking resistor is a function of the drive type and size.

Size 1 Unidrive SP heatsink shown

A Zero-space braking resistor is available for heatsink mounting on Unidrive SP frame sizes 0-2. These resistors are designed for low-inertia loads commonly used in servo type applications. For higher-inertia loads, the heatsink mounted resistor may not have enough braking capacity, and a larger external resistor may be required. No additional thermal protection device is required with these heatsink mounted resistor packages.

Frame Size	DC Resistance	Power Rating	Order Code
0	75 Ω	50W	SM-HEATSINK-DBR0
1	75 Ω	50W	SM-HEATSINK-DBR1
2	37.5 Ω	100W	SM-HEATSINK-DBR2

(Drives Larger than Size 2 do not have this option)

DYNAMIC BRAKING RESISTORS

E-STOP DUTY

E-Stop duty DB resistors are designed for non-cyclic use where energy dissipation from an active drive is required.

CYCLIC DUTY

These heavy-duty kits have been designed to provide dynamic braking for cyclic and continuous braking applications.

See the Options and Accessories section for details

HUMAN MACHINE INTERFACE (HMI)

These operator interface units complement the product line by offering an impressive way of accessing parameters and adding more programming power to your application. The following features make these screens a simple and impressive solution for you... and your customers:

- Graphical full color or monochrome touchscreens
- Menus, submenus, alarms, fault conditions
- Realtime trends and graphs
- Scheduling and background programs
- Modbus RTU and Modbus TCP/IP
- Import pictures and graphics
- Advanced Recipe capabilities

For more information, refer to the Accessories Section.

See the RapidPak pages in the Packaged Drives and Engineered Systems section for details.

AC Inverter Duty Motors

NEW

ACCU-Torq™

Totally Enclosed, Non-Ventilated (TENV)
Vector Duty, C-Face, 2000:1 Constant Torque

Designed for use with inverter and vector drive applications requiring up to a 2000:1 constant torque speed range. This makes it perfect for use with Commander SL, SK, GP20 or Unidrive SP drives. The ACCU-Torq motor may be used for almost any AC drive application from a simple conveyor to those applications requiring the very best speed and torque or position control. Typical applications: winders, material handling, packaging machines, test equipment, and other industrial machinery.

If you need to accurately position the motor, but don't require the high speed and rapid acceleration dynamics of a servo motor, the Unidrive SP with an encoder-equipped AC induction motor may be the optimum performance solution as well as very affordable.

The flexibility and high performance of the Unidrive SP make it possible to control three phase induction motors on applications that previously demanded higher priced servo motors. Point to point indexing and material handling applications are ideal for utilizing this capability, especially when motors above 5 hp are required. The cost savings is significant due to the lower cost of materials used in the induction motor design.

AC induction motors have rotors with more mass and larger diameters than servo motors of the same torque capacity, and therefore higher inertia. This is helpful for high load-to-motor inertia ratios, and in most cases can eliminate the need for inertia matching gear reduction. The higher inertia of these systems also results in greater low-speed stability.

- From 1 to 25 hp
- High performance 2000 to 1 speed range
- Encoder ready with cables
- Constant torque operation from Zero to base speed with vector drives
- Constant hp operation to twice base speed
- Optimized for operation with IGBT and intelligent-power-module drives (NEMA Design-A)
- Class F insulation
- Normally closed thermostats standard
- Shaft grounding ring option on all ratings
- F-1 standard, field convertible to F-2 for 180 frame and above
- Encoder and brake provision on all ratings
- Three year warranty

Benefits of Vector Motor Positioning

- Overcomes high load inertia mismatches with use of larger AC motors without the expense of large servomotors and/or gear reducers
- Provides precise high-speed positioning when rapid accel/decel rates are not required
- Enables low-cost, error-free closed loop performance in applications that would be cost prohibitive where traditional servo systems are used
- Eliminates environmental and maintenance issues associated with hydraulic and pneumatic systems

