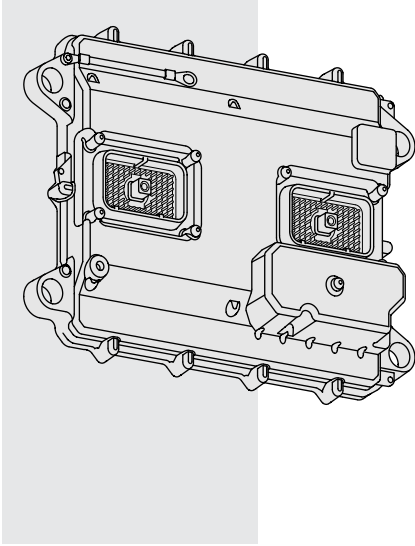


## ECU-ML Heavy-Duty Machine Controller



### FEATURES

- Advanced electronic design for reliability and accuracy.
- Reliable operation in extreme temperature conditions from -40° to +85°C.
- Ruggedly designed, fully-sealed aluminum housing.
- Inputs and Outputs have both protection and diagnostics.
- Regulated power supplies are provided for external sensors.
- No special power is required.
- No external cooling or heat dissipation required.
- Low cost/compact size.
- Fully programmable for application versatility.
- Software developed with *Composer™*.

### DESCRIPTION

The ECU-ML Machine Control is a heavy-duty general-purpose programmable controller designed to withstand the extreme environmental demands of the agricultural, marine, mining and construction industries. Based on a 32-bit MPC555 microprocessor running at 40MHz, the ECU-ML is a monitor and controller for use as a stand alone system, or for working together in a large complex network with other devices using its onboard CAN communications.

ECU-ML is equipped with ample inputs and outputs to interface with HydraForce joysticks, sensors, displays and valves. There are 72 inputs consisting of digital switch to both ground and battery, analog signals, PWM signals, and frequency/speed types. A total of 26 outputs consist of sinking drivers of 300mA, sourcing drivers of 2.0 Amps, a neutral start driver, and PWM drivers of 2.0 Amps.

