



***IntElect™* MDC13P150**

Description

The IntElect™ MDC13P150 is an advanced low voltage high power electric motor controller for Permanent Magnet and Induction motor applications. It gives precise motor speed and torque control with an abundance of features for adaptation to many motor types and applications. This allows the MDC13P150 to accommodate a wide range of control systems and to adapt to new requirements.

This robust controller provides an economical means to process analog and switched input signals and/or CAN bus commands to control the speed, torque and direction of an electric motor. Depending on the application the motor speed can be controlled using Hall Effect sensors on the motor, or with sensor-less speed control. Depending on the implementation Regenerative Braking can also be employed to further optimize the efficiency and safety of the application. The MDC13P150 is capable

of preventing over temperature, and over-current conditions. The unit is able to self check for faulty sensors or motor, report faults and correct or compensate for minor faults. It is also field-programmable, and provides flexibility for customization and installation.

Features

Speed, acceleration and torque control of one PMBLDC or Induction motor.

Motor parameter identification

Interface with Hall Effect commutation sensors

Fault monitoring and status indication

Sealed water proof enclosure and connector

Operational from -40° to 65°C ambient operation when installation requirements are followed

24 - 72 volt DC nominal power systems

Reverse polarity protected* (see p.6)

Over-current, over-voltage, under-voltage, thermal-overload protections

Automatic recovery from over-current protection

5 analog inputs

3 digital inputs

RS-232 communication

5 VDC output for sensor power

CAN Bus with J1939 protocol

Software can be updated in application

PG can also customize this controller and its software to fit your application.

Control Wiring

Pin No.	Pin Name	Type	Description
J1-01	CANH	CAN	CAN Bus High Port
J1-02	48V CE	+48V DC	Low Current Controller Supply, Enable
J1-03	Hall C	Digital Freq. Input	Hall Effect Motor Position Input Sensor
J1-04	SCI TX	Serial	Serial out RS-232 capable (DB-9 pin 2)
J1-05	PWGND	Power Ground	Power Ground Reference
J1-06	In 1	Input	Discrete Input Signal High Triggered
J1-07	Analog 4	Analog	Analog input
J1-08			
J1-09	CANL	CAN	CAN Bus Low Port
J1-10	Hall A	Digital Freq. Input	Hall Effect Motor Position Input Sensor
J1-11	Hall Power	Power	Power Supply for Hall Effect Sensors
J1-12	SCI RX	Serial	Serial in RS-232 capable (DB-9 pin 3)
J1-13	Analog 2	Analog	Analog input
J1-14	In 2	Input	Discrete Input Signal High Triggered
J1-15	Analog 5	Analog	Analog input
J1-16	GND	Ground	Controller ground
J1-17	Hall B	Digital Freq. Input	Hall Effect Motor Position Input Sensor
J1-18	COMGND	Ground	Communication signal ground/return
J1-19	Analog 1	Analog	Analog input
J1-20	Analog 3	Analog	Analog input
J1-21	In 3	Input	Discrete Input Signal High Triggered
J1-22			
J1-23			
T1	+ Power	Power	High Current Power Positive
T2	- Power	Ground	High Current Power Negative
T3	Phase A	Power AC	High Current Motor Phase A
T4	Phase B	Power AC	High Current Motor Phase B
T5	Phase C	Power AC	High Current Motor Phase C
T6			

Control Pin Layout

01	CANH	+48V	Hall C	SCI TX	PWGND	In 1	Analog 4		08
09	CANL	Hall A	Hall PWR	SCI RX	Analog 2	In 2	Analog 5		15
16	GND	Hall B	COMGND	Analog 1	Analog 3	In 3			23

Power Terminal Layout

T1	+ Power			
T2	- Power			
	T3	T4	T5	T6
	Phase A	Phase B	Phase C	NA

Specifications

Mechanical / Operating Environment

Item	Specs
Operating Ambient Temperature	-40 to 65°C -40 to 150°F
Weight	2.55 Kgs 5.6 lbs
Vibration	6 G, 40 to 2000 Hz , 8 hours per axis
Sealing	IP65
Power Connections	Ring Terminal I.D. 5/16" (8mm)
Signal Connector	TE PN 770680-1

Inputs and Outputs

Item	#	Description	Specs
Discrete Inputs	3	There are three discrete inputs which may be triggered by grounding the input.	3 - switch to ground
Analog Inputs	5	Analog input capable of providing source as well if needed to power certain sensors. Thresholds may be set to trigger certain actions based on readings. Use COMGND for reference to analog inputs.	Max Voltage – 20 V Full Scale : 1 x 0 to 8.3V 2: 0-3.4v, 10k pullup 3.3v 2: 0-3.4v, 1k pullup to 3.3v
Hall Effect Speed/Position Sensor	3	Digital frequency signal input which may be used to measure motor speed and determine motor position.	Max Voltage - 10v Power - 5 VDC, 1k pullup Max frequency – 1.5 kHz