AC Inverter Duty Motors

ACCU-Torq™

HP	Base RPM	Max. RPM	Rated Voltage	Frame Size	Catalog Number	F.L Amps	Rated Stall Torque lb-in	Inertia lb-in-sec2	Weight lbs.	Frame Material
0.25	1800	3600	230/460	56C	UN14T2BC	1.0/0.5	37.2	0.026	18.9	Steel
0.33	1800	3600	230/460	56C	UN13T2BC	1.1/0.6	45.6	0.036	18.9	Steel
0.5	1800	3600	230/460	56C	UN12T2BC	1.5/0.7	58.8	0.039	19.3	Steel
	1800	3600	575	56C	UN12T2GC	0.6	58.8	0.039	19.3	Steel
1	1800	3600	230/460	56C	UN1T2BC-a	3.2/1.6	169	0.040	24.3	Steel
	1800	3600	575	56C	UN1T2GC	0.9	168	0.040	24.3	Steel
	1800	3600	230/460	143TC	UN1T2BC	3.2/1.6	169	0.040	26.8	Steel
	1200	2400	230/460	145TC	UN1T3BC	3.6/1.8	163	0.045	41.6	Steel
1.5	1800	3600	230/460	145TC	UN32T2BC	4.6/2.3	278	0.048	41.9	Steel
2	1800	3600	230/460	145TC	UN2T2BC	4.4/2.2	306	0.065	54.3	Steel
	1800	3600	575	145TC	UN2T2GC	2.2	298	0.065	54.3	Steel
	1200	2400	230/460	184TC	UN2T3BC	6.2/3.1	245	0.134	75.3	Aluminum
3	1800	3600	230/460	182TC	UN3T2BC	10.0/5.0	427	0.109	65.2	Aluminum
	1800	3600	575	182TC	UN3T2GC	4.1	434	0.109	65.2	Aluminum
	1200	2400	230/460	213TC	UN3T3BC	9.0/4.5	514	0.254	115.6	Aluminum
5	1800	3600	230/460	184TC	UN5T2BC	14.0/7.0	653	0.176	83.5	Aluminum
	1800	3600	575	184TC	UN5T2GC	5.6	646	0.176	83.5	Aluminum
	1200	2400	230/460	215TC	UN5T3BC	15.8/7.9	1,022	0.344	148.7	Aluminum
7.5	1800	3600	230/460	213TC	UN7T2BC	18.6/9.8	902	0.299	135.2	Aluminum
	1800	3600	575	213TC	UN7T2GC	7.8	883	0.299	135.2	Aluminum
	1200	2400	230/460	254TC	UN7T3BC	20.2/10.1	1,041	0.986	211.1	Aluminum
10	1800	3600	230/460	215TC	UN10T2BC	25.4/12.7	1,477	0.494	143.5	Aluminum
	1800	3600	575	215TC	UN10T2GC	10.2	1,430	0.494	143.5	Aluminum
	1200	2400	230/460	256TC	UN10T3BC	26.0/13.0	1,420	1.298	265.4	Aluminum
15	1800	3600	230/460	254TC	UN15T2BC	36.6/18.3	1,858	0.985	255.2	Aluminum
	1800	3600	575	254TC	UN15T2GC	14.5	1,779	0.985	255.2	Aluminum
20	1800	3600	230/460	256TC	UN20T2BC	55.6/27.8	3,304	1.189	266	Aluminum
	1800	3600	575	256TC	UN20T2GC	22.3	3,297	1.189	266	Aluminum
25	1800	3600	230/460	284TC	UN25T2BC	57.6/28.8	2,381	1.654	482.9	Cast Iron
	1800	3600	575	284TC	UN25T2GC	23.3	2,496	1.654	482.9	Cast Iron

Note: Brakes, encoders and other accessories available.