**Note:** Refer to ECU Technical Reference pages for specific data and ratings of individual inputs and outputs.

### RATINGS

#### POWER REQUIREMENTS:

**Operating Voltage:** 9 to 32 VDC

Battery is internally monitored by the CPU

**Operating Current:** 450 mA + 30 Amp Maximum Load

**Non-Destructive Voltage:** -32 to +80 VDC

#### SENSOR POWER SUPPLIES:

**One 5V Sensor Supply:** 200 mA DC

**One 8V Sensor Supply:** 400 mA DC

**One 10V Sensor Supply:** 3A

#### COMMUNICATION:

**J1939 (CAN) Data Link**

#### PROCESSING and MEMORY:

**MPC555 Microprocessor:** 40 MHz

**Flash ROM:** 2 MByte

**SRAM:** 256 KByte

**EEPROM:** 32 KBytes

#### ENVIRONMENTAL RATINGS:

**Operating Temperature Range:** -40°C to 85°C

**Radiated Immunity:** 15.0 KHz to 1.0 GHz at 100 V/M

**Storage Temperature Range:** -50°C to 120°C

**Humidity Tolerance:** 115% of nominal system voltage at 90% relative humidity over operating temperature range

**Salt Spray Tolerance:** 115% of nominal system voltage with 5% salt spray for 48 hours at 35°C

**Chemical Splash Immunity:** Diesel Fuel, engine/machine oil, SAE J1455 chemical agents

**Vibration (Shock-isolated components):** 8.0 Grms random vibration from 24 Hz to 2000 Hz in three orthogonal planes

**Moisture Leakage (sealant pressure tolerance):** ±0.35 bar (5 psi) against water and water vapor; meets IP67 standards

**Electrostatic Environment:** Zero damage during exposure to electrostatic painting process

#### INPUTS:

**Switch to Ground:** 35

**Switch to Battery:** 3

**Key Switch (+Batt):** 1

**Neutral Start Input:** 1

**Analog Inputs:** 5

**PWM / Frequency Input:** 20

**Speed Input:** 6

**Alternator Input:** 1

**Internal Battery Monitor:** 1

#### OUTPUTS:

**On/Off Sinking Driver**

(0.5 to 300 mA): 8

**On/Off Sourcing Driver**

(10 mA to 2A): 5

**On/Off Neutral START Driver**

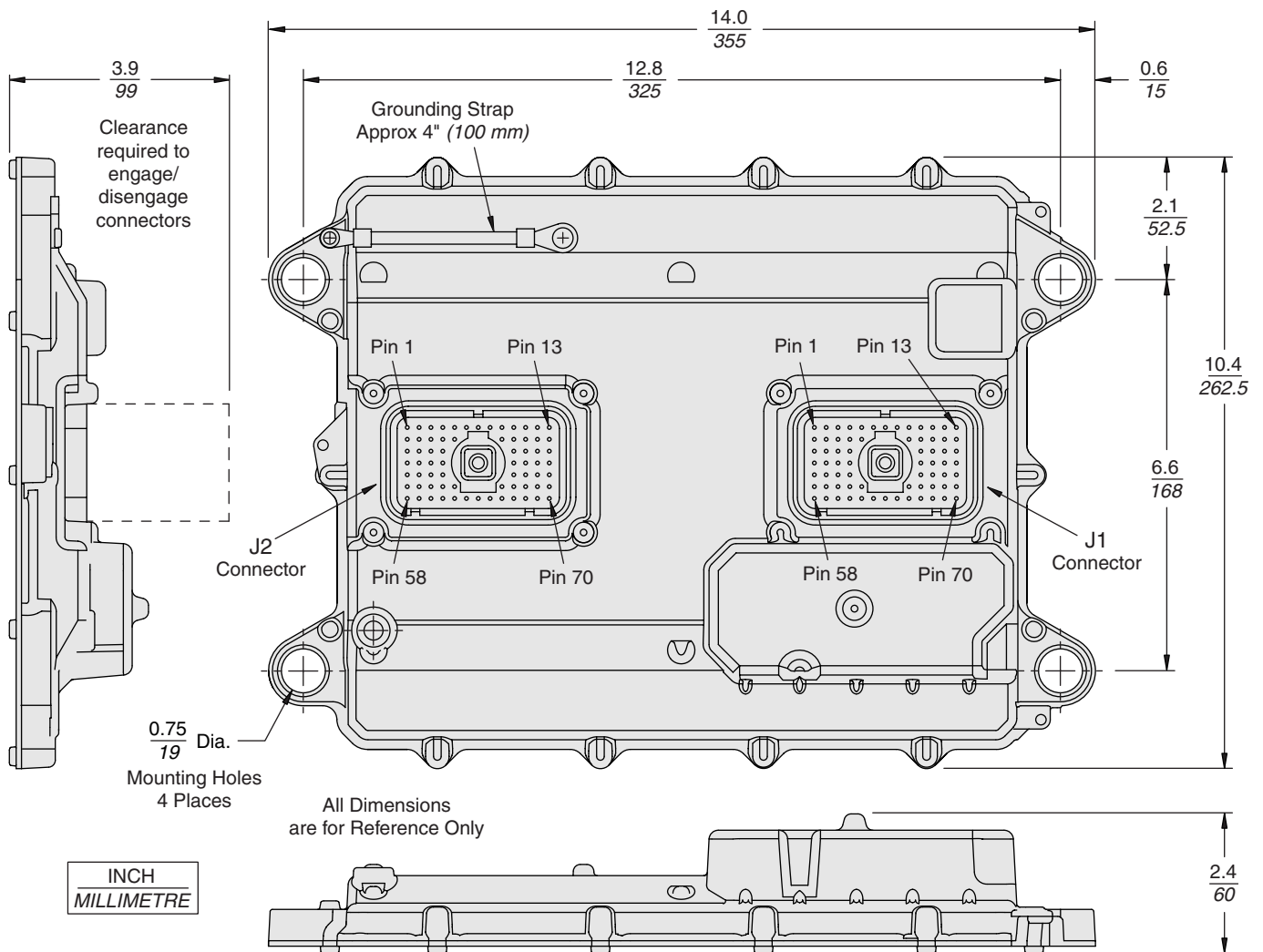
(10 mA to 2A): 1

**PWM Driver (50 mA to 2A):** 12

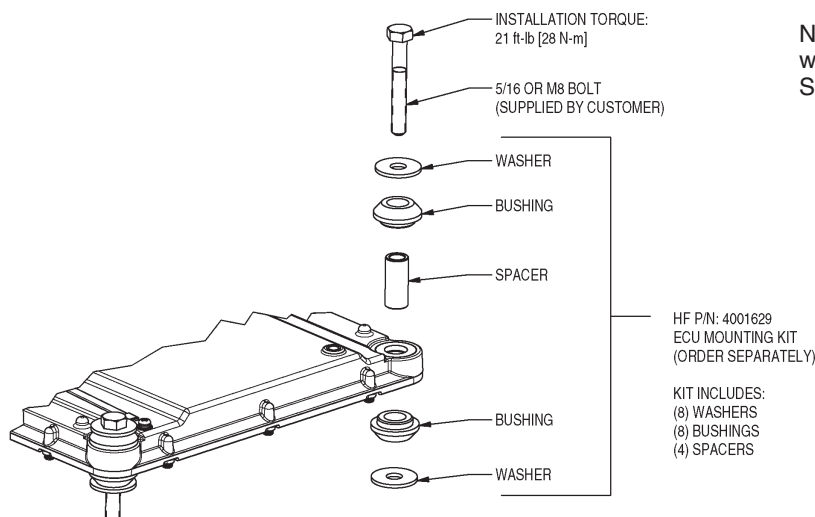
