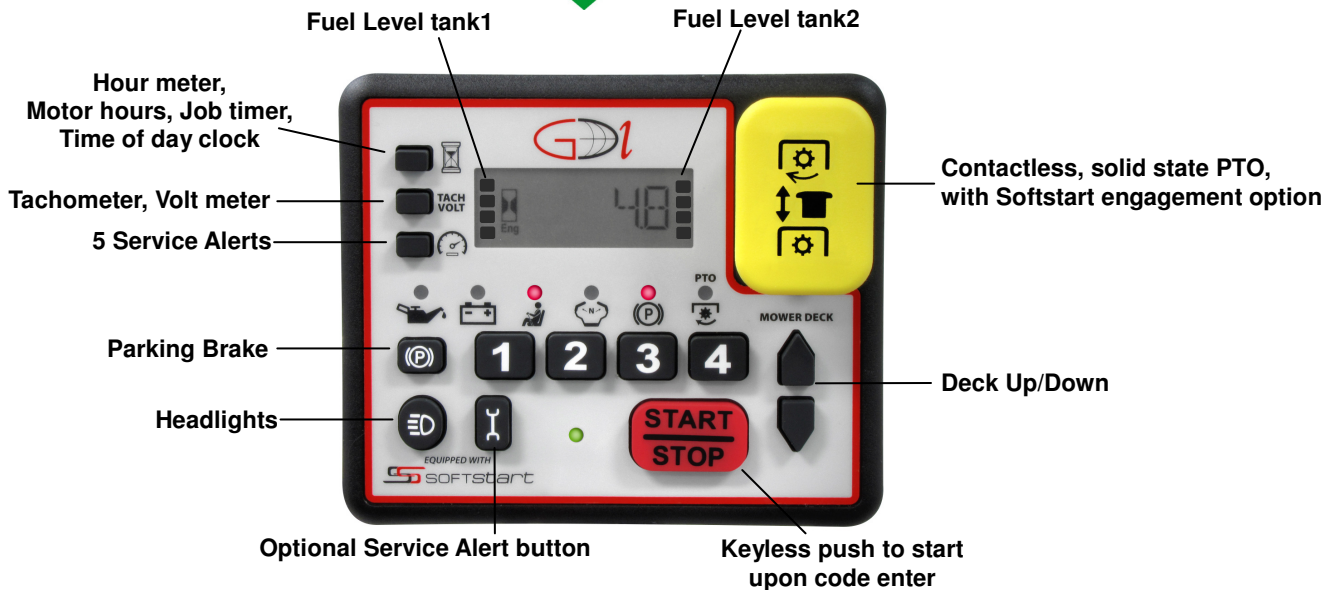


VERSA GUARD™

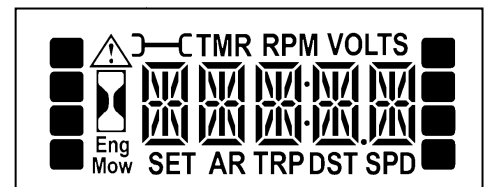


The VersaGuard™ console from GDI represents a leap forward in technology providing control, monitoring, display status, and safety systems. Reliability is achieved by utilizing solid state controls, a contactless PTO, advanced interlock switch monitoring, and multiple microprocessor checks for safety.

The Versa Guard efficiently controls carbureted, EFI and Echoke engines, plus reduces equipment cost by eliminating relays, reducing the wire harness, single connector, faster production throughput, less handling, and less inventory items with associated administrative costs.

Features include:

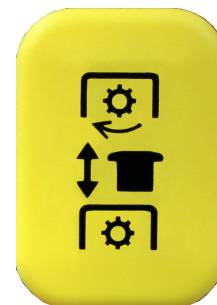
- Keyless entry for engine Start (1 to 6 digit codes)
- Monitoring of interlock switches with onboard safety logic
- Interlock switch tamper detect
- Large Multi-Function LCD
- Ultra-Bright Status LEDs
- Intuitive buttons toggle between functions, alerts, and status
- Contactless, long life PTO switch
- Patented Softstart mower engagement
- Solid State controls (no relay logic or control relays)
- Seat bounce delay
- Dual tank fuel gauges
- Deck lift motor and accessory drive outputs
- Redundancy and internal checks for operational safety
- Overvoltage and Load Dump protected
- Mechanics code for dealer operation
- Reduces wire harness and associate cost
- Ultra fast installation with single connector
- Fully potted and sealed assembly
- OEM customizable front label



Large, multi-segment LCD display with easy message reading.

