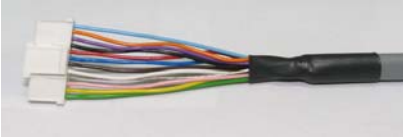


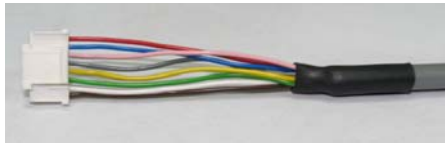
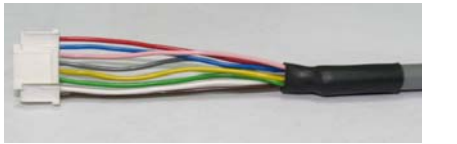







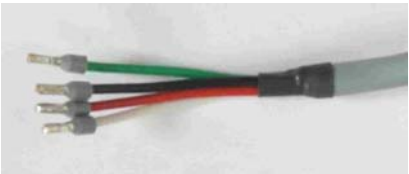




Harmonica & Bassoon Digital Servo Drive Cable Kits

		
<p>Main Feedback: (general-purpose) CBL-MLXFDBK CBL-MLXFDBK-5</p>	<p>Encoder: (for SAR,SA,SB,SC) CBL-MTRENC1 CBL-MTRENC1-5</p>	<p>Encoder: CBL-MTRENC3 (for SE) CBL-MTRENC3-5</p>
		
<p>Aux. Feedback: CBL-MLXAUX CBL-MLXAUX-5</p>	<p>Digital Input: CBL-MLXDI CBL-MLXDI-5</p>	
		
<p>Digital Output: CBL-MLXDO CBL-MLXDO-5</p>	<p>Analog Input: CBL-MLXAI CBL-MLXAI-5</p>	<p>Aux. Power: CBL-MLX24 CBL-MLX24-5</p>
		
<p>RS-232 Com.: CBL-RJ452321 CBL-RJ452321-5</p>	<p>RS-232 Com.: JCA-HAR11 JCA-HAR11-5</p>	
		
<p>CAN Com.: CBL-RJ45CAN1 CBL-RJ45CAN1-5</p>	<p>CAN Com.: CBL-RJ45CAN2</p>	
		
<p>Motor Power: (general-purpose) CBL-MTRPWR CBL-MTRPWR-5</p>	<p>Motor Power: (for SAR,SA,SB,SC) CBL-MTRPWR1 CBL-MTRPWR1-5</p>	<p>Motor Power: CBL-MTRPWR2 (for SE) CBL-MTRPWR2-5</p>

Important Notice

This guide is delivered subject to the following conditions and restrictions:

- This guide contains proprietary information belonging to Elmo Motion Control Ltd. Such information is supplied solely for the purpose of assisting users of the Elmo Harmonica and Bassoon servo drives in assembling the required cables for their drive.
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1. Introduction

This document provides the wiring details for the cables used to connect Elmo Harmonica and Bassoon digital servo drives with the end-user application. The servo drive-side pinouts are provided in Chapter 3 of the drive’s installation guide.

The cables come in two lengths: 2 meters (6 ½ feet) and 5 meters (16 ½ feet). The exact cable length is indicated in the cable part number by use of an extended suffix to indicate 5-meter length. For example, cable CBL-MTRENC1 is a 2 meter cable while CBL-MTRENC1-5 is a 5 meter cable.

CBL-RJ45CAN2, is an exception, it is only 20 cm long.

1.1 Harmonica Connectors

The table below shows the connector panel of the Harmonica.

Port	Type	Connector Maker & No. / Mating Plug (on Cable)	Pins	Connector Location
J1	RJ-45	RJ-45 jack mates with RJ-45 plug	8	
J2	2 mm Pitch	Molex 35363-0800 mates with 35507-0800	8	
J3	2 mm Pitch	Molex 35363-1200 mates with 35507-1200	12	
J4	2 mm Pitch	Molex 35363-0200 mates with 35507-0200	2	
J5	2 mm Pitch	Molex 35363-0800 mates with 35507-0800	8	
J6	2 mm Pitch	Molex 35363-0400 mates with 35507-0400	4	
J7	2 mm Pitch	Molex 35363-0300 mates with 35507-0300	3	
J8	5.08 mm Pitch Terminal Block	Phoenix MSTBA 2.5/7-G-5.08 with MSTB 2.5/7-ST-5.08	7	

1.2 Bassoon Connectors

The table below shows the connector panel of the Bassoon.

