Low Voltage Mobile Drives

MC Series

Quick Start Manual

PVD 3667d_GB

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MC Drive Series - Information

It is the responsibility of the user to ensure end product compliance with all European requirements. The user, through its own analysis and testing, is solely responsible for making the final selection of the system and components and assuring that all performance, endurance, maintenance, safety and warning requirements of the application are met. The user must analyze all aspects of the application, follow applicable industry standards, and follow the information concerning the product in the current product catalogue and in any other materials provided from Parker Hannifin Corporation or its subsidiaries or authorized distributors.

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1. INTRODUCTION

1.1. Product Description

Parker's MC Series Mobile Inverter range provides high performance and functionality in a compact package for mobile motor control applications from 24 to 96 VDC. Compatible with multiple asynchronous motor manufacturers, the MC series settings can be optimized with supplied configuration software. Each inverter provides system control capabilities such as analogue and digital inputs and outputs, contactor coil drivers and proportional valve drivers.

1.2. Product Features

- Advanced field oriented vector control
- Auto-configuration of typical induction motors
- High efficiency cold plate heat sink design
- High frequency MOSFET power stages
- IP 65 protection class
- Motor temp sensor input
- Encoder supply output (5V)
- Auxiliary supply (+5V, +12V)
- AB encoder input
- Dual, configurable throttle inputs
- Configurable CAN communication
- Parker IQAN compatible
- Ability to control vehicle control tasks separately from motor control
- 5 configurable coil drive outputs
- 2 configurable digital outputs
- 2 Analogue inputs
- 6 Digital inputs

1.3. Part Number

1	2	3		4		5		6		7
M	C	C	-	02	-	0200	-	01	-	00

1		**Inverter family**	
		M	Mobile inverter
2		**Control module build**	
		C	Low voltage
3		**Frame size**	
		C	
		D	
		E	
		F	
4		**Maximum operating voltage**	
		02	24 VDC
		03	36 VDC
		04	48 VDC
		08	80 VDC
		09	96 VDC
5		**Peak current ratings**	
24 VDC Nominal Voltage		**0180**	180 A – MC series Frame C
		0250	250 A – MC series Frame C
		0350	350 A – MC series Frame D
36 VDC Nominal Voltage		**0400**	400 A – MC series Frame E
		0500	500 A – MC series Frame E
		0650	650 A – MC series Frame F
		0800	800 A – MC series Frame F
48 VDC Nominal Voltage		**0200**	200 A – MC series Frame C
		0275	275 A – MC series Frame D
		0350	350 A – MC series Frame D
		0450	450 A – MC series Frame E
		0550	550 A – MC series Frame E
		0650	650 A – MC series Frame F
80 VDC Nominal Voltage		**0175**	175 A – MC series Frame C
		0250	250 A – MC series Frame D
		0350	350 A – MC series Frame E
		0450	450 A – MC series Frame F
		0550	550 A – MC series Frame F
		0650	650 A – MC series Frame F
96 VDC Nominal Voltage		**0550**	550 A – MC series Frame F
		0650	650 A – MC series Frame F
6		**Branding**	
		01	Parker branded
7		**Special options**	
		00	E version with PMAC
		02	E version without PMAC

![Parker logo]

