XD series

Proportional, industrial hand grip controllers • non-contacting Hall effect technology



DISTINCTIVE FEATURES

SIL 2 compatible - Redundant Hall sensors
Resists high axial load (1780 N - 400 lbf)
Shallow mounting depth of <60 mm (2.36)
Rated for 10 million lifecycles
SAE CAN bus J1939-71



ENVIRONMENTAL SPECIFICATIONS

- Operating Temperature: -40 °C to +85 °C (-40 °F to +185 °F)
- Storage Temperature: -40 °C to +85 °C (-40 °F to +185 °F)
- Above Panel Sealing: Up to IP67 (subject to handle configuration)
- Humidity: IEC 60068-2-38
- Thermal shock: SAE J1455 section 4.1.3.2
- Salt spray: IEC 60068-2-11
- Random vibration: IEC 60068-2-64
- Sinusoidal vibration: IEC 60068-2-6
- EMC Emissions:
  - Radiated Emissions Level: ECE/324/Add.9:2012; CISPR 25:2002
  - Radiated Emissions Level: CISPR 25:2008
- EMC Immunity:
  - ESD: ISC 10605:2008; criteria A
  - Radiated immunity: ISO 11452-2:2004; criteria B
  - Bulk current injection immunity: ISO 11452-4:201; criteria A
  - Pulse 1, Pulse 2a, Pulse 2b, Pulse 3a, Pulse 3b, Pulse 4, Pulse 5a: ISO 7637-2:2011; criteria A

The company reserves the right to change specifications without notice.

XD series

Proportional, industrial hand grip controllers • non-contacting Hall effect technology

ELECTRICAL SPECIFICATIONS

- Technology: Redundant Hall effect sensor
- Supply voltage range: 6 - 35 VDC
- Typical current consumption: 12 V @ 53 mA
- Transient overvoltage max: 40 V
- Reverse polarity Max: -1000 VDC
- Output signal: SAE CANbus J1939-71
- Connections: Deutsch DTM04-6p

ELECTRICAL CONNECTIONS

- Six position connector: Deutsch DTM04-6P
- Wire: 22 AWG, PTFE insulation with expandable sleeve
- Length: 6:00" +/- 0.5" (bottom of joystick to connector)

MECHANICAL SPECIFICATIONS

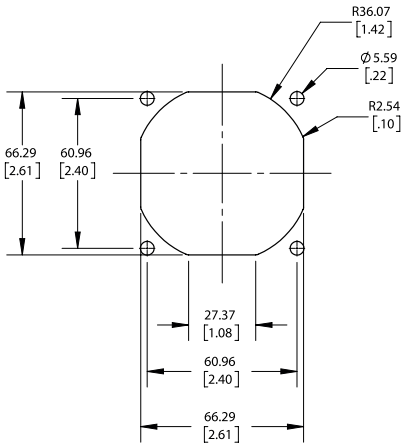
- Operation: Two axis
- Deflection angle: ±20° in X and Y directions
- Operating torque, breakout: .68 Nm *
- Operating torque, 50% travel: .8 Nm *
- Operating torque, 100% travel: 1.5 Nm *
- Maximum axial load: 400 lbf.
- Expected life: 10 million lifecycles (X and Y axis)
- Lever Action (centering): Spring return

MATERIALS

- Shaft: Stainless steel
- Boot: Silicone
- Handles: Glass filled nylon
- Bezel: Hard black anodized aluminum
- Body: Aluminum
- Cover: Zinc plated steel
- Weight: 800 g

* Operating force: configuration option «L»

PANEL CUT-OUT



CAN J1939 INTERFACE SPECIFICATION

The XD Series utilizes redundant Hall effect sensors to measure the primary X and Y axis. The CAN controller support various button configurations as well as proportional thumbwheels and mini-joysticks for additional axis data.
All axis and button data are delivered on a CAN 2.0B compliant physical interface. Two additional signals allow configuration of the controller Source Address. Controller messages are delivered per the SAE J1939-71 message protocol.