Communications

Type	#	Description	Settings/Defaults
RS-232	1	Used to interface to a PC or other peripheral. The serial port is typically used to show data coming from the controller and may also be used to reprogram the device in the field.	57.6K baud (or Auto) 8 data bits No parity/flow control 1 stop bit
CAN Bus	1	The CAN bus is used to communicate to other devices on the bus using the J-1939 standard protocol. Custom commands and actions may be added by PG if needed.	Customizable J-1939 Protocol Up to 1MHz

Detailed Specification

Electrical Specifications

Parameter	Description	Pin	Min.	Typ.	Max.	Units
Battery Voltage	+ Batter Voltage to – Battery Voltage (Ground)	T1 – T2	20		85	Volts
Power Idle Current Consumption	Power consumption of device, Motor Phase Current off	T1		0.1	0.2	Amps
Hall Power VDC	0 – 100mA source for sensors or other peripherals. Short circuit protected.	J1-11	4.75	5.0	5.25	Volts
Power Control	Controller Supply Enable	J1-02	20	48	80	Volts
Over Voltage Protection	Motor disabled above threshold	T1-T2	20	80	100	Volts
Under Voltage Protection	Motor disabled below threshold	T1-T2	20	20	100	Volts
Intermittent Max Phase Current	Max. Phase Current for 30 seconds	T3,T4,T5		175		Amps, RMS
Continuous Max Phase Current	Phase Current to Motor	T3,T4,T5		150		Amps, RMS
Phase Current Limit	Maximum Phase Current (Peak) to Motor	T3,T4,T5		250		Amps, pk
Short Circuit Detection	Current where controller stops Phase Current	T3,T4,T5	0	225	283	Amps , Pk
Phase Voltage PWM Frequency		T3,T4,T5	1	10	20	KHz

Parameter	Description	Pin	Min.	Typ.	Max.	Units
SCI RX Voltage	RS 232 Serial Input, Reference to Pin J1-18	J1-12	-20		20	Volts
SCI RX Low Threshold Voltage	RS 232 Serial Input, Reference to Pin J1-18	J1-12	0.2	0.5	1, < Max	Volts
SCI RX Hi Threshold Voltage	RS 232 Serial Input, Reference to Pin J1-18	J1-12	0.3, > Min	0.5	1	Volts
SCI TX Voltage	RS 232 Serial Output, Reference to Pin J1-18	J1-04	-20		5.25	Volts
SCI TX Low Threshold Voltage	RS 232 Serial Output, Reference to Pin J1-18. Tx utilizes Rx to supply negative.	J1-04	-14	-5	1.0, Rx + 1.0v	Volts
SCI TX Hi Threshold Voltage	RS 232 Serial Output, Reference to Pin J1-18	J1-04	3.5	4.5	5.25	Volts
Analog Input Range	Analog Input Voltage Reference to Pin J1-18	J1-07, 13, 15, 19, 20	0		1:8.3 2-5: 3.4	Volts
Analog Input Precision		J1-07, 13, 15, 19, 20	0	2	4.5	%
Analog Input Resolution		J1-07, 13, 15, 19, 20		2, 0.8		mVolts
Hall Input Low Thresh.	Voltage Reference to Pin J1-18	J1- 03, 10, 17	2.35	2.65	2.95	Volts
Hall Input Hi Thresh.	Voltage Reference to Pin J1-18	J1- 03, 10, 17	3.15	3.45	3.75	Volts
Hall Input Hysteresis	Difference between Low and High thresholds	J1- 03, 10, 17	0.45	0.63	0.8	
Hall Input Freq.	Frequency limit	J1- 03, 10, 17		1.5		KHz