## 1.4. Software

MC Configuration Manager Software

- PC-based programming
- System monitoring
- System diagnostics
- Adjust system variables and programmable parameters
- Online or offline use
- Windows XP/Vista/7 compatible
- Includes USB adaptor
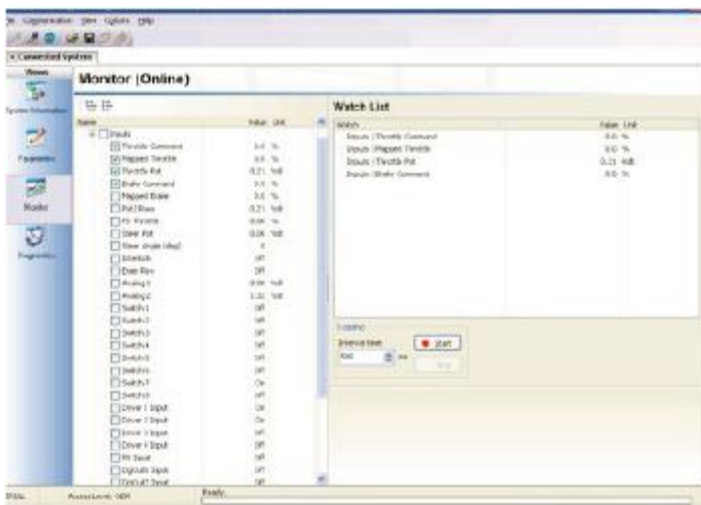
To be able to configure an MC Inverter, a software and connecting devices are required as shown hereunder (1314 at the moment).
Its part number is **USB-MC-01**.
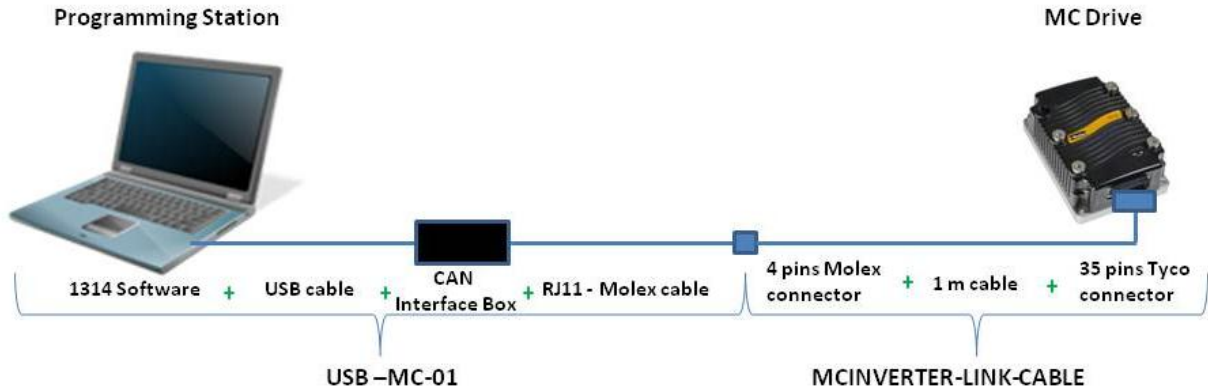
To connect the 1314 to the MC inverter, a specific cable is required.
It is made with a 35 pins Tyco connector on one side to be connected to the inverter and with a 4 pins Molex connector to be connected with the 1314 on the other.
