



INTUITIVE HUMAN INTERFACE SOLUTIONS

Vehicle Display Controller

- Three Configurations
 - Optical Rotary Encoder
 - Encoder with Pushbutton
 - Joysticking Encoder with Pushbutton
- J1939 and CANopen versions
- Dimmable LED indicators and legends
- Sealed to IP67
- Vibration and impact resistant
- Operating Temp: -40°C to +85°C
- Long Life: 500,000 cycles
- Support for multiple key combinations
- Designed for 12/24 volt systems
- Custom legends and configurations

Put display functions within reach

- 5 hot keys for rapid navigation
- Scroll with rotary encoder
- Select with pushbutton
- Navigate with joystick



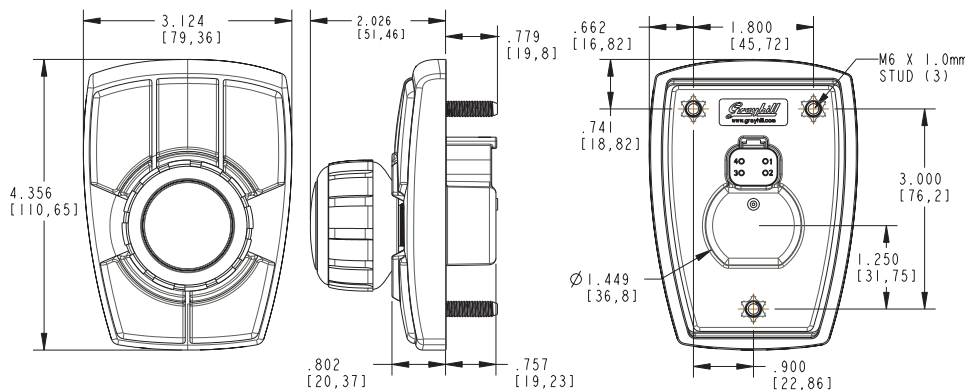
Joysticking Encoder version

Rotary Encoder version with Target Legends

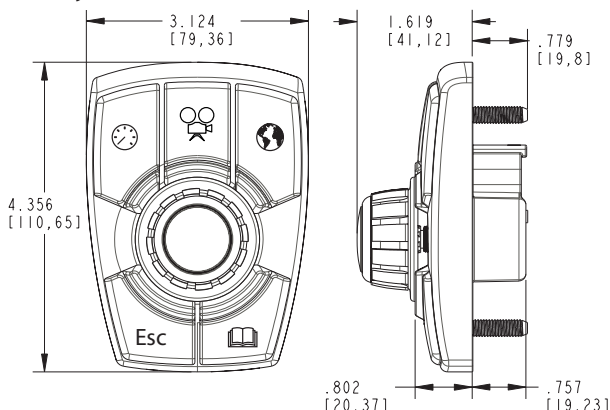


DIMENSIONS in inches (and millimeters)

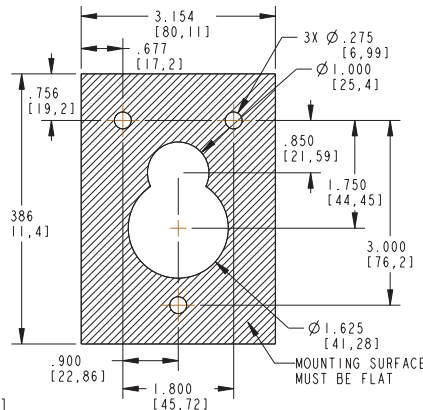
Blank keys shown below



ISO Symbols shown below



Recommended Panel Cut-out



Your Experts in Cab Controls

Grayhill specializes in the design, development and production of human interface controls, including:

- Cab user interface design
- Customized control panels
- CAN-bus interface devices

Agriculture



Construction





INTUITIVE HUMAN INTERFACE SOLUTIONS

ENVIRONMENTAL SPECIFICATIONS

Operating temperature	ANSI/ASAE EP455 5.1.1 Level 2	-40°C for 4 hours to +85°C for 11 hours
Storage Temperature	ANSI/ASAE EP455 5.1.2 Level 2	-40°C 4 hours to +85°C 4 hours
Thermal Shock	ANSI/ASAE EP455 5.1.3	-40°C to 70°C at a rate of 4°C/min (1 hour at extremes)
Altitude (Barometric Pressure)	ANSI/ASAE EP455 5.2	101.3kPa to 18.6kPa
Sand and Dust	ANSI/ASAE EP455 5.3	24 hours with 0.88g/m3
Solar Radiation	ANSI/ASAE EP455 5.4	43 to 75W/m2 UV Radiation (280 to 400nm wavelength) for 300h
Wash Down	ANSI/ASAE EP455 5.6 Level 2	375 kPa and 8.3 L/min for 10 minutes @ 15°C Water temp
Ingress Protection	IP67	1 meter submersion for 30 minutes
Humidity	ANSI/ASAE EP455 5.13	96% Humidity at 35°C for 240 hours.
Salt Fog	ANSI/ASAE EP455 5.9	5% aqueous solution of NaCl @ 35°C and a pH between 6.5 and 7.2 for 48 hours
Chemical resistance (Resistance to Solvents)	ISO 16750-5 EP 455 (5.8.2)	
Thermal Cycling (Change of Temperature)	ISO 16750-4	-40° to 85°C 2 hours at extremes change rate = 1°C/min (8 hours) repeat for 30 cycles.

