

700 Electronic joystick

Joystick series 700 combines proportional electric outputs with switches, rockers and push button. The above functions can be implemented on many different types of handles. Electrical outputs are full programmable for voltage, current, PWM and CANBus.

The electronic circuit is fully protected against water and any kind of contaminants. Thanks to its particular enclosure, IP67 is guaranteed for the whole electronic circuits and environmental contamination is minimized.


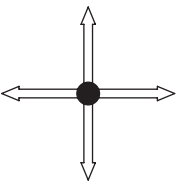
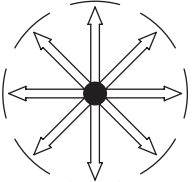
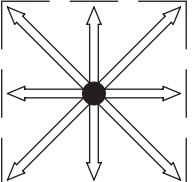
Measuring position is through Hall effect sensors which guarantee a precise proportional control in the whole working area with programmable reaction time for any kind of movement of the joystick's lever.

Programming via PC guarantees full flexibility in the setting of the interface profiles. Its strong structure guarantees long life operation also in case of misused conditions.

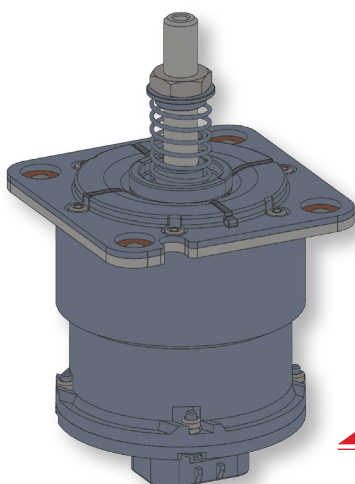
The joystick is available in the versions:

- single axis
- dual axis (simple)
- dual axis with full range movements
- dual axis with limited crossed movements

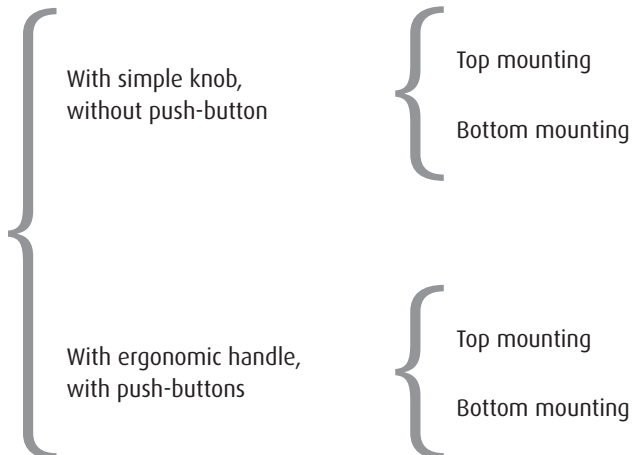


<p>Single axis</p>  <p>Code: DDD=710</p>	<p>Dual axis with orthogonal crossed movements</p>  <p>Code: DDD=720</p>	<p>Dual axis with movements limited on circle boundary</p>  <p>Code: DDD=730</p>	<p>Dual axis with full range movements</p>  <p>Code: DDD=740</p>
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It can be configured either for top or for bottom mounting; the base mechanism, combined with specific accessories produces different joystick versions:

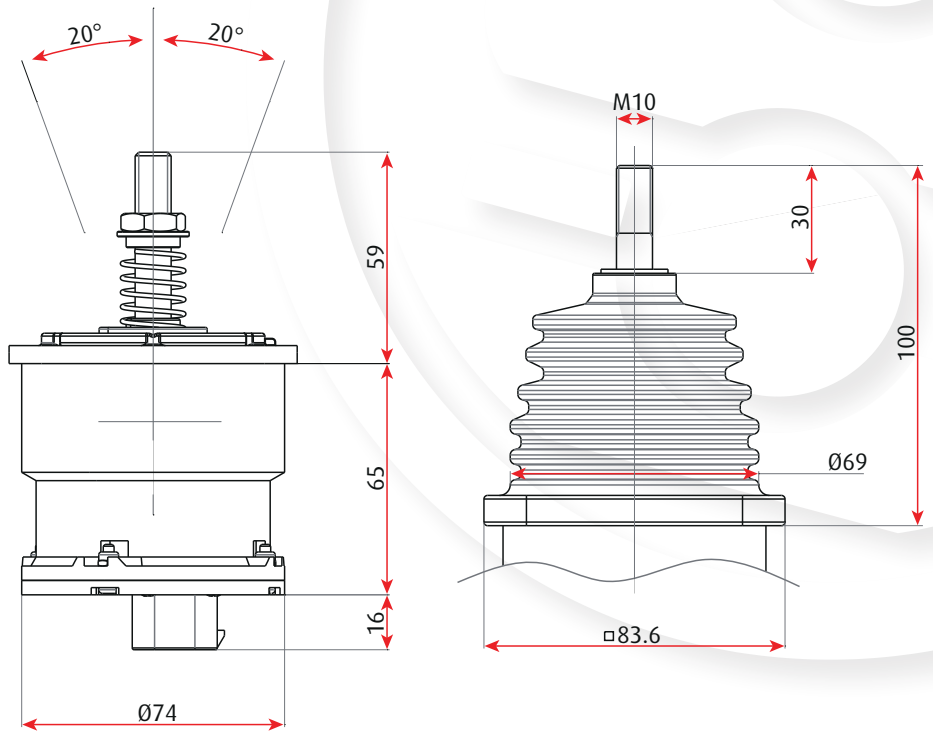
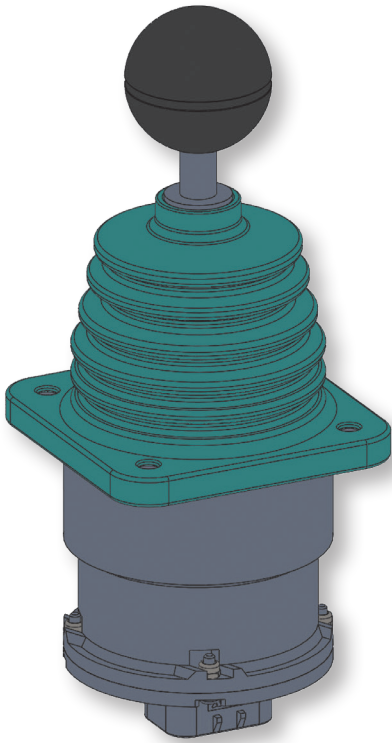


