Grayhill
Intuitive Human Interface Solutions

Generation 2 Man-Machine Interface (MMI) Controllers

WISDOM

Multi-Functional Control for Intuitive Operation

- Three Mechanical Form Factors:
  - Rotary Encoder with Optical Pushbutton
  - Digital Joystick Encoder with Pushbutton
  - Proportional Joystick with Optical Pushbutton
- Modern Flush Styling
- No-tool Snap-in Front Mounting
- Designed for ISO 13849 Safety Rated Vehicles
- Self-Diagnostics Include:
  - Supply Voltage Monitoring
  - Indicator Operation Verification
  - Button Short Detection
- J1939
- Designed for 12/24 volt Systems
- Dimmable LED Indicators and Legends
- Low Current Sleep Mode (<1.5 mA Current Draw; Wake Up on Key Press/CAN Message)
- Same Field-tested Reliability as our Original MMI Controllers – Over 500,000 in Operation
- Software Backwards Compatible with our Original VDC
- Customizable Legends, Indicator Colors, Backlight Colors, Knob Colors

Rotary Encoder with 16 Position Continuous Rotation

Digital Joystick with 20 Position Continuous Rotation

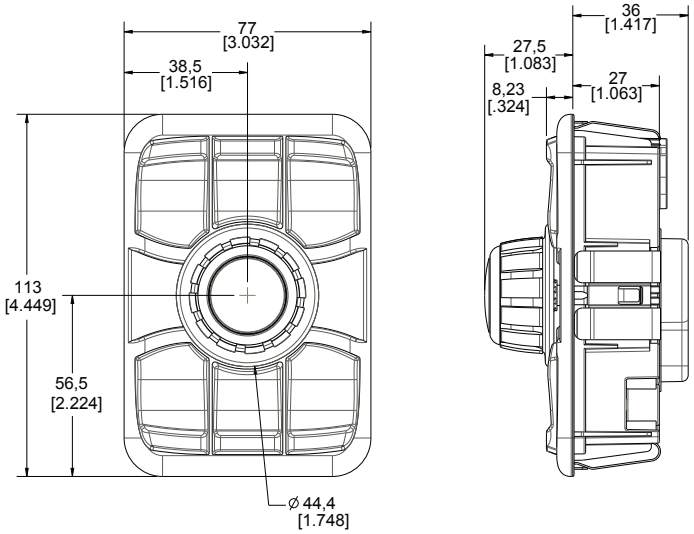
Proportional Joystick with Momentary Rotation

Grayhill
Intuitive Human Interface Solutions

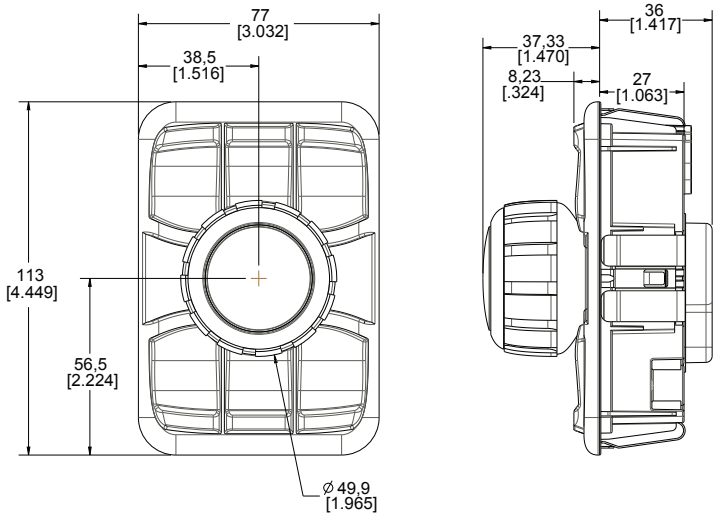
WISDOM

DIMENSIONS in mm [inch]

