CAN-bus Keypads for Off-Highway Vehicles

- Five standard keypad form factors available
- 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: 1,000,000 cycles per key
- Support for multiple key press combinations
- Designed for 12/24 volt systems
- Custom legends and configurations available

3K SERIES KEYPADS CUSTOM OPTIONS
Contact Grayhill to build your custom part number

- Custom keytop legends
- Up to 3 LED indicators per key
- Indicator colors:
  - Red, Amber, Green, Blue
- Custom backlight colors:
  - Red, Amber, Green
- Factory configured parameters

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

www.grayhill.com
DIMENSIONS in inches (and millimeters)
ISO Symbols shown in dimensional drawings

4 x 5 Keypad

3 x 5 Keypad

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

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

Pin 4: CAN L
Pin 3: CAN H
Pin 1: Power
Pin 2: Ground
ENVIRONMENTAL TESTING STANDARDS

Operating temperature, High
ANSI/ASAE EP455 5.1.1
Level 2
+85°C for 11 hours

Operating temperature, Low
ANSI/ASAE EP455 5.1.1
Level 2
-40°C for 4 hours

Storage Temperature, High
ANSI/ASAE EP455 5.1.2
Level 2
+85°C 4 hours

Storage Temperature, Low
ANSI/ASAE EP455 5.1.2
Level 2
-40°C 4 hours

Thermal Shock
ANSI/ASAE EP455 5.1.3
-4°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 79W/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 (Resist ance 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.

PHYSICAL TESTING STANDARDS

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 over a period of 10 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 STANDARDS

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
12V class B, 24V class A

Battery-less operation
ANSI/ASAE EP455 5.11.3
Level 2
Apply 6+12.6sin(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
14+200e^(-t/14x10^-6)V 1Hz for 300 cycles

Alternator field decay
ANSI/ASAE EP455 5.11.2
Class A

CE COMPLIANCE

Agriculture and Forestry Machinery EMC
ISO 14982
ESA

Construction Machinery EMC
EN 13309:2000
ESA

ORDERING INFORMATION

Series Code 3KXXX

Keypad Symbols
0 = Blank
1 = ISO Symbols (as shown above)
2 = Targets (6 and 8-key)

Key Quantity
08 (2 or 4 row), 12 (4 row),
15 (3 row), 20 (4 row),
06 (2 row)

Default
Comm Protocol
C = J1939
N = CANopen

Key Material
R = Rubber

Rows: 2, 3, 4

CUSTOMIZATION OPTIONS

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