1 Introduction

This document covers the steps to retrofit an AxCent™ servo drive into an existing Brushed or Brushless Analog drive application. The information in this document relates specifically to the "small size" AxCent models (see Table 2 below) that replace existing analog drive models (see Table 1 below).

1.1 AxCent Platform

The new AxCent models are replacing older analog products that are reaching end-of-life due to component obsolescence. The AxCent platform is designed to integrate multiple existing analog products into a smaller number of base models that include common features and are designed to easily support custom modifications.

The small size AxCent platform replaces the following existing analog series of servo drives.

Brushed	Brushless
12A8	B12A6
25A8	B15A8
20A14	BE12A6
20A20	BE15A8
	BX15A20

Table 1 Discontinued Analog Drive Families Being Replaced by AxCent Models

1.1.1 AxCent Models

The table below lists the model numbers and overall power capabilities for upcoming AxCent drives.

	DC Models	Peak (A)	Cont (A)	Supply (VDC)	Dimensions	Release Date
Brushless/Brushed	AB15A100	15	7.5	20-80	Small Size 5 x 3 x 1 (inches)	3/8/2016
	AB25A100	25	15	20-80		
	AB20A200	20	12	40-175		
Brushed Only	A12A100	12	6	20-80		2/1/2016
	A25A100	25	15	20-80		
	A20A200	20	12	40-175		
Brushless/Brushed	AB30A100	30	15	20-80	Large Size 7.5 x 4.3 x 1.1 (inches)	TBD
	AB50A100	50	25	20-80		
	AB25A200	25	15	40-175		
	AB50A200	50	25	40-175		
Brushed Only	A30A100	30	15	20-80		
	A50A100	50	25	20-80		
	A25A200	25	15	40-175		
	A50A200	50	25	40-175		

Download the "large size" AxCent Retrofit document here.

Table 2 AxCent Model Numbers

The model mask for the new AxCent drive models is given below. Note that not all possible part number combinations are standard off-the-shelf offerings.

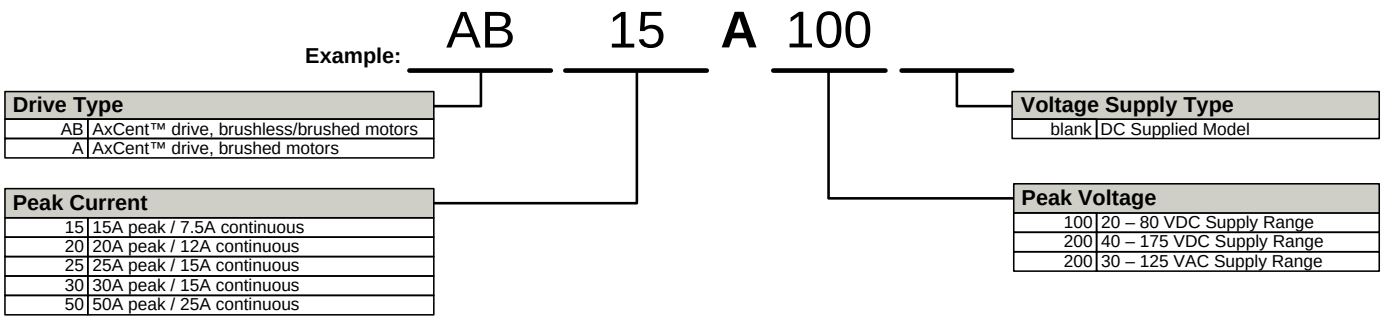


Figure 1 AxCent Model Mask

1.2 Small Size AxCent - Replacement Charts

For an existing analog drive and the specific mode of operation in use, the table below indicates the AxCent drive model that will serve as the corresponding replacement.

Note: Older analog part numbers use a revision letter at the end of the base model number, and may include an extension at the end of the part number to designate specific ordering options or customer-specific modifications.

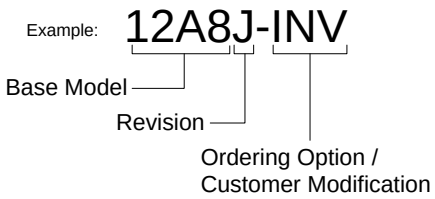


Figure 2 Existing Analog Drive Part Numbering

The AxCent replacement will be determined by the base model number of the existing analog drive.

The standard ordering options that were available for existing analog drives are no longer used with the AxCent platform.

