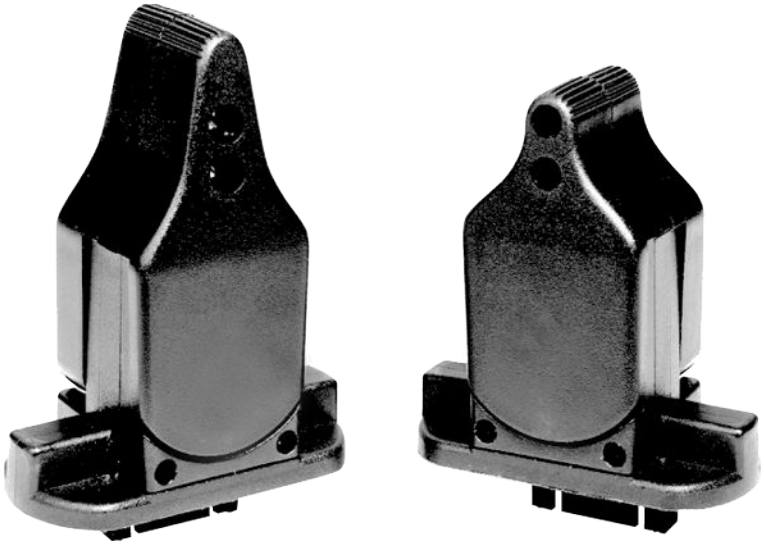
ENGINEERING
TOMORROW

Technical Information

Joysticks
JS120 Single Axis Fingertip Joystick



Revision history

Table of revisions

Date	Changed	Rev
October 2017	Cable 10101762 is obsolete, replaced with part number 162U1010	0304
December 2016	Corrected pinout drawing	0303
April 2016	Updated to Engineering Tomorrow design	0302
November 2015	Converted to Danfoss layout	0301
July 2009	Corrected connector pin assignments and added output voltage curve	DA
February 2007	Lever length options; connector pin assignments	CA
May 2006	Model code number	BA
May 2006	Typical contact resistance to ohms	AA

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Overview

JS120 description

Danfoss has developed the JS120 base to meet the harsh operating requirements of today's mobile machine market.

Developed for applications where ergonomics and system integrity are paramount, the JS120 is a minimum width, low profile joystick that provides precise fingertip control in one axis. The low profile lever makes the JS120 less susceptible to unintentional operation and the minimum under-panel footprint makes it ideal for mounting in panels and operator arm rests. The JS120 is sealed to IP 66 above panel to enable it to operate in extreme environments.

Designed for use with electronic controllers, the joystick generates analog and switched reference signals proportional to the distance and direction over which the handle is moved. The output is configured to provide signals for fault detection circuits and a center tap provides an accurate voltage reference for the lever in its released position, or a zero point for a bipolar supply voltage. Electrically independent direction switches are also available.

This publication describes the technical features and data required to specify the JS120 base for your application.

Features and options

- Long life potentiometric sensing
- Single axis
- Spring center return and end return options
- Slim profile with low operating forces
- Easy installation
- Operating life > 5 million cycles
- Output options
  - 10 to 90 % Vs
  - 25 to 75 % Vs
- IP 66 environmental sealing above panel
- Independent direction switch signals
- Width only 26.5 mm (1.04 in)
- Ergonomic design
- Choice of two lever heights

Product configuration model code

The product configuration model code specifies particular features when ordering the JS120. The model code begins with the product family name and the remaining fields are filled in to configure the product with the desired features.

Model code summary

Product configuration model code sample

A	B
JS120	0002

A—Product series

Code	Description
JS120	Series JS120 Joystick

B—Lever length and output voltage range options

Code	Description
0002	Short lever, 10 to 90% Vs output range, 5 kΩ, spring return to center
0003	Short lever, 25 to 75% Vs output range, 5 kΩ, spring return to center
0005	Long lever, 10 to 90% Vs output range, 5 kΩ, spring return to center
0006	Long lever, 25 to 75% Vs output range, 5 kΩ, spring return to center
0008	Long lever, 10 to 90% Vs output range, 5 kΩ, spring return to end
0009	Long lever, 25 to 75% Vs output range, 5 kΩ, spring return to end
0010	Short lever, 10 to 90% Vs output range, 5 kΩ, spring return to end
0011	Short lever, 25 to 75% Vs output range, 5 kΩ, spring return to end

Vs = supply voltage

Product configuration model code

Center tap

A center tap (spring return to center option) is a standard JS120 feature, where 50% of the supply voltage can be supplied to force the sensor voltage to this known reference. When the center tap is not connected there will be a center dead band (where the voltage output does not change on initial deflection).