Base mechanism

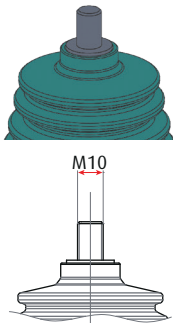


DIMENSIONS & CONFIGURATIONS

Joystick with simple knob, without push-button

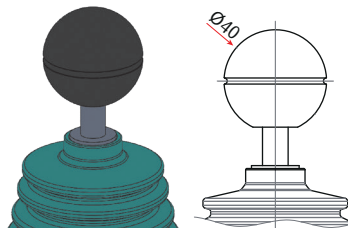


No knob, thread M10



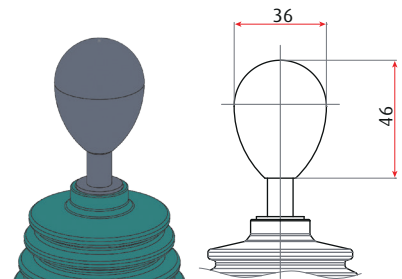
Code: K=0

Round knob



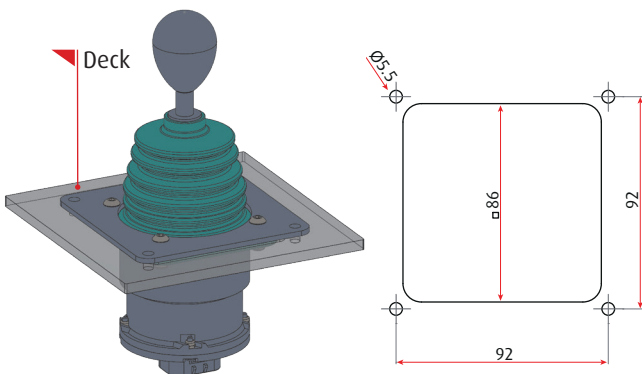
Code: K=1

Ogival knob



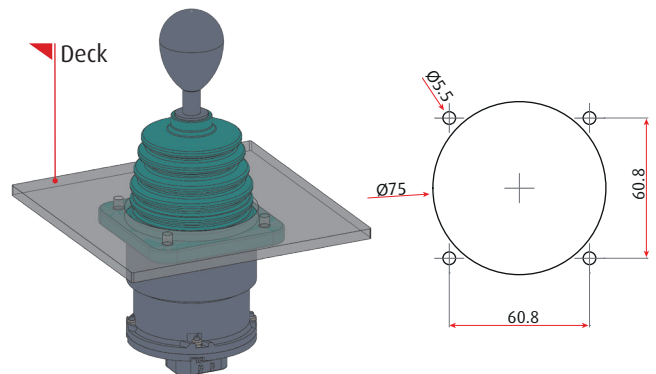
Code: K=2

Top mounting



Code: J=0

Bottom mounting

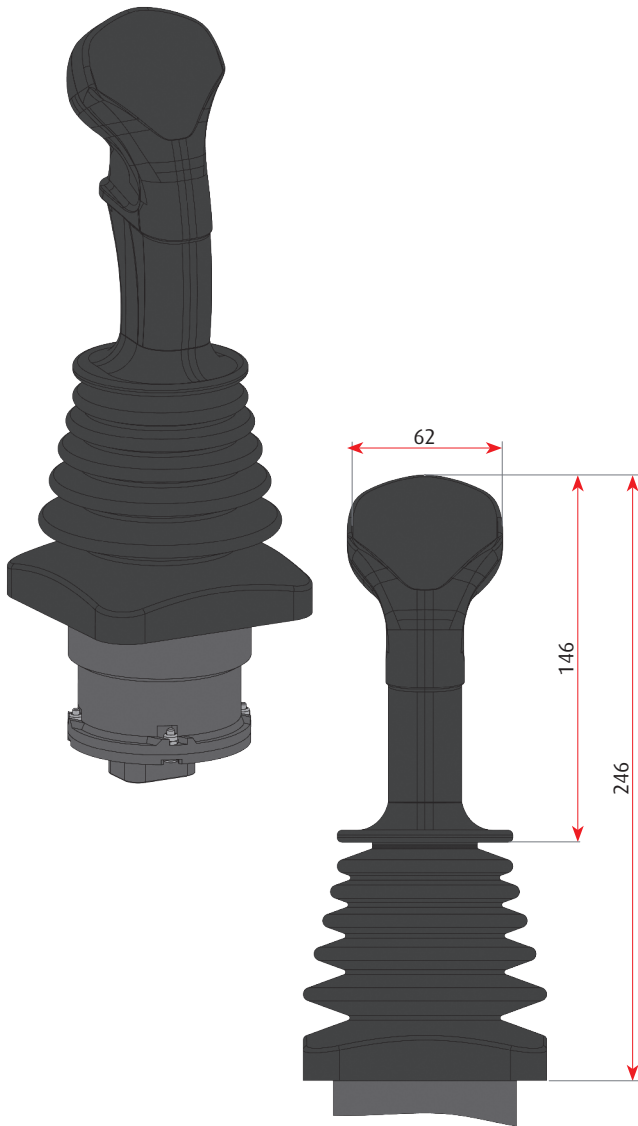


Code: J=2



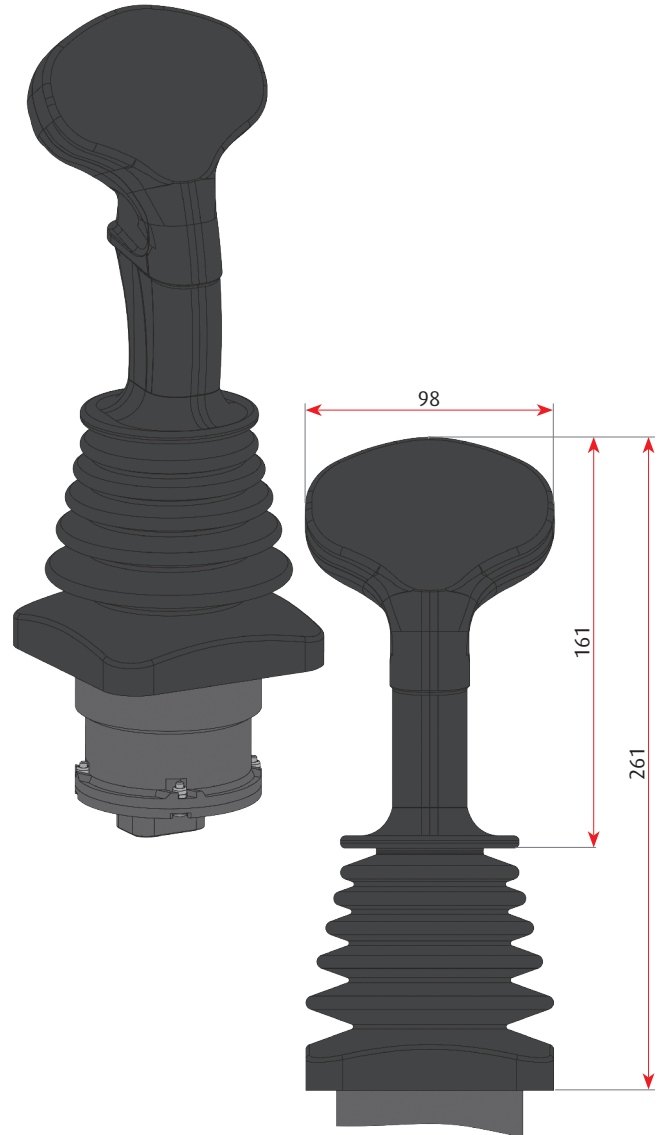
JOYSTICK WITH ERGONOMIC HANDLE

Handle type 1725



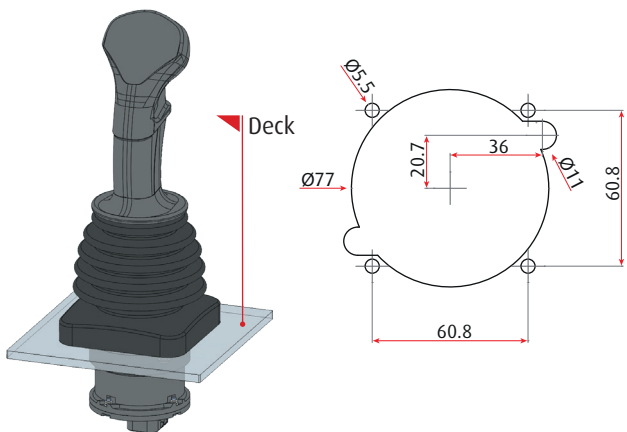
Code: K=3

Handle type 1730



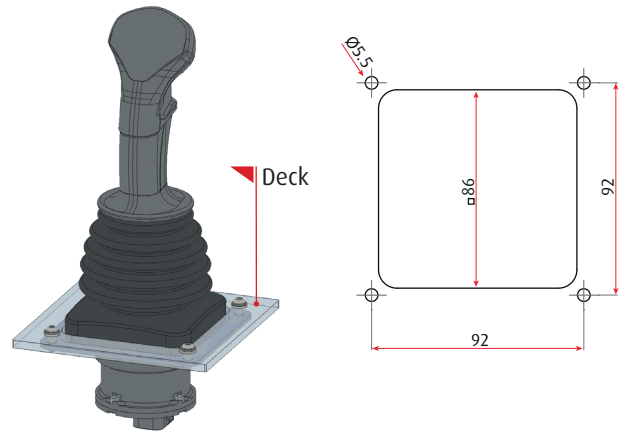
Code: K=4

Top mounting



Code: J=1

Bottom mounting



Code: J=3



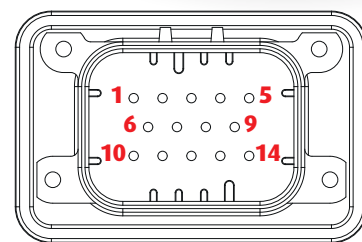
SPECIFICATION

MECHANICAL AND GENERAL SPECIFICATION	
Life	5 million cycles
Operating temperature	-40°C : 85°C
Protection	IP67
Travel on axis	20°
Travel at 45 °	28°
Force to come out of centre	600 gr
Force at 20 °	750 gr
Force at 28 °	900 gr
Max static load on X axis (190 mm from the rotation point)	1000 N
Max static load on Y axis (190 mm from the rotation point)	1000 N
Max static load on Z axis	500 N

CONNECTOR PINOUT

Electronic connector is placed under the base of the joystick body. This is a standard TE connector Vertical HDR for printed circuit board applications with 14 poles. It should be matched with TE connector code 776273-1 or similar.

