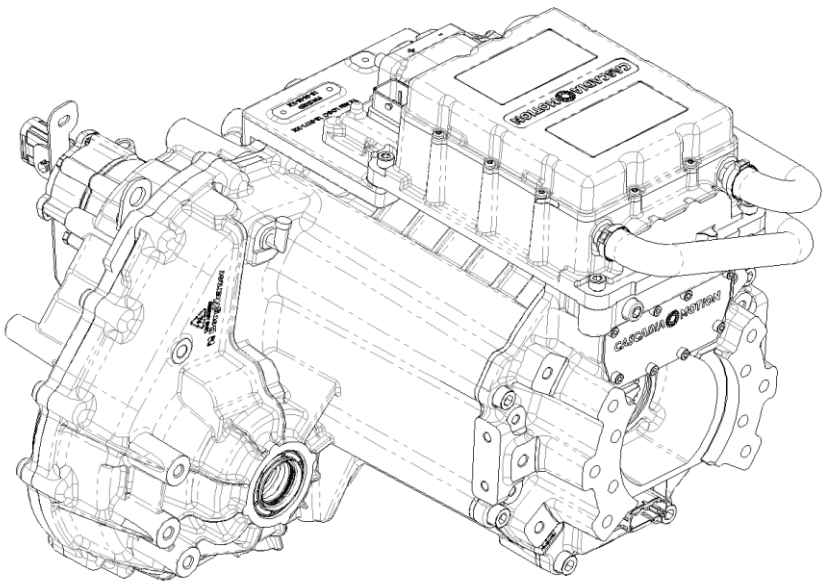
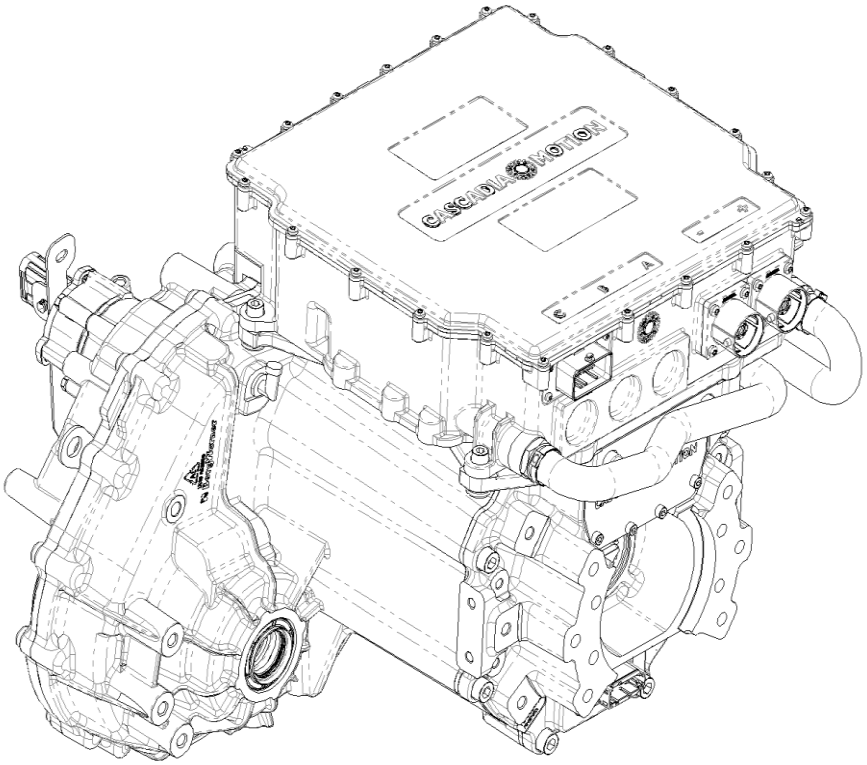




iDM-190 & iDM-375 USER MANUAL

INTEGRATED DRIVE MODULE (iDM)