Port	Type	Connector Maker & No. / Mating Plug (on Cable)	Pins	Connector Location
J1, J8, J9	RJ-45	RJ-45 jack mates with RJ-45 plug	8	<p>The diagram shows a vertical connector panel with the following ports and functions: <ul style="list-style-type: none"> J8 and J9: CAN (RJ-45) J1: RS232 (RJ-45) J4: Auxiliary Power Supply (2 pins) J2: Auxiliary Feedback (8 pins) J5: Digital Input (8 pins) J6: Digital Output (4 pins) J7: Analog Input (3 pins) J3: Main Feedback (12 pins) Main Power: Indicated by an arrow pointing to the bottom of the panel. The panel is labeled 'Elmo' and 'BAS0028A'. </p>
J2, J5	2 mm Pitch	Molex 35363-0800 mates with 35507-0800	8	
J3	2 mm Pitch	Molex 35363-1200 mates with 35507-1200	12	
J4	2 mm Pitch	Molex 35363-0200 mates with 35507-0200	2	
J6	2 mm Pitch	Molex 35363-0400 mates with 35507-0400	4	
J7	2 mm Pitch	Molex 35363-0300 mates with 35507-0300	3	
	5.08 mm Pitch Trmnl Block	Phoenix MSTBA 2.5/7-G-5.08 with MSTB 2.5/7-ST-5.08	7	

1.3 Cable Cross-Reference

Cable Application	Cable Part. No.	Pins	Harmonica	Bassoon	pg
Main Feedback (gen-purpose)	CBL-MLXFDBK-5	12	J3	J3	4
Encoder (for SAR, SA, SB, SC)	CBL-MTRENC1-5	12	J3	J3	5
Encoder (for SE)	CBL-MTRENC3-5	12	J3	J3	6
Auxiliary Feedback	CBL-MLXAUX-5	8	J2	J2	7
Digital Input	CBL-MLXDI-5	8	J5	J5	8
Digital Output	CBL-MLXDO-5	4	J6	J6	9
Analog Input	CBL-MLXAI-5	3	J7	J7	9
Auxiliary Power	CBL-MLX24-5	2	J4	J4	10
RS-232 Communications	CBL-RJ452321-5	8	J1	J1	11
RS-232 Communications	JCA-HAR11-5	3 of 8	see 9.2	-	12
CAN Communications	CBL-RJ45CAN1-5	8	J1	J8, J9	13
CAN Communications	CBL-RJ45CAN2	8	see 9.4	J8, J9	14
Motor Power (general-purpose)	CBL-MTRPWR-5	4			15
Motor Power (for SAR, SA, SB, SC)	CBL-MTRPWR1-5	4	PE/M1 /M2/M3	PE/M1 /M2/M3	16
Motor Power (for SE)	CBL-MTRPWR2-5	4			17

2. Cable Kits

Several Cable Kits can be purchased from Elmo. Each contain a set of 10 cables. The -5 suffix on the kits (CBL-MLXFDBK-5 for example) and on the cables indicate that the cables are 5m long. Cables and kits without that suffix are 2m long (except for CBL-RJ45CAN2 which is 20cm long). **Customers may purchase cables in kits, or individually in multiples of 10 each.** The contents of the kits are listed below:

Cable Application	Cable Part. No.	CBL-MLXKIT01	CBL-MLXKIT02
		CBL-MLXKIT01-5	CBL-MLXKIT02-5
Main Feedback (gen-purpose)	CBL-MLXFDBK-5	1	-
Encoder (for SAR, SA, SB, SC)	CBL-MTRENC1-5	-	1
Encoder (for SE)	CBL-MTRENC3-5	-	-
Auxiliary Feedback	CBL-MLXAUX-5	1	1
Digital Input	CBL-MLXDI-5	1	1
Digital Output	CBL-MLXDO-5	1	1
Analog Input	CBL-MLXAI-5	1	1
Auxiliary Power	CBL-MLX24-5	1	1
RS-232 Communications	CBL-RJ452321-5	1	1
RS-232 Communications	JCA-HAR11-5	1	1
CAN Communications	CBL-RJ45CAN1-5	1	1
CAN Communications	CBL-RJ45CAN2	-	-
Motor Power (general-purpose)	CBL-MTRPWR-5	1	-
Motor Power (for SAR, SA, SB, SC)	CBL-MTRPWR1-5	-	1
Motor Power (for SE)	CBL-MTRPWR2-5	-	-

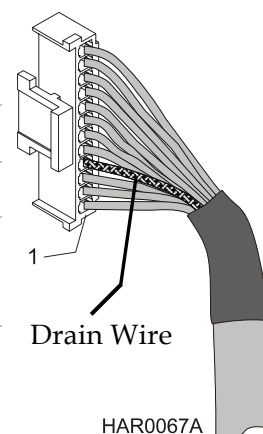
3. Main Feedback Cables

The main feedback cables are made from 24-AWG twisted-pair shielded cable. There are three types of feedback cables, all use a 12-pin Molex 2.0 mm pitch plug on the *SimplIQ* side.