According to the different electronic joystick versions, it follows the cabling:



Pin	Joystick versions		
	DAC (Voltage) 1.2	PWM (Coils Driver) 2.2	CAN Bus 2.0
1	Analog Output (0-5V) - A	Low Side Coil AN	NPN DIN 1
2	Analog Output (0-5V) - B	Low Side Coil AP	NPN DIN 2
3	Analog Output (0-5V) - C	All Coils Power Supply	NPN Din 3
4	Analog Output (0-5V) - D	Low Side Coil BP	Can H
5	Optional +5V ref. Input	Low Side Coil BN	Can L
6	+V Supply (8 / 32 Vdc)		
7	Factory reserved - Do Not Connect		
8	Factory reserved - Do Not Connect		
9	GND		
10	High Side Digital Output - E	Low Side Coil CN	NPN Din 4
11	High Side Digital Output - F	Low Side Coil CP	NPN Din 5
12	High Side Digital Output - G	Low Side Digital Output	NPN Din 6
13	High Side Digital Output - H	Low Side Coil DP	NPN Din 7 - Pot. 1
14	GND	Low Side Coil DN	NPN Din 8 - Pot. 2

Notes:

- PNP Din inputs must be supplied from 5V to 24V
- NPN Din inputs must be shorted to GND
- High Side outputs are +V Supply - 500mA capable
- Low Side output is 2A capable



CODING SYSTEM FOR ELECTRONIC JOYSTICK

DEVICE				MOUNTING		TYPE OF SIGNAL	HANDLE		PUSH BUTTONS			SPECIAL CUSTOM PROJECTS	
D	D	D	-	J	.	S	K	.	P1	P2	.	X	X

The code is composed of 10 digits which correspond to the following:

D	D	D
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 define the product and the joystick version:

DDD = 710 single axis

DDD = 720 dual axis with orthogonal crossed movements

DDD = 730 dual axis with movements limited on circle boundary

DDD = 740 dual axis with full range movements

J

 defines the type of mounting:

J = 0 bottom

J = 1 top

S

 defines the type of signal:

S = 0 voltage

S = 1 PWM

S = 2 4-20 mA

S = 3 Canbus

K

 defines the type of handle
(for complete description of handles refer to Chapter 7 of the Industrial Catalogue):

K = 0 without handle

K = 1 simple knob, round

K = 2 simple knob, ogival

K = 3 handle type 1725 (ergonomic handle)

K = 4 handle type 1730 (ergonomic handle XL)

P1	P2
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 define the number, type and position of switches:

P1 = number of push buttons low current (200 mA)

P2 = number of push buttons high current (4 A)

X	X
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 A numbering system 0 to 99 is used to define special projects, cable length, number of poles, type of connector, special switches and their position, dead man function, rocker, etc.

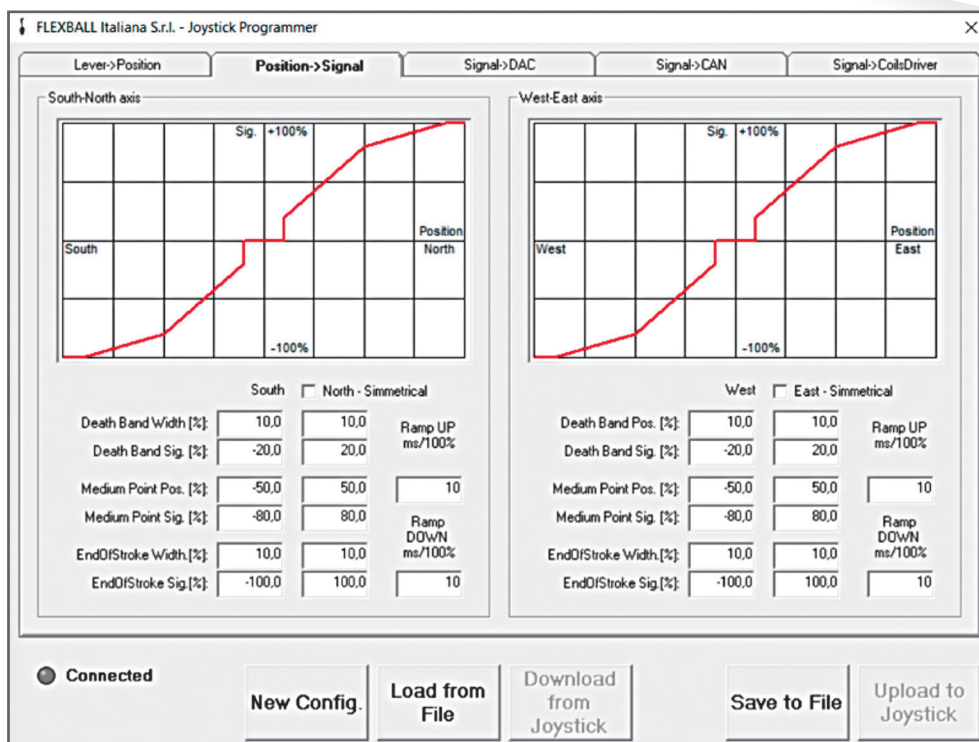
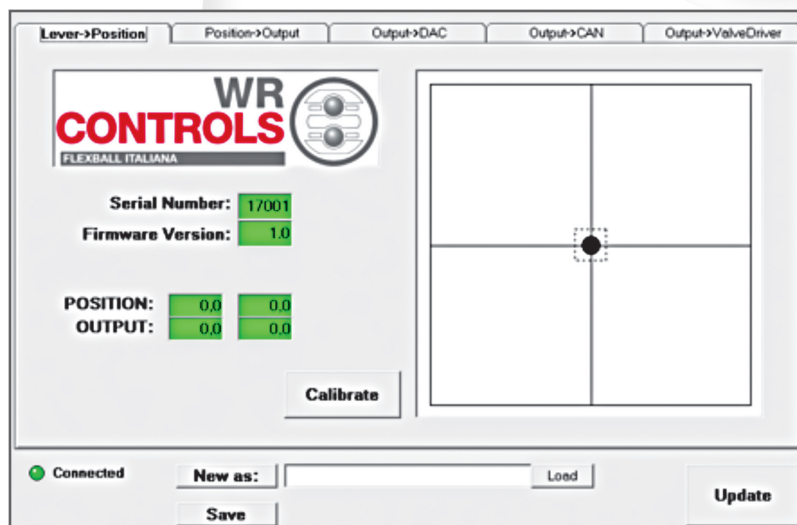
THE JOYSTICK PROGRAMMER

With this Pctool you define the correlations between the lever and the output signals.