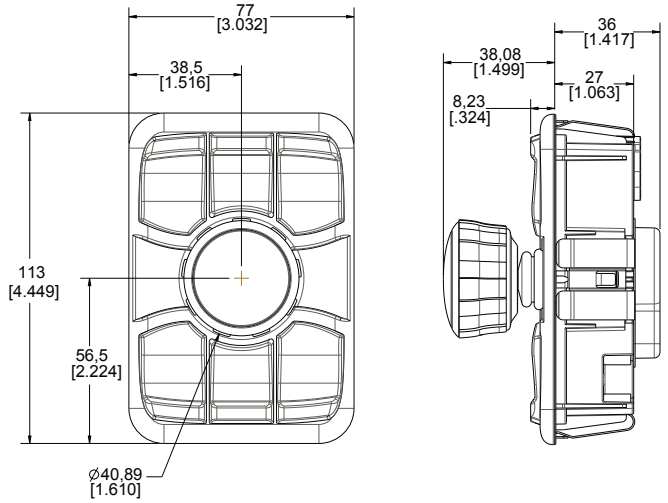
3JX0X5-G2-100X
ROTARY ENCODER VERSION

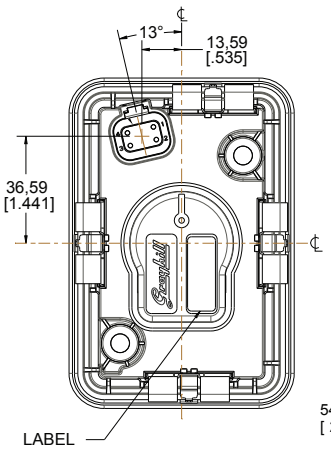


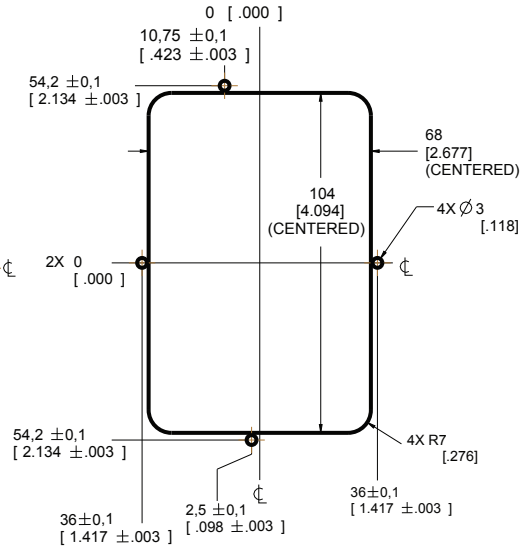
3JX115-G2-100X
DIGITAL JOYSTICK VERSION



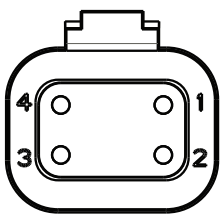
3JX2X5-G2-100X / 3JX305-G2-100X
PROPORTIONAL JOYSTICK / DUAL PROPORTIONAL OUTPUT VERSION







CONNECTOR: MATES WITH DEUTSCH #DT04 - 4S WITH W4S WEDGE LOCK.



PIN	SIGNAL
1	POWER
2	GROUND
3	CAN_H
4	CAN_L

Panel Cutout
RECOMMENDED PANEL THICKNESS: 2,5 [.098] ±1,0 [.039]

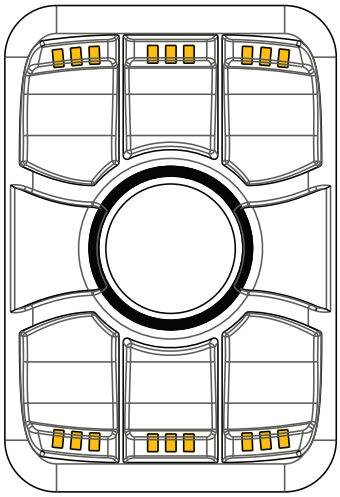
Bulletin 1288
Rev 05/18

Grayhill
Intuitive Human Interface Solutions

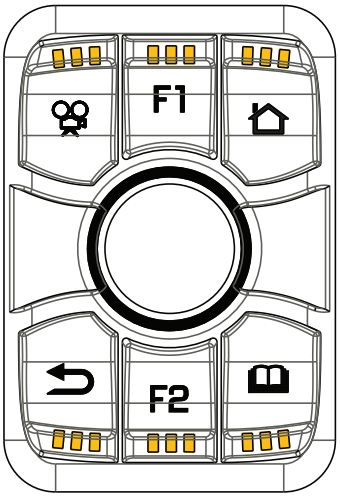
WISDOM

STANDARD KEYPAD SYMBOL OPTIONS

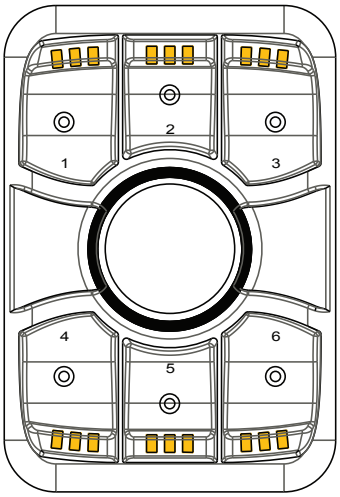
-0: BLANK



-1: ISO SYMBOLS



-2: GENERIC TARGETS



STANDARD KEYPAD SYMBOL

KNOBS

Contact us about optional knob colors!