ELECTROMAGNETIC COMPATIBILITY SPECIFICATIONS

ESD	ANSI/ASAE EP455 5.12	+/- 25kV for 10 pulses, 5 of each polarity
Radiated Immunity	ISO14982 6.6	10MHz-1000MHz Range 48mA Bulk Current Injection 100V/m
Conducted Emissions	SAE J1113-41	Class 3
Broadband Radiated Emissions	ISO14982 6.4	64dB to 54dB, 30MHz-75MHz (linearly decreases) 54dB to 65dB, 75MHz-400MHz (linearly increases) 65dB, 400MHz-1000MHz

CE COMPLIANCE

Agriculture and Forestry Machinery EMC	ISO 14982	ESA
Construction Machinery EMC	EN 13309:2000	ESA

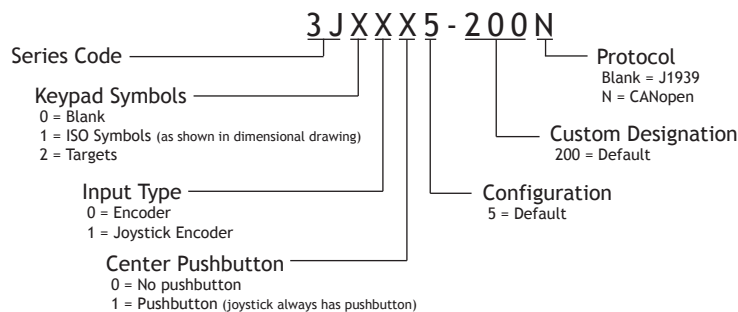
MECHANICAL PERFORMANCE

Vibration, Random	ANSI/ASAE EP455 5.15.1	2 hours each axis @ 52.4 m/s2 RMS overall acceleration and spectral power density of 2m2/s3 from 50Hz to 2000Hz
Vibration, Sinusoidal	ANSI/ASAE EP455 5.15.2	A logarithmic sweep from 10Hz to 2000Hz to 10Hz over a period of 20 minutes for 4 hours in each of 3 orthogonal axes with amplitude of 1.5mm from 10Hz to 40Hz and a constant acceleration of 35m/s2 RMS from 40Hz to 2000Hz.
Shock / Crash Safety	ANSI/ASAE EP455 5.14	A single 11ms half sine pulse of 490 m/s2 in 3 perpendicular axes.
Drop	ANSI/ASAE EP455 5.14.2 Level 1	Drop component 400 mm onto a hardwood benchtop on all practical edges.
Shipping integrity	International Safe Transit Agency procedure 3A	

ELECTRICAL PERFORMANCE SPECIFICATIONS

Maximum load	ANSI/ASAE EP455 5.1.1 Level 2	-40°C 4 hours +85°C for 11 hours max load applied
Jump start forward voltage	ISO 16750-2	36V for 60 minutes
Jump start reverse voltage	ISO 16750-2	-36V for 60 minutes
Short circuit protection	ISO 16750-2	All outputs to ground for 60s
Reverse polarity protection	ISO 16750-2	28V for 60s
Starting profile	ISO 16750-2	Class A
Battery-less operation	ANSI/ASAE EP455 5.11.3 Level 2	Apply $6+12.6\sin(2\pi f t)$ f is swept from 500Hz to 1.5kHz 5min
Load dump	ISO 7637-2 Test Pulse 5b	Class A
Switching spikes – negative	ISO 7637-2 Test Pulse 3a	Class A
Switching spikes – positive	ISO 7637-2 Test Pulse 3b	Class A
Wire harness inductance	ISO 7637-2 Test Pulse 2a and 2b	Class A
+/- inductive load pulse	ANSI/ASAE EP455 5.11.4	$14-300e^{-(t/.001)}V$ 1Hz for 300 cycles
+/- mutual coupling	ANSI/ASAE EP455 5.11.6 Level 2	$14+200e^{-(t/14 \times 10^{-6})}V$ 1Hz for 300 cycles
Alternator field decay	ANSI/ASAE EP455 5.11.2	Class A

ORDERING INFORMATION



CONNECTION

4 pin Deutsch DT Connector. Power with 8V to 32V vehicle type inputs.



Pin	1	2	3	4
Signal	Power	Gnd	CAN_H	CAN_L

MOUNTING INFO

Use M6 Nut (1mm pitch)
Max Torque 25 in-lbs

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