- *-INV models: Inverted inhibit/enable logic. AxCent models feature a dedicated DIP Switch to toggle the inhibit/enable logic.*
- *-QD models: Quick-disconnect motor/power connector. AxCent models come standard with a quick-disconnect motor/power connector.*
- *-QDI models: Quick-disconnect motor/power connector with inverted inhibit/enable logic. AxCent models come standard with a quick-disconnect motor/power connector, and feature a dedicated DIP Switch to toggle the inhibit/enable logic.*
- *-ANP models: Analog position loop configuration. Analog position loop is not supported in the AxCent platform. It is recommended to switch to the DigiFlex® Performance™ family of digital servo drives for position control. Please contact ADVANCED Motion Controls for assistance.*

	Existing Analog Part Number	Mode of Operation	AxCent Replacement Part Number	Configuration Information
Small Size	12A8	Current Voltage	AB15A100	Section 2.1
		IR Compensation Tachometer Velocity	A12A100	Section 2.2
	20A14	Current Voltage	AB20A200	Section 2.1
		IR Compensation Tachometer Velocity	A20A200	Section 2.2
	20A20	Current Voltage	AB20A200	Section 2.1
		IR Compensation Tachometer Velocity	A20A200	Section 2.2
	25A8	Current Voltage	AB25A100	Section 2.1
		IR Compensation Tachometer Velocity	A25A100	Section 2.2
	B12A6 B15A8	Current Duty Cycle	AB15A100	Section 2.1
		Tachometer Velocity	Contact AMC	
	BE12A6 BE15A8 BE15A8-H	Current Duty Cycle Encoder Velocity	AB15A100	Section 2.1
		Tachometer Velocity Hall Velocity	Contact AMC	
	BX15A20	Current Duty Cycle	AB20A200	Section 2.1
		Tachometer Velocity	Contact AMC	

Table 3 AxCent Replacement Chart – Small Size

2 Installation

2.1 Small Size AxCent – Brushless Drives Installation and Configuration

This section covers the basic connections and setup for small size brushless AxCent drives, and highlights the differences from the existing analog products. For additional information and in-depth wiring, configuration, and feature functionality consult the AxCent Hardware Installation Manual, available for download at www.a-m-c.com.

Figure 3 Existing brushless analog drive and new brushless AxCent drive

2.1.1 Dimensions

The new AxCent models match the physical and mounting dimensions of existing analog products as shown below in the following figure. Full mounting dimensions can be found on the drive datasheets.