The two axis are completely independent; for each axis it is possible to define:

- the dead band around neutral detent
- signal profiles for north-south axis and respectively for east-west axis. Points which define the transfer function are:
 - starting point after dead band zone
 - value at medium travel
 - end of travel
- ramp-up time (in ms)

If the electronic joystick is connected to the PC, through the Joystick Programmer you can verify the results of your programming and eventually change the parameters and verify runtime the effect of the new setting.



VOLTAGE

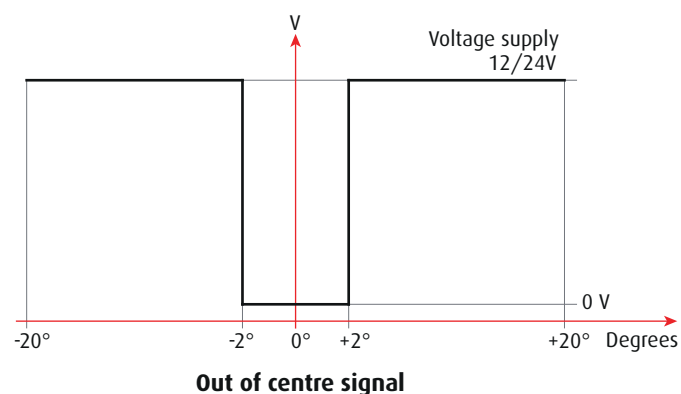
There are available 4 analogue and 4 digital signals. The analogue signal is fully programmable within the range 0-5 V and can represent:

1. either a half stroke (from centre of axis to one of the poles)
2. or a full stroke from one pole to its opposite (from e.g. South to North pole or for West to East pole).

In case 1, there is only one analogue signal per each half stroke.

In case 2, are available two voltage signals per every full stroke. From programming it is possible to keep the programming of the 2 axis completely independent or to make setting of axis WE (West -East) equal to SN (South-North).

The 4 digital signals detect the out of centre position. Centre or Dead band position is fully programmable as described at previous page. Each out of centre position signal can withstand a current of 500 mA and its profile is according to the drawing here below.

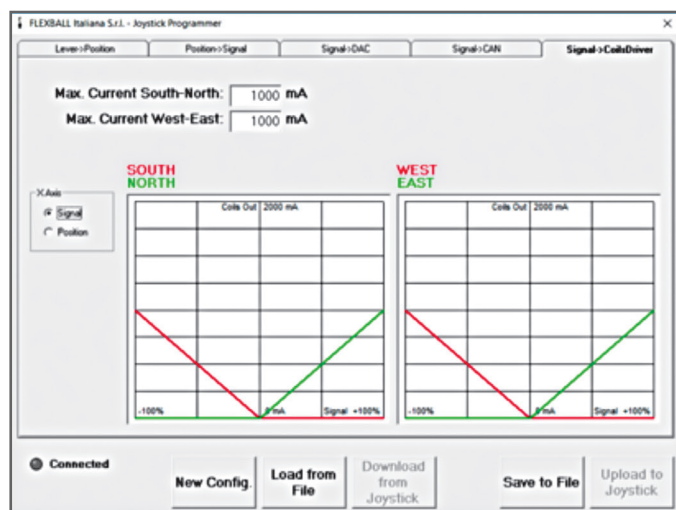
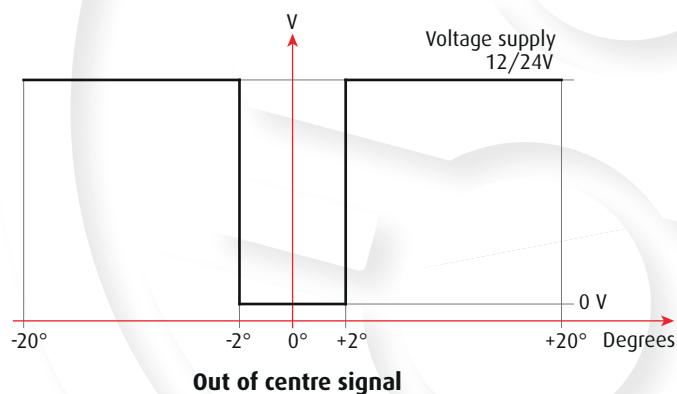


PWM

There are available 4 PWM and 4 digital signals. Each PWM signal is fully programmable within the range 0-100% and represents the half stroke from centre of axis to the pole.

The 4 digital signals detect the Out of centre position. Dead band position is fully programmable as previously described.

Each out of centre position signal can generate a current of 500 mA and its profile is according to the drawing here below.



