

HS2 MULTI-AXIS JOYSTICK

Designed for the most demanding applications, the HS2 multi-axis joystick offers durability and performance in a robust package. Available with Hall-Effect, CAN, ProfiBus, ProfiNet & 4-20mA outputs, the HS2 can be configured to a broad range of applications.



DESIGNED AROUND DURABILITY

Boasts a metal housing and stainless steel components that offer mechanical robustness and reliability. Ideal for rugged applications.



LONG LIFE TECHNOLOGY

3D hall-effect technology designed to provide a long operating life. Contactless design prevents wear and tear that is typical to industrial joysticks.

FEATURES & OPTIONS

- Single or dual axis operation
- Spring return action with open or cross grate
- Metal body and components for maximum durability
- Contactless 3D hall-effect technology
- Sleek design with optional canister on bottom (HS2G)
- Drop-in or panel mounting for easy installation

OUTPUT OPTIONS

- Hall-Effect (Redundant)
- CANOpen*
- J1939*
- ProfiBus-DP*
- ProfiNet*
- 4-20mA*

*Canister required (HS2G model)



Shown with
FG-4 handle &
hall-effect output



Shown with G56 handle
and optional canister
(HS2G model)

HS2 HANDLE OPTIONS



G56



G58



FG2



FG4



MG1



MG2



MG9 & MG25



MG13



RH & RHS



CUSTOMIZEABLE WITH:

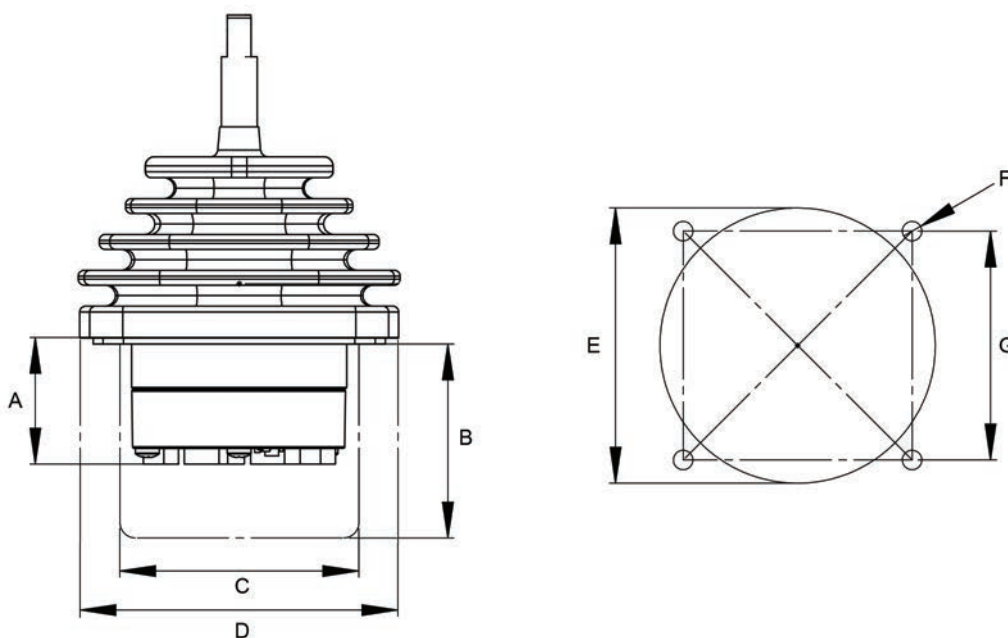
- Thumbwheels
- Rocker switches
- Push buttons
- Triggers*
- Operator Presence Switch*
- Twist Function**