Parker is proposing such a cable that is 1m long : **MCINVERTER-LINK-CABLE**.
In case of other length requirements, you will find hereunder the different components required to make such a cable :

Side 35 pins Tyco connector :   Plug Housing : 776164-1
(see Appendix B)   Pins : 770520-3
                                   Crimp Plier : 58529-1
                                   Crimp tool : 58529-2

Side 4 pins Molex :   Plug Housing : 39-01-2046
                                   Pin : 39-00-0082
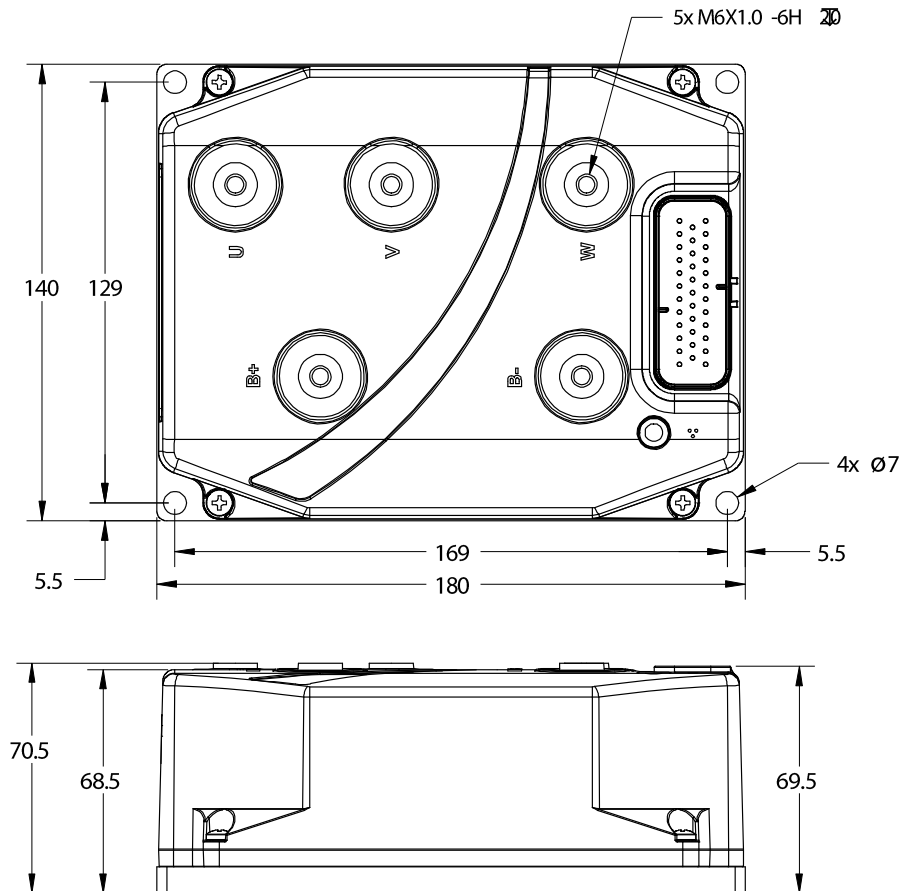   Crimp Plier : 63819-0900
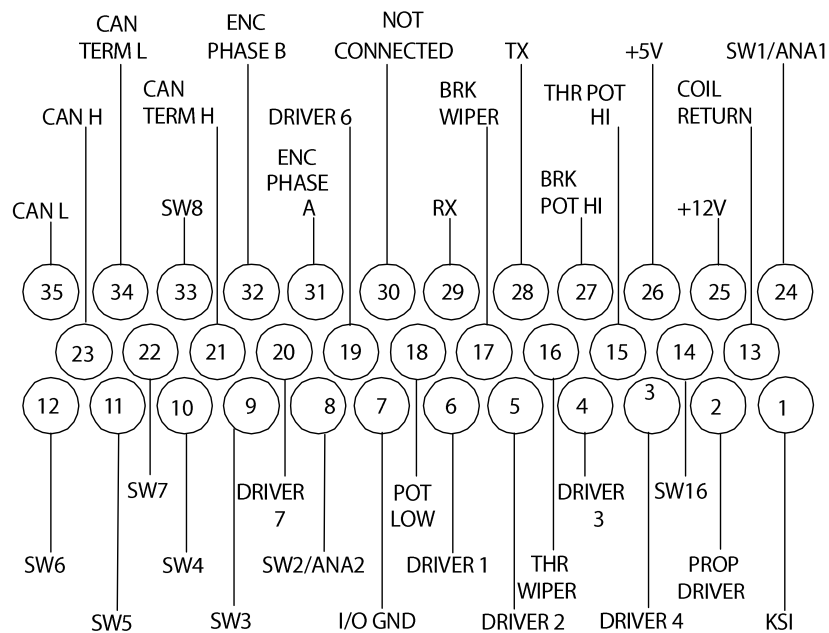
1	RX
2	Ground
3	TX
4	+12V (100mA)
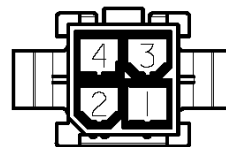
bottom view