Encoder Options

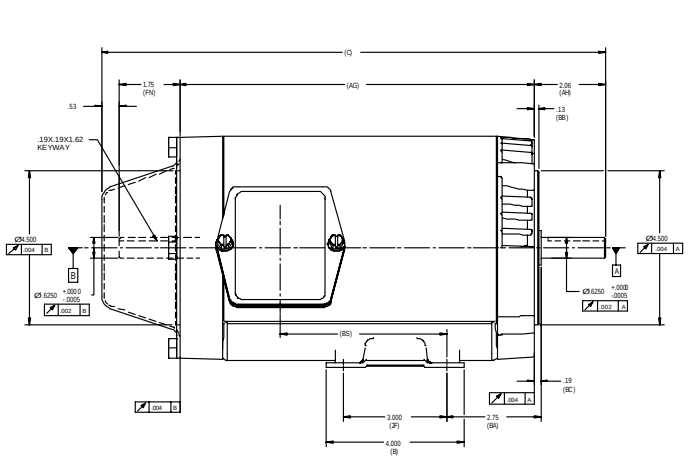
Description	Order Code Suffix
EPC-260 2048 ppr Encoder with M12 8 pin connector	-E2
EPC-25T 2048 ppr Encoder with MS 10 pin connector	-E3

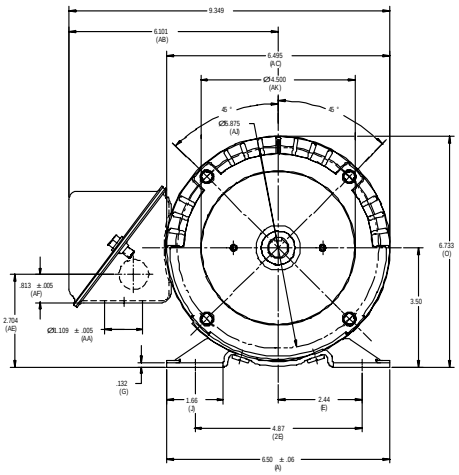
Description	Order Code
Motor Feedback Cable, M12 connector at encoder to DB15 connector on drive end. Custom lengths in 5ft. increments. (EPC-260 Encoder to Unidrive SP)	VUFCS-015
	VUFCS-025
	VUFCS-050
	VUFCS-075
	VUFCS-100
	VUFCS-xxx

Description	Order Code
Motor Feedback Cable. MS 10 pin connector at Encoder to Flying leads, Custom lengths in 5ft increments. (SCSLD, EPC 25T, Marathon & Reliance HS35 Encoders)	ENCO-015
	ENCO-025
	ENCO-050
	ENCO-075
	ENCO-100
	ENCO-xxx

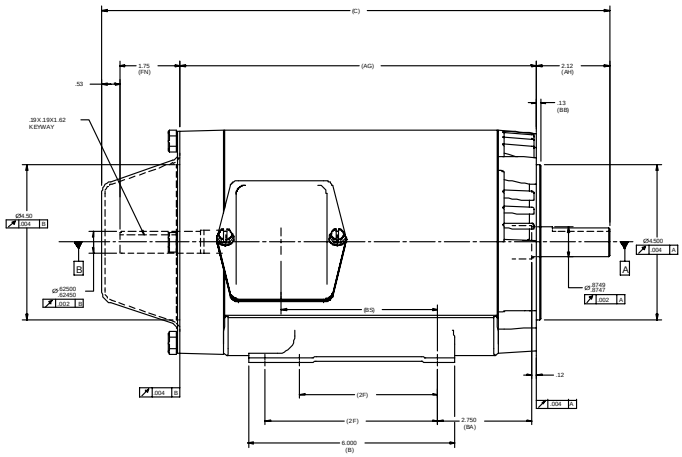
Note: Custom length cables are NOT Returnable

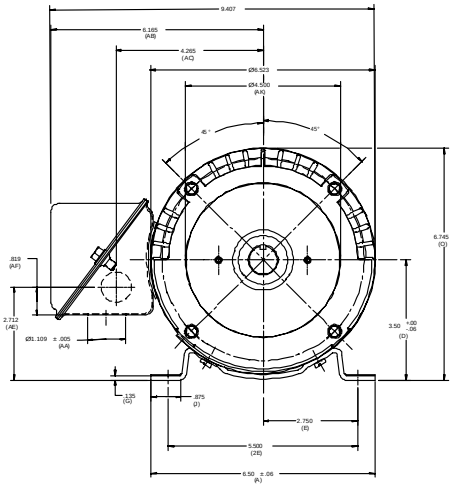
ACCU-Torq™ 56C-FRAME





ACCU-Torq™ 140TC-FRAME





ACCU-Torq™ 180TC-FRAME