Display Functions. LCD

- Hour meter (engine)
- Hour meter (mower), Resettable
- Job Timer, Resettable
- Time of day clock
- Tachometer (RPM, with optional firing pattern)
- Battery voltage (available with High/Low alerts)
- Service Alerts (5 alerts with break-in intervals and OEM specified messages)
- Liquid fuel level (up to 2 tanks)
- System Errors and Codes
- Unlock, Engine start, Engine stop messages



LED Indicators, LED

- Start/Stop (Green= system okay to start, Red= system not ready)
- Operator presence (seat switch)
- Drive Levers
- Parking brake
- PTO status
- LED #5 – OEM designated (low oil, low/high battery voltage, high temp, etc.)
- LED #6 – OEM designated (low oil, low/high battery voltage, high temp, etc.)

Contactless, Solid State PTO drives electric clutch for blade engagement (Softstart option)!

- Tested to 200K+ cycles
- No arcing
- No contaminated contacts

Controlling (Note: all functions below are Solid State controlled)

- Engine start (engage fuel solenoid and engage starter, for EFI-engage power relay)
- Engine stop (disengage fuel solenoid and ground magneto, for EFI- remove power)
- Softstart mower blade engagement
- Mower deck raise/lower (DC motor drive)
- Headlights on/off
- Other drive applications available

System monitoring:

- Parking Brake (on/off)
- Drive Levers (neutral or drive position)
- Operator present (seat switch)
- PTO position (on/off)
- Oil pressure switch
- Battery voltage
- Overcurrent (fuel solenoid, engine start, motor drive, etc.)
- Interlock switches with failure and tamper detect

Keyless Entry Access Code:

- 1 to 6 digit code entries
- OEM code: factory set at GDI to start and operate equipment
- Customer code: changeable by user to start and operate equipment
- Mechanics code: special code specified by OEM for dealer to operate equipment.

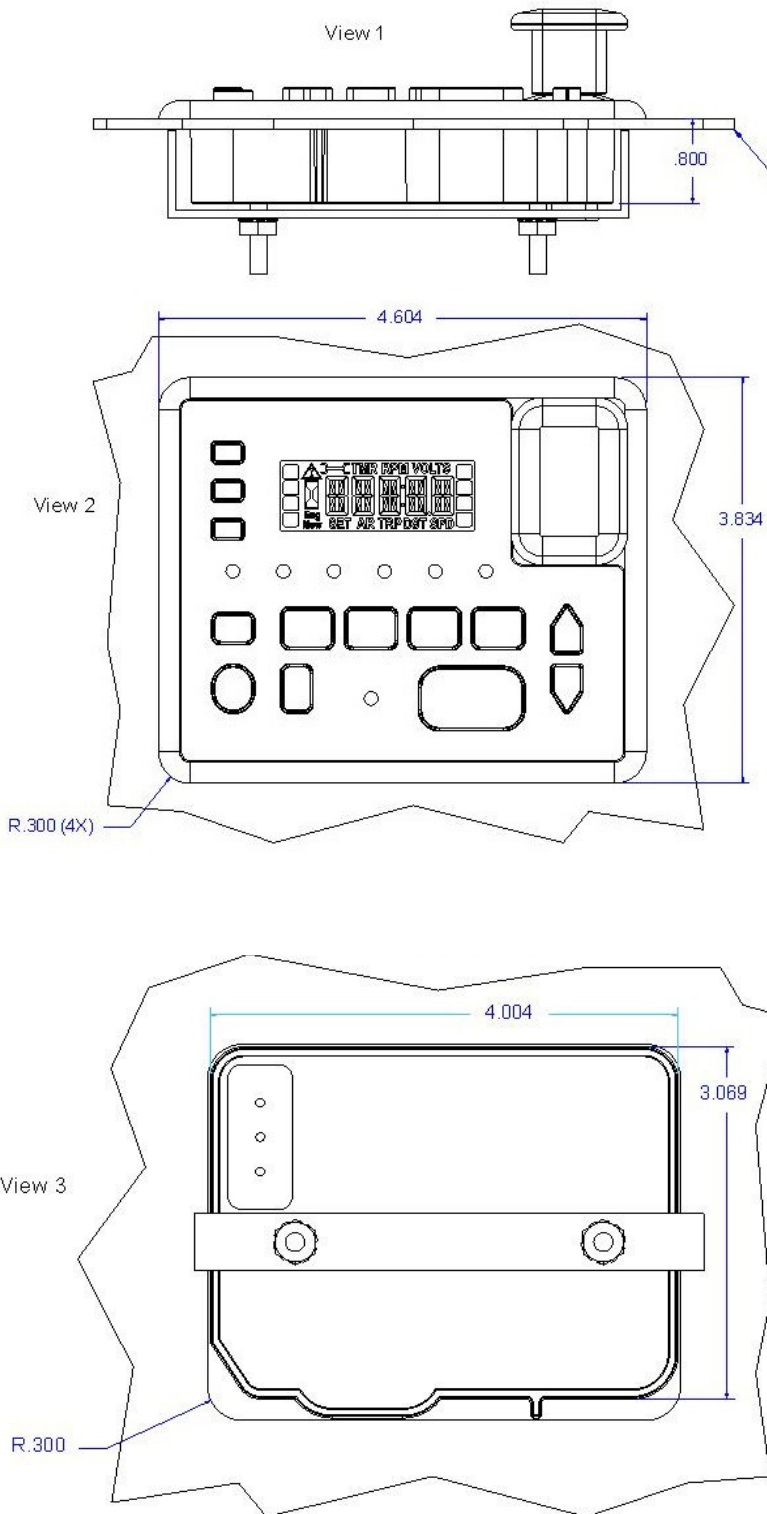
Parameter	Limit	Conditions
System Maximum Allowable Continuous Current Draw	10A	All combined outputs, continuous duty.
System Maximum Allowable Intermittent Current Draw. ALL combined outputs. Duty cycle uses the specified "Limit" current during the high duty period and 10A load during low duty period.	15A	<10 seconds ON time, 25% duty
	20A	<3 seconds 15% duty
	25A	<2.0 seconds, 10% duty
	30A	<0.4 seconds, 5% duty
System Current Draw Asleep	<700uA	Unit fully asleep
System Operating Voltage	5.5V -> 16V	Normal operating range
Reverse Voltage Protection	ISO7637	Reverse voltage on system power supply
Jump Start Overvoltage	26.5V	5 minutes
Load Dump	ISO7637	Power supply load dump, 87V
Short Circuit Protection	58A, <100us response time	Short circuit to ground on any active output pin, or short circuit across deck motor pins.
Positive Mutual Coupling	ISO7637	Any pin
Negative Induced Spikes	ISO7637	Any pin
ESD Protection	ISO10605	Handling and normal operation
Miss-wire: apply +16V to any pin, with the exception of the LV_KILL, COIL, and CLUTCH_RETURN pins.	Continuous, no damage.	UUT ground connected. UUT powered normally OR unpowered.