2. MCC

2.1. Overview

PART NUMBER	Supply Voltage	Output Current (1 hour)	Max.Current (2 min)	Weight (kg)
MCC-02-0180-01-02	24VDC	90A	180A	1.7
MCC-02-0250-01-02	24VDC	125A	250A	1.7
MCC-04-0200-01-02	36/48VDC	100A	200A	1.7
MCC-08-0175-01-02	48/80VDC	80A	175A	1.7

2.2. Dimensions (mm)

5x M6X1.0 -6H ⌀10

U V W

B+ B-

140 129

169 5.5

5.5 180

4x ⌀7

70.5 68.5 69.5

2.3. Connector wiring

CAN TERM L	ENC PHASE B	NOT CONNECTED	TX	+5V	SW1/ANA1	
CAN TERM H	BRK WIPER	THR POT HI	COIL RETURN			
CAN H	DRIVER 6					
ENC PHASE A	BRK POT HI					
CAN L	SW8	RX	+12V			

Row 1: 35 34 33 32 31 30 29 28 27 26 25 24

Row 2: 23 22 21 20 19 18 17 16 15 14 13

Row 3: 12 11 10 9 8 7 6 5 4 3 2 1

SW7 DRIVER 7 POT LOW DRIVER 3 SW16

SW6 SW4 SW2/ANA2 DRIVER 1 THR WIPER PROP DRIVER

SW5 SW3 I/O GND DRIVER 2 DRIVER 4 KSI

3. MCD

3.1. Overview

PART NUMBER	Supply Voltage	Output Current (1 hour)	Max.Current (2 min)	Weight kg
MCD-02-0350-01-02	24VDC	175A	350A	2.8
MCD-04-0275-01-02	36/48VDC	140A	275A	2.8
MCD-04-0350-01-02	36/48VDC	175A	350A	2.8
MCD-08-0250-01-02	48/80VDC	110A	250A	2.8