- The General-Purpose Main Feedback Cable (CBL-MLXFDBK) is open on the motor side so that it can be connected to customer-specific connectors.
- Encoder Cable CBL-MTRENC1 has a 15-pole socket on the motor side for Metronix APM-SAR, SA, SB and SC motors.
- Encoder Cable CBL-MTRENC3 has a 17-pole Amphenol socket on the motor side for Metronix APM-SE motors.

3.1 Gen.-Purpose Main Feedback Cable (CBL-MLXFDBK-5)

Pin No.	Color	Twisted & Shielded Wire	Description
1	Green	Pair	see Installation Guide
2	Yellow		
3	Pink		see Installation Guide
4	Drain wire		see Installation Guide
5	White	Pair	see Installation Guide
6	Brown		
7	Blue	Pair	see Installation Guide
8	Red		see Installation Guide
9	Black	Pair	see Installation Guide
10	Purple		see Installation Guide
11	Orange	Pair	see Installation Guide
12	Cyan		



The specific functionality of each pin is fully outlined in the *Harmonica and Bassoon Installation Guides*.

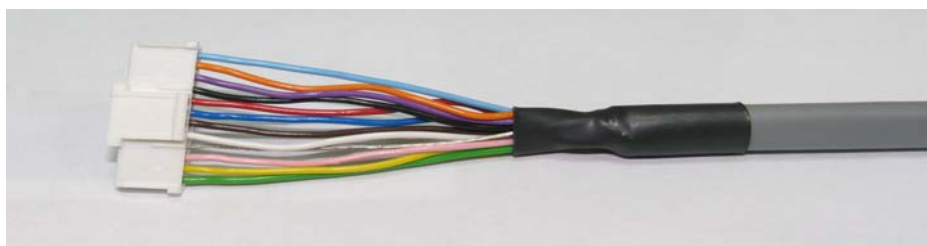


Figure 1: Single-sided Main Feedback Cable (Part No. CBL-MLXFDBK-5)

3.2 Encoder Cable (CBL-MTRENC1-5 for SAR, SA, SB, SC)

Molex Pin No.	Color	Socket Pin No.	Twisted & Shielded Wire	Signal	Description
1	Green	11	Pair	HC	Hall sensor C input
2	Yellow	9		HB	Hall sensor B input
3	Pink	7		HA	Hall sensor A input
4	Drain wire	15		SUPRET	Drain wire connection
5	White	14	Pair	SUPRET	Supply return
6	Brown	13		+5V	Encoder\Hall supply +5 V
7	Blue	6	Pair	INDEX-	Index complement
8	Red	5		INDEX	Index
9	Black	4	Pair	CHB-	Channel B complement
10	Purple	3		CHB	Channel B
11	Orange	2	Pair	CHA-	Channel A complement
12	Cyan	1		CHA	Channel A

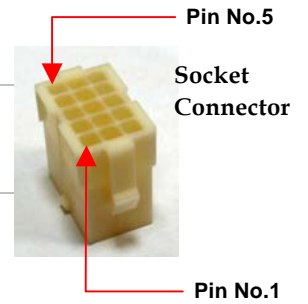
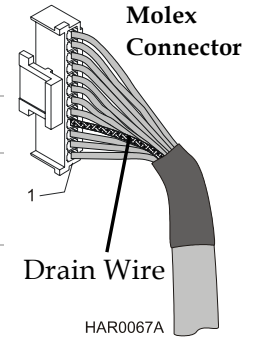


Figure 2: Encoder Cable (Part No. CBL-MTRENC1-5 for Metronix SAR, SA, SB, SC motors)