CANBUS IS ACCORDING TO SAE J1939

FLEXBALL Italiana S.r.l. - D-0700 Electronic Joystick Programmer

Lever->Position | Position->Signal | Signal->DAC | **Signal->CAN** | Signal->CoilsDriver

Baudrate: 120 Ohm Term.
 Axis MaxValue:
 Inv. Axis S/N
 Inv. Axis W/E
Pots MaxValue:
 Inv. Pot. 1
 Inv. Pot. 2

Switch 1	Switch 2	Switch 3	Switch 4	Switch 5	Switch 6	Switch 7	Switch 8
<input type="checkbox"/> Toggle	<input type="checkbox"/> Toggle	<input type="checkbox"/> Toggle	<input type="checkbox"/> Toggle	<input type="checkbox"/> Toggle	<input type="checkbox"/> Toggle	<input type="checkbox"/> Toggle	<input type="checkbox"/> Toggle
<input type="checkbox"/> Negate	<input type="checkbox"/> Negate	<input type="checkbox"/> Negate	<input type="checkbox"/> Negate	<input type="checkbox"/> Negate	<input type="checkbox"/> Negate	<input type="checkbox"/> Negate	<input type="checkbox"/> Negate
<input type="checkbox"/> HandON							

Tx1: ID=0x1000, Rate=50 ms | Tx2: Disabled | Rx: Disabled

CAN Bus ID: Hex | Refresh Time: ms

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
AxisSN lsb	AxisSN msb	Axis WE lsb	Axis WE msb	Switches	None	None	Counter

Axis SN -WE: the value of "Signal" in one direction, Range = +/- MAXVALUE
 Axis S - N - W - E: the value of "Signal" in one only versus, Range = 0 / MAXVALUE

Connected

| | | |

From here you have full programming access. In the red frame are depicted the parameters and function for the general setting of the communication.

Parameter/function	Range/number/configuration
Baudrate	From 125 Kbit/s to 1 Mbit/s
End of line/Ohm termination	120 Ohm
Accuracy of position signal of axis X and Y	From 100 to 10.000 bit with the possibility to invert the signal
Analogue input (for e.g. potentiometer, max 2)	From 100 to 10.000 bit with the possibility to invert the signal
Switches or digital input (max 8)	Momentary - Toggle - Negate - Hand on (for only switch 1)

Analog and digital signals come from the potentiometers, pushbuttons, switches, capacitive switches which are mounted on the knob. Their signals enter into the joystick, are then converted and transmitted via the CANbus network.

In the yellow frame it is possible to configure further parameters and functions. It follows the list:

Parameter/function	Range/number/configuration
CANBus ID	HEX format
Transmission refresh time	From 10 to 1000 ms
Message package	8 bytes

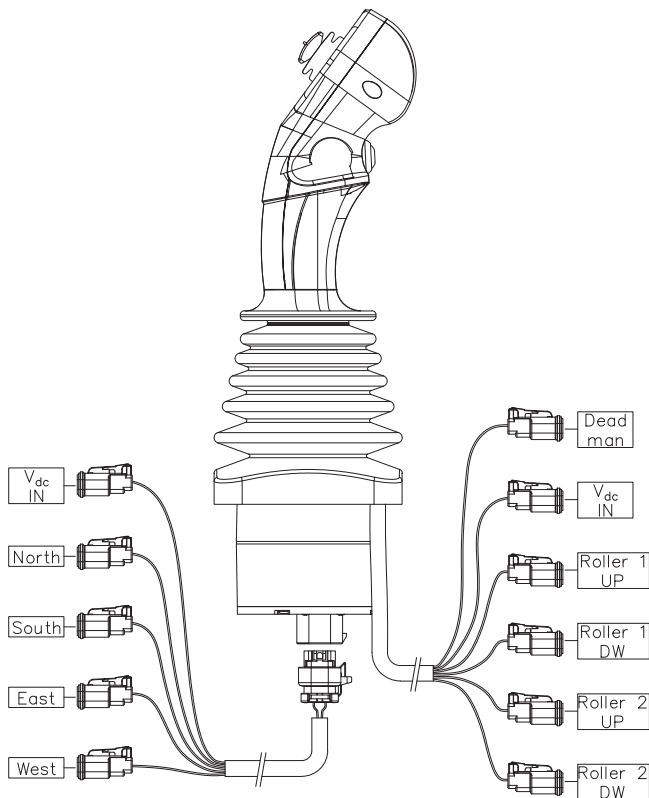
Byte 0	Byte 4
AxisSN lsb	Switches
AxisSN msb	Axis E lsb
Axis WE lsb	Axis E msb
Axis WE msb	Pot. 1 lsb
Axis S lsb	Pot. 1 msb
Axis S msb	Pot. 2 lsb
Axis N lsb	Pot. 2 msb
Axis N msb	Switches
	Counter

Communication is via messages of 8 bytes. Each byte is freely configurable. Here beside are reported some of the possible information that can be stored in each byte.

