

# 1326 Cables for 460V AC Servo Motors



## *Product Data*



This publication provides product information about cables for use with Bulletin 1326 (460V) AC Servomotors and the Bulletin 1394 Motion Control System. This publication includes:

- Solution examples for cable accessories
- Dimensional information
- Interconnection tables
- Bend radius and installation instructions

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## Servomotor Cable

Series B Power cables (catalog number 1326-CPB1 and 1326-CPC1) and commutation cables (catalog number 1326-CCU and 1326-CECU) are available in lengths up to 90 m (295 ft) for standard, one-time flex applications. (PLTC 90° C 300V, AWM 90° C 300V for 1326-CCU and 1326-CECU, type TC 90° C 600V for 1326-CPB1 and 1326-CPC1.) Each cable features:

- UL Listed (file #E88699) cable assemblies.
- A braided cable shield for superior electromagnetic noise immunity.
- Molded push/pull connectors at the motor end for easy installation and maintenance.

Cable systems for 1394 Motion Control System:

- Standard single-connector cables.
- Right-angle connector cables.
- In-line system that uses bulkhead and double-ended cables.
- Harsh environment cables.
- High-resolution feedback cables.

Allen-Bradley also offers high flex-rated cable for power-track applications. Power cables (catalog number 1326-CPB1T and 1326-CPC1T) and commutation cables (catalog number 1326-CCUT and 1326-CECUT) are available in lengths up to 90 m (295 ft). In addition to the features listed for standard cables, each flex-cable features excellent minimum bend radius ratings and a superior flex cycle life.

## Motor Power Cables

Bulletin Number	Type	Function	Motor Size Used On	Flex Cable Option	Connector Accessory	IP Rating	Cable Length
<b>1326</b>	—				—		
C = Connector and cable assembly							
P = Power connection							
B1 = Power cable for 1326AB-B4xx and 1326AB-B5xx C1 = Power cable for 1326AB-B7xx							
T = Flex-rated cable for high-flex applications Blank = No option, standard cable							
Blank = Single-standard connector D = Double-ended, standard connector E = Bulkhead connector EE = Double-ended, bulkhead connector RA = Right-angle connector RB = Right-angle connector							
Blank = IP65 L = IP67, harsh environment							
005 = 5m (16.4 ft.) 015 = 15m (49.2 ft.) 030 = 30m (98.4 ft.) 060 = 60m (196.8 ft.) 084 = 84m (275.5 ft.) 090 = 90m (295.2 ft.)							

## Motor Feedback Cables

Bulletin Number	Type	Function	Motor Size Used On	Flex Cable Option	Connector Accessory	IP Rating	Cable Length
1326	—				—		
C = Connector and cable assembly		C = Resolver feedback EC = High-resolution		U = Commutation and encoder cable for all series motors.		T = Flex-rated cable for high-flex applications Blank = No option, standard cable	
Blank = Single-standard connector D = Double-ended, standard connector E = Bulkhead connector EE = Double-ended, bulkhead connector RA = Right-angle connector RB = Right-angle connector		Blank = IP65 L = IP67, harsh environment		005 = 5m (16.4 ft.) 015 = 15m (49.2 ft.) 030 = 30m (98.4 ft.) 060 = 60m (196.8 ft.) 084 = 84m (275.5 ft.) 090 = 90m (295.2 ft.)			

## Connection Solutions

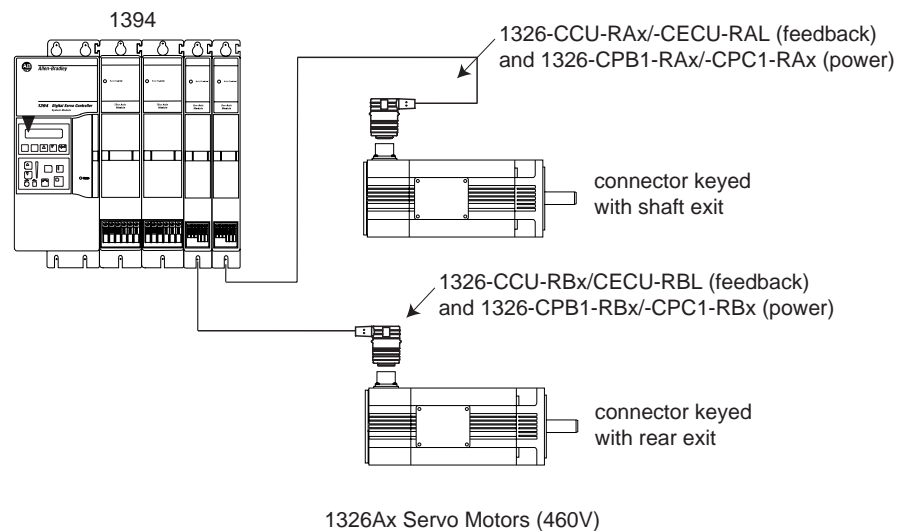
Several accessories are available with 460 volt 1326 cables. This section highlights the most common application used with each accessory, including:

- Right-angle connection.
- CE-compliant in-line connection.
- Remote in-line connection.
- Harsh environment connection.
- Double-ended bulkhead in-line connection.

### Right-Angle Connection

This solution provides a low-profile right-angle connection at the motor.