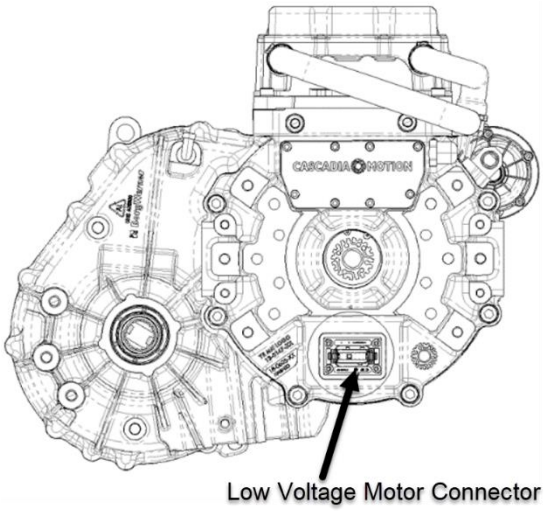
Document Number 0A-0088-01

CASCADIA MOTION

Section 1: Supporting Documents

1.1 Additional useful documents

- Inverter Support Documentation
- 0C-0004-XX – iDM-190 3D CAD
- 0C-0005-XX – iDM-375 3D CAD
- 0A-0082-XX – iDM-190 Customer Interface Drawing (CID)
- 0A-0083-XX – iDM-375(CID)
- 0A-0116-XX – CM200i (CID), inverter used on iDM-190
- 0A-0105-XX – CM350SiC (CID), inverter used on iDM-375
- 0A-0081-XX – iDM-XXX BASE (CID), used on iDM-190 and iDM-375
- 26-0012-XX – Stub Axle (CID), fits all iDM-products



Section 2: Oiling

CAUTION: Additional oil is required after carefully inserting stub axles (avoid damage to seals).

2.1 Oil Fill/Procedure

Reference CID 0A-0081-XX for "level position" (datum C), fill and drain plug locations, and torques. Remove fill plug add DEXRON-VI ATF until oil level reaches the lower surface of the oil fill port and begins to seep out of the port (total capacity is 1.8 ±0.1L). Reinstall fill plug and torque to specification.

Section 3: Cooling System

CAUTION: Inverter will be damaged if loaded without cooling fluid, as specified below.

3.1 Overview

Cooling of the integrated drive module is achieved by use of the included coolant pump and a customer supplied radiator and coolant. A coolant reservoir is generally necessary to accommodate expansion/contraction and de-aeration. Consider off-level operation angles of the vehicle to make sure that the coolant pump inlet always remains primed with fluid. For more coolant loop, coolant connection sizes, pressure drop, current limiting temperatures and other details reference the respective inverter support documentation and inverter CIDs listed in section 1.

3.2 Specification & connections

- Coolant (e.g., 50/50% ethylene glycol & water)
- Coolant temperature to inverter: 45 ˚C max to achieve required cooling at max continuous power operation.

Section 4: Wiring

CAUTION: Do not remove high voltage cover or inverter. Repairs to high voltage components are to be performed by authorized personnel only.