3.2. Dimensions (mm)
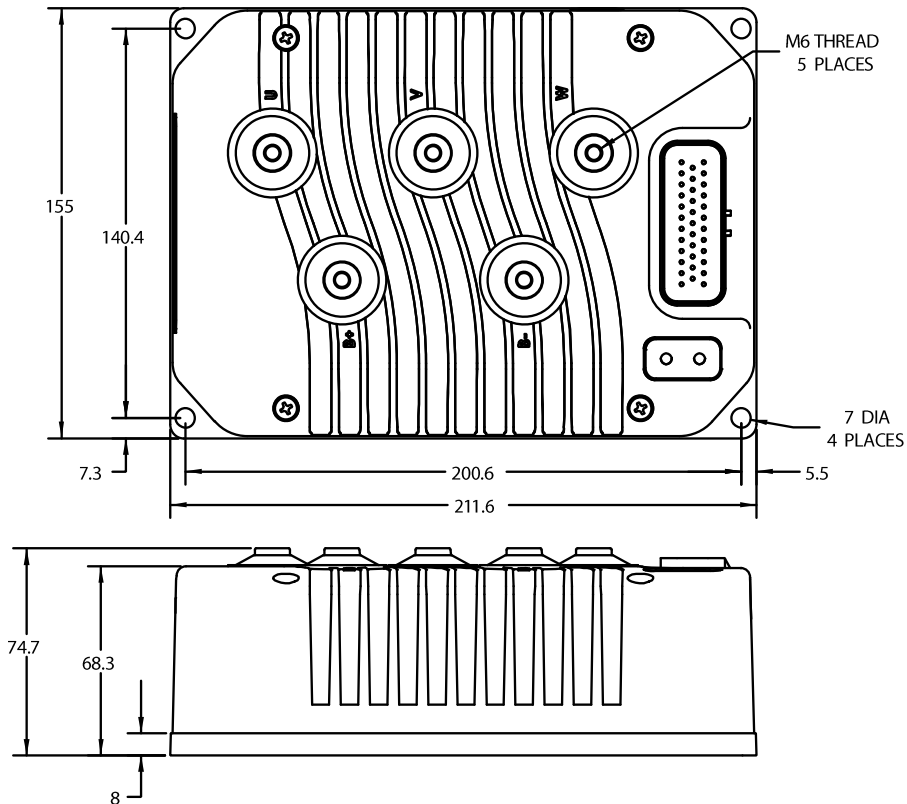
3.3. Connector wiring
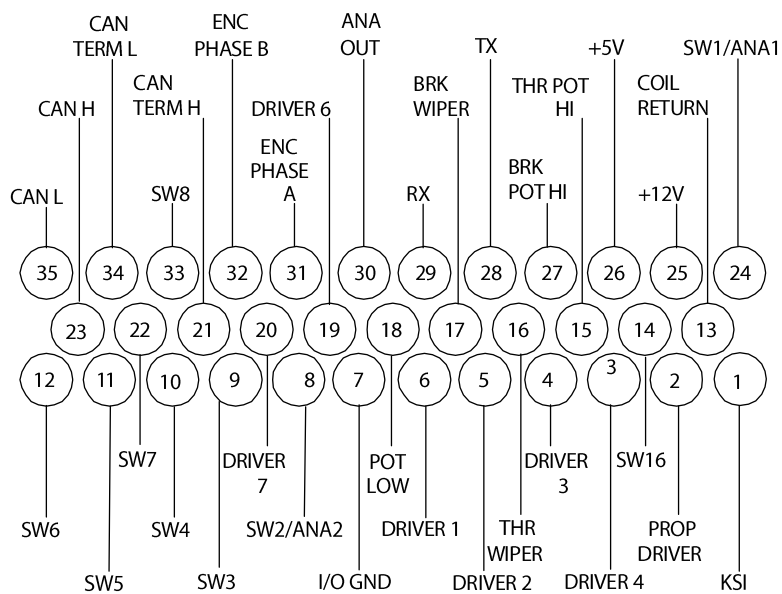
4. MCE & MCF

4.1. Overview MCE

PART NUMBER	Supply Voltage	Output Current (1 hour)	Max.Current (2 min)	Weight kg
MCE-03-0400-01-02	24/36VDC	175A	400A	4.1
MCE-03-0500-01-02	24/36VDC	240A	500A	4.1
MCE-04-0450-01-02	36/48VDC	205A	450A	4.1
MCE-04-0550-01-02	36/48VDC	250A	550A	4.1
MCE-08-0350-01-02	48/80VDC	100A	350A (1 min)	4.1

4.2. Overview MCF

| PART NUMBER	Supply Voltage	Output Current (1 hour)	Max.Current (2 min)	Weight kg
MCF-03-0650-01-02	24/36VDC	300A	650A	6.8
MCF-03-0800-01-02	24/36VDC	355A	800A	6.8
MCF-04-0650-01-02	36/48VDC	295A	650A	6.8
MCF-08-0450-01-02	48/80VDC	155A	450A	6.8
MCF-08-0550-01-02	48/80VDC	190A	550A	6.8
MCF-08-0650-01-02	48/80VDC	195A	650A (1min)	6.8
MCF-09-0550-01-02	72/96VDC	175A	550A	6.8
MCF-09-0650-01-02	72/96VDC	200A	650A	6.8