LEDS

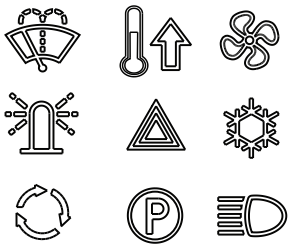
Contact us for optional LED colors

Indicator colors:
- Amber (Standard)
- Blue
- Green
- Pure Green
- Red
- White
- Yellow

Backlight colors:
- Green (Standard)
- White (Standard)
- Amber
- Blue
- Pure Green
- Red
- Yellow

LEGENDS

Contact us for Custom Legends



3J X X X 5 – G2 – X 3A X

SERIES CODE

KEYPAD SYMBOLS
0 = BLANK
1 = ISO SYMBOLS
2 = GENERIC TARGETS

INPUT TYPE
0 = ROTARY ENCODER
1 = DIGITAL JOYSTICK
2 = PROPORTIONAL JOYSTICK
3 = DUAL PROPORTIONAL OUTPUT JOYSTICK

CENTER PUSHBUTTON / OUTPUT
0 = NO CENTER PUSHBUTTON
(DIGITAL JOYSTICK ALWAYS HAS CENTER PUSHBUTTON)
1 = CENTER PUSHBUTTON
(DIGITAL JOYSTICK ALWAYS HAS CENTER PUSHBUTTON)

GENERATION CODE
G2 = GENERATION 2

PROTOCOL
C = CANbus J1939

INCATOR NUMBER/COLOR
3A = 3 AMBER INDICATORS
PER KEY

BACK LIGHT COLOR
G = GREEN
W = WHITE

Bulletin 1288
Rev 05/18

Grayhill
Intuitive Human Interface Solutions

ENVIRONMENTAL SPECIFICATIONS

Operating temperature	ISO 16750-4 5.1.1.2 ISO 16750-4 5.1.2.2	Low temperature -40ºC for 24hrs High temperature +85ºC for 96hrs
Storage Temperature	ISO 16750-4 5.1.1.1 ISO 16750-4 5.1.2.1	Low temperature -55ºC High temperature +105ºC
Thermal Shock (Ice Water Shock Test)	ISO 16750-4 5.4.3	High temperature +85 ºC
Altitude (Barometric Pressure)	MIL-STD-202G Method 105C Test Condition B	Sea level to 15240m (101.3 kPa to 11.6 kPa), Exposure Time: 2 hour
Sand and Dust	ISO16750-4 5.10	
Solar Radiation	ISO 4892-2 Method B	1000 hours
Ingress Protection	IEC 60529 / ISO20653 - IP67/IP69K	Dust - Talcum powder Liquid - 1m submersion for 30 minutes Wash down - 14L/min @ 8kPa 80C
Wash Down	SAE J1211 Section 4.4 >>ISO 60529 / ISO20653	375 kPa and 8.3 L/min for 10 minutes @ 15ºC
Humidity	ISO 16750-4 5.7	96% Humidity at +35ºC, Duration: 240 hours
Salt Fog	ISO 16750-4 5.5.1	5% aqueous solution of NaCl @ 35ºC and a pH between 6.5 and 7.2 for 48 hours
Thermal Cycling	ISO 16750-4 5.3.1	Low temperature: -40˚ High Temperature: +85˚C, Profile per Table 2
Chemical Resistance	ISO 16750-5	(All agents, Table 1)

