Data Sheet for Joysticks

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MEGATRON

Finger Joystick

Series TRY120

- Rugged finger joystick ideal for mobile vehicle applications
- Easy to service due to plug connection
- With Hall sensors, optionally redundant
- Also with digital interfaces (CAN J1939, CANopen, USB)
- Shallow installation depth < 26 mm

The TRY120 joystick was developed for applications in mobile machines, smaller vehicles and for controlling small boats. It has the dimensions of a standard finger joystick, but has a reinforced mechanism that allows maximum loads of 350 N in the X and Y directions, as well as a maximum of 9 Nm torque for the Z rotation. All versions are available with protection class IP67 (above panel).

Technical Data

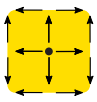
Sensor technology	Hall Effect
Supply Voltage*	5.0 ± 0.5 VDC transient free
Voltage in Center Position*	2.5 V
Return to Center Accuracy	±200 mV
Output Linearity	±200 mV
Output Impedance	2 Ohm
Supply Current	typ. 40 mA / max. 50 mA (3 axes)
Load Resistance	Min. 1 kOhm, recommended > 100 kOhm
Expected Life	5 million cycles
Output Voltages*	0 to 5 V / 0.5 to 4.5 V / 0.25 to 4.75 V / for others see description on page 2
Angle of Movement X-, Y-Axis / Z-Axis	36° (±18° from center) / 60° (±30° from center)
Operating Force X-Y-Axis	Break out force: 1.3 N/ operating force: 2.8 N / max. applied: 350 N
Operating Torque Z-Axis	Break out torque: 0.9 Nm / operating torque: 0.12 Nm / max. applied: 9,0 Nm
Operating / Storage Temperature	-40 °C .. +85 °C / -40 °C .. +85 °C
Above Panel Sealing	IP67
Panel Thickness	1.17 to 3.17 mm
EMC Immunity Level (V/M)	EN61000-4-3
EMC Emissions Level	EN6100-6-3:2001
ESD	EN61000-4-2

*Only valid for the standard variants with analog output. The output voltage is ratiometric to the input voltage. We therefore recommend using low-noise, stabilized voltage sources.

Material Informationen

Schaft Material	Stainless steel
Rubber Boot Material:	Silicone
Handle Materials	Glass filled nylon (abhängig von Knaufvariante)
Housing Material	Glass filled nylon

Limiters



Square - Option „1“

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Finger Joystick — Series TRY120

Please contact us for information regarding stock articles, delivery times and minimum order quantities.

Order Description / Options

Description	Selection: standard=**black/bold**, possible options=*grey/italics*								
Series	**TRY120**								
Axes:									
2 Axes		*2*							
3 Axes (Handle can be rotated)		**3**							
Sealing:									
Rubber boot			**5**						
Return Mechanism:									
Spring return (standard type)				**1**					
Handles:									
Handle B, for 2-3 Axes, without pushbutton, IP67					*B*				
Handle C, for 2-3 Axes, 1 pushbutton, IP67					*C*				
Handle D, for 2-3 Axes, 2 pushbuttons, IP67					**D**				
Handle E „cobra-shaped“, for 2-3 Axes, 2 pusbuttons, IP67					*E*				
Limiter:									
Square						**1**			
Output Signal:									
0 to 5 V *(redundant signals parallel / inverse [1])*							**1** *(1P / 1X)*		
0.5 to 4.5 V (redundant signals parallel / inverse [2])							*2 (2P / 2X)*		
0.25..4.75 V (redundant signals parallel / inverse [3])							*3 (3P / 3X)*		
USB HID compliant game controller							*5*		
USB HID compliant mouse-emulation							*6*		
CAN-Bus J1939-71							*7*		
CANopen with Baud rate 250 kbit/s							*8B*		
CANopen LSS							*9*		
Bipolar ±10 V (with option VB, see below)							*0*		
Mounting:									
Drop-in								**1**	
Voltage Regulator:									
Unipolar, supply 8-35 V, outputs according to order code above									*VU*
Bipolar, supply 11..35 V (only for output option „0“, bipolar ±10 V)									*VB*