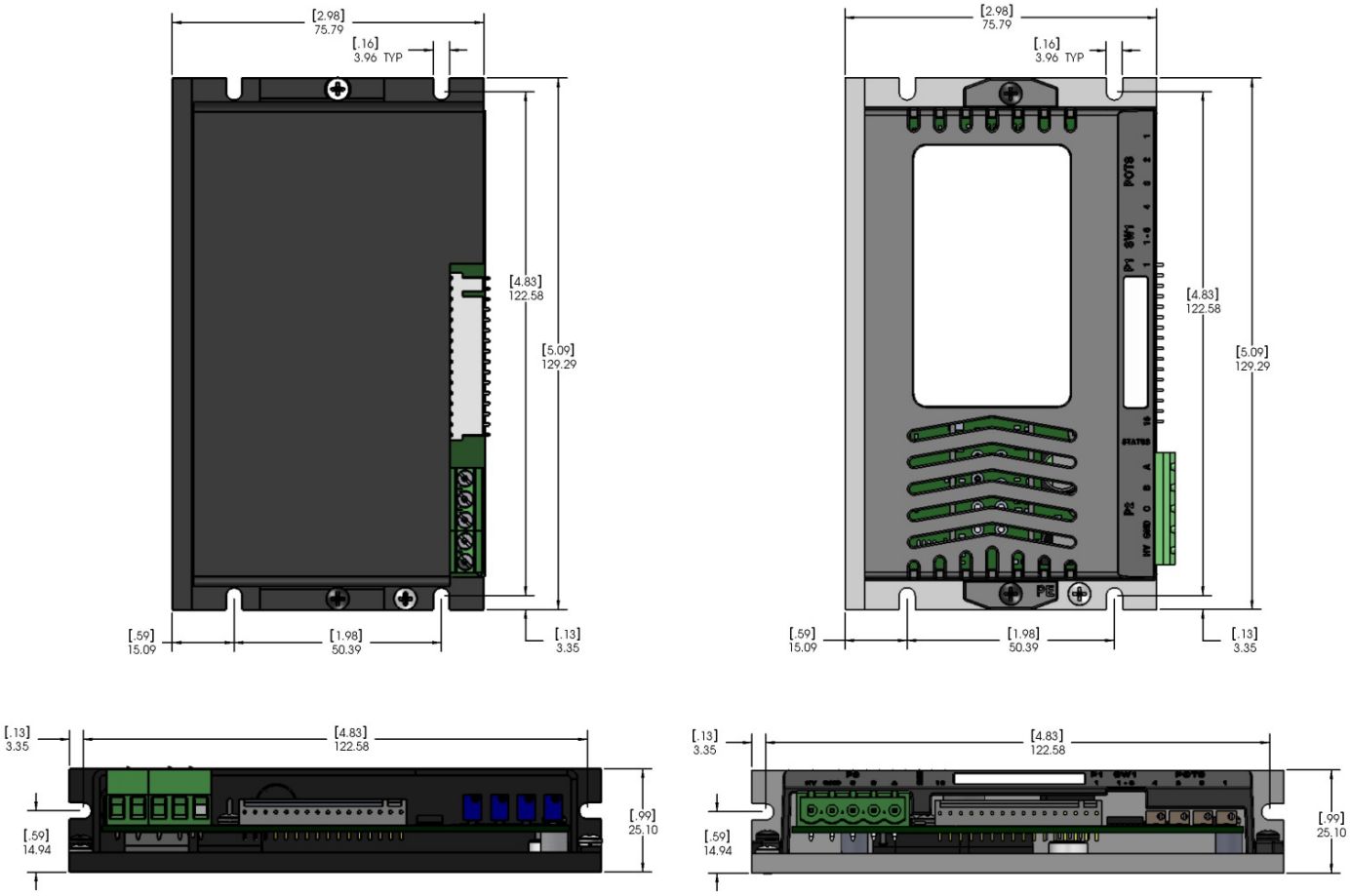


Figure 4 Mounting dimensions comparison

2.1.2 Connectors

Small size brushless AxCent drives feature the same number of connectors as the existing analog drive models. The connector types are listed below. Mating connectors for both P1 and P2 are included with the drive.

Existing analog drive connectors		AxCent connectors	
Connector	Description	Connector	Description
P1 – I/O / Feedback	16-pin, 2.54 mm spaced, friction lock header	P1 – I/O / Feedback	16-pin, 2.54 mm spaced, friction lock header
P2 – Motor/Power	5-port, 5.08 mm spaced, screw terminal	P2 – Motor/Power	5-port, 5.08 mm spaced, quick disconnect terminal

Table 4 Connectors

2.1.2.1 Motor and Power Connector – P2

The standard product option for the existing analog models used a screw terminal connector for the motor and power connections. A –QD option was available that featured a quick-disconnect motor and power connector. The new small size AxCent models come standard with a quick-disconnect motor and power connector. The mating connector is included with the drive shipment.

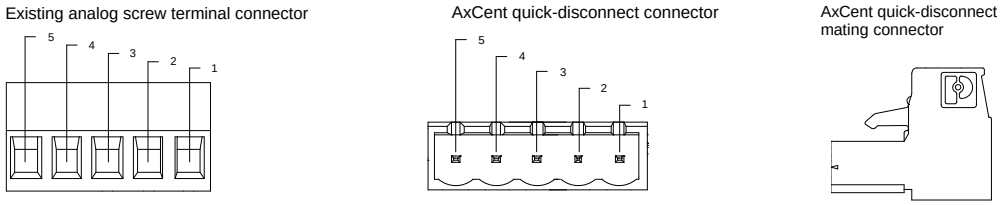


Figure 5 P2 Connector – Existing Analog and AxCent Drives

The motor and power connector for the existing analog models and the new small size AxCent models are shown below.

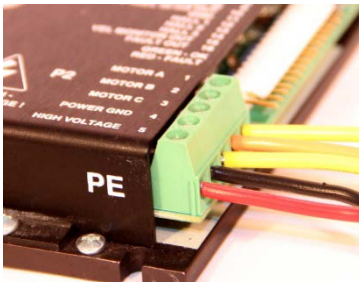
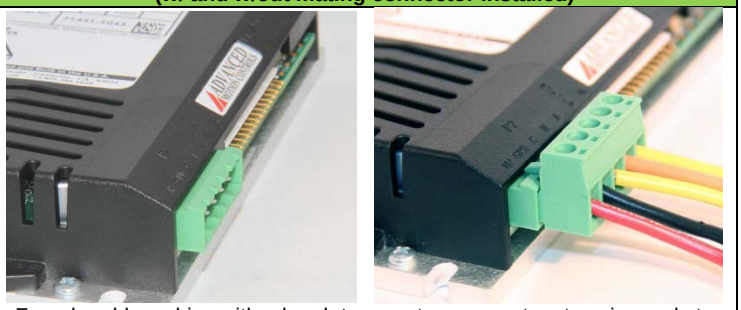
Existing analog drives Motor and Power Connector	AxCent (small size) drives Motor and Power Connector (w/ and w/out mating connector installed)
	
	For a brushless drive with a brush type motor, connect motor wires only to Motor A and Motor B outputs on the drive.