***Reverse Polarity Protection:**

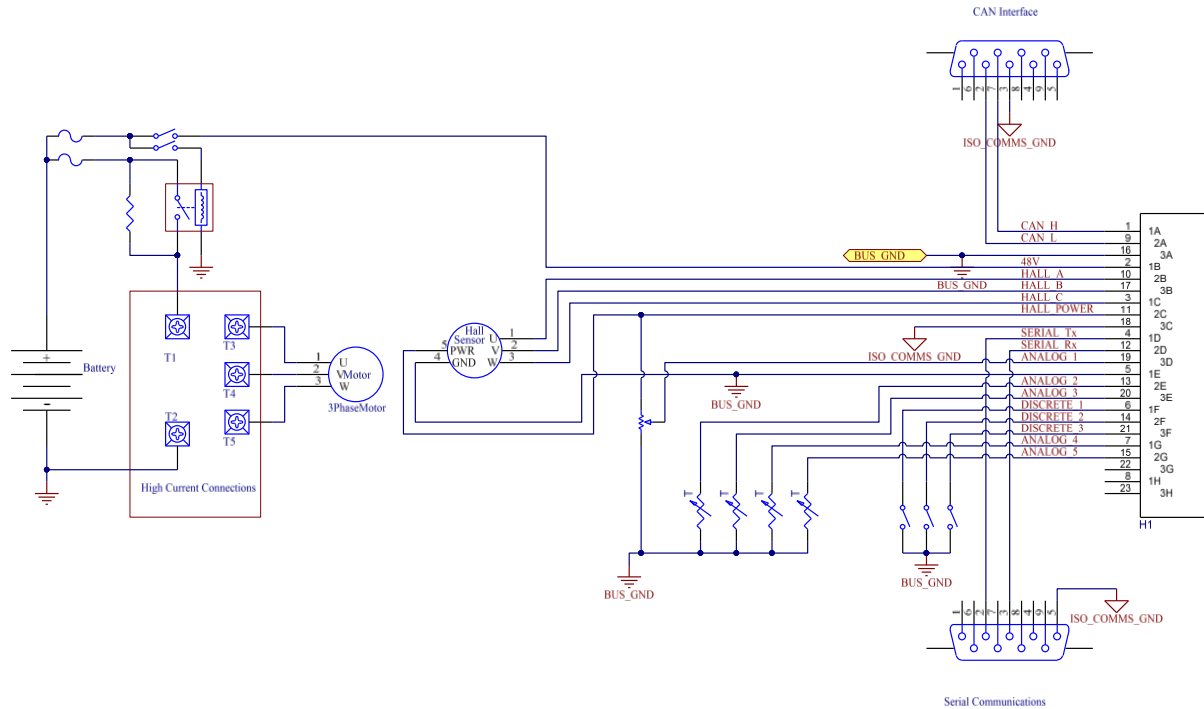
+Hall Power VDC output: This should not be connected to a +DC power source through any external components.

J1-05 and J1-16 ground must not be connected to any power source. Use of these pins is limited to ground reference for analog and discrete inputs and offline controller programming.

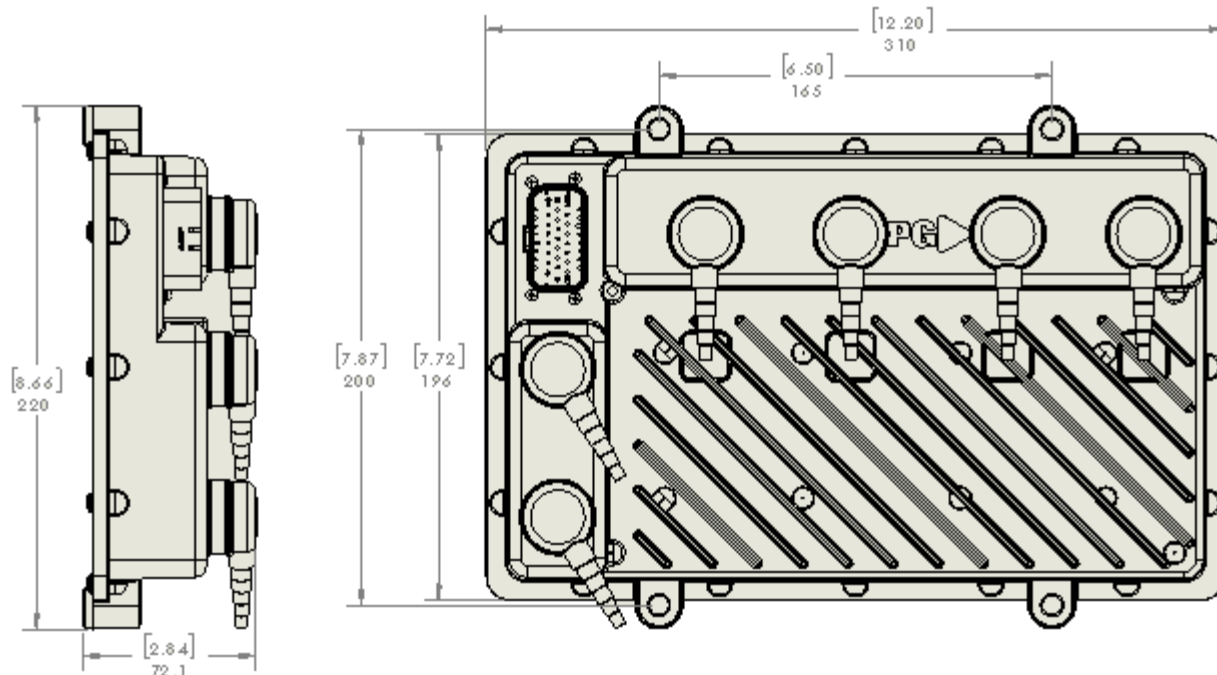
T1 and T2 must not be connected to reverse polarity.

All other pins are fully protected against application of reverse polarity.

Wiring Example:



Dimensions:



IntElect™

Intelligent Electrification

The MDC13P150 Motor Drive is part of PG's IntElect™ technology initiative.

IntElect™ elements may be applied in whole, as shown in the diagram below, to fully exploit all the advantages of a networked electrified vehicle, or used independently as components in other electrified or conventional system architectures.