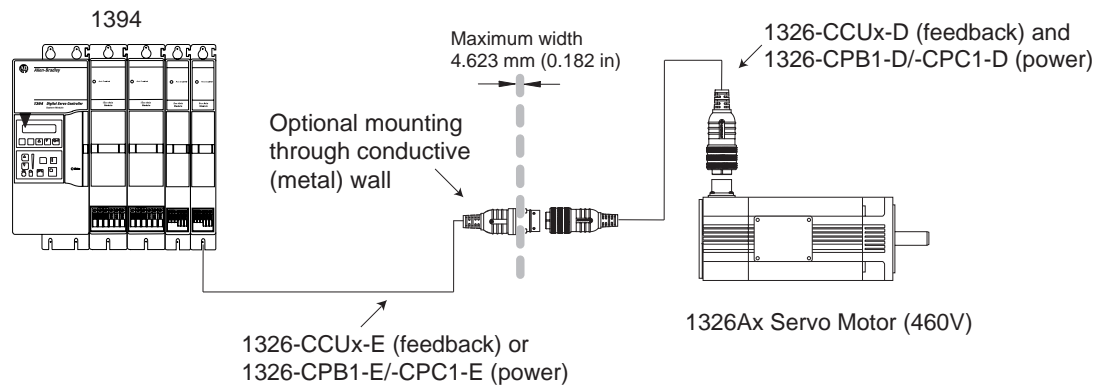
**Figure 1**  
**Right-Angle Connector Cables**



## CE-Compliant In-Line Connection

This solution allows for a quick connect or disconnect at the cabinet wall while meeting CE requirements. Link bulkhead and double-ended cables to create an interconnect in a single cable run.

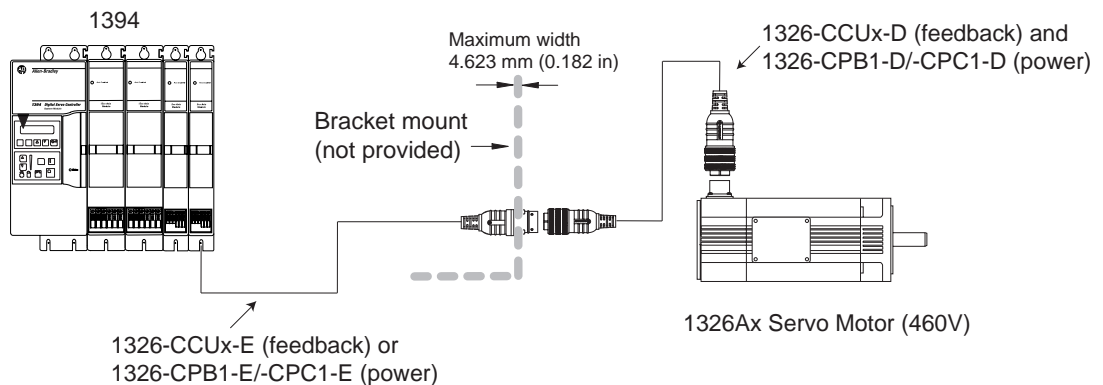
**Figure 2**  
Bulkhead and Double-Ended Connector Cables



## Remote In-Line Connection

This solution provides a connection outside of a cabinet that uses flex and nonflex cables together for cost reduction.

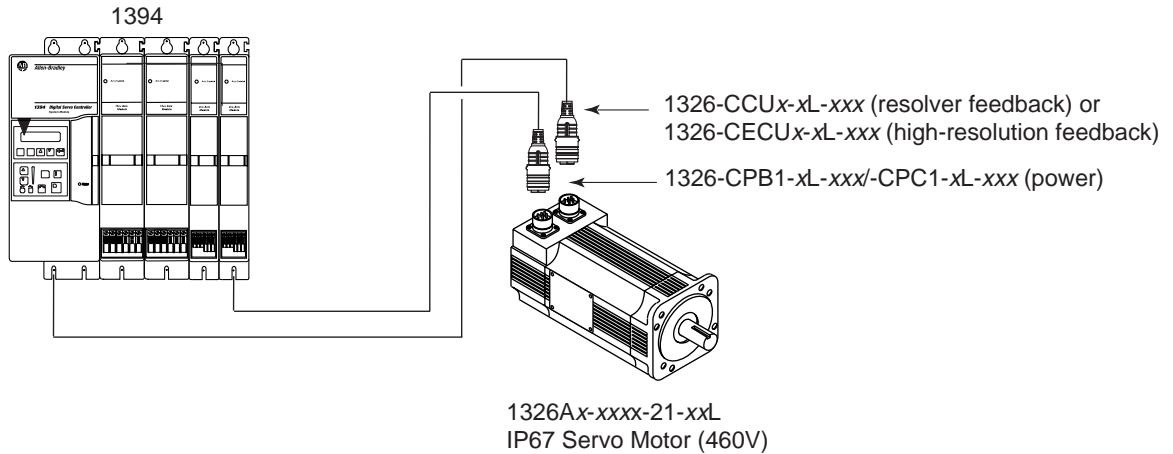
**Figure 3**  
Remote Bulkhead Connection



## Harsh Environment Connection

Use the IP67 cable (with the -L option) with an L motor for harsh environments.