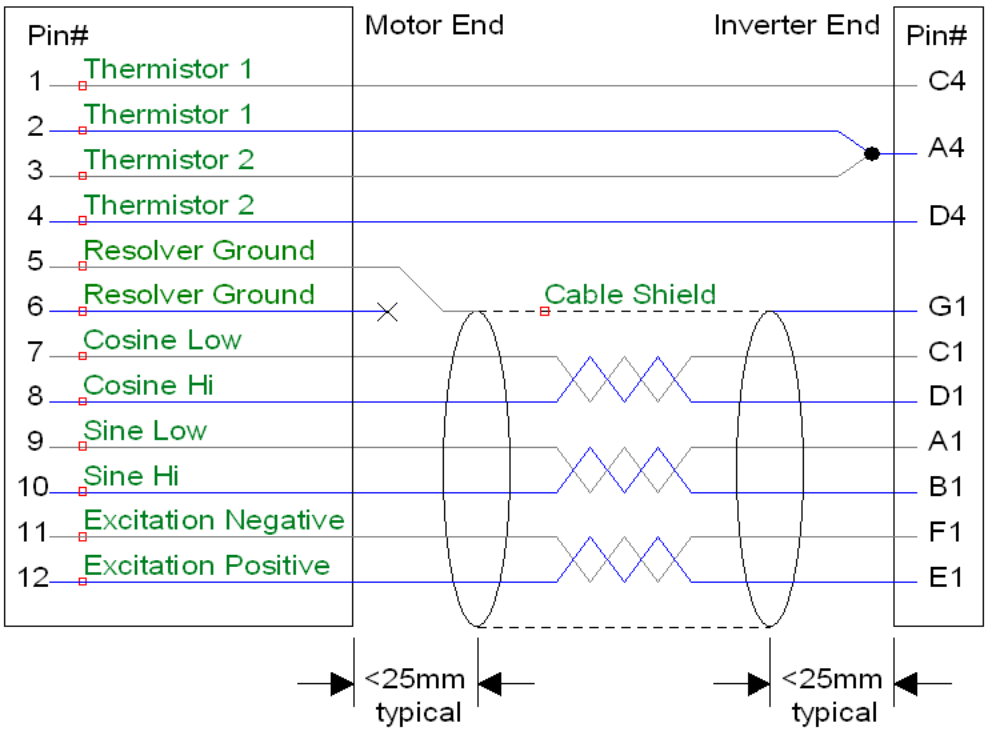
4.1 Motor low voltage to inverter low voltage

Mating Connector Kit at Motor End,
Cascadia Motion PN: G1-0057 includes:

- (1) Connector housing, DTM06-12SA
- (14) Contact, 1062-20-0122
- (1) WM-12S Wedge Lock, 12P, WM-12S

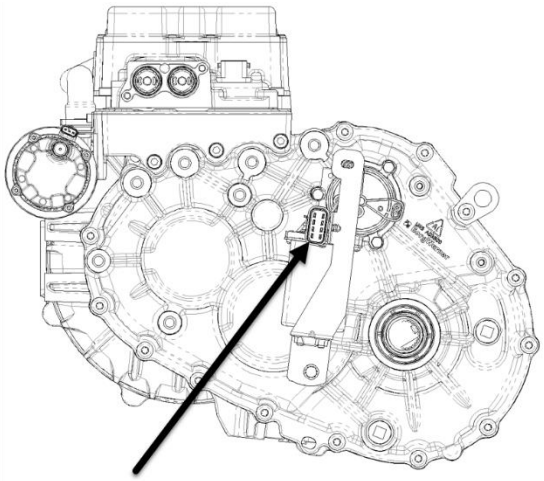
Pinout and installation:

- For Sine, Cosine, and Excitation use 20AWG twisted pair within a single shielded cable as seen at right, or use 20AWG twisted pair, each within its own shielded cable.
- If each pair is within its own shielded cable, all 3 shields must connect to pin G1 at Inverter End, and only one cable shield is required at pin 5, Motor End.
- Resolver ground/shield is NOT Chassis/12V ground. Do not connect it to any chassis ground, motor case or inverter case.
- Route all low voltage wires away from all high voltage cables.
- For more Inverter End details see CM Inverter Hardware Manual and 0A-0116-XX CID