3.3 Encoder Cable (CBL-MTRENC3-5 for SE motors)

Molex Pin No.	Color	Amphenol Pin No.	Twisted & Shielded Wire	Signal	Description
1	Green	P	Pair	HC	Hall sensor C input
2	Yellow	M		HB	Hall sensor B input
3	Pink	K		HA	Hall sensor A input
4	Drain wire	J		SUPRET	Drain wire connection
5	White	G	Pair	SUPRET	Supply return
6	Brown	H		+5V	Encoder\Hall supply +5 V
7	Blue	F	Pair	INDEX-	Index complement
8	Red	E		INDEX	Index
9	Black	D	Pair	CHB-	Channel B complement
10	Purple	C		CHB	Channel B
11	Orange	B	Pair	CHA-	Channel A complement
12	Cyan	A		CHA	Channel A

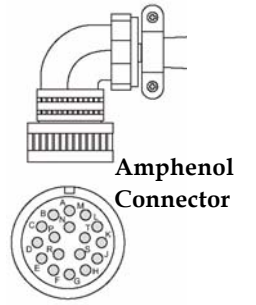
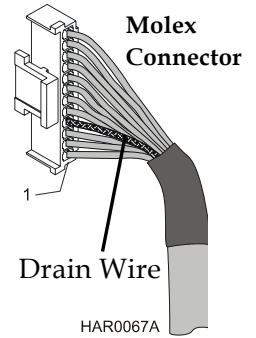


Figure 3: Encoder Cable (Part No. CBL-MTRENC3-5 for Metronix SE motors)

4. Auxiliary Feedback Cable (CBL-MLXAUX-5)

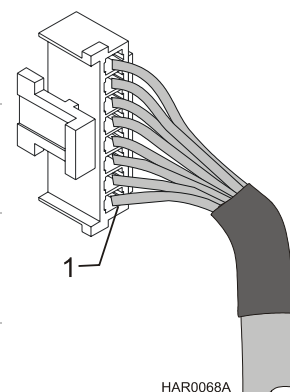
The auxiliary feedback cable is a 24-AWG twisted-pair shielded cable. It is connected using an 8-pin Molex plug.

Four options – described in the *Auxiliary Feedback* section(s) in the *Harmonica and Bassoon Installation Guides* – are available for auxiliary feedback:

- Main encoder buffered outputs
- Differential encoder inputs
- Single-ended encoder input
- Pulse-and-direction input

The general pinout of the auxiliary feedback cable is as follows:

Pin No.	Color	Twisted & Shielded Wire	Description
1	Brown	Pair	see Installation Guide
2	White		
3	Green	Pair	see Installation Guide
4	Yellow		
5	Gray	Pair	see Installation Guide
6	Pink		
7	Blue	Pair	see Installation Guide
8	Red		



The specific functionality of each pin is fully outlined in the *Harmonica and Bassoon Installation Guides*.



Figure 4: Auxiliary Feedback Cable (Part No. CBL-MLXAUX-5)

5. Digital Input Cable (CBL-MLXDI-5)

The digital input cable is a 24-AWG twisted-pair shielded cable. It is connected using an 8-pin Molex plug.

Pin No.	Color	Twisted & Shielded Wire	Signal	Description
1	Brown	Pair	IN1	Programmable input 1
2	White		IN2	Programmable input 2
3	Green	Pair	IN3	Programmable input 3
4	Yellow		IN4	Programmable input 4
5	Gray	Pair	IN5	Programmable input 5
6	Pink		IN6	Programmable input 6
7	Blue	Pair	INRET	Programmable input return
8	Red		INRET	Programmable input return

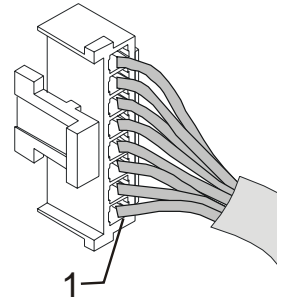


Figure 5: Digital Input Cable (Part No. CBL-MLXDI-5)

6. Digital Output Cable (MLXDO-5)

The digital output cable is a 26-AWG twisted-pair shielded cable. It is connected using a 4-pin Molex plug.

Pin No.	Color	Twisted & Shielded Wire	Signal	Description
1	Brown	Pair	OUT1	Programmable output 1
2	White		OUTRET1	Programmable output return 1
3	Green	Pair	OUT2	Programmable output 2
4	Yellow		OUTRET2	Programmable output return 2

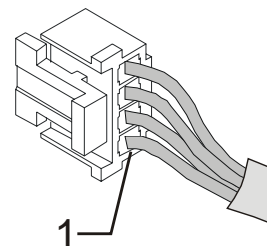


Figure 6: Digital Output Cable (Part No CBL-MLXDO-5)

7. Analog Input Cable (CBL-MLXAI-5)

The analog input cable is a 26-AWG twisted-pair shielded cable. It is connected using a 3-pin Molex plug.