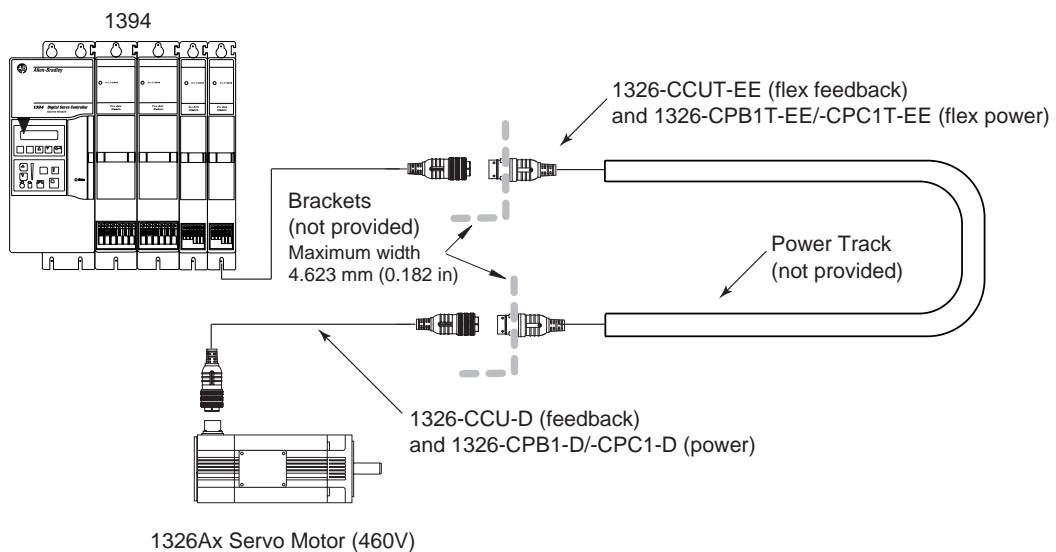
**Figure 4**  
**Harsh Environment Connection**



## Double-Ended Bulkhead In-Line Connection

This solution combines flex and nonflex cables for a single run. Shown below are two disconnects in a single cable run with a double-ended bulkhead, a double-ended standard, and a standard cable.

**Figure 5**  
**Standard, Double-Ended Bulkhead, and Double-Ended Cable for In-Line Connection to Flex Track**



Linear-flex is defined as flex in one direction. The flex-rated cable is not rated for twist-flex, which is flex in two directions. Power track (linear-flex) cabling must not be used in twist applications.

Standard Allen-Bradley cables—1326-CCU-*xxx* for commutation and 1326-CPB1-*xxx* or 1326-CPC1-*xxx* for power—are tray-rated (stationary) and should only be used for one-time flex applications.

- Power track cabling is required for applications where dynamic linear flexing occurs. Use the following cables for these applications:
- 1326-CCUT-*xxx* (commutation for all motors)
- 1326-CPBIT-*xxx* (power for 1326AS-B3*xxx* and 1326AS-B4*xxx* motors)
- 1326-CPCIT-*xxx* (power for 1326AS-B6*xxx* and 1326AS-B8*xxx* motors)

Allen-Bradley high-flex cables have excellent minimum bend radius specifications and a long flex cycle life in linear flex applications. The cycle life of linear-flex cable is directly related to the cable's bend radius in the power track. Refer to the graphs on the following page for Bend Radius vs. Cycle Life specifications.

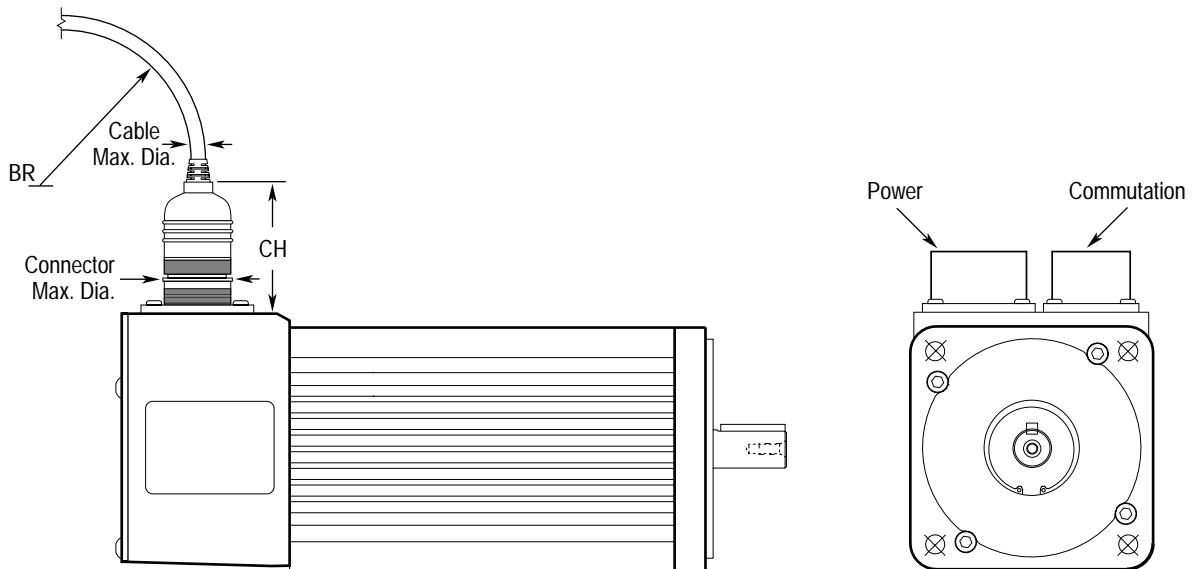


## Dimensional Information

## Standard Connector Dimensions

The section below provides dimensions, flex-cable specifications, and interconnect information for the various 1326 cables.