[1] Output signals parallel: 0 to 5 V / 0 to 5 V; output signals inverse: 0 to 5 V / 5 to 0 V
[2] Output signals parallel: 0.5 to 4.5 V / 0.5 to 4.5 V; output signals inverse: 0.5 to 4.5 V / 4.5 to 0.5 V
[3] Output signals parallel: 0.25 to 4.75 V / 0.25 to 4.75 V; output signals inverse: 0.25 to 4.75 V / 4.75 to 0.25 V

Note on the order code when selecting the axis options

All handles are suitable for operating modes for 2 and 3 axes. When selecting the 2-axis variants, the handle cannot be rotated. When selecting the 3-axis variant, the handle can be rotated and includes a sensor and a spring return mechanism.

Information on the order code for the unipolar voltage regulator (special option VU)

If you select the special option VU, you can choose from all analog output signals.
For example, the variant TRY120 3 5 1 D **2** 1 **VU** provides an output signal of 0.5-4.5 V with an input of 8-35 V.

For higher quantities or on-going demand, additional options are available

- Customer-specific cables
- Increased operation force/torque
- Additional limiters
- Customer-specific programming of the output signals (USB, CANBus, see the following pages)

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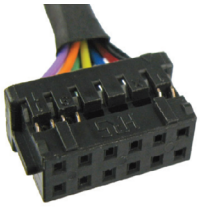
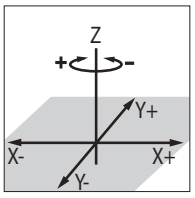
Connection description for analog outputs (output options 1-3)

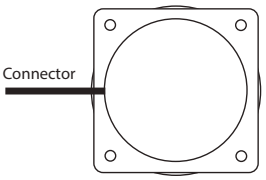
The analog outputs are supplied with your Hirose connector type DF11-12DP-2DS9 (24) (pin connector, see the first illustration on the right). We optionally offer the appropriate connection cable (length approx. 25 cm) with Hirose DF11-12DS-2C connector (item no. 129802).
We are happy to supply other lengths and configurations on request. For the connection configuration of joysticks with digital outputs (CANBus, USB interface) see the respective sections below.



Pin assignment for analog outputs (output options 1-3)

Pin	Function	Color	Pin	Function	Color
1	Ground	black	7	Z axis dual output	gray (old: green / black)
2	Vcc	red	8	Z axis	green
3	X axis dual output	pink	9	Pushbutton 1	orange
4	X axis	blue	10	Pushbuttons 1/2 Common	White
5	Y axis dual output	brown	11	Pushbutton 2	violet
6	Y axis	yellow	12	Not used	Not used





USB specifications (output options 5-6)

Supply voltage	5 V
Max. current consumption:	70 mA
USB version:	2.0
Operating systems:	Windows 7, Windows 8.1, Windows 10, (Linux depending on kernel configuration)
Cable outlet	USB mini B connector (at housing)
Cable (included)	USB cable (length approx. 198 cm) with USB A plug to USB mini B plug.

The USB controller is integrated in the joystick housing. The joystick is powered via the interface cable. Most Windows and Linux versions recognize the device without additional drivers.

There are two different configurations of the joystick available according to the data sheet:

USB HID compliant game controller (option 5)
The device identifies itself on the USB bus as a USB 2.0 HID-compliant game controller, i.e. as a joystick. The axis resolution is 12 bits (0 to 4095).

USB HID-compliant mouse emulation (USB joystick as a mouse replacement, option 6)
Optionally, the joystick can also be operated as a mouse replacement. In this case, the device identifies itself on the USB bus as a USB 2.0 HID-compliant mouse. The X and Y axes are converted in the movement of the mouse pointer on the screen. The third axis acts as an additional input element similar to a mouse wheel and can be assigned various functions by the user. Button 1 is a left mouse button, button 2 is a right mouse button.