CAN 2.0B INTERFACE PARAMETERS

- Baud rate: 250 Kbps
- Transmission repetition rate: 50 ms to 80 ms **
- BJMI/EJMI interval time: 20 ms
- Terminating resistor: No
  (available by special request to factory)
- Connection to Deutsch DTM04-6P connector:

Pin	Color	Function
1	White	CAN Lo
2	Green	CAN Hi
3	Blue	Source Address SEL 1
4	Orange	Source Address SEL 0
5	Black	Ground
6	Red	6 - 35 VDC

** Transmission repetition rate is dependent upon the faceplate configuration.

XD series

Proportional, industrial hand grip controllers • non-contacting Hall effect technology

CAN J1939 INTERFACE SPECIFICATION (CONTINUED)

CAN MESSAGE PROTOCOL

- Primary Axis and button data on Basic Joystick Message 1 (BJM1):
  - Priority: 3
  - Base PGN: 0xFDD6
  - Source address: 0x10[1]
  - Data field: 8 bytes
- Redundant Axis data on Extended Joystick Message 1 (EJMl):
  - Priority: 3
  - Base PGN: 0xFDD7
  - Source address: 0x10[1]
  - Data field: 8 bytes
- Additional thumbwheels and mini-joysticks data on Extended Joystick Message 2 (EJM2):
  - Priority: 3
  - Base PGN: 0xFDD9
  - Source address: 0x10[1]
  - Data field : 8 bytes

Note 1: Alternate source addresses can be configured by grounding of the blue and/or orange wires.
- Source address= Ox10: ORANGE= floating , BLUE= floating (default)
- Source address= Ox20: ORANGE= floating, BLUE= grounded
- Source address= Ox30: ORANGE= grounded, BLUE= floating
- Source address= Ox40: ORANGE= grounded, BLUE= grounded

BJM1 DATA FIELD STRUCTURE:

START POSITION (BYTE/BIT)	LENGTH (BITS)	FUNCTION
1/1	2	Primary X-axis neutral position status
1/3	2	Primary X-axis left position status
1/5	2	Primary X-axis right position status
1/7 to 2/8	10	Primary X-axis position data
3/1	2	Primary Y-axis neutral position status
3/3	2	Primary Y-axis down position status
3/5	2	Primary Y-axis up position status
3/7 to 4/8	10	Primary Y-axis position data
6/1	2	Button 4 status
6/3	2	Button 3 status
6/5	2	Button 2 status
6/7	2	Button 1 status
7/1	2	Button 8 status
7/3	2	Button 7 status
7/5	2	Button 6 status
7/7	2	Button 5 status
8/5	2	Button 10 status
8/7	2	Button 9 status

Note: If faceplate configured with n buttons, Trigger and/or paddle would be respectively positioned in Button n+1 and Button n+2.

EJM1 DATA FIELD STRUCTURE:

START POSITION (BYTE/BIT)	LENGTH (BITS)	FUNCTION
1/1	2	Redundant X-axis neutral position status
1/3	2	Redundant X-axis left position status
1/5	2	Redundant X-axis right position status
1/7 to 2/8	10	Redundant X-axis position data
3/1	2	Redundant Y-axis neutral position status
3/3	2	Redundant Y-axis down position status
3/5	2	Redundant Y-axis up position status
3/7 to 4/8	10	Redundant Y-axis position data

EJM2 DATA FIELD STRUCTURE:

START POSITION (BYTE/BIT)	LENGTH (BITS)	FUNCTION
1/1	2	A-axis neutral position status
1/3	2	A-axis left position status
1/5	2	A-axis right position status
1/7 to 2/8	10	A-axis position data
3/1	2	B-axis neutral position status
3/3	2	B-axis left position status
3/5	2	B-axis right position status
3/7 to 4/8	10	B-axis position data
5/1	2	C-axis neutral position status
5/3	2	C-axis left position status
5/5	2	C-axis right position status
5/7 to 6/8	10	C-axis position data

XD series

Proportional, industrial hand grip controllers • non-contacting Hall effect technology

BUILD YOUR PART NUMBER

XD	GT	___	___	___	___	N	___
SERIES	HANDLE	OPERATION	CENTERING	OPERATING FORCE	MECHANICAL		OUTPUT

OPERATION

T	Two axis [1]
X	One axis, X
Y	One axis, Y

* Square limiter plate

CENTERING

2	Spring centering

OPERATING FORCE

L	.8Nm *
M	1.24Nm *

MECHANICAL

N	None [2]
G	Guided feel*

OUTPUT

C	SAE CAN bus J1939-71

___	___	___	A	N
OPERATOR PRESENCE PADDLE	INDEX TRIGGER	FACEPLATE		

OPERATOR PRESENCE PADDLE

Y	Yes
N	No

INDEX TRIGGER

Y	Yes
N	No

FACEPLATE

A	Blank
B	One pushbutton
C	Two pushbuttons
D	Three pushbuttons
E	Four pushbuttons
F	Five pushbutton
G	Six pushbuttons
H	Toggle switch, two pushbuttons
J	Two toggle switches
K	Mini joystick
L	Eight pushbuttons
M	Two Hall effect thumbwheels
N	One Hall effect thumbwheel
P	Two pushbuttons, one Hall effect thumbwheel