*Exclusive to G58 & FG4

**Exclusive to FG4 & MG13

Other restrictions apply

HS2 DIMENSIONS & MOUNTING



	Drop-in Mounting	Panel Mounting
A - Depth (No Canister)*	2 in [51 mm]	2.75 in [70 mm]
B - Depth with Canister (HS2G)*	Hall-Effect: 2.55 in [65 mm] CAN: 2.55 in [65 mm] 4-20mA: 2.55 in [65 mm] ProfiBus: 3.35 in [85 mm] ProfiNet: 3.6 in [92 mm]	Hall-Effect: 2.75 in [70 mm] CAN: 3.94 in [100 mm] 4-20mA: 3.94 in [100 mm] ProfiBus: 4.75 in [120 mm] ProfiNet: 4.75 in [120 mm]
C - Diameter (No Canister)	Hall-Effect: 2.55 in [65 mm]	Hall-Effect: 2.55 in [65 mm]
C - Diameter with Canister (HS2G)	Hall-Effect: 3.15 in [80 mm] CAN: 3.15 in [80 mm] 4-20mA: 3.15 in [80 mm] ProfiBus: 3.15 in [80 mm] ProfiNet: 3.55 in [90 mm]	Hall-Effect: 3.15 in [80 mm] CAN: 3.15 in [80 mm] 4-20mA: 3.15 in [80 mm] ProfiBus: 3.15 in [80 mm] ProfiNet: 3.55 in [90 mm]
D - Mounting Flange	4.5 x 4.5 in [114 x 114 mm]	3.05 x 3.05 in [77 x 77 mm]
E - Mounting Hole	Ø 3.6 in [92 mm]	Ø 1.73 in [44 mm]
F - Screw Hole	Ø.25 in [6.5 mm]	Ø.18 in [4.5 mm]
G - Hole Distance	Ø 3.01 in [76.5 mm]	Ø 2.3 in [58 mm]

*Additional space required on bottom of joystick for cable outlet/D-Sub.

HS2 SPECIFICATIONS

General

Mechanical Life

5 million life cycles

Handle Travel

±20 degrees

Shaft

0.50 in [12mm] diameter

Fits up to 16 wires for handle devices

Impact Force in A-B & C-D Direction

Max. 75 Nm (max. 400 N at 1.5 in [37.5 mm] distance from pivot point)

Impact Force in Z-Direction

± 300 N (compression and tensile loading)

Electrical (Hall-Effect)

Sensor Type

Fully redundant dual-die 3D-hall

Resolution

8-Bit (at 20° lever deflection)

Linearity

Max. +3% rel. linearity

Interfering Magnetic Fields

EN61000-4-8 Level 5

Operating Voltage U_b

5 VDC ± 0.5

Current Consumption:

< 20 mA

Load Consumption

> 10 kΩ

Output Signal

A1 (Standard): 0.5 to 4.5 V Ratiometric Redundant, Same Direction
Middle Position: 2.5 V ± 0.1 V

A2 (Optional): 0.5 to 4.5 V Ratiometric Redundant, Inverse

Environmental

Mechanical Operating Temperature

-40° to +176° F [-40° to +80° C]

Electronic Operating Temperature

-40° to +158° F [-40° to +70° C]

Storage Temperature

-58° to +194° F [-50° to +90° C]

IP Rating

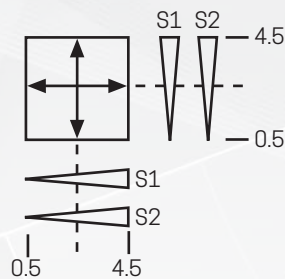
IP65

UL94 Flame Classification

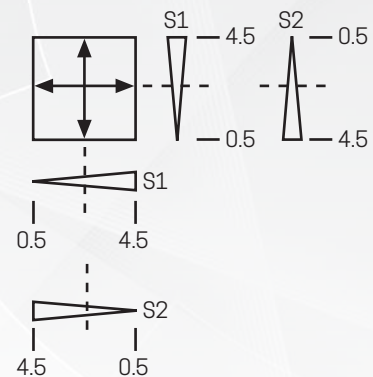
HB

Description	Pin	Wire Color
Supply Voltage 1	1	Red
GND 1	2	Brown
Signal S1, A-B axis	3	Blue
Signal S1, C-D axis	7	Green
Supply Voltage 2	5	Orange
GND 2	6	Black
Signal S2, A-B axis	4	Violet
Signal S2, C-D axis	8	Yellow

Standard Output (A1) Example
Redundant, Same Direction



Optional Output (A2) Example
Redundant, Inverse



CAN SPECIFICATIONS

Electrical Details

Supply Voltage(Vcc)

9 to 36 Volts DC

Absolute Maximum

36 Volts

Supply Current

50 - 100 mA (typ.) 200 mA (max.)