**Note:** Diagnostic current of 20 mA may prevent solenoid valve from turning off.

# ECU-ML Heavy-Duty Machine Controller

## DIMENSIONS



## MOUNTING



No restrictions on mounting angle when using this optional kit. See "To Order" section.

## ECU-ML Heavy-Duty Machine Controller

### J1 CONNECTOR PIN ASSIGNMENTS

Pin No.	J1 Connector Function	Type	Pin No.	J1 Connector Function	Type
1	Key-on	Input	36	Analog Active 1	Input
2	Differential Speed 1 (+)	Input	37	Analog Active 2	Input
3	Differential Speed 1 (-)	Input	38	Battery (+)	—
4	Differential Speed 2 (+)	Input	39	Battery (+)	—
5	Differential Speed 2 (-)	Input	40	Switch to Ground 8	Input
6	Differential Speed 3 (+)	Input	41	Switch to Ground 9	Input
7	Differential Speed 3 (-)	Input	42	Switch to Ground 10	Input
8	Differential Speed 4 (+)	Input	43	Switch to Ground 11	Input
9	Differential Speed 4 (-)	Input	44	8V Sensor PS	—
10	—	—	45	8V Sensor Return	—
11	5V Sensor PS	—	46	Battery (+)	—
12	2A On/Off 6	Output	47	Battery (+)	—
13	Battery (-)	—	48	PWM Driver 1 (+)	Output
14	Switch to Battery 1	Input	49	PWM Driver 2 (+)	Output
15	Differential Speed 5 (+)	Input	50	PWM Driver Return 1-4	Output
16	Differential Speed 5 (-)	Input	51	PWM Driver 3 (+)	Output
17	Differential Speed 6 (+)	Input	52	PWM Driver 4 (+)	Output
18	Differential Speed 6 (-)	Input	53	Ground Pin	—
19	CAN Shield	I/O	54	PWM Dvr 2-wire Return 11-12	Output
20	—	—	55	PWM Driver Return 9-12	Output
21	5V Sensor Return	—	56	Battery (-)	—
22	Analog Passive 1	Input	57	Battery (-)	—
23	Battery (-)	—	58	PWM Driver 5 (+)	Output
24	Switch to Battery 2	Input	59	PWM Driver 6 (+)	Output
25	Switch to Battery 3	Input	60	PWM Driver Return 5-8	Output
26	Switch to Ground 1	Input	61	PWM Driver 7 (+)	Output
27	Switch to Ground 2	Input	62	PWM Driver 8 (+)	Output
28	Switch to Ground 3	Input	63	Switch to Ground 12	Input
29	Analog Passive 2	Input	64	Switch to Ground 13	Input
30	Analog Passive 3	Input	65	PWM Driver 9 (+)	Output
31	Battery (+)	—	66	PWM Driver 10 (+)	Output
32	Switch to Ground 4	Input	67	PWM Driver 11 (+)	Output
33	Switch to Ground 5	Input	68	PWM Driver 12 (+)	Output
34	Switch to Ground 6	Input	69	10V Sensor PS	—
35	Switch to Ground 7	Input	70	Battery (-)	—