For higher quantities or on-going demand, additional options are available

- Button assignment / sequence
- Custom USB product identification

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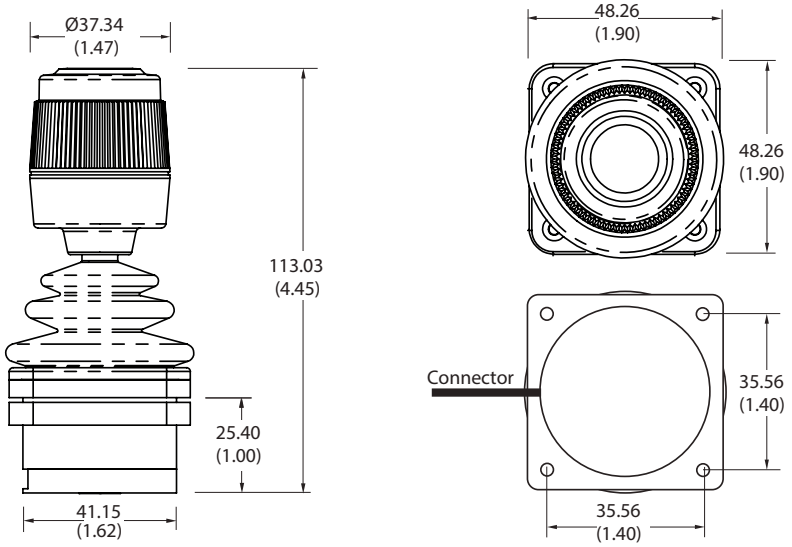
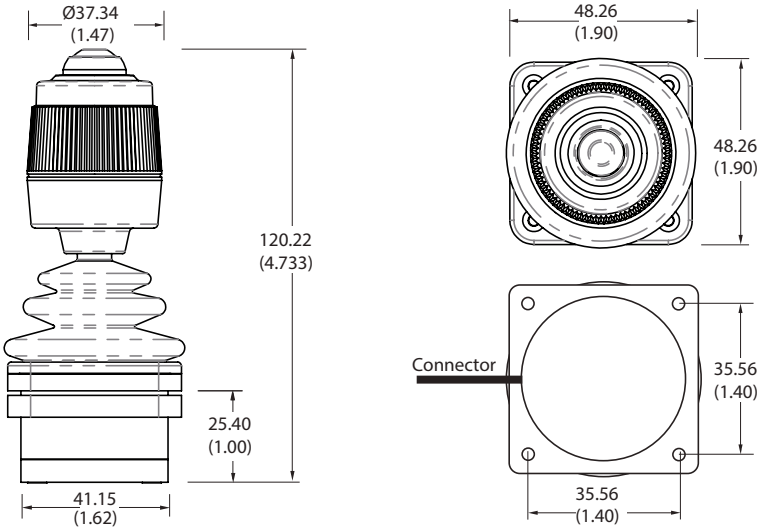
Handle versions

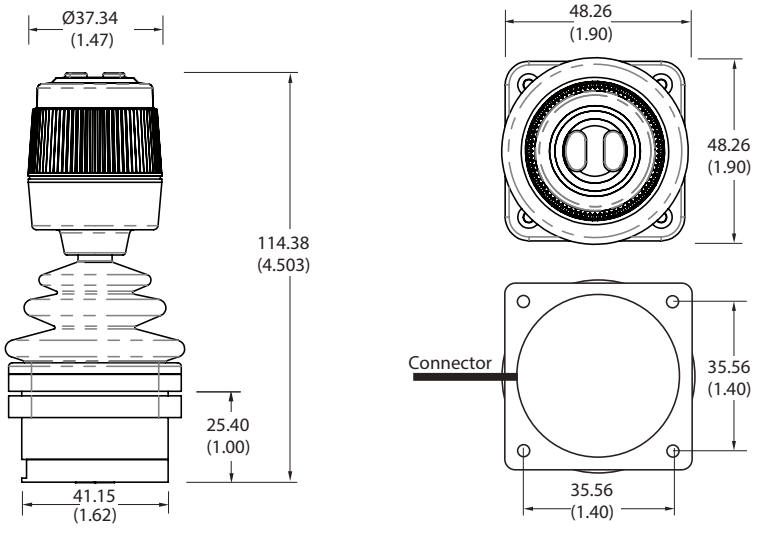
Handle B



Handle C



Handle D



All dimensions in mm (inches)