4.3. Dimensions MCE & MCF (mm)
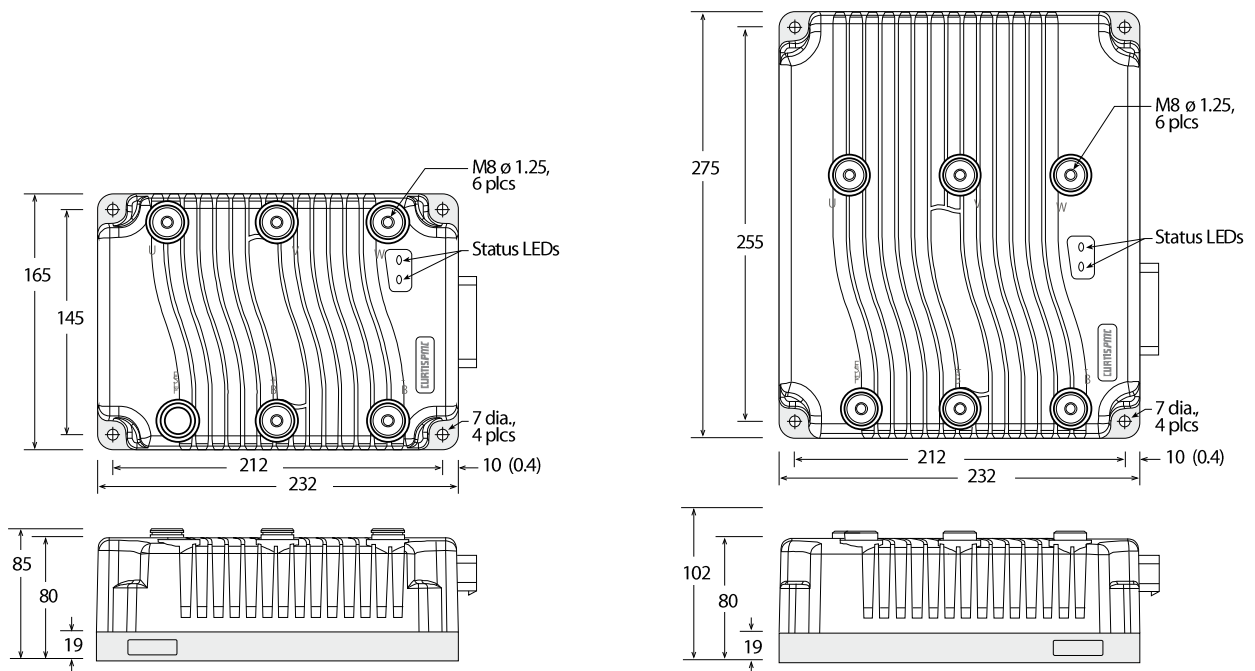
4.4. Connector wiring MCE & MCF
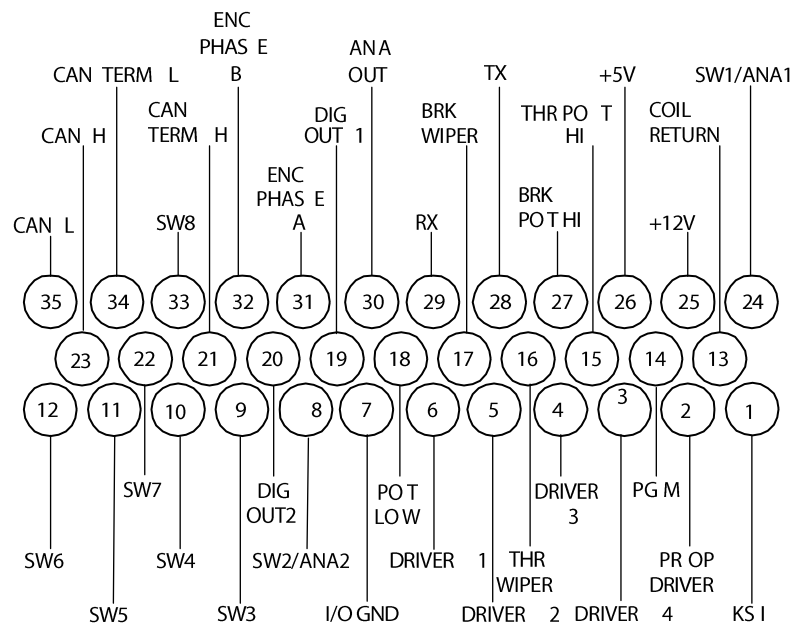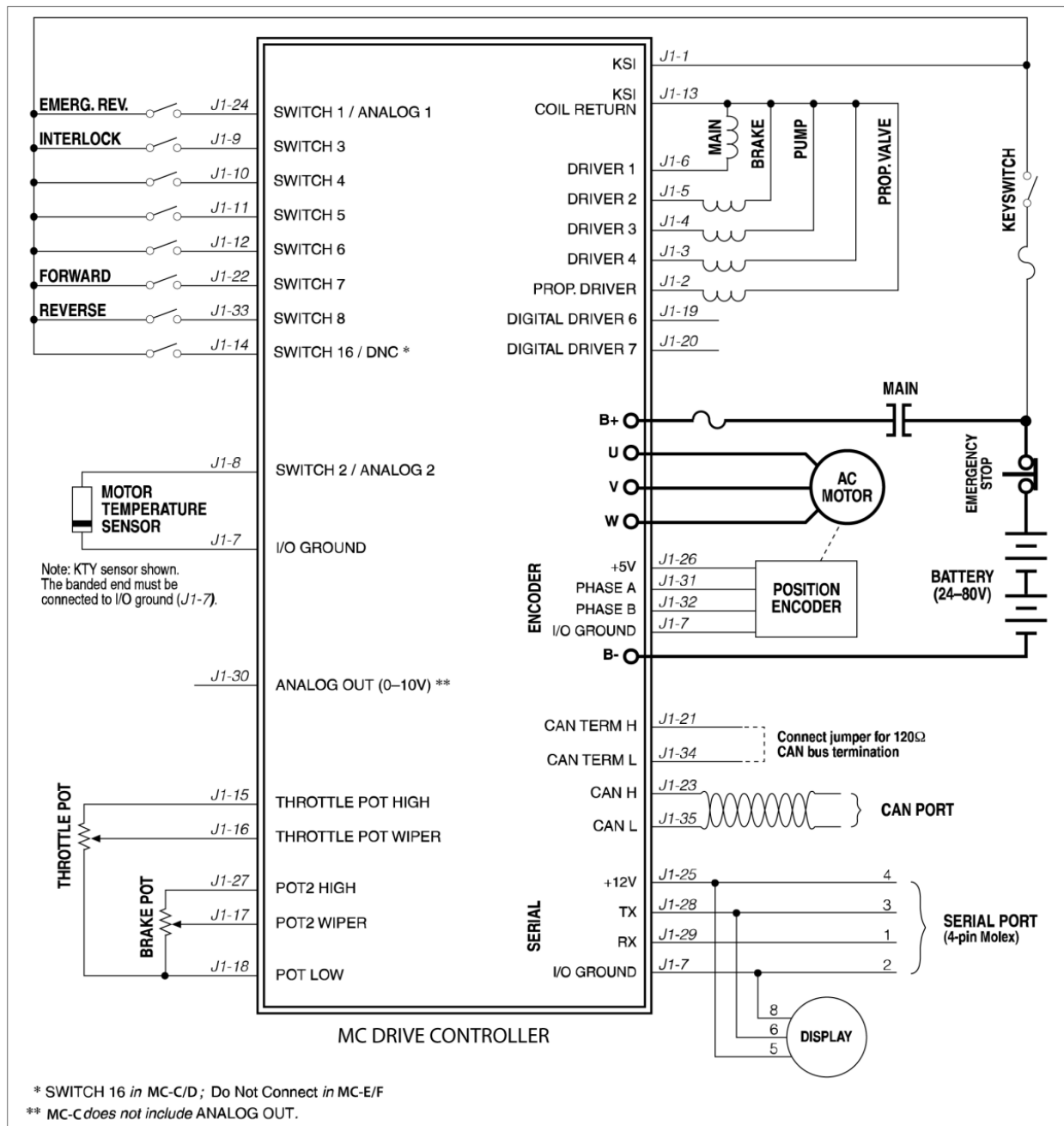
APPENDIX A   HIGH CURRENT CONNECTIONS