Figure 6 Motor and Power Connector

2.1.2.1.1 PE Connection

The PE connection terminal on the new AxCent models is the silver screw terminal on the lower right corner of the drive baseplate. This is the same location as on the existing analog models. This PE ground connection terminal should be connected to a single point system ground. **Do not use the screw attaching the drive cover to the baseplate as the PE connection point!** Note that the "PE" label on the new AxCent models is embossed into the case, while on the existing analog models the "PE" label was silkscreened.

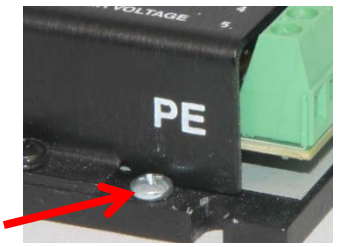
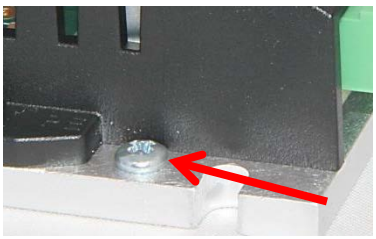
Existing analog drives PE Connection	AxCent (small size) drives PE Connection
	

Figure 7 PE Connection Terminal Location

2.1.2.2 I/O and Feedback Connector – P1

The I/O and Feedback connector on the new AxCent models is the same physical connector used on the existing analog product. The mating connector is included with the drive shipment.

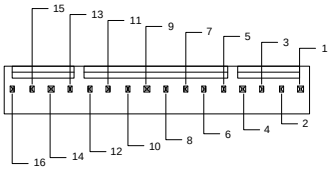


Figure 8 P1 Connector – Existing Analog and AxCent Drives

The pinouts on the new AxCent models has changed slightly and are reproduced in the tables below. Table 4 shows the pinouts for existing brushless analog drives and the new brushless AxCent models.

Existing Analog Models I/O and Feedback Pinout		AxCent Models I/O and Feedback Pinout	
B12A6 B15A8 BE15A8* BX15A20		AB15A100 AB25A100 AB20A200	
Pin	**Name**	**Name**	**Changes**
1	+10V 3mA OUT +5V 3mA OUT*	+10V 3mA OUT	All new AxCent models feature ±10V output supply. Users replacing a BE15A8 model will need to adjust their systems accordingly.
2	SIGNAL GND	SIGNAL GND	
3	-10V 3mA OUT -5V 3mA OUT*	-10V 3mA OUT	All new AxCent models feature ±10V output supply. Users replacing a BE15A8 model will need to adjust their systems accordingly.
4	+REF IN	+REF IN	
5	-REF IN	-REF IN	
6	-TACH IN ENCODER-B IN*	ENCODER-B IN	Brushless AxCent models feature only Incremental Encoder inputs. Contact *ADVANCED* Motion Controls about tachometer feedback options.
7	+TACH / GND ENCODER-A IN*	ENCODER-A IN	
8	CURRENT MONITOR	CURRENT MONITOR	
9	INHIBIT IN	INHIBIT / ENABLE	The inhibit pin behavior is configured via DIP Switch on new AxCent drives.
10	+V HALL 30mA OUT	+V HALL 30mA OUT	
11	GND	GND	
12	HALL 1	HALL 1	
13	HALL 2	HALL 2	
14	HALL 3	HALL 3	
15	CURR REF OUT VEL MONITOR OUT*	VEL MONITOR OUT	Brushless AxCent models feature only a Velocity Monitor Output.
16	FAULT OUT	FAULT OUT	

Table 5 I/O and Feedback Connector Pinouts – Brushless Drives

2.1.3 Drive Configuration

For the new small size brushless AxCent models, a 6-position DIP Switch bank (SW1) is used for mode selection and drive configuration tasks, while the corresponding existing brushless analog models used a 4-position DIP Switch bank. DIP switch SW1 for the existing analog models and the new small size AxCent models is shown below.

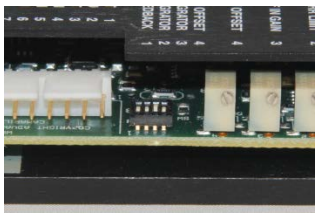
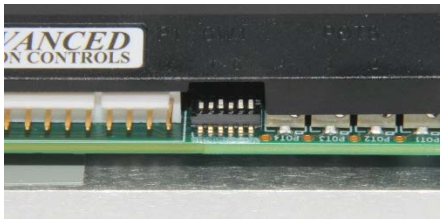
Existing analog DIP Switch SW1	AxCent (small size brushless) DIP Switch SW1
	

Figure 9 Configuration DIP Switches

2.1.3.1 SW1 DIP Switch Settings

The configuration settings for DIP Switch SW1 are given below for existing brushless analog products and new brushless AxCent models.