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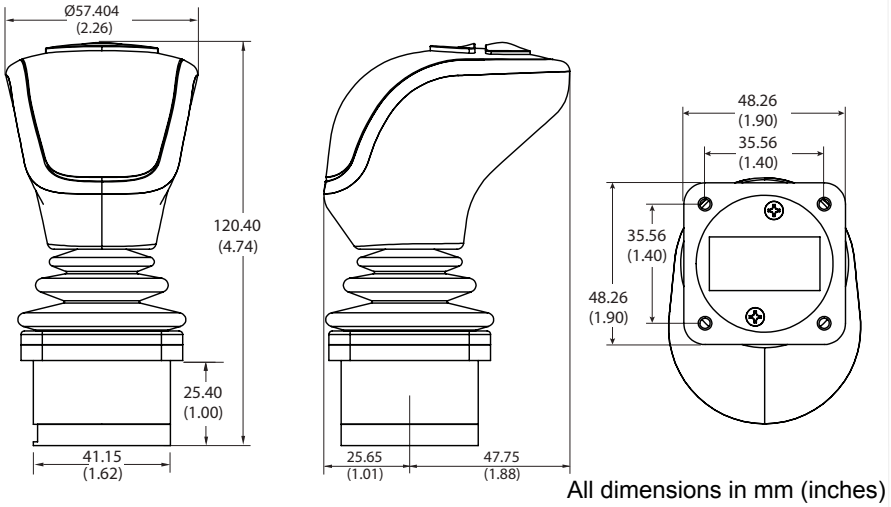
Handle versions

Handle E



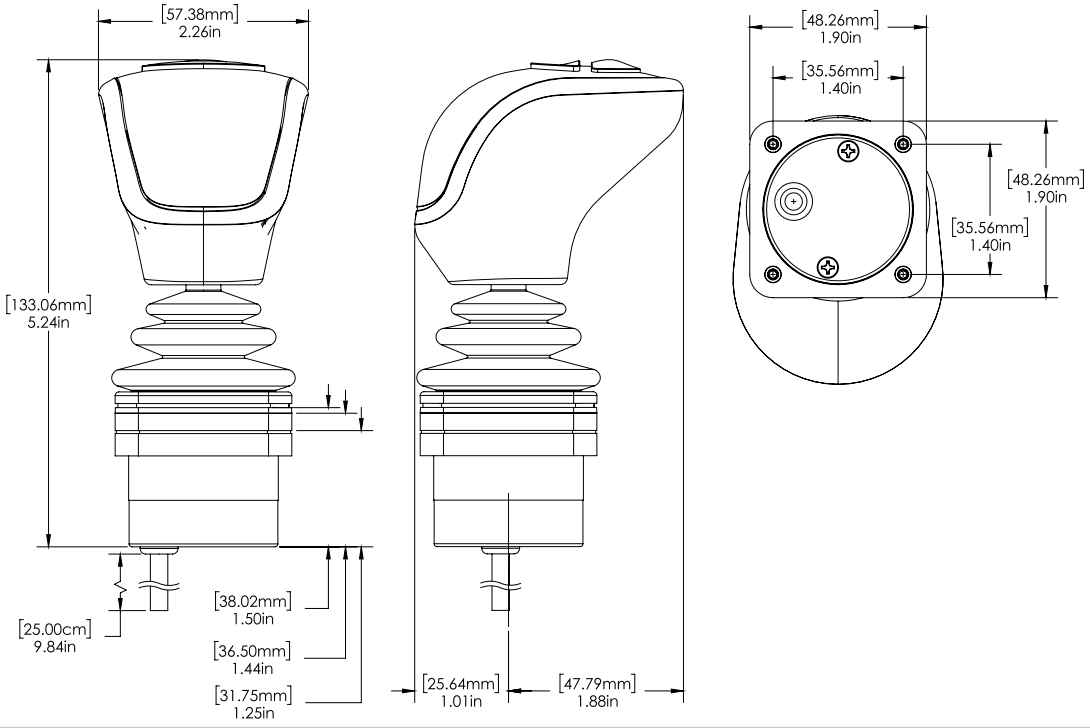
All dimensions in mm (inches)