Supply Input

Reverse Polarity Protected

Analog / Digital Inputs

-0.5 mA (10K resistor, 5V source)

Maximum Baud Rate

1Mbps (250kbps default)

Environmental

Operating Temperature

-40° to +140° F [-40° to +60° C]

Storage Temperature

-40° to +176° F [-40° to +80° C]

Sealing

Silicone conformal coating

Diagnostics

Diagnostic LEDs

One (1) Power LED and One (1) Status LED

Normal Operation

Power LED lit indicates 5V power
Status LED blink once per second

Error

Status LED will blink ten times per second

Connection

Connector

Standard 22 AWG harness 18" with
Deutsch DTMO4-6P connector
Other connectors available upon request

J1939

Generic Interface

SAE J1939 71 Standard for joystick
Source Addresses: 0x01 - 0xFE or custom on demand
Priority: 3

Basic Joystick Message 1 (BJM1)

Base PGN: 0xFDD6
X - 3D Hall Analog
Y - 3D Hall Analog

Extended Joystick Message 1 (EJM1)

Base PGN: 0xFDD7
3 Analog Inputs (Thumbwheels)

Lamp Command

4 low-power outputs

Inputs / Outputs

Standard 2 analog joystick inputs (X/Y)
Up to 14 digital inputs
Up to 4 digital outputs*
Up to 5 additional analog inputs*
* Replacing digital inputs

CANopen

CANopen Device Profile

DS301, DS401, V3.0 6/08

Terminal Resistance

120R Removable

Basic messaging

X - 3D Hall Analog
Y - 3D Hall Analog
8 Digital Inputs

Extended messaging

8 Analog Inputs

Lamp command

4 low-power outputs

Inputs / Outputs

Standard 2 analog joystick inputs (X/Y)
Up to 14 digital inputs
Up to 4 digital outputs*
Up to 8 additional analog inputs*
* Replacing digital inputs

Node ID

0x01- 0x7F

Axis & Digital Inputs

181h (180h + Node ID)

Analog Inputs

281h (280h + Node ID)

Digital Outputs

201h (200h + Node ID)

Heartbeat (500ms):

720h (700h + Node ID)

Analog Resolution

8-bit

Network Management

Auto start enabled

PROFIBUS-DP (ESS094A) SPECIFICATIONS

Supply Voltage

Operating Voltage U_B

10 to 30 VDC

Max. Operational Voltage

36 V (short circuit protection not granted)

Max. Ripple Band

10%

Current Input

$U_B = 12V : I < 110 \text{ mA}$

$U_B = 24V : I < 60 \text{ mA}$

Profibus Interface

Feature

IEC 61158, IEC 61784

Max. Baud Rate

12 MBaud, automatically deleted

PNO-Ident No

AAAB

GSD-File

TROAAAAB.GSD

Address

Adjustable from 3 to 99

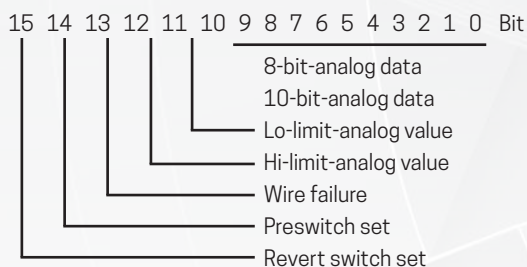
Transmission

RS485

Termination

ohne

Data



Digital Inputs

15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 Bit

16 15 1 Input

Inputs / Outputs

Analog Inputs

4 analog inputs for potentiometer wiperxxx

4 analog inputs for center tap potxxx

4x2 digital inputs for direction contacts

Digital Inputs

16 digital inputs for switches in handle

Digital Outputs

8 digital outputs for LEDs (5V, 10 mA)

4 analog inputs for center tap pot

4x2 digital outputs for direction contacts

Environmental

EMC Requirements

Spurion radition according to

DIN EN61000-6-3:2007

Interference rejection according to

DIN EN61000-6-2:2006

Operating Temperature

-31° to +158° F [-35° to +70° C]

Storage Temperature

-40° to +176° F [-40° to +80° C]

Relative Humidity

98% no condensation

Connection

Connector

D-sub Plug

9 pin

Pin	Function
1	NC
2	NC
3	L_B-wire
4	NC
5	NC
6	NC
7	NC
8	L_A-wire
9	NC

Error Messages

LED	Status	Meaning
Green	Off	No Operation
	Fast Blinking	Check Parameters
	Continuous On	Ready for Operation
Red	Off	No Failure, Bus in Cycle
	Blinking	No Connection to Bus
	Continuous On	Failure