ELECTROMAGNETIC COMPATIBILITY SPECIFICATIONS

Radiated Immunity	ISO 11452-2 ALSE	400MHz-2GHz, 100 V/m AM/CW modes
	ISO11452-4	Bulk current injection 1MHz - 400 MHz 100 mA
Electrostatic Discharge	ISO 10605 8 powered-up test	ESD Capacitor Network 330pF, 330Ω Conductive Surfaces Contact Discharge +/-15kV Non-Conductive Surfaces Air Discharge +/-25kV Indirect Discharge +/-20kV
Electrostatic Discharge	ISO 10605 9 unpowered test	ESD Capacitor Network 150pF / 2kΩ Conductive Surfaces Contact Discharge +/-15kV Non-Conductive Surfaces Air Discharge +/-25kV Indirect Discharge +/-20kV
Magnetic Field Immunity Test	ISO 14528-8:2007	15 Hz - 1000 Hz,100 A/m, Class A 1 kHz - 10 kHz, 100/(F/1000)^2, Class A 10 kHz - 150 kHz, 1 A/m, Class A
Broadband/Narrowband	ISO14982 CISPR 25 (where frequency bands are specified)	CISPR 25 Class 5 where specified Class 3 - Average, Peak and Quasi Peak (where specified), on remaining CISPR 25 defined bands
Conducted Emissions	CISPR 25 6.2	Class 5

ELECTRICAL SPECIFICATIONS

WISDOM

Maximum Load	ISO 16750-4 5.1	Low Temp = -40C, High Temp = +85C Duration: 4 hours at Low Temp, 11 hours at High Temp Maximum load applied
Over-voltage	ISO 16750-2 4.3.2	High Voltage: 36V, Duration: 60 min Tmax - 20˚C
Superimposed alternating voltage	ISO 16750-2 4.4	Severity 2 and 3 Ri = 50mΩ Frequency Range: 50Hz to 25kHz Sweep Duration: 120s Number of sweeps: 5 (continuously)
Reset behavior at voltage drop	ISO 16750-2 4.6.2	Class C
Starting Profile	IISO 16750-2 Sec. 4.6.3 Formerly known as pulse 4	12V, Level II Class B and Level IV Class A 24V, Level II Class A and Level III Class A
Load Dump	ISO16750-2 sec 4.6.4.2.2 Test A Formerly known as ISO7637-2 pulse 5	12V: Us = 101V, Ri=0.5Ω, td=400ms 24V: Us = 202V, Ri=1.0Ω, td=350ms
Reverse Polarity	ISO 16750-2 4.7.2.3	Voltage: -28V, Duration: 60s
Open Circuit tests	ISO 16750-2 4.9.1.2	Relay and signal outputs to be connected to load TBD
Short-circuit Protection	ISO 16750-2 4.10.2 Signal Circuits	Connect all signal inputs and outputs to Vmax and GND for 60s. One circuit tested at a time.
Short-circuit Protection	ISO 16750-2 4.10.3	ISO 8820 operating time rating +10% Minimum Class C
Parallel inductive load	ISO7637-2 Pulse 1	Us = -600V
Wire Harness Inductance	ISO 7637-2 Pulse 2a	Wire Harness Inductance
Switching Spikes	ISO 7637-2 Pulse 3a	Pulse 3a: Us = -300V Pulse 3b: Us = +300V
Fast transients mutual coupling	ISO 7637-2 Pulse 3b	Pulse a: 24V class IV Us = -80 Pulse b: 24V class IV Us = +80
Slow transients mutual coupling	ISO7637-3 4.3.2	DCC Slow + = +30 DCC Slow - = -30 ICC slow + = +6 ICC slow - = -6

PHYSICAL SPECIFICATIONS

Vibration, Random	ISO 16750-3 4.1.2.7	Commercial vehicle, Sprung Masses	
Vibration, Sinusoidal	MIL-STD-202G, Method 204D, Test Condition C	Logarithmic Sweep from 10 Hz - 2000 Hz - 10 Hz over a period of 20 minutes Duration: 4 hours duration (12 cycles) in each of 3 orthogonal axes. Maximum displacement for 10Hz - 55Hz: 0.06". Constant acceleration for 55Hz - 2000 Hz: 10G.	
Shock/Crash Safety	ISO 16750-3 4.2.2	10 pulses per axis	
Drop	ISO 16750-3 4.3	Height: 400 mm Repeat for all practical edges and faces	
Mechanical Life	Internal Testing Procedure	Keypad Center Pushbutton Rotary Encoder Optical Joystick Proportional Joystick Momentary-turn Encoder	1M Cycles 1M Cycles 1M Cycles 500K Cycles 1M Cycles 1M Cycles

Grayhill, Inc. • 561 Hillgrove Avenue • LaGrange, Illinois 60525-5997 • USA • Phone: 708-354-1040 • Fax: 708-354-2820 • www.grayhill.com