**Figure 6**  
**Motor Power & Feedback Cable Dimensions**



Cable	Description	CH <sup>1</sup> mm (in.)	BR <sup>2</sup> mm (in.)	Connector Max. Dia. without -L option	Connector Max. Dia. with -L option	Cable Max. Dia.
1326-CPB1-xxx	Standard power cable for 1326AS-B3xxx and 1326AS-B4xxx	110.0 (4.3)	76.2 (3.0)	43.2 (1.70)	47 (1.85)	14.0 (0.55)
1326-CPB1T-xxx	Flex-rated cable for 1326AS-B3xxx and 1326AS-B4xxx	110.0 (4.3)	104.1 (4.1)	43.2 (1.70)	47 (1.85)	10.4 (0.41)
1326-CPC1-xxx	Standard power cable for 1326AS-B6xxx and 1326AS-B8xxx	128.0 (5.0)	76.2 (3.0)	54.1 (2.13)	57.2 (2.25)	16.3 (0.64)
1326-CPC1T-xxx	Flex-rated power cable for 1326AS-B6xxx and 1326AS-B8xxx	128.0 (5.0)	160.2 (6.3)	54.1 (2.13)	57.2 (2.25)	16.0 (0.63)
1326-CCU-xxx	Standard commutation feedback cable for motor resolver	110.0 (4.3)	50.8 (2.0)	36.6 (1.44)	40.4 (1.59)	11.0 (0.43)
1326-CCUT-xxx	Flex-rated commutation feedback cable for motor resolver	110.0 (4.3)	101.6 (4.0)	36.6 (1.44)	40.4 (1.59)	10.1 (0.40)
1326-CECU-RAx-xxx, 1326-CECU-RBx-xxx	High-resolution feedback, right-angle (shaft exit and rear exit) is available in 5, 15, 30, 60, and 90m.	87.4 (3.44)	115 (4.5)	36.6 (1.44)	40.4 (1.59)	11.5 (0.45)
1326-CECUT-RAx-xxx, 1326-CECUT-RBx-xxx	High-flex, high-resolution feedback, right-angle (shaft exit and rear exit) is available in 5, 15, 30, 60, and 90m.	87.4 (3.44)	120 (4.7)	36.6 (1.44)	40.4 (1.59)	11.5 (0.45)

<sup>1</sup>CH is described as the cable connector height.

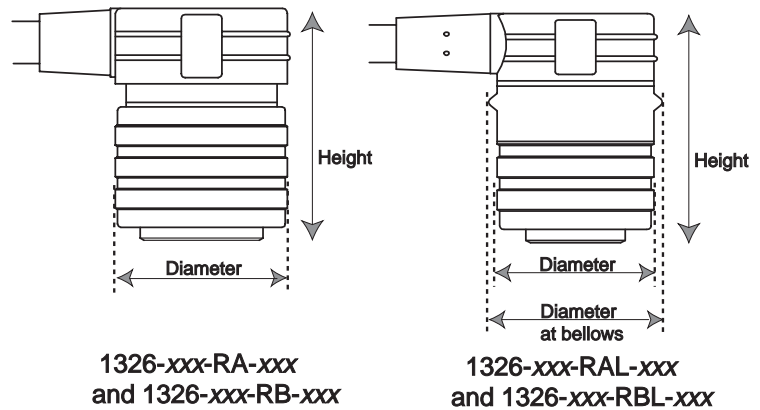
<sup>2</sup>BR (bend radius) is described as the specified bend radius for standard 1326 cable assemblies. BR may vary on user-fabricated cables. For standard cable, BR is a one-time flex application. Flex cables have a much higher BR to withstand flex applications.

All cables should be hung or laid flat for 24 hours prior to installation. This will allow the conductors to relax into their natural state and guards against internal twisting.

## Right-Angle Connector Dimensions

The following table shows connector height and width. For 1326-xxx-RAL-xxx and 1326-xxx-RBL-xxx cables, the diameter at the connector bellows is also given.

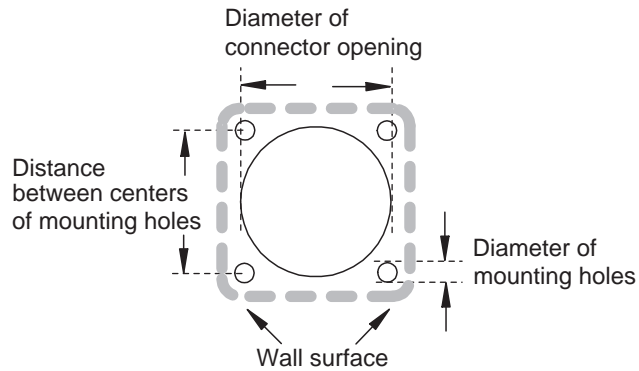
Cable	Height mm (in)	RA or RB Diameter mm (in)	RAL or RBL Diameter mm (in)	Bend Radius
1326-CCU-RA-xxx and -RB-xxx	65.78 (2.59)	36.83 (1.45)	N/A	50.8 (2.0)
1326-CCUT-RA-xxx and -RB-xxx	66.80 (2.63)	36.83 (1.45)	N/A	101.6 (4.0)
1326-CCU-RAL-xxx and -RBL-xxx	66.80 (2.63)	40.38 (1.59)	38.61 (1.52)	50.8 (2.0)
1326-CCUT-RAL-xxx and -RBL-xxx	66.80 (2.63)	40.38 (1.59)	38.61 (1.52)	101.6 (4.0)
1326-CECU-RAL-xxx and -RBL-xxx	66.80 (2.63)	40.38 (1.59)	38.61 (1.52)	115 (4.5)
1326-CECUT-RAL-xxx and -RBL-xxx	66.80 (2.63)	40.38 (1.59)	38.61 (1.52)	120 (4.7)
1326-CPB1-RA-xxx and -RB-xxx	68.58 (2.70)	43.18 (1.70)	N/A	76.2 (3.0)
1326-CPB1T-RA-xxx and -RB-xxx	68.58 (2.70)	43.18 (1.70)	N/A	104.1 (4.1)
1326-CPB1-RAL-xxx and -RBL-xxx	69.85 (2.75)	46.99 (1.85)	45.47 (1.79)	76.2 (3.0)
1326-CPB1T-RAL-xxx and -RBL-xxx	69.85 (2.75)	46.99 (1.85)	45.47 (1.79)	104.1 (4.1)
1326-CPC1-RA-xxx and -RB-xxx	84.07 (3.31)	54.36 (2.14)	N/A	76.2 (3.0)
1326-CPC1T-RA-xxx and -RB-xxx	84.07 (3.31)	54.36 (2.14)	N/A	160.2 (6.3)
1326-CPC1-RAL-xxx and -RBL-xxx	84.07 (3.31)	57.15 (2.25)	55.37 (2.18)	76.2 (3.0)
1326-CPC1T-RAL-xxx and -RBL-xxx	84.07 (3.31)	57.15 (2.25)	55.37 (2.18)	160.2 (6.3)