PROFINET (ESS132) SPECIFICATIONS

Supply Voltage

Operating Voltage U_B

12 to 28 V, non-bounce protection

Max. Operational Voltage

30 V (short circuit protection not granted)

Max. Ripple Band

10%

Current Input

$U_B = 12V : I < 110 \text{ mA}$

$U_B = 24V : I < 60 \text{ mA}$

Environmental

Operating Temperature

-4° to +176° F [-20° to +80° C]

Storage Temperature

-40° to +176° F [-40° to +80° C]

Relative Humidity

98% no condensation

EMV Requirements

Spurious radiation acc. to
DIN EN6100-6-3: 2007 and
DIN EN6100-6-2: 2006

ProfiNet IO

Feature

IEC 61158, IEC 61784

ProfiNet Specification

V2.2

Software Stack

V3.1

Conformance Class

Conformance class B

Physical Layer

ProfiNet 100Base-TX, fast ethernet,
ISO/IEC 8802-3

Output Code

Binary

Inputs / Outputs

Inputs for Conversion of Lever Deflection in A-B Axis (X)

1x analog input for potentiometer wiper (resolution max. 12 bits)

2x digital input for directions (ground switched, internal pull-up resistors)

1x analog input for controlling wire failure of center taps

Connection suitable for micro-match-plug

Inputs for Conversion of Lever Deflection in C-D Axis (Y)

1x analog input for potentiometer wiper (resolution max. 12 bits)

2x digital input for directions (ground switched, internal pull-up resistors)

1x analog input for controlling wire failure of center taps

Connection suitable for micro-match-plug

Digital Inputs for Internal Devices

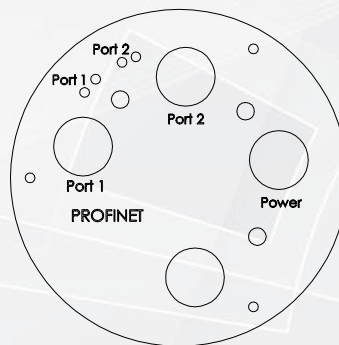
8x digital input for push buttons (ground switched, internal pull-up resistors)

Connection suitable for Molex plug-case, 12 pole with crimp-contacts

Digital Outputs for Internal Devices

8x digital TTL-output 5 VDC (max. 10 mA)

Connection suitable for Molex plug-case, 12 pole with crimp-contacts



Cycle Time

$\geq 1 \text{ ms}$ (IRT/RT)

Transfer Rate

100 MBit/s, CAT-5 cable shielded (STIP),
ISO/IEC11801

Address:

Per name (given by software), mapping of
name-MAC when booting

Integrated Switch

Yes

Real-time-class

RT class 1 frames (RT), RT class 2 frames
(RT), RT class 3 frames (IRT)

Support of

DCP, LLDP, SNMP

GSDML-file

DSDML-V2.2-SPOBU-master control-
ler-20110214.xml

Connection Port 1 / Port 2

Bus-plug M12, 4-pole, female D-coded

Bus Status Display

Each port 2 LED

4-20 mA (ESS149) SPECIFICATIONS

Electrical

Current Output

4 to 12 to 20 mA

Voltage Range

12 to 30 VDC

Current Consumption

< 300 mA

Power on Rise Time

< 30 ms

Connection

Connector

15 pin D-Sub connector

Pin	Function
1	+24 VDC
2	0 V GND
3	Direction Signal Right
4	Direction Signal Left
5	Direction Signal Forward
6	Direction Signal Backward
7	Current Signal X-Axis
8	Current Signal Y-Axis
9	Relay Output 0-Position
10	Relay Output 0-Position
11	N.C.
12	N.C.
13	For Internal Use
14	For Internal Use
15	For Internal Use

Environmental

Operating Temperature

-13° to +158° F [-25° to +70° C]

Storage Temperature

-67° to +212° F [-55° to +100° C]

EMC Emission

DIN EN 61000-6-3 (VDE 0839-6-3) /
09.2011 - EN 6 7000-6-3:2007 + AI :2077

EMC Immunity

DIN EN 61000-6-2 (VDE 0839-6-2) /
03.2006 - EN 61000-6-2:2005