	Switch	Description	On	Off
	1	Activates PWM feedback for Duty Cycle Mode	Duty Cycle Mode	Other Modes
	2	60/120 degree commutation phasing.	120 degrees	60 degrees
	3	Velocity loop integration.	Inactive	Active
	4	Switches the Test/Offset potentiometer between an on-board command input for testing or a command offset adjustment.	Test	Offset
AxCent drives only	5	Inhibit Logic. (This DIP switch replaces the need for –INV and –QDI ordering options)	Drive Inhibit is active low.	Drive Inhibit is active high. (Use this setting to replace –INV and –QDI models)
	6	Velocity feedback polarity.	Standard	Inverted

Table 6 SW1 DIP Switch Settings – Brushless Drives

2.1.3.2 Mode Selection

Mode of Operation DIP switch settings are the same on the new brushless AxCent models as they were on the existing brushless analog products. Note that not all DIP Switches are used in mode selection.

Mode	SW1-1	SW1-3
Current	OFF	ON
Duty Cycle (Open Loop)	ON	OFF
Encoder Velocity	OFF	OFF
Tachometer Velocity	Not available on brushless drives. Contact AMC	
IR Compensation		

Table 7 Mode Selection Table – Brushless Drives

2.1.3.3 Potentiometers

AxCent models feature the same four on-board potentiometers as the previous analog drive models. The potentiometers are approximately linear and have 12 active turns, with 1 inactive turn on each end. AxCent models use lower-profile potentiometers than the previous analog versions. The drive case does not need to be removed to access the potentiometers.

Pot	Description	Turning CW
1	Loop gain adjustment for voltage / duty cycle / velocity modes. Turn this pot fully CCW in current mode.	Increases gain
2	Current limit. It adjusts both continuous and peak current limit while maintaining their ratio.	Increases limit
3	Reference gain. Adjusts the ratio between input signal and output variables (voltage, current, or velocity).	Increases gain
4	Offset / Test. Used to adjust any imbalance in the input signal or in the drive. Can also be used as an on-board signal source for testing purposes.	Adjusts offset in negative direction

Table 8 Potentiometers

2.1.4 Advanced Tuning

The new brushless AxCent models contain additional DIP Switch banks SW2 and SW3 underneath the drive cover that can be used for additional drive tuning. SW2 adds additional capacitance to the velocity loop integrator capacitor, and SW3 adds additional resistance to the current loop gain resistor and additional capacitance to the current loop integrator capacitor.

The tuning DIP Switch banks on the new small size brushless AxCent models are shown below (drive cover removed). Values for the switch settings can be found on the drive datasheet.

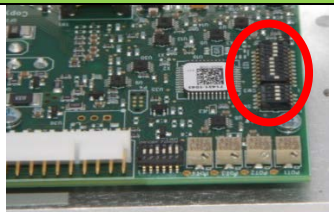
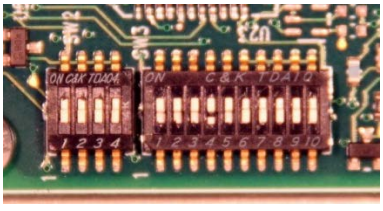
AxCent (small size) Tuning DIP Switches	
Location	Top View Detail
	

Figure 10 Tuning DIP Switches

2.2 Small Size AxCent – Brushed Drives Installation and Configuration

This section covers the basic connections and setup for small size brushed AxCent drives, and highlights the differences from the existing brushed analog products. For additional information and in-depth wiring, configuration, and feature functionality, consult the AxCent Hardware Installation Manual, available for download at www.a-m-c.com.

Figure 11 Existing brushed analog drive and new brushed AxCent drive

2.2.1 Dimensions

The new AxCent models match the physical and mounting dimensions of existing analog products as shown below in the following figure. Full mounting dimensions can be found on the drive datasheets.