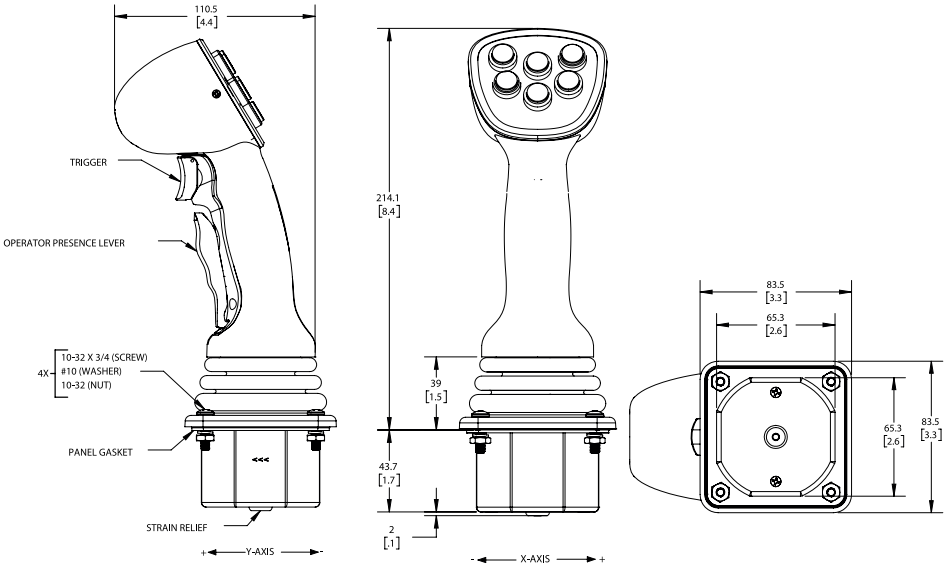
[1] Measured at ±10° (50% travel) from center
[2] The Guided feel option aids the joystick lever into the cardinal direction

XD series

Proportional, industrial hand grip controllers • non-contacting Hall effect technology

DIMENSIONS





COMPONENT DESCRIPTIONS



- **MT series:** Sealed toggle switch
  - MOM-OFF-MOM



- **IM series:** Sealed momentary pushbutton
  - Snap action
  - Red



- **TS series :** Miniature Hall effect joystick
  - Two axis, proportional output
  - Castle actuator



- **HR** series: Hall effect thumbwheel
  - One axis, proportional output
  - Black wheel

XD series

Proportional, industrial hand grip controllers •
non-contacting Hall effect technology

FACEPLATE OPTIONS


A


B


C


D


E


F


G


H


J


K


L


M


N


P

XD series

Proportional, industrial hand grip controllers • non-contacting Hall effect technology

BUILD YOUR PART NUMBER

XD	RT	___	___	___	___	N	___
SERIES	HANDLE	OPERATION	CENTERING	OPERATING FORCE	MECHANICAL		OUTPUT

OPERATION

T	Two axis *
X	One axis, X
Y	One axis, Y

* Square limiter plate

CENTERING

2	Spring centering

OPERATING FORCE

L	.8 Nm [1]
M	1.24 Nm [1]

MECHANICAL

N	None
G	Guided feel [2]

OUTPUT

C	SAE CAN bus J1939-71

___	___	___	___	___	A
BACK PLATE PUSHBUTTON	BACK PLATE ROCKER SWITCH	UPPER FACEPLATE CONFIGURATION	FACEPLATE ROLLERS	SEALING	

BACK PLATE PUSHBUTTON

N	None
A	One momentary pushbutton - black
B	One momentary pushbutton - red

BACK PLATE ROCKER SWITCH

N	None
B	mom-off-mom

UPPER FACEPLATE CONFIGURATION

R00	Zero pushbutton / two rollers
R10	One upper pushbutton / two rollers
R01	One lower pushbutton / two rollers
R03	Two lower pushbuttons / two rollers
R30	Two upper pushbuttons / two rollers
R70	Three upper pushbuttons / two rollers
R07	Three lower pushbuttons / two rollers
R71	Three upper/ one lower pushbutton / two rollers
R55	Two upper / two lower pushbuttons / two rollers
R75	Three upper/ two lower pushbuttons / two rollers
R77	Six pushbuttons / two rollers
CB7	Five pushbutton / one 4-way NV / two rollers