Function	Spec	Limit	Conditions	Comment
PTO	Current	8A ¹	Continuous	Limited by SoftStart A/D range
Deck Lift	Current	9A ¹	Continuous	Designed for typical deck motor load and usage.
		15A ¹	<5 seconds, 25% duty	
		20A ¹	<2 seconds 15% duty	
		25A ¹	<1.0 seconds, 10% duty	
Headlights	Current	6A ¹	Continuous duty	
Fuel Solenoid	Current	2A ¹	Continuous duty	Typical solenoid load is 300mA.
Starter	Current	25A / 6A	25A <0.5 second duration, 10% duty cycle 6A continuous	Designed for starter solenoid load that pulls in with high current then reduces to a holding current.
High Voltage Kill	Current	5A 10% duty pulses	10 sec intermittent load during engine kill spin down.	Unit unpowered or engine kill
High Voltage Kill	Voltage	500V peak	continuous	Engine running
Low Voltage Kill	Resistance	30 ohms max		Unit unpowered or engine kill
Low Voltage Kill	Voltage	25V peak	continuous	Engine running
Oil Pressure	Resistance	Custom		May be used with switch or resistive sender
Engine Temp	Resistance	Custom		May be used with switch or resistive sender
Fuel Sensor 1,2	Resistance	Custom		May be used with switch or resistive sender