Pin No.	Color	Twisted & Shielded Wire	Signal	Description
1	Green	Pair	ANLIN1+	Analog input 1+
2	Yellow		ANLIN1-	Analog input 1-
3	White		ANLRET	Analog ground

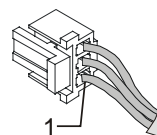


Figure 7: Analog Input Cable (Part No. CBL-MLXAI-5)

8. Auxiliary Power Cable (CBL-MLX24-5)

The auxiliary power cable is a 24-AWG twisted-pair shielded cable. It is connected using a 2-pin Molex plug.

Pin No.	Color	Twisted & Shielded Wire	Signal	Description
1	Red	Pair	+24VDC	+24 VDC auxiliary power supply
2	Black		RET24VDC	Return (common) of 24 VDC auxiliary power supply

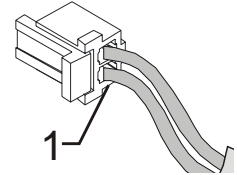


Figure 8: Auxiliary Power Cable (Part No. CBL-MLX24-5)

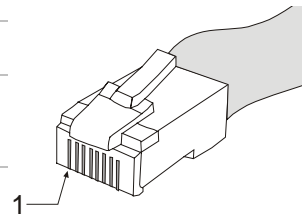
9. Communication Cables

The communication cables use 26-AWG twisted pair shielded cable. They are connected using an 8-pin RJ-45 plug or, in the case of an extended Harmonica, with a special *pitchfork* connector. Elmo drives can communicate using the following options:

- RS-232, full duplex
- CANopen

9.1 RS-232 Option (CBL-RJ452321-5)

RJ45 Pin No.	Color	D-type Female Pin No.	Signal	Description
1	–	–	–	–
2	–	–	–	–
3	Brown	2	Tx	RS-232 transmit
4	–	–	–	–
5	White	5	COMRET	Communication return
6	Green	3	Rx	RS-232 receive
7	–	–	–	–
8	–	–	–	–
body	Drain Wire	body	shield	cable shield



The shields of the RJ-45 and D-type plugs are connected to each other through the cable braid.



Figure 9: RS-232 Cable (Part No. CBL-RJ452321-5)

9.2 RS-232 Pitchfork Option (JCA-HAR11-5)

This cable is connected to the Harmonica through a vent opening on the top of the Harmonica.

Color	D-type Female Pin No.	Signal	Description
Brown	2	Tx	RS-232 transmit
Green	3	Rx	RS-232 receive
White	5	COMRET	Communication return
	body	shield	cable shield

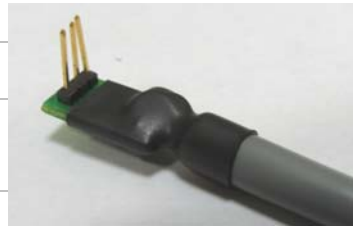
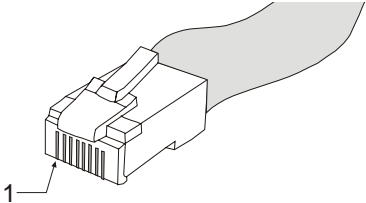


Figure 10: RS-232 Pitchfork Cable (Part No. JCA-HAR11-5)

9.3 CAN Option (CBL-RJ45CAN1-5)

RJ45 Pin No.	Color	D-type Female Pin No.	Signal	Description
1	Green	7	CAN-H	CAN_H bus line
2	Yellow	2	CAN_L	CAN_L bus line
3	White	3	CAN_GND	CAN ground
4	—	—	—	—
5	—	—	—	—
7	—	—	—	—
8	—	—	—	—
body	Drain Wire	body	shield	cable shield



The shields of the RJ-45 and D-type plugs are connected to each other through the cable braid.

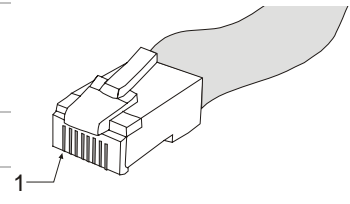


Figure 11: CAN Cable (Part No. CBL-RJ45CAN1-5)

9.4 CAN Option (CBL-RJ45CAN2)

Cable CBL-RJ45CAN2 is 20 cm long, it is used for “daisy-chaining” CAN nodes. On the Harmonica this cable is connected to the External Dual Can Port.