Padding resistors

The JS120 potentiometer track has resistors placed in series with the main resistive element. These resistors are used to reduce the outputs at full mechanical deflection. This is a safety feature that the machine control system can use to determine a broken wire or short circuit to full voltage or ground. The degree to which the output is reduced can be chosen from the Code B table in *Model code summary* on page 5.

Position switches

Position switches are a standard JS120 feature. The normally open switches close at the angles specified in the table below indicating forward and reverse travel of the lever. These switches are connected independently of the proportional potentiometric elements and can be terminated by the customer to provide center on/off data to the control system.

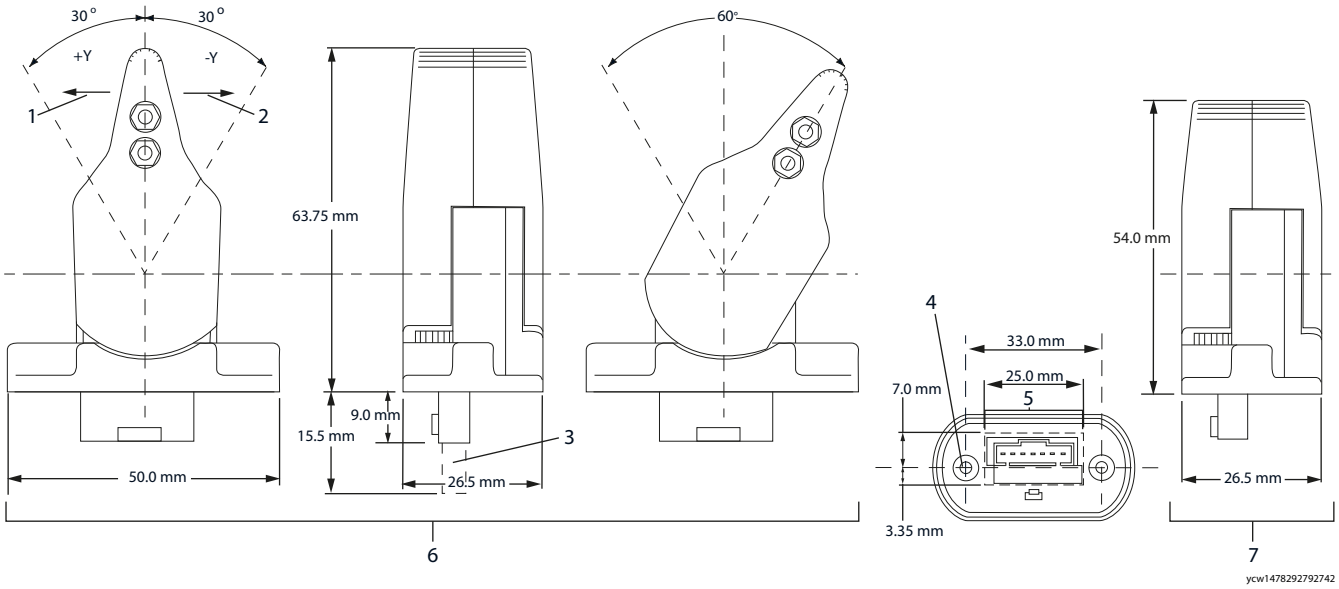
Specifications

Switch operating angle	5˚ either side of center (± 1˚ tolerance)
Maximum supply voltage—maximum Vs	< 35 Vdc
Minimum load resistance	10 kΩ
Maximum load current	2 mA resistive
Typical contact resistance	150 Ω

Product installation

Dimensions and mounting

Dimensions



1.	Forward	2.	Backward
3.	Connector	4.	Panel clearance holes 3.10 mm
5.	Panel cut out	6.	Long lever
7.	Short lever		

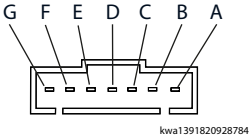
JS120 is designed to be fitted down into the panel, through the panel cutout. Panel seal integrity can be achieved by using sealing gasket. Mounting screws can be driven to a recommended torque of 1 N•m (9 lbf•in). The joystick is fitted with 2 x M3 inserts and the maximum screw penetration is 6 mm plus panel thickness.