There are five high-current terminals, identified on the controller housing as
B+, **B-**, **U**, **V**, and **W**.

Table 1 High Current Connections	
TERMINAL	FUNCTION
B+	Positive battery to controller.
B-	Negative battery to controller.
U	Motor phase U.
V	Motor phase V.
W	Motor phase W.

Lug assembly: MCC and MCD models

Five aluminum M6 terminals are provided. Lugs should be installed as follows,
using M6 bolts sized to provide proper engagement (see diagram):
- Place the lug on top of the aluminum terminal, followed by
   a high-load safety washer with its convex side on top. The
   washer should be a SCHNORR 416320, or equivalent.
- If two lugs are used on the same terminal, stack them so the
   lug carrying the least current is on top.
- Tighten the assembly to 10.2 ±1.1 N·m (90 ±10 in-lbs).
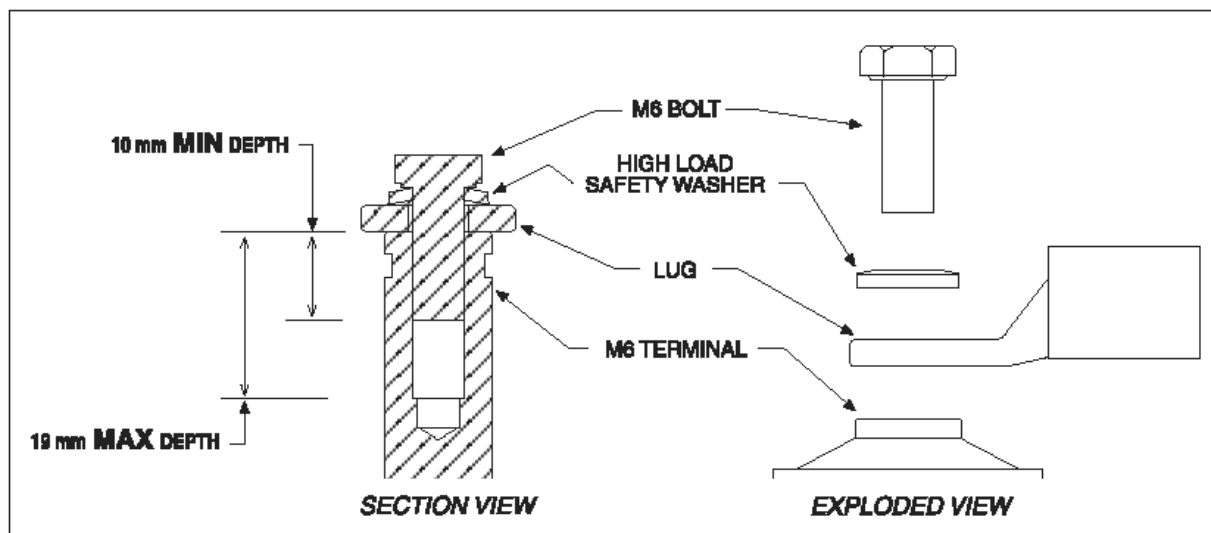
Lug assembly: MCE and MCF models

Five brass M8 terminals are provided. Lugs should be installed as follows, using M8 bolts sized to provide proper engagement (see diagram):

- Place the lug on top of the terminal, followed by a safety washer with its convex side on top. The washer should be a SCHNORR 700800, or equivalent.
- If two lugs are used on the same terminal, stack them so the lug carrying the least current is on top.
- Tighten the assembly to 9.6 ±0.9 N·m (85 ±8 in-lbs).

Note: The terminals may rotate up to ±5° in the cover.
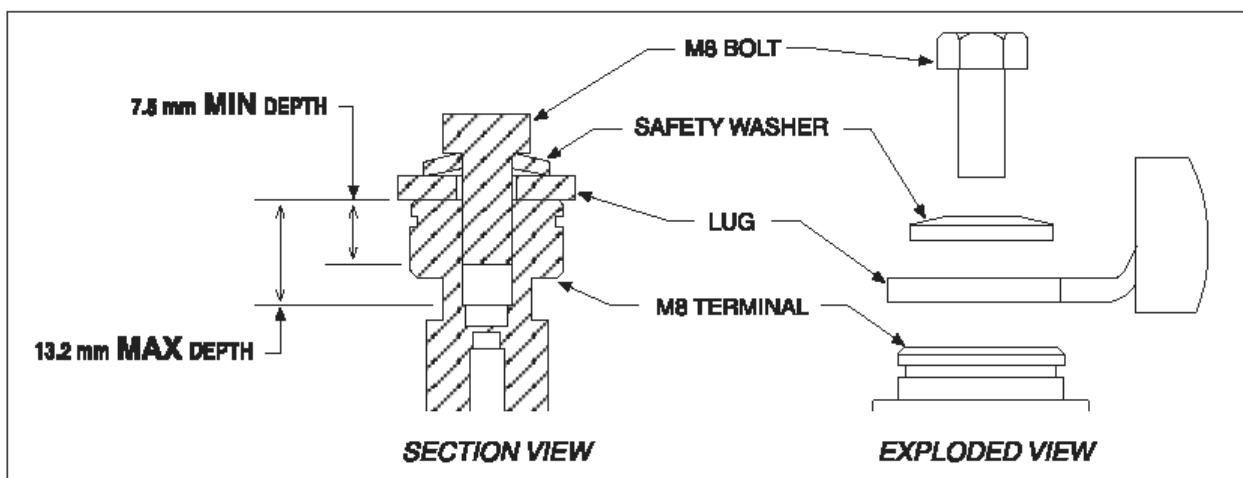
High current wiring recommendations: all models

Battery cables (**B+**, **B-**)
These two cables should be run close to each other between the controller and the battery. Use high quality copper lugs and observe the recommended torque ratings. For best noise immunity the cables should not run across the center section of the controller. With multiple high current controllers, use a star ground from the battery **B-** terminal.

Motor wiring (**U**, **V**, **W**)
The three phase wires should be close to the same length and bundled together as they run between the controller and the motor. The cable lengths should be kept as short as possible. Use high quality copper lugs and observe the recommended torque ratings. For best noise immunity the motor cables should not run across the center section of the controller. In applications that seek the lowest possible emissions, a shield can be placed around the bundled motor cables and connected to the **B-** terminal at the controller. Typical installations will readily pass the emissions standards without a shield. Low current signal wires should not be run parallel to the motor cables. When necessary they should cross the motor cables at a right angle to minimize noise coupling.