Classification	Equipment	Test Conditions
Environmental Test: UV Exposure	Q-Sun Xenon Chamber Model:XE-1-B with 340nm UV sensor and daylight filter	1: Light at 0.35 Irradiance (W/m ²), temp at 70°C, and time interval of 1 hr : 48 min 2: Dark at 35°C and time interval of 0:18 min 3: Repeat step 1 and 2 for 2220 hours. The UUTs are inspected and rotated clockwise weekly in the chamber. Total Cycle/Time: <u>2220 Hours</u> Pass-Fail Criteria: UUT should not have any signs of UV damage; color fading, flaking, cracking, and brittleness of material.
Environmental Test: Temperature Cycling with Electrical Loading 16V 5A PTO, 5A Headlight, 1 Fuel Solenoid	Tenney Temperature Chamber Model: TJR S/N: 27856-12	Low End Temp: <u>-40C (-40F)</u> High End Temp: <u>+70C (+158F)</u> Soak Time at Low Temp: <u>2 Hours</u> 8 hours Ramp Time Up: <u>2 Hours</u> equals Soak Time at High Temp: <u>2 Hours</u> one cycle Ramp Time Down: <u>2 Hours</u> Total Cycle/Time: <u>500 Hours</u> Pass-Fail Criteria: UUT must be fully functional.
Environmental Test: Inorganic Dust Test	Custom Dust Chamber with fan in bottom to keep dust agitated Test Dust: ISO12103-1, A2 Fine	PTO Actuation Cycle Time: <u>10 sec/cycle: 5 sec up, 5 sec down</u> Total Cycle/Time: <u>200,000 cycles</u> Pass-Fail Criteria: UUT must be fully functional. Dust is allowed in the PTO switch well. No visual evidence of dust intrusion in the LCD display.
Environmental Test: Salt Environment Test	Custom Salt Solution Enclosure Based on ASTM B117-03	Based on ASTM B117-03 Salt Solution: 5 (+/-1) part salt per 95 parts distilled water by mass Temperature: 35°C Total Cycle/Time: 48 hours unpowered salt fog exposure, turn off fog power up UUT and allow 168 hours powered dryout. Pass-Fail Criteria: UUT must be fully functional at the end of 168 hour dryout; No visible corrosion.
Cleaning	3100 PSI Pressure Washer	(Pressure washer 8" away, 15 deg nozzle, degrees to 90 degrees from all perimeter, half of the time PTO up, half down. 5 minute duration.
Chemical Resistance	½" paint brush	Gasoline, Motor Oil, Hydraulic Oil, Diesel Fuel, IPA, Coffee, Soda, Anti-freeze, Washer Solvent, Carburetor Cleaner, Starting Fluid. Brush apply once per day for 3 days, then allow to sit for 4 additional days. Inspect for degradation.
Immersion	Tenney Temperature Chamber, Bucket of solution.	17 parts tap water, 2 parts Dawn Dishwashing liquid, 1 part sodium chloride, by volume. Heat soak unit at +70°C, then plunge into solution at 0°C and keep submerged for 2 hours. Repeat 5 times.
Vibration	MIL-STD-202G method 204D	Unit connected normally and operating.

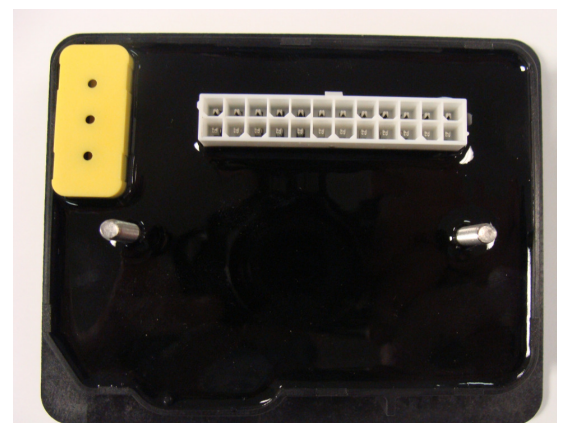
Specifics: Test Conditions: -40°C to +70°C. **Note 1:** "System Maximum Allowable Continuous Current Draw" and "System Maximum Allowable Intermittent Current Draw" must not be exceeded. Consider the sum of all outputs. **Note 2:** *All specifications subject to change without notice All rights reserved GDI 2-16

VERSA G GUARD™



Pin	Name	Function
1	FUEL_SOLENOID	Fuel solenoid control, internal overcurrent protection and flyback diode
2	LV_KILL	Low voltage kill and tachometer input
3	MOTOR_A	Half of H bridge output, works in concert with MOTOR_A. Internal overcurrent and flyback protection.
4	FUEL_2_SENSE	Resistive fuel sender input
5	MOTOR_B	Half of H bridge output, works in concert with MOTOR_B. Internal overcurrent and flyback protection.
6	ILK_DRV_SOURCE	Pulsed drive output for interlocks. Internal overcurrent protection.
7	HEADLIGHT_SRC	Headlight output, internal overcurrent and flyback protection.
8	+12V	Power supply
9	CLUTCH_OUT	Clutch drive output, internal overcurrent and flyback protection. Note: NO NOT use an external flyback diode.
10	CLUTCH_OUT	Same as pin 10
11	CLUTCH_RETURN	Clutch ground connection for SoftStart current measurement
12	GND	Power supply ground connection
13	STARTER	Starter solenoid drive output , internal overcurrent and flyback protection.
14	OIL_PRESSURE_SENSE	Resistive oil sender input, or switch
15	FUEL1_SENSE	Resistive fuel sender input
16	ENG_TEMP_SENSE	Resistive temperature sender input, or switch
17	SPARE_SW	Spare interlock
18	BRAKE_SW	Parking brake interlock (closed = safe)
19	DRIVE_SW	Drive lever neutral safety interlock (closed = safe)
20	+12V	Same as pin 8
21	SEAT_SW	Operator presence interlock (closed = safe)
22	HV COIL	High voltage kill and tachometer input
23	CLUTCH_RETURN	Same as pin 11
24	GND	Same as pin 12

24	23	22	21	20	19	18	17	16	15	14	13
12	11	10	9	8	7	6	5	4	3	2	1



Fully potted and sealed!
Single point connection