Technical data voltage regulator (options VU, VB)

As a special option, the joystick TRY120 can be equipped with a voltage regulator, which enables the joystick to be operated with various input voltage signals. There are two variants to choose from: With dhe unipolar variant (VU option), the standard output signals can be selected in the order code. The bipolar variant (option VB) generates a bipolar signal of ±10 V at the axis outputs (middle position at approx. 0 V, output option „0“ only).

Maximum power consumption:	90 mA
Cable assembly:	AWG 28 16.5 ± 1.25 cm PTFE
Supply voltage unipolar variant (VU):	8-35 V
Supply voltage bipolar variant (VB):	11-35 V

Housing dimensions of the voltage regulator versions (options VU, VB)



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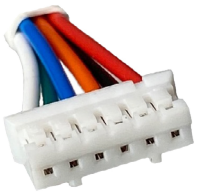
Cable configuration CANBus versions (output options 7-9)

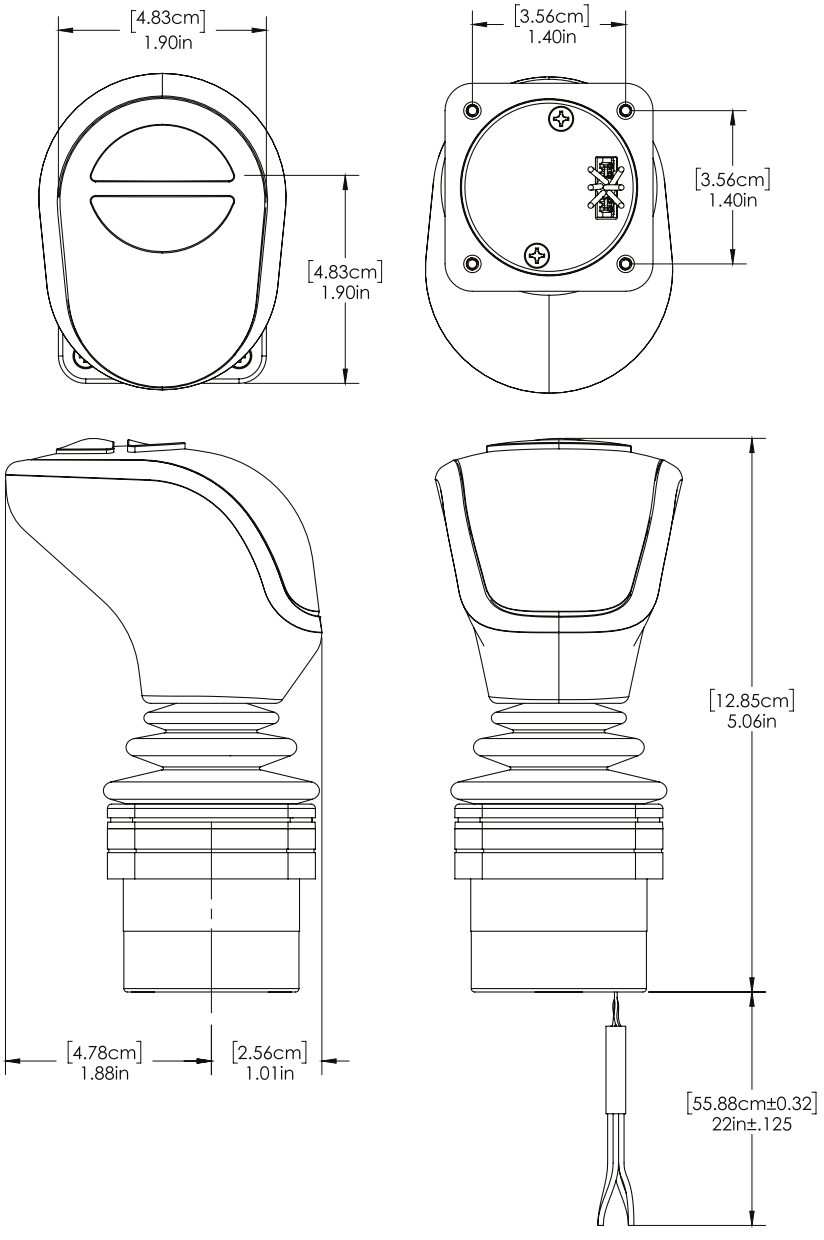
TRY120 series joysticks with CAN bus output (output options 7-9) are delivered with a JST B6B-PH-S (LF) (SN) connector in combination with a 56 cm cable harness (AWG22, PTFE, JST PHR-6 , stripped ends, tinned). The table on the left shows the assignment / functions of the individual pins on the housing or the different strands.