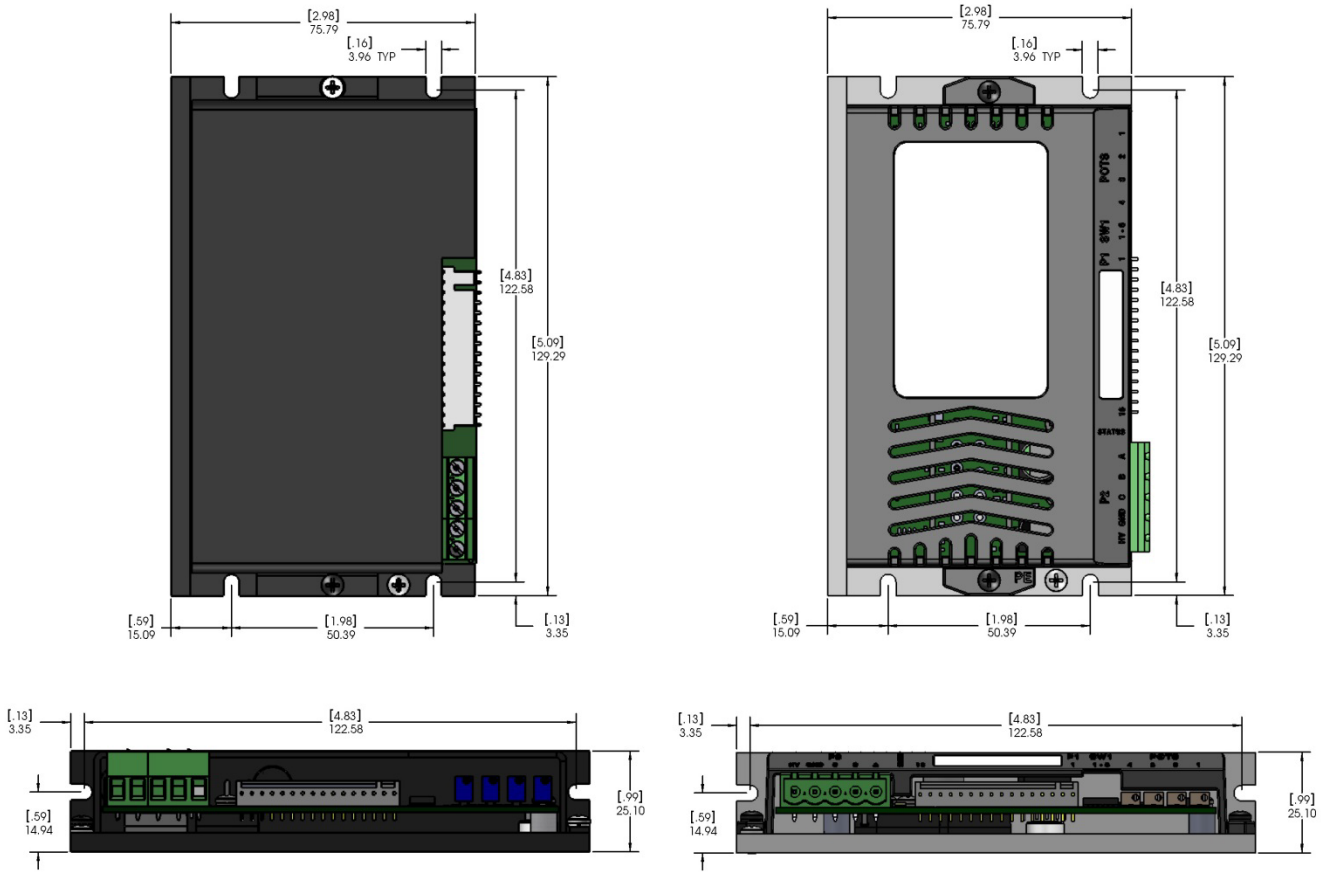


Figure 12 Mounting dimensions comparison

2.2.2 Connectors

Small size brushed AxCent drives feature the same number of connectors as the previous analog drive models. The connector types are listed below. Mating connectors for both P1 and P2 are included with the drive.

Existing analog drive connectors		AxCent connectors	
Connector	Description	Connector	Description
P1 – I/O / Feedback	16-pin, 2.54 mm spaced, friction lock header	P1 – I/O / Feedback	16-pin, 2.54 mm spaced, friction lock header
P2 – Motor/Power	5-port, 5.08 mm spaced, screw terminal	P2 – Motor/Power	5-port, 5.08 mm spaced, quick disconnect terminal

Table 9 Connectors

2.2.2.1 Motor and Power Connector – P2

The standard product option for the existing analog models used a screw terminal connector for the motor and power connections. A –QD option was available that featured a quick-disconnect motor and power connector. The new small size AxCent models come standard with a quick-disconnect motor and power connector. The mating connector is included with the drive shipment.