APPENDIX B   LOW CURRENT CONNECTIONS

All low power connections are made through a single 35-pin connector.
The connector will accept 20 to 16 AWG wire with a 1.7 to 2.7mm diameter thin-wall insulation.

The 35 individual pins are characterized in Table 2.
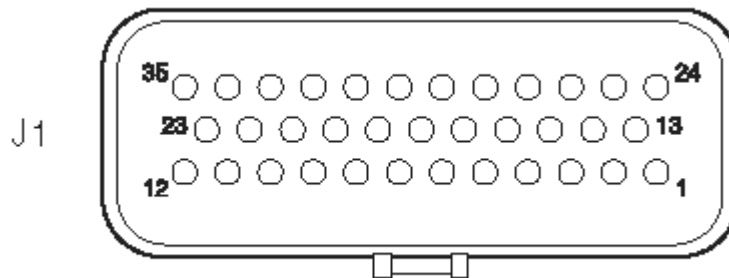
Low current wiring recommendations

<u>Motor encoder (Pins 31, 32)</u>
All four encoder wires should be bundled together as they run between the
motor and controller logic connector. These can often be run with the rest of
the low current wiring harness. The encoder cables should not be run near
the motor cables. In applications where this is necessary, shielded cable should
be used with the ground shield connected to the I/O ground (pin 7) at only
the controller side. In extreme applications, common mode filters (e.g. ferrite
beads) could be used.

<u>CAN bus (Pins 21, 23, 34, 35)</u>
It is recommended that the CAN wires be run as a twisted pair. However,
many successful applications at 125 kBaud are run without twisting, simply
using two lines bundled in with the rest of the low current wiring. CAN wiring
should be kept away from the high current cables and cross it at right angles
when necessary.

<u>All other low current wiring</u>
The remaining low current wiring should be run according to standard practices.
Running low current wiring parallel to the high current wiring should always
be avoided, and cross it at right angles when necessary.

Table 2.

PIN	NAME	DESCRIPTION
1	KSI	Keyswitch input. Provides logic power for the controller and power for the coil drivers.
2	Prop. Driver	Proportional driver. This is a coil driver with current control capability typically used for a proportional valve on a hydraulic manifold. Can also be used as a digital input.
3	Driver 4	Generic driver #4; can also be used as a digital input. Has low frequency PWM capabilities.
4	Driver 3	Generic driver #3; can also be used as a digital input. Has low frequency PWM capabilities. Typically used for pump contactor.
5	Driver 2	Generic driver #2; can also be used as a digital input. Has low frequency PWM capabilities and a slightly higher current rating. Typically used for electromagnetic brake.
6	Driver 1	Generic driver #1; can also be used as a digital input. Has low frequency PWM capabilities. Typically used for main contactor.
7	I/O Ground	Input and output ground reference.
8	Switch 2 Analog 2	Can be used as generic switch input #2 or as generic analog input #2. Typically used as the motor temperature analog input.
9	Switch 3	Generic switch input #3. Typically used as the interlock switch.
10	Switch 4	Generic switch input #4.
11	Switch 5	Generic switch input #5.

PIN	NAME	DESCRIPTION
12	Switch 6	Generic switch input #6.
13	Coil Return	This is the coil return pin (at B+ potential) for all the contactor coils.
14	Switch 16 / DNC	In the 1234, this is generic switch input #16. In the 1236 and 1238, Do Not Connect.
15	Throttle Pot High	Pot high connection for a 3-wire throttle pot.
16	Throttle Pot Wiper	Pot wiper connection for the throttle pot.
17	Pot2 Wiper	Pot wiper connection for the brake pot.
18	Pot Low	Common pot low connection for the throttle and brake pots.
19	Digital Out 6	An open collector digital output. Can also be used as a digital input.
20	Digital Out 7	An open collector digital output. Can also be used as a digital input.
21	CAN Term H	High connection for the CAN termination jumper.
22	Switch 7	Generic switch input #7. Typically used as the Forward switch.
23	CANH	CAN bus high.
24	Switch 1 Analog 1	Can be used as generic switch input #1 or as generic analog input #1. Typically used for emergency reverse switch (if applicable).
25	+12V Out	Unregulated low power +12V output.
26	+5V Out	Regulated low power +5V output.
27	Pot2 High	Pot high connection for a 3-wire brake pot.

PIN	NAME	DESCRIPTION
28	Serial TX	Serial transmit line for display or flash update.
29	Serial RX	Serial receive line for flash update.
30	Analog Output *	Low power, low frequency 0–10V analog output.
31	Encoder A	Quadrature encoder input phase A.
32	Encoder B	Quadrature encoder input phase B.
33	Switch 8	Generic switch input #8. Typically used as the Reverse switch.
34	CAN Term L	Low connection for the CAN bus termination jumper.
35	CANL	CAN bus low.

* Pin 30 not connected on MCC controllers.