Pin	Color	Function
1	red	Supply voltage 7-35 V
2	black	ground GND
3	green	CAN high
4	White	CAN low
5	blue	ID / Node ID select LSB
6	orange	ID / Node ID Select MSB

Connector JST B6B-PH-S(LF)(SN)
at the housing


Cable harness with connector
JST-PHR-6

Housing dimensions of the CANBus versions (output options 7-9)



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Technical data CAN J1939 version (output option 7)

The TRY120 series can be configured with a maximum of 3 proportional axes and with a maximum of 2 buttons. The axis information and button data are transmitted via a CAN 2.0B-compatible physical interface. Two additional wires allow the address of the controller to be configured. The controller transmits its information in accordance with the SAE J1939-71 protocol. For the exact structure of the data packages, see the tables on the next page.

Transmission repetition rate	50 ms
Terminal resistor	None
Baud rate	250 kbit/s
CAN ID format	29 bit (CAN 2.0B)
BJMI/EJMI interval time	20 ms

For higher quantities or on-going demand, additional options are available

- Redundant joystick versions with CANBus
- Other Baud rates 125 kbit/s, 500 kbit/s, 1 Mbit/s
- Customer-specific CAN addresses and output configuration

Data CAN J1939-71 protocol (output option 7)

• Primary axis and Pushbutton data on Basic Joystick Message 1 (BJM1):
- Priority: 3
- PGN: 0xFDD6
- Source address: 0x16(1)
- Length of data field: 8 bytes

Redundant axis and Pushbutton data on Extended Joystick Message 1 (EJM1):
- Priority: 3
- PGN: 0xFDD7
- Source address: 0x16(1)
- Length of data field: 8 bytes

(1) Alternative source addresses can be configured by grounding the blue and / or orange wires:
- Source address = Ox16: ORANGE = floating, BLUE = floating (standard)
- Source address = Ox26: ORANGE = floating, BLUE = grounded
- Source address = Ox36: ORANGE = grounded, BLUE = floating
- Source address = Ox46: ORANGE = grounded, BLUE = grounded

BJM1 data field configuration (output option 7)

Start position (BYTE/BIT)	Length (BITS)	Function
1/1	2	Primary data X-axis, status neutral position
1/3	2	Primary data X-axis, status left position (minimum value)
1/5	2	Primary data X-axis, status right position (maximum value)
1/7 to 2/8	10	Primary data X-axis, axis position
3/1	2	Primary data Y-axis, status neutral position
3/3	2	Primary data Y-axis, status forward position (maximum value)
3/5	2	Primary data Y-axis, status backward position (minimum value)
3/7 to 4/8	10	Primary data Y-axis, axis position
6/5	2	Button 2 status
6/7	2	Button 1 status

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EJM1 data field configuration (output option 7)