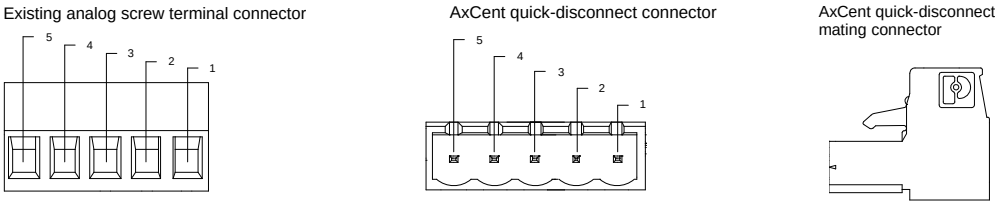


Figure 13 P2 Connector – Existing Analog and AxCent Drives

The motor and power connector for the reserved analog models and the new small size AxCent models are shown below.

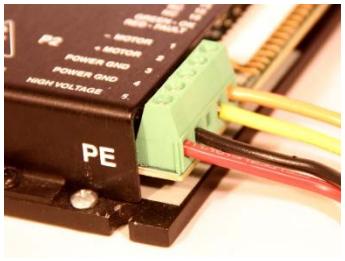
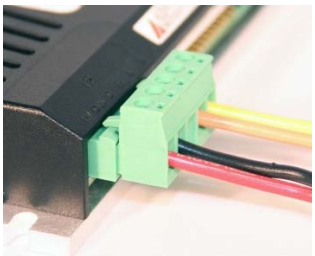
Existing analog drives Motor and Power Connector	AxCent (small size) drives Motor and Power Connector (w/ and w/out mating connector installed)
	  For brush type motors, connect motor wires only to Motor A and Motor B outputs on the drive.

Figure 14 Motor and Power Connector

2.2.2.1.1 PE Connection

The PE connection terminal on the new AxCent models is the silver screw terminal on the lower right corner of the drive baseplate. This is the same location as on the existing analog models. This PE ground connection terminal should be connected to a single point system ground. **Do not use the screw attaching the drive cover to the baseplate as the PE connection point!** Note that the "PE" label on the new AxCent models is embossed into the case, while on the existing analog models the "PE" label was silkscreened.

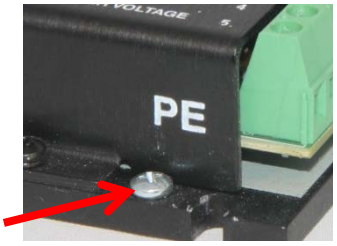
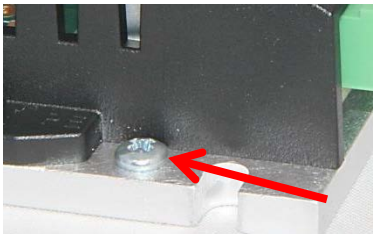
Existing analog drives PE Connection	AxCent (small size) drives PE Connection
	

Figure 15 PE Connection Terminal Location

2.2.2.2 I/O and Feedback Connector – P1

The I/O and Feedback connector on the new AxCent models is the same physical connector used on the existing analog product. The mating connector is included with the drive shipment.

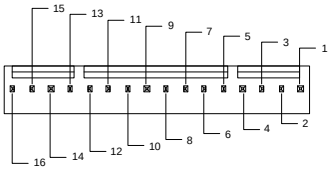


Figure 16 P1 Connector – Existing Analog and AxCent Drives

The pinouts on the new AxCent models has changed slightly and are reproduced in the tables below. Table 4 shows the pinouts for existing brushed analog drives and the new brushed AxCent models

	Existing Analog Models I/O and Feedback Pinout		AxCent Models I/O and Feedback Pinout	
	12A8 25A8 20A14 20A20		A12A100 A25A100 A20A200	
Pin	**Name**		**Name**	**Changes**
1	+5V 3mA OUT		+5V 3mA OUT	
2	SIGNAL GND		SIGNAL GND	
3	-5V 3mA OUT		-5V 3mA OUT	
4	+REF IN		+REF IN	
5	-REF IN		-REF IN	
6	-TACH IN		-TACH IN	
7	+TACH / GND		+TACH / GND	
8	CURRENT MONITOR		CURRENT MONITOR	
9	CURR REF OUT		CURR REF OUT	
10	CONT CURRENT LIMIT		CONT CURRENT LIMIT	
11	INHIBIT IN		INHIBIT / ENABLE	The inhibit pin behavior is configured via DIP Switch on new AxCent drives.
12	+INHIBIT IN		+ INHIBIT / ENABLE	
13	-INHIBIT IN		- INHIBIT / ENABLE	
14	FAULT OUT		FAULT OUT	
15	NC		NC	
16	NC		NC	

Table 10 I/O and Feedback Connector Pinouts – Brushed Drives

2.2.3 Drive Configuration

For the new small size brushed AxCent models, a 6-position DIP Switch bank (SW1) is used for mode selection and drive configuration tasks, while the corresponding existing brushed analog models used a 4-position DIP Switch bank. DIP switch SW1 for the existing analog models and the new small size AxCent models is shown below.