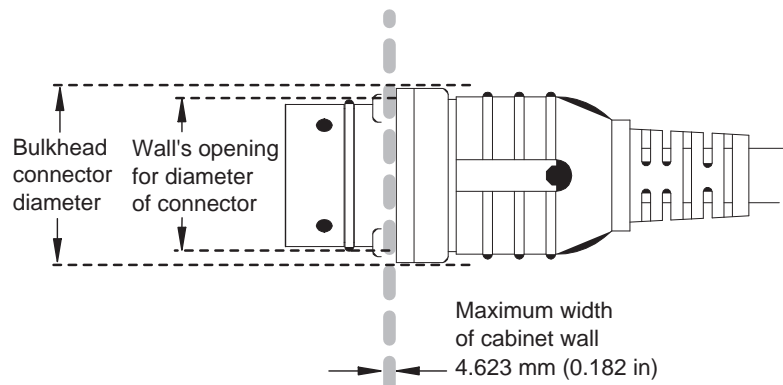
### Bulkhead Connector Dimensions

The following tables show dimensions for 1326-CCU-Ex, 1326-CPB1x-Ex, and 1326-CPC1x-Ex cables.

1326 Cable	Screw description	Diameter of mounting holes mm (in)	Distance between centers of mounting holes mm (in)	Diameter of connector mm (in)	Diameter of connector opening mm (in)	Bend Radius
1326-CCU-E-xxx 1326-CCUT-E-xxx 1326-CCUT-EE-xxx 1326-CCU-EL-xxx 1326-CCUT-EL-xxx	4/40 3/8in	3.353 (0.132)	26.975 (1.062)	28.575 (1.125)	30.163 (1.188)	CCU 11.0 (0.43)  CCUT 10.1 (0.40)
1326-CPB1-E-xxx 1326-CPB1T-E-xxx 1326-CPB1T-EE-xxx 1326-CPB1-EL-xxx 1326-CPB1T-EL-xxx	4/40 3/8in	3.353 (0.132)	31.75 (1.25)	34.925 (1.375)	36.513 (1.438)	CPB1 140 (0.55)  CPB1Tx 10.4 (0.41)
1326-CPC1-E-xxx 1326-CPC1T-E-xxx 1326-CPC1T-EE-xxx 1326-CPC1-EL-xxx 1326-CPC1T-EL-xxx	6/32 3/8in	3.810 (0.150)	39.675 (1.562)	43.637 (1.718)	45.225 (1.781)	CPC11 16.3 (0.64)  CPC1Tx 16.0 (0.63)



Note: You do not need to attach the bulkhead cables to a cabinet wall, but you do need to follow the information in *Guidelines for Connecting Bulkhead and Double-Ended Cables*.



## Wiring Information

### 1326-CCU-xxx Standard Commutation Cable for Motor Resolver

Wire Color	Gauge mm <sup>2</sup> (AWG)	Connector Pin	System Module Terminal #
Black (Axis_0_R1)	0.518 (20)	A	1
White (Axis_0_R2)	0.518 (20)	B	6
Shield - Drain	0.518 (20)	no connection	2
Black (Axis_0_S1)	0.518 (20)	D	3
Red (Axis_0_S3)	0.518 (20)	E	8
Shield - Drain	0.518 (20)	no connection	7
Black (Axis_0_S4)	0.518 (20)	H	9
Green (Axis_0_S2)	0.518 (20)	G	4
Shield - Drain	0.518 (20)	no connection	5
Overall Shield	N/A	no connection	10

### 1326-CCUT-xxx Flex Rated Commutation Feedback Cable for Motor Resolver

Wire Color	Gauge mm <sup>2</sup> (AWG)	Connector Pin	System Module Terminal #
Black (Axis_0_R1)	0.518 (20)	A	1
White (Axis_0_R2)	0.518 (20)	B	6
Shield	0.518 (20)	no connection	2
Black (Axis_0_S1)	0.518 (20)	D	3
Red (Axis_0_S3)	0.518 (20)	E	8
Shield	0.518 (20)	no connection	7
Black (Axis_0_S4)	0.518 (20)	H	9
Green (Axis_0_S2)	0.518 (20)	G	4
Shield	0.518 (20)	no connection	5
Overall Shield	N/A	no connection	10

### 1326-CECU-xxL-xxx High Resolution Feedback Cable for High-Resolution Motors Only

Wire color	Gauge mm <sup>2</sup> (AWG)	Connector pin	System module terminal #
Black (power)	0.518 (20)	A	3
White (ground)	0.518 (20)	B	2
Shield	0.518 (20)	no connection	no connection
Black (ChA_LO)	0.518 (20)	C	11
Red (ChA_HI)	0.518 (20)	D	12
Shield	0.518 (20)	I	10
Black (ChB_LO)	0.518 (20)	E	8
Blue (ChB_HI)	0.518 (20)	F	9
Shield	0.518 (20)	I	7
Black (Comm_HI)	0.518 (20)	G	6
Green (Comm_LO)	0.518 (20)	H	5
Shield	0.518 (20)	I	4
Overall Shield	N/A	J	1