# ECU-ML Heavy-Duty Machine Controller

## J2 CONNECTOR PIN ASSIGNMENTS

Pin No.	J2 Connector Function	Type	Pin No.	J2 Connector Function	Type
1	Neutral Start	Input	36	Switch to Ground 19	Input
2	2A On/Off 1	Output	37	Switch to Ground 20	Input
3	2A On/Off 2	Output	38	Switch to Ground 21	Input
4	2A Load Return 1	Output	39	Switch to Ground 22	Input
5	2A On/Off 3	Output	40	PWM In 13	Input
6	2A On/Off 4	Output	41	PWM In 14	Input
7	2A On/Off 5	Output	42	PWM In 15	Input
8	2A Load Return 2	Output	43	PWM In 16	Input
9	300mA Sink 1	Output	44	Switch to Ground 23	Input
10	300mA Sink 2	Output	45	Switch to Ground 24	Input
11	300mA Sink 3	Output	46	Switch to Ground 25	Input
12	300mA Sink 4	Output	47	Switch to Ground 26	Input
13	300mA Sink 5	Output	48	PWM In 17	Input
14	Alternator Monitor	Input	49	PWM In 18	Input
15	PWM High Res 1	Input	50	PWM In 19	Input
16	PWM High Res 2	Input	51	PWM In 20	Input
17	PWM High Res 3	Input	52	Switch to Ground 27	Input
18	PWM High Res 4	Input	53	Switch to Ground 28	Input
19	300mA Sink 6	Output	54	Switch to Ground 29	Input
20	300mA Sink 7	Output	55	Switch to Ground 30	Input
21	300mA Sink 8	Output	56	Ground Pin	—
22	Digital Return	—	57	Ground Pin	—
23	Switch to Ground 14	Input	58	Switch to Ground 31	Input
24	PWM In 5	Input	59	Switch to Ground 32	Input
25	PWM In 6	Input	60	Switch to Ground 33	Input
26	PWM In 7	Input	61	Switch to Ground 34	Input
27	PWM In 8	Input	62	Switch to Ground 35	Input
28	Switch to Ground 15	Input	63	Ground Pin	—
29	Switch to Ground 16	Input	64	CAN B (+)	I/O
30	Switch to Ground 17	Input	65	CAN B (-)	I/O
31	Switch to Ground 18	Input	66	CAN B Shield	I/O
32	PWM In 9	Input	67	CAN A (+)	I/O
33	PWM In 10	Input	68	CAN A (-)	I/O
34	PWM In 11	Input	69	CAN A Shield	I/O
35	PWM In 12	Input	70	Ground Pin	—

## TO ORDER

**Controller Model** ECU-ML

**Composer™ Software:** Part No. 4100001

**70 Pin Connectors:** J2 Part No. 4000979  
J1 Part No. 4000980

**90° Harness Hood** Part No. 4000899

**Socket** Part No. 4002063

**Seal Plug** Part No. 4001465

**Mounting Kit** Part No. 4001629