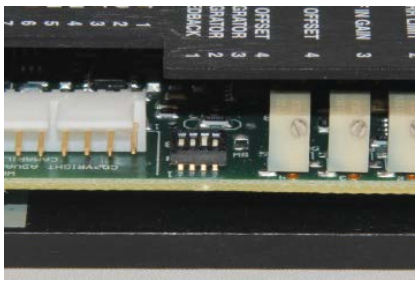
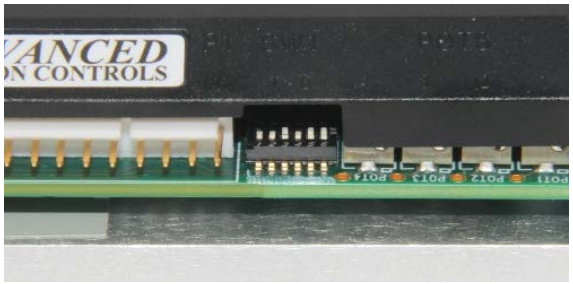
Existing analog DIP Switch SW1	AxCent (small size brushed) DIP Switch SW1
	

Figure 17 Configuration DIP Switches

2.2.3.1 SW1 DIP Switch Settings

The configuration settings for DIP Switch SW1 are given below for existing analog products and new brushed AxCent models.

	Switch	Description	On	Off
	1	Activates voltage feedback for Voltage Mode	Voltage Mode	Other Modes
	2	Current loop integration.	Inactive	Active
	3	Velocity loop integration.	Inactive	Active
	4	Switches the Test/Offset potentiometer between an on-board command input for testing or a command offset adjustment.	Test	Offset
AxCent drives only	5	Inhibit Logic. (This DIP switch replaces the need for –INV and –QDI ordering options)	Drive Inhibit is active low.	Drive Inhibit is active high. (Use this setting to replace –INV and –QDI models)
	6	Leave in the ON position for standard operation.	Standard	-

Table 11 SW1 DIP Switch Settings – Brushed Drives

2.2.3.2 Mode Selection

Mode of Operation DIP switch settings are the same on the new brushed AxCent models as they were on the existing brushed analog products. Note that not all DIP Switches are used in mode selection.

Mode	SW1-1	SW1-3
Current	OFF	ON
Voltage	ON	OFF
IR Compensation*	ON	OFF
Tachometer Velocity	OFF	OFF

Table 12 Mode Selection Table – Brushed Drives

**Note: IR Compensation mode requires an additional SMT resistor to be added to the drive PCB. Contact ADVANCED Motion Controls for information and instructions on configuring the drive for this mode.*

2.2.3.3 Potentiometers

AxCent models feature the same four on-board potentiometers as the previous analog drive models. The potentiometers are approximately linear and have 12 active turns, with 1 inactive turn on each end. AxCent models use lower-profile potentiometers than the previous analog versions. The drive case does not need to be removed to access the potentiometers.

Pot	Description	Turning CW
1	Loop gain adjustment for voltage / duty cycle / velocity modes. Turn this pot fully CCW in current mode.	Increases gain
2	Current limit. It adjusts both continuous and peak current limit while maintaining their ratio.	Increases limit
3	Reference gain. Adjusts the ratio between input signal and output variables (voltage, current, or velocity).	Increases gain
4	Offset / Test. Used to adjust any imbalance in the input signal or in the drive. Can also be used as an on-board signal source for testing purposes.	Adjusts offset in negative direction

Table 13 Potentiometers

2.2.4 Advanced Tuning

The new AxCent models contain additional DIP Switch banks SW2 and SW3 underneath the drive cover that can be used for additional drive tuning. SW2 adds additional capacitance to the velocity loop integrator capacitor, and SW3 adds additional resistance to the current loop gain resistor and additional capacitance to the current loop integrator capacitor.

The tuning DIP Switch banks on the new small size AxCent models are shown below (drive cover removed). Values for the switch settings can be found on the drive datasheet.

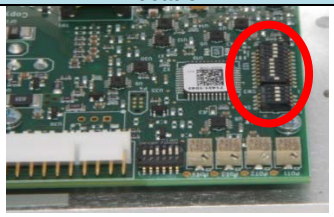
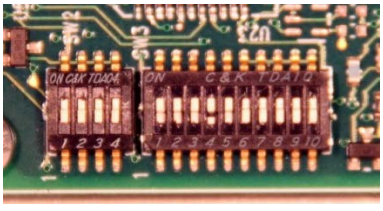
AxCent (small size) Tuning DIP Switches	
Location	Top View Detail
	

Figure 18 Tuning DIP Switches