**1326-CPB1-xxx Standard Motor Power Cable for 1326AS-B3xxx and 1326AS-B4xxx Servomotors**

Wire Number	Wire Color	Gauge mm <sup>2</sup> (AWG)	Connector Pin	1394 Terminal
1 (Power)	Black	1.29 (16)	1	U1
2 (Power)	Black	1.29 (16)	2	V1
3 (Power)	Black	1.29 (16)	3	W1
4 (Brake)	Black	1.29 (16)	4	TB1-3
5 (Thermostat)	Black	1.29 (16)	5	TB1-2
6 (Brake)	Black	1.29 (16)	6	TB1-4
7 (GND)	Drain Wire	1.29 (16)	7	PE3
8 (GND)	Black	1.29 (16)	8	PE2
9 (Thermostat)	Black	1.29 (16)	9	TB1-1
Shield	Shield	N/A	no connection	Ground Stud

**1326-CPC1-xxx Standard Power Cable for the 1326AS-B6xxx and 1326AS-B8xxx Servomotors**

Wire Number	Wire Color	Gauge mm <sup>2</sup> (AWG)	Connector Pin	1394 Terminal
1 (Power)	Black	2.59 (10)	1	U1
2 (Power)	Black	2.59 (10)	2	V1
3 (Power)	Black	2.59 (10)	3	W1
4 (Brake)	Black	1.29 (16)	4	TB1-3
5 (Thermostat)	Black	1.29 (16)	5	TB1-2
6 (Brake)	Black	1.29 (16)	6	TB1-4
7 (GND)	Drain Wire	2.05 (12)	7	PE3
8 (GND)	Black	2.05 (12)	8	PE2
9 (Thermostat)	Black	1.29 (16)	9	TB1-1
Shield	Shield	N/A	no connection	Ground Stud

**1326-CPB1T-xxx Flex Rated Power Cable for 1326AS-B3xxx and 1326AS-B4xxx Servomotors**

Wire Number	Wire Color	Gauge mm <sup>2</sup> (AWG)	Connector Pin	1394 Terminal
1 (Power)	White	1.29 (16)	1	U1
2 (Power)	White	1.29 (16)	2	V1
3 (Power)	White	1.29 (16)	3	W1
4 (Brake)	White	1.29 (16)	4	TB1-3
5 (Thermostat)	White	1.29 (16)	5	TB1-2
6 (Brake)	White	1.29 (16)	6	TB1-4
7 (GND)	Overall Shield	1.29 (16)	7	PE3
8 (GND)	White	1.29 (16)	8	PE2
9 (Thermostat)	White	1.29 (16)	9	TB1-1

**1326-CPC1T-xxx Flex Rated Power Cable for the 1326AS-B6xxx 1326AS-B8xxx Servomotors**

Wire Number	Wire Color	Gauge mm <sup>2</sup> (AWG)	Connector Pin	1394 Terminal
1 (Power)	White	2.59 (10)	1	U1
2 (Power)	White	2.59 (10)	2	V1
3 (Power)	White	2.59 (10)	3	W1
4 (Brake)	White	1.29 (16)	4	TB1-3
5 (Thermostat)	White	1.29 (16)	5	TB1-2
6 (Brake)	White	1.29 (16)	6	TB1-4
7 (GND)	Overall Shield	2.05 (12)	7	PE3
8 (GND)	White	2.05 (12)	8	PE2
9 (Thermostat)	White	1.29 (16)	9	TB1-1

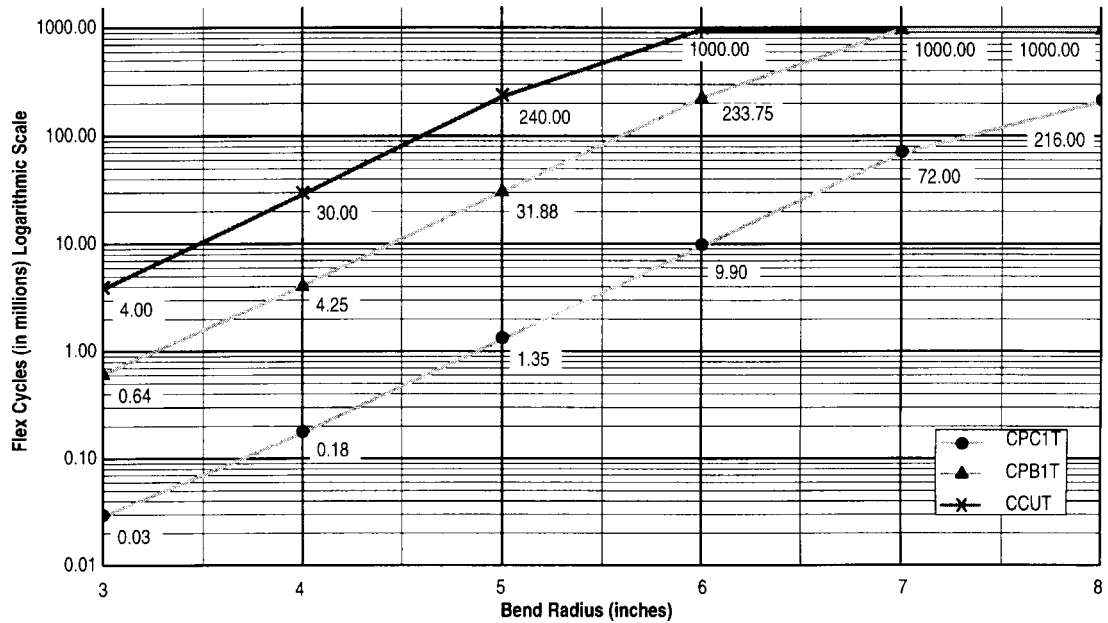
**1326-CECUT-xxL-xxx Flex-Rated High-Resolution Feedback Cable for High-Resolution Motor Only**