Start position (BYTE/BIT)	Length (BITS)	Function
1/1*	2	Redundant data X axis, status neutral position *
1/3*	2	Redundant data X axis, status left position (minimum value) *
1/5*	2	Redundant data X axis, status right position (maximum value) *
1/7 bis 2/8*	10	Redundant data X axis, axis position *
3/1*	2	Redundant data Y axis, status neutral position *
3/3*	2	Redundant data Y axis, status reverse position (minimum value) *
3/5*	2	Redundant data Y axis, status forward position (minimum value) *
3/7 bis 4/8*	10	Redundant data Y axis, axis position *
5/1	2	Z axis primary data, neutral position status
5/3	2	Primary data Z axis status deflection counterclockwise
5/5	2	Primary data Z-axis status deflection clockwise
5/7 to 4/8	10	Primary data Z axis, axis position

*Redundant outputs are available as a special version

Technical data CANOpen version (output option 8B)

The TRY120 series can be configured with a maximum of 3 proportional axes and 2 buttons. Two additional lines allow the address of the controller to be configured. The following configuration applies to the CANopen® protocol. To use LSS (Layer Setting Service), please select the exit option „9“ according to the order key.

Node ID:	20h
Baud rate:	250 kbit/s
Push button data:	Button status is transmitted in a 1 byte data frame with the identifier 1A0 (180h + node ID)
Axis data:	Axis data are transmitted in a 3 byte data frame with the identifier 2A0 (280h + node ID)
Heartbeat (500 ms):	720h (700h + node ID)
Axis resolution:	8 bit
Network management:	Autostart activated

Alternative node IDs can be configured by grounding the blue and/or orange wires:
- Node ID = 20H ORANGE= floating, BLUE= floating (standard)
- Node ID = 21H: ORANGE= floating, BLUE= earthed
- Node ID = 22H: ORANGE= grounded, BLUE= floating
- Node ID = 23H: ORANGE= grounded, BLUE= grounded

Button data (output option 8B)

Identifier	1A0
Byte 0	Buttons 2:0

Axis data (output option 8B)

Identifier	2A0
Byte 0	A_IN0 [7:0]
Byte 1	A_IN1 [7:0]
Byte 2	A_IN2 [7:0]

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Technical data CANOpen LSS (output option 9)

The TRY120 series can be configured with a maximum of 3 proportional axes and 2 buttons. Two additional wires allow the address of the controller to be configured. The CANopen LSS interface option follows the CiA305 and CiA401 standards from CiA (CAN in Automation). Node ID, baud rate and additional configurations can be configured in the EEPROM Service Data Object can be set and saved. The default settings are as follows:

Node ID:	20h
Baud rate:	250 kbit/s
Push button data:	Button status is transmitted in a 1 byte data frame with the identifier 1A0 (180h + node ID)
Axis data:	10-bit axis data are transmitted in a 6-byte data field with the identifier 2A0 (280h + node ID)
Heartbeat (500 ms):	720h (700h + node ID)
Axis resolution:	10 bit
Network management:	Autostart activated

Alternative node IDs can be configured by grounding the blue and/or orange wires:
- Node ID = 20H ORANGE= floating, BLUE= floating (standard)
- Node ID = 21H: ORANGE= floating, BLUE= earthed
- Node ID = 22H: ORANGE= grounded, BLUE= floating
- Node ID = 23H: ORANGE= grounded, BLUE= grounded

Button data (output option 9)

Identifier	1A0
Byte 0	Taster 2:0

Axis data (output option 9)

Identifier	2A0
Byte 0	A_IN0 [7:0]
Byte 1	A_IN1 [9:8]
Byte 2	A_IN2 [7:0]
Byte 3	A_IN1 [9:8]
Byte 4	A_IN2 [7:0]
Byte 5	A_IN2 [9:8]

For higher quantities or on-going demand, additional options are available

- Redundant joystick versions with CANBus
- Other Baud rates 125 kbit/s, 500 kbit/s, 1 Mbit/s
- Customer-specific CAN addresses and output configuration