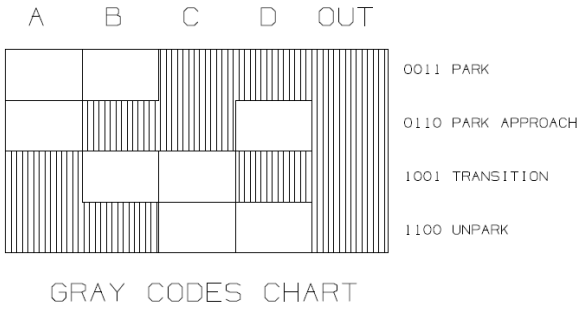
4.2 Parking Lock Actuator

- Max current 14A peak at 12V
- Pin connections: reference drawing 0A-0082-XX
  - Mating connector: Delphi 15326654
  - Mating terminals: Delphi 15304719

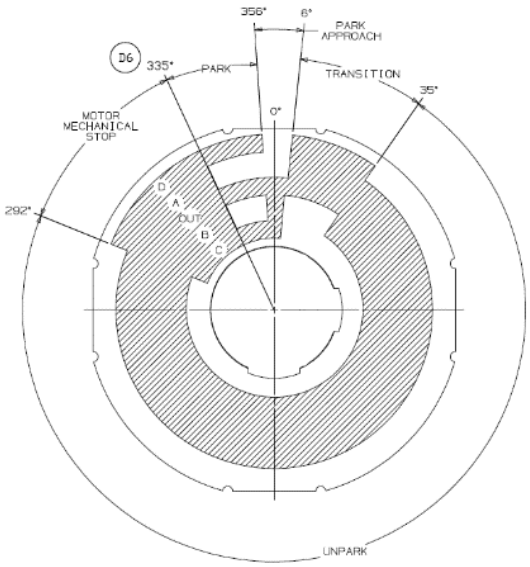


Parking Lock Actuator Connector

CONNECTOR PIN	CONTROLLER LOGIC	WIRE COLOR CODE AT SHIFT MOTOR	WIRE LENGTH FROM GROMMET TO END OF TERMINAL	WIRE GAUGE	WIRE TYPE	TERMINAL NO.	CABLE SEAL NO.
A	MOTOR POSITION COMMON (OUT)	YELLOW/WHITE	185 +/- 10	18 AWG	CROSS-LINKED POLYETHYLENE	15304731	15366066
B	MOTOR POSITION 1 (D)	ORANGE/WHITE	185 +/- 10	18 AWG	CROSS-LINKED POLYETHYLENE	15304731	15366066
C	MOTOR POSITION 2 (C)	BROWN/WHITE	185 +/- 10	18 AWG	CROSS-LINKED POLYETHYLENE	15304731	15366066
D	MOTOR CNTRL PARK - UNPARK (CW)	ORANGE	180 +/- 10	14 AWG	CROSS-LINKED POLTETHYLENE	15304732	15366067
E	MOTOR CNTRL UNPARK - PARK (CCW)	YELLOW	180 +/- 10	14 AWG	CROSS-LINKED POLYETHYLENE	15304732	15366067
F	BLANK					BLANK	15305170
G	MOTOR POSITION 4 (A-MSB)	VIOLET	185 +/- 10	18 AWG	CROSS-LINKED POLYETHYLENE	15304731	15366066
H	MOTOR POSITION 3 (B)	WHITE	185 +/- 10	18 AWG	CROSS-LINKED POLYETHYLENE	15304731	15366066



GRAY CODES CHART

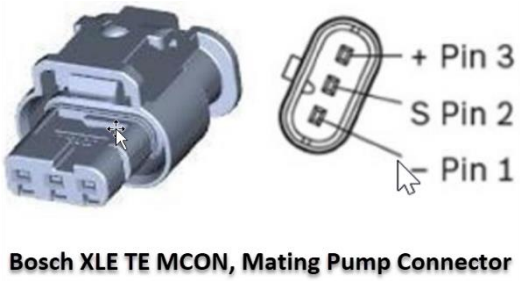


Actuation Position Command

4.3 Coolant Pump

CAUTION: Pump must operate at 100%, do not use pin 2.