Wire color	Gauge mm <sup>2</sup> (AWG)	Connector pin	System module terminal #
Black (power)	0.518 (20)	A	3
White (ground)	0.518 (20)	B	2
Shield	0.518 (20)	no connection	no connection
Black (ChA_LO)	0.518 (20)	C	11
Red (ChA_HI)	0.518 (20)	D	12
Shield	0.518 (20)	I	10
Black (ChB_LO)	0.518 (20)	E	8
Blue (ChB_HI)	0.518 (20)	F	9
Shield	0.518 (20)	I	7
Black (Comm_HI)	0.518 (20)	G	6
Green (Comm_LO)	0.518 (20)	H	5
Shield	0.518 (20)	I	4
Overall Shield	N/A	J	1

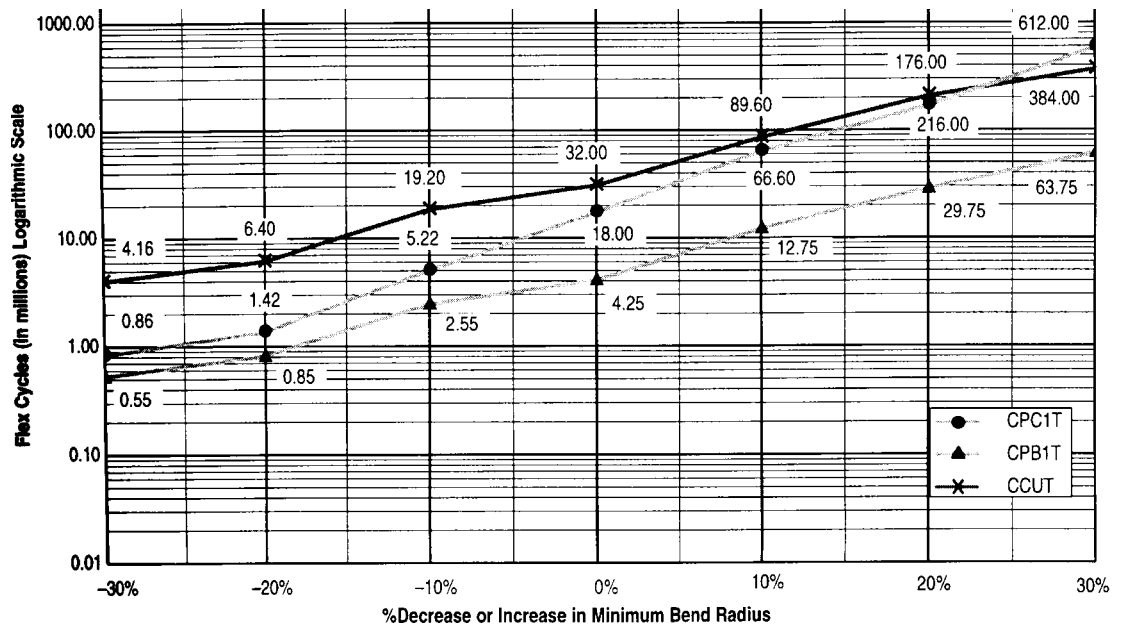
## Bend Radius Information

Rated Bend Radius in mm and (inches)	
1326-CCUT	101.6 (4.0)
1326-CPB1T	104.1 (4.1)
1326-CPC1T	160.2 (6.3)

**Figure 7**  
Flex Cycle Life vs. Cable Bend Radius



**Figure 8**  
Flex Cycle Life vs. % Change in Cable Bend Radius



## Installation Guidelines

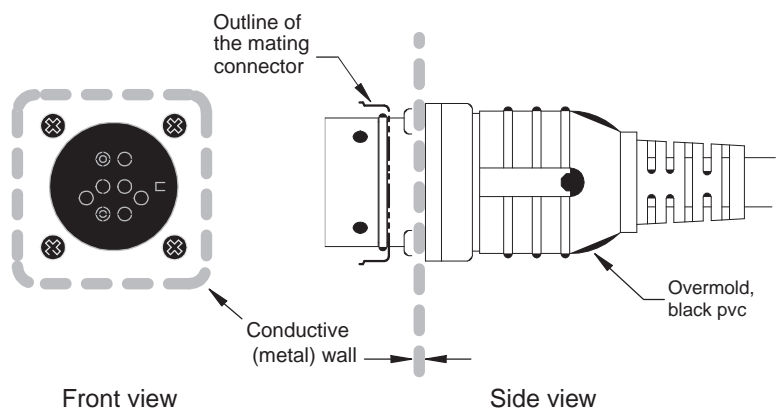
### Power Track Installation Guidelines

Follow the guidelines below to maintain power track reliability:

- Always follow installation instructions of the cable manufacturer.
- Remove twists, bends and kinks from the cable before installing it in the cable carrier.
- It is important to lay out the cabling at least 24 hours before installation to relax any stresses resulting from transit or storage.
- When placing the cable into the cable carrier, the carrier should be laid out flat with the bending direction facing upward. It should then be fitted with the cables in working position. The cables should be laid into the cable carrier and not woven between or around other cables.
- Allow at least 10% clearance between cables so that they are free to move. Use separators between cables.
- The cables must be free to move within the carrier. Do not attach the cables to the carrier or to each other. Clamp cables beyond the ends of the carrier. Cycle the carrier several times before clamping.
- Clamp heavier cables toward the edge of the track and lighter cables in the center of the track.
- Do not pull cables tight against the inner/outer track curves.