For the communication between the joystick and the other devices of the CANBus network you have available as standard 3 frames: TX1, TX2 and RX1.

<p>Tx1: ID=0x1000, Rate=50 ms Tx2: Disabled Rx: Disabled</p> <p>CAN Bus ID: 1000 Hex Refresh Time: 50 ms</p> <p>Byte 0 Byte 1 Byte 2 Byte 3 Byte 4 Byte 5 Byte 6 Byte 7</p> <p>AxisSN lsb AxisSN msb Axis WE lsb Axis WE msb Switches None None Counter</p> <p><small>Axis SN - WE: the value of "Signal" in one direction, Range = +/- MAXVALUE Axis S - N - W - E: the value of "Signal" in one only versus, Range = 0 / MAXVALUE</small></p>	Tx1 = transmission frame (main frame)
<p>Tx1: ID=0x1000, Rate=50 ms Tx2: Disabled Rx: Disabled</p> <p>CAN Bus ID: 0 Hex Refresh Time: 50 ms</p> <p>Byte 0 Byte 1 Byte 2 Byte 3 Byte 4 Byte 5 Byte 6 Byte 7</p> <p>None None Switches None None None None None</p> <p><small>Axis SN - WE: the value of "Signal" in one direction, Range = +/- MAXVALUE Axis S - N - W - E: the value of "Signal" in one only versus, Range = 0 / MAXVALUE</small></p>	Tx2 = transmission frame; it is a second further frame
<p>Tx1: ID=0x1000, Rate=50 ms Tx2: Disabled Rx: Disabled</p> <p>CAN Bus ID: 0 Hex <input checked="" type="checkbox"/> Switchoff after Timeout of 200 ms</p> <p>Drive the LEDs with Byte: 0</p> <p>1 2 3 4 5 6 7</p>	Rx = receive frame, mainly used to control from remote (switch on/off) the LEDs on the knob

APPLICATION EXAMPLES



Stand alone solution

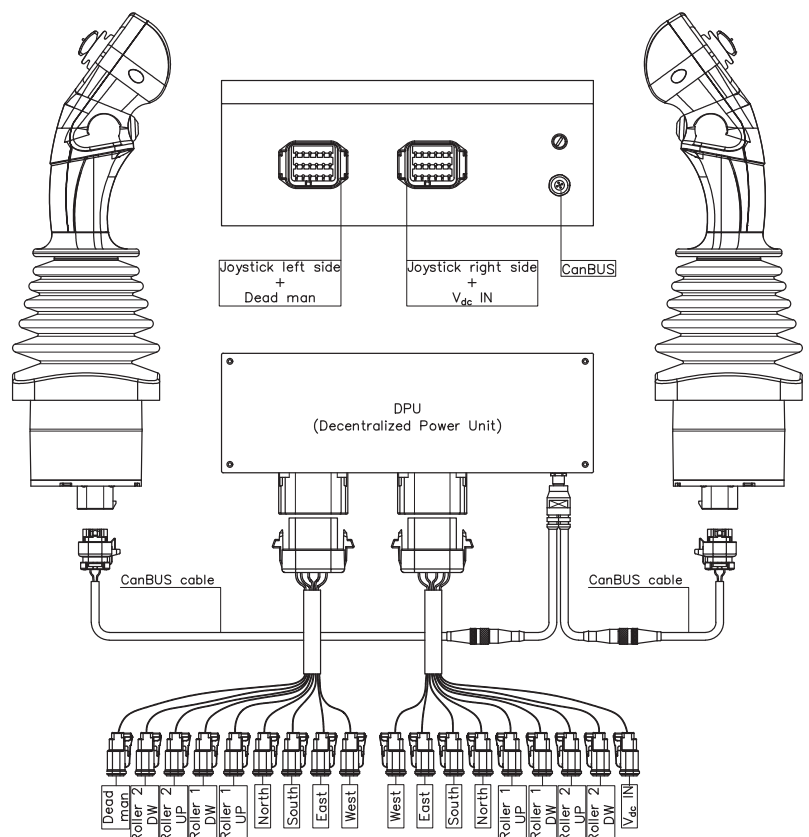
The joystick can directly command the proportional valves of an hydraulic distributor.

There 8 PWM signals:

- 4 signals are proportional to the joystick movements
- 4 signal are generated on the handle via proportional rollers.

Decentralized solution

The commands go from the joysticks to a Power Distribution Unit via a digital signal (CANBus). The Decentralized Power Unit generates the commands to the hydraulic distributor valves (power PWM signals). The distance between the joystick and the Decentralized Power Unit can be of any length, giving full flexibility to the installation.



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