RJ45 Pin No.	Color	RJ45 Pin No.	Signal	Description
1	Green	1	CAN-H	CAN_H bus line
2	Yellow	2	CAN_L	CAN_L bus line
3	White	3	CAN_GND	CAN ground
4	—	—	—	—
5	—	—	—	—
7	—	—	—	—
8	—	—	—	—
body	Drain Wire	body	shield	cable shield



The shields of the two RJ-45 plugs are connected to each other through the cable braid.



Figure 12: CAN Cable (Part No. CBL-RJ45CAN2)

10. Motor Power Cables

There are three types of power cables:

- General-Purpose Motor Power Cable (CBL-MTRPWR) has pin terminals on the *SimplIQ* drive side and is open on the motor side.
- CBL-MTRPWR1 has pin terminals on the *SimplIQ* drive side and a 4-pole socket on the motor side for Metronix APM-SAR, SA, SB and SC motors.
- CBL-MTRPWR2 has pin terminals on the *SimplIQ* drive side and a 4-pole Amphenol connector on the motor side for Metronix APM-SE motors.

10.1 Motor Power Cable (CBL-MTRPWR-5 for general-purpose use)

CBL-MTRPWR is a general-purpose motor power cable. It is made from four 14-AWG shielded wires with pin terminals on the *SimplIQ* drive side. The other end is open so that it can be attached to a customer-specific connector.

Color	Signal	Description
White	U	Motor Phase U
Black	V	Motor Phase V
Red	W	Motor Phase W
Green	Earth	Ground

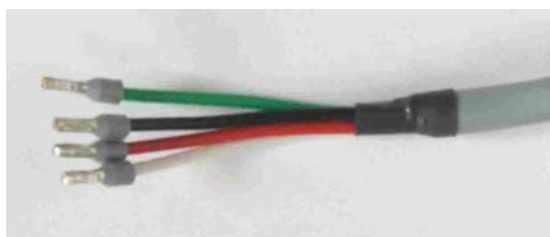


Figure 13: General-Purpose Motor Power Cable (Part No. CBL-MTRPWR-5)

10.2 Motor Power Cable (CBL-MTRPWR1-5 for Metronix SAR, SA, SB and SC motors)

CBL-MTRPWR1 is a 24-AWG shielded cable in which each wire, on the *SimplIQ* drive side, is connected to a pin terminal and the wires on the motor side are connected to a 4-pole socket. This cable is designed for connecting Harmonicas or Bassoons to Metronix APM-SAR, SA, SB and SC motors.

Socket

Pin No.	Color	Signal	Description
1	Brown & White	U	Motor Phase U
2	Pink & Gray	V	Motor Phase V
3	Blue & Red	W	Motor Phase W
4	Green & Yellow	Earth	Ground



Figure 14: Motor Power Cable (Part No. CBL-MTRPWR1-5)



Until November 2004, CBL-MTRPWR1-5 sold individually and as part of the CBL-MLXKIT02-5 cable kits **were wired as follows:**

Pin No.	Color	Signal	Description
1	Brown & White	U	Motor Phase U
2	Green & Yellow	V	Motor Phase V
3	Blue & Red	W	Motor Phase W
4	Pink & Gray	Earth	Ground

10.3 Motor Power Cable (CBL-MTRPWR2-5 for Metronix SE motors)

CBL-MTRPWR2 is a 14-AWG shielded cable in which each wire, on the *SimplIQ* drive side, is connected to a pin terminal and the wires on the motor side are connected to a 4-pole Amphenol connector. This cable is designed for connecting Harmonicas or Bassoons to Metronix APM-SE motors.

Amphenol

Pin No.	Color	Signal	Description
A	White	U	Motor Phase U
B	Black	V	Motor Phase V
C	Red	W	Motor Phase W
D	Green	Earth	Ground

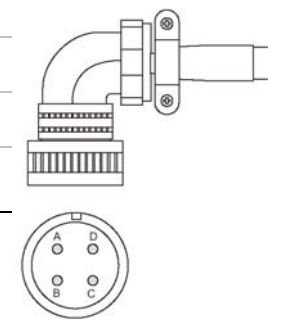


Figure 15: Motor Power Cable (Part No. CBL-MTRPWR2-5)