### Bulkhead Connector Assembly

The graphic below shows the side view of the bulkhead connector attached by screws and protruding through the flange and a conductive wall (e.g., metal cabinet). The front view shows the pins of the attached bulkhead connector protruding through the wall.





## Bulkhead Installation Through a Cabinet Wall

To prepare a cabinet wall for mounting the bulkhead connector:

1. Locate the area of the cabinet wall where you will mount the bulkhead connector.



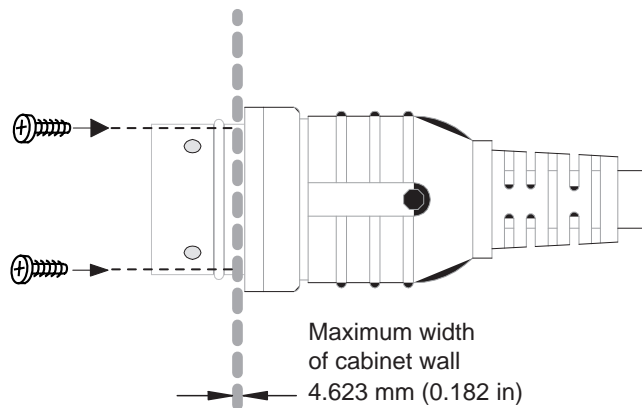
**ATTENTION:** To avoid a shock hazard, remove power to the motor controller and motor before installing or removing cables. Failure to do this can cause personal injury.

2. Mark the places where the four mounting holes and the center connector opening will be located.
3. Drill the four mounting holes and the large center opening.
4. Scrape any paint from the inside surface of the cabinet wall where the bulkhead flange of the 1326-CPB1-E-xxx, 1326-CPBIT-E-xxx, 1326-CPC1-E-xxx, or 1326-CPC1T-E-xxx cables will make contact.

Note: All series B cable connectors are treated with a black, highly-conductive, cobalt coating. Do not scrape this coating.

**Important:** A metal-to-metal connection is required to meet CE Compliance standards.

5. Remove the viton seal from the face of the connector for 1326-CCU-EL-xxx, 1326-CPB1-EL-xxx, and 1326-CPC1-EL-xxx cables to provide clearance for the cabinet wall. The connection at the cabinet wall will be IP65.
6. Attach the bulkhead connector through the wall, as shown:

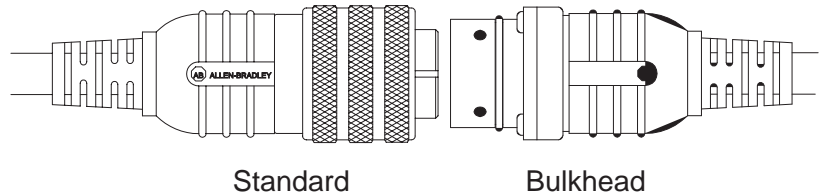


## Double-Ended Bulkhead Connectors

The 1326-xxx-D-xxx and the 1326-xxx-EE-xxx connectors have male pins on one end and female pins on the other end.

## Guidelines for Connecting Bulkhead and Double-Ended Cables

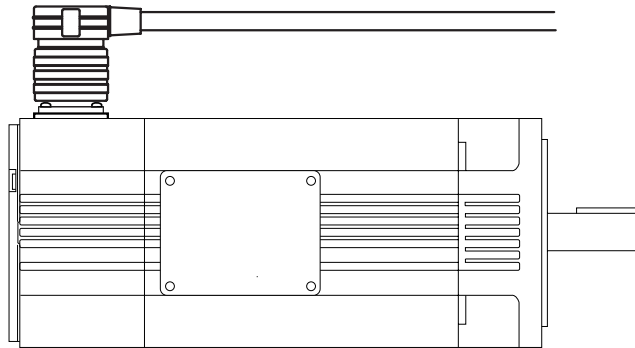
The guidelines for connecting bulkhead and standard cables are:



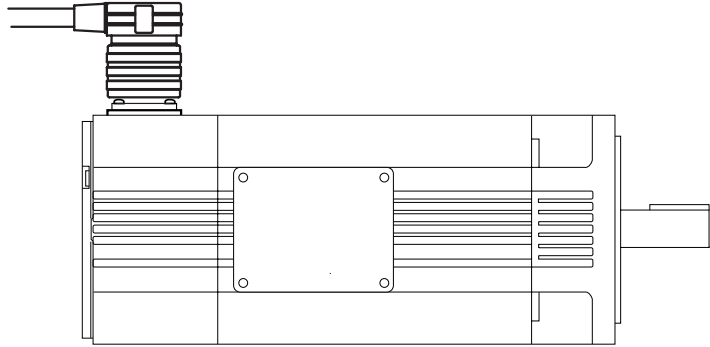
- A standard connector can only connect to a bulkhead connector or a 460V-1326Ax motor.
- A bulkhead connector can only connect to a standard connector.
- When connecting a bulkhead to a standard connector, one connector must have male pins and the other must have female pins.
- Though cables designated with the L option can be connected to cables or motors without this option, the resulting connection will not have the L option.
- The length of a cable run cannot exceed 90 meters.

## Installing Right-Angle Connector Cables

Right-angle connectors are keyed for correct orientation. The orientation of the 1326 cables attached with right-angle connectors in relation to the motor shaft is shown below:



1326-xxx-RA-xxx and 1326-xxx-RAL-xxx cables exit towards the motor shaft



1326-xxx-RB-xxx and 1326-xxx-RBL-xxx  
cables exit away from the motor shaft



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