FACEPLATE ROLLERS

S	Single signal
R	Redundant signals

SEALING

N	Not specified. Inside cabin only
A	IP67 above panel sealing

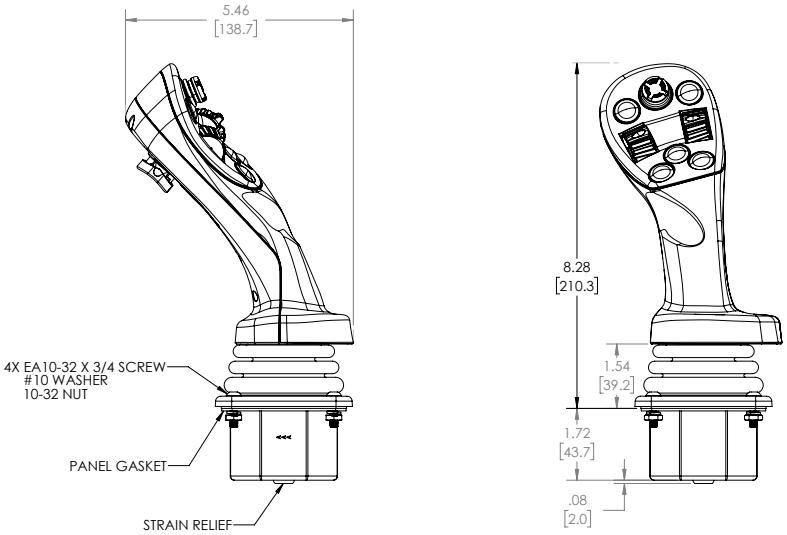
[1] Measured at ±10° (50% travel) from center
[2] The Guided feel option aids the joystick lever into the cardinal direction

XD series

Proportional, industrial hand grip controllers • non-contacting Hall effect technology

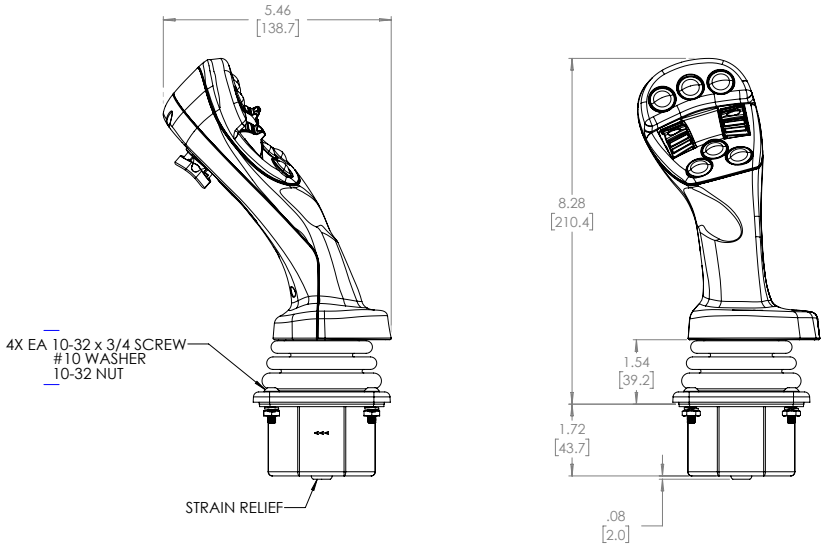
CONTOURED FACEPLATE





RAISED FACEPLATE





COMPONENT DESCRIPTIONS







- **IX series:** Sealed momentary pushbutton
  - Protective elastomer boot
  - IP67 panel sealed
  - Black
- **IS series:** Sealed momentary pushbutton
  - Tactile feedback
  - IP67 panel sealed
  - Black
- **FNR series:** Three position rocker switch
  - Mom-off-mom actuation
  - IP69K panel sealed





- **NV series :** 4 way navigation switch
  - Tactical momentary actuation
  - IP67 panel sealed

HR series: Hall effect thumbwheel
- One axis, proportional control
- Single or redundant outputs
- Optional IP67 panel sealing
- Black

XD series

Proportional, industrial hand grip controllers • non-contacting Hall effect technology

BACK PLATE OPTIONS



N no pushbutton
N no rocker switch



N no pushbutton
B mom-off-mom rocker switch



A black pushbutton
N no rocker switch



A black pushbutton
B mom-off-mom rocker switch

RAISED FACEPLATE OPTIONS



R00



R10



R01



R03



R30



R70



R07



R71



R55



R75



R77

XD series

Proportional, industrial hand grip controllers • non-contacting Hall effect technology

CONTOURED FACEPLATE OPTION



CB7