- Mating Connector Kit - Cascadia Motion PN: G1-0040-01 includes:
  - Connector: Mouser P/N: 571-1488991-2 (qty:1)
  - Pins: Mouser P/N: 571-1418850-3 (qty:3)
  - Seal Plug: 571-964972-1 (qty: 3)



Bosch XLE TE MCON, Mating Pump Connector

Section 5: Stub Axle Options

5.1 Cascadia Motion Stub Axle

- Plugs directly into iDM units and accepts common Porsche 930 CVJ
- Reference 0A-0083-XX – iDM-375 for installed flange-to-flange dimension (same as iMD-190).
- G1-0061-XX KIT, STUB AXLE, 26 SPLINE includes:
  - (1) 26-0012-XX – STUB AXLE, SIZE 15CV FLANGE, 26SPLINE INPUT, 115mm L
  - (1) 19-0176 – CIRCLIP, AXLE RETAINER, 25mm

5.2 Work with an OEM CV Supplier for a mating or complete shaft solution

Recommended for high volume customers only, for application specific solutions that plug directly into iDM units. External involute spline is application specific, and design should be verified.

INTERNAL INVOLUTE SPLINE DATA (iDM-190 & iDM-375)
FILLET ROOT FIT TOLERANCE CLASS - 6H
SIMILAR TO ANSI B92.2M-1980 (R1989) OR B92.1-1996

NUMBER OF TEETH	26
MODULE	1.000
PRESSURE ANGLE	45.0
PITCH DIAMETER (REF)	26.000
BASE DIAMETER (REF)	18.385
MAJOR DIAMETER	27.34-27.20
MINOR DIAMETER	25.41-25.22
FORM DIAMETER (MIN)	27.00
CIRCULAR TOOTH SPACE MIN. EFFECTIVE	1.571
CIRCULAR TOOTH SPACE MAX. ACTUAL	1.657
FILLET RADIUS MINIMUM	N/A
PIN DIAMETER	2.360
MEASUREMENT BETWEEN PINS (REF)	21.895-21.837

EXTERNAL INVOLUTE SPLINE DATA (Sample Customer Spline)
FILLET ROOT SIDE FIT TOLERANCE CLASS - 6H
SIMILAR TO ANSI B92.2M-1980 (R1989)

NUMBER OF TEETH	26
MODULE	1.000
PRESSURE ANGLE	45.0
PITCH DIAMETER (REF)	26.000
BASE DIAMETER (REF)	18.385
MAJOR DIAMETER	26.78-26.70
MINOR DIAMETER	24.78-24.64
FORM DIAMETER (MAX)	25.00
CIRCULAR TOOTH THICKENSS MAX. EFFECTIVE	1.571
CIRCULAR TOOTH THICKNESS MIN. ACTUAL	1.481
FILLET RADIUS MINIMUM	N/A
PIN DIAMETER	2.000
MEASUREMENT OVER PINS (REF)	29-176-29-114

5.3 Volvo half shaft option, cut and welded to a suitable outboard joint

Suitable for initial proof-of-concept vehicles. Not recommended for applications requiring high torque or reliability. It is possible to use this inboard CVJ and shaft, by cutting the shaft and welding it to the outboard shaft and CVJ of the desired application. Potential sources:

- Autozone Part numbers 14251n & 14252n
- GKN Driveline, Volvo part number 8603625 - Used on the rear axle of 2003 to 2008 Volvo XC90 AWD 6cyl 3.2L or V8 4.4L.

Section 6: External Features

For mount points, connections and other external features, reference
Customer Interface Drawing (CID), links in section 1.

- 0A-0105-XX – CM350SiC
- 0A-0077-XX - CM200
- 0A-0081-XX - iDM BASE Mount points, Tilt angle etc.
- 0A-0082-XX – iDM-190
- 0A-0083-XX – iDM-375
- Standard direction of a forward drive unit axle is counterclockwise, when viewed from Park Lock Actuator end. Reverse units have a different limited slip differential and product part number.