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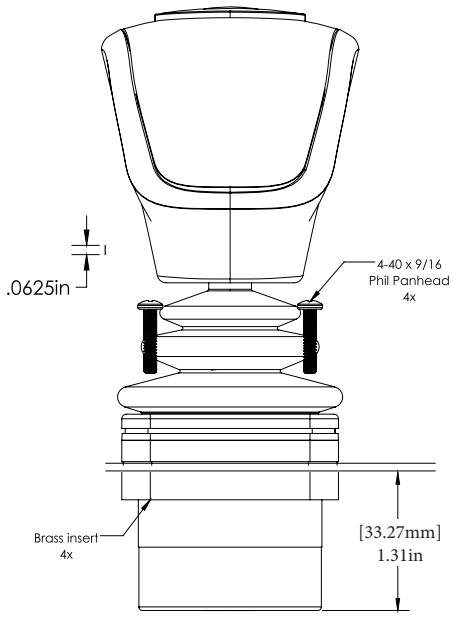
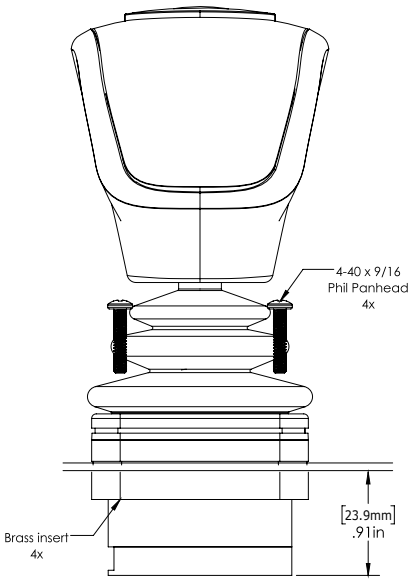
Mounting Options

Each joystick is supplied with 1 seal, 1 clamping ring and 4 pieces of mounting screws type 4-40 x 9/16.

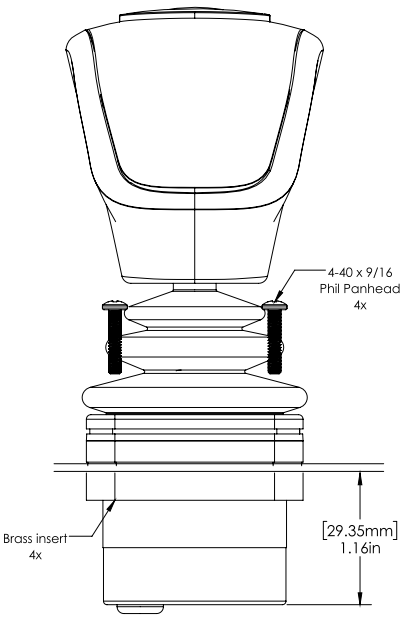
Drawings for panel thickness 1.6 mm (max. 3.17 mm)



CANBus variants
(Output options 7-9)

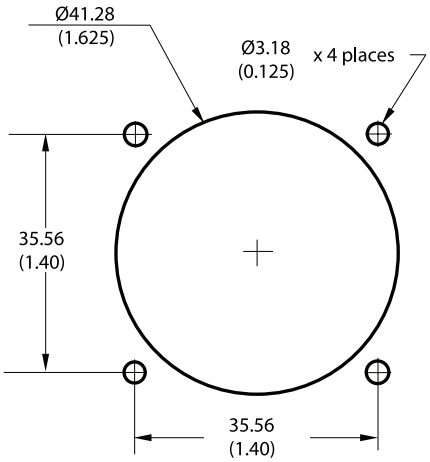


Analog variants
without voltage converter
(Output options 1-3)
as well as USB variants
(Output options 5 and 6)

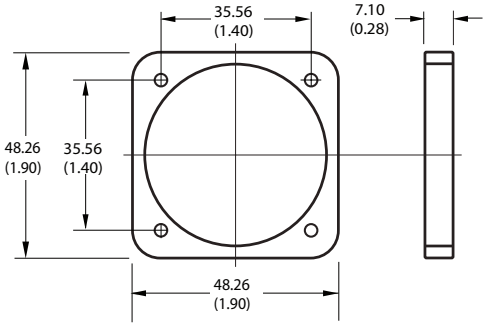


Analog variants
with voltage converter
(Output options 1-3,
Special options VU and VB)

Panel cut-out



Clamping ring



All dimensions in mm (inches)