Product installation

Connector pin assignments

Connector

Pin assignments (connector end view)



Pinout and wiring information

Pin	JS120-0002, 0003, 0005, 0006	JS120-0008, 0009, 0010, 0011
G	Direction switch common	Direction switch common
F	Direction switch +Y (N/O)	Direction switch (N/O)
E	Direction switch -Y (N/O)	Not used
D	(-) supply (ground)	(-) supply (ground)
C	Output voltage	Output voltage
B	(+) supply (power)	(+) supply (power)
A	Center tap	Not used

Marker on underside of mating connector indicates pin G

Mating connector details

Mating connector – AMPMODU MTE series

Connector	AMP ordering number
7 pin latching male	103957-6

Mating connector assembly

Type	Danfoss ordering number
7 pin with 610 mm [24.02 in] leads	162U1010

Product installation

Machine wiring guidelines

Joystick safety

Joystick dust and water protection

The joystick is sealed above the mounting surface to prevent dust and water ingress and is supplied with a sealing gasket for mounting above the panel. The effectiveness of the seal is dependent on the mounting surface being sufficiently rigid to compress the sealing gasket. The finish of the mounting surface is critical to achieving an adequate seal and rough surface finishes, paint chips, deep scratches, etc. should be avoided.

The joystick base below the mounting surface should be protected from dust and direct water spray.

Joystick safety critical functions

For a system to operate safely it must be able to differentiate between commanded and uncommanded inputs. Take steps to detect and manage joystick and system failures that may cause an erroneous output.

For safety critical functions Danfoss recommends you use an independent momentary action system enable switch. You can incorporate this switch into the joystick as an operator presence switch or can be a separate foot or hand operated momentary switch. Disable all joystick functions that the joystick controls when this switch is released.

Ensure the control system looks for the appropriate system enable switch input before the joystick is displaced from its neutral position. Enable functions only after receiving this input.

Applications using CAN joysticks should continuously monitor for the presence of the CAN messages on periodic basis. Messages are to be checked frequently enough for the system or operator to react if the CAN messages lose priority or are no longer received.

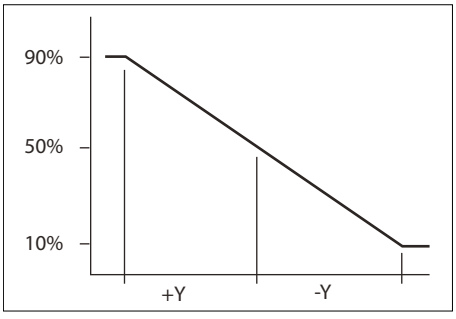
Product specifications

Electrical characteristics

Electrical characteristics

Sensor type	Potentiometric
Electrical angle of movement center return	28° ± 1°
Electrical angle of movement end return	Start 2° ± 1°, end return full angle 56° ± 1°
Total track resistance	5 kΩ (± 20%)
Maximum supply voltage (Vs)	35 Vdc
Maximum wiper current	5 mA (non-destructive)
Maximum power dissipation	0.25 W at 20°C [68°F]
Wiper circuit impedance	200 kΩ minimum
Output voltage	10 to 90% Vs 25 to 75% Vs
Resolution	Infinite
Center tap voltage (no load)	50% Vs ± 2%
Center tap angle (center return)	± 2.5° either side of center (± 1° tolerance)
Insulation resistance	> 50 MΩ at 500 Vdc
Load resistance minimum	10 kΩ
Load current maximum	2 mA resistive

Output voltage curve



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Mechanical characteristics

Mechanical characteristics

Description	Short lever	Long lever
Breakout force (at lever tip)	3.1 N [0.70 lbf]	2.3 N [0.52 lbf]
Operating force (at tip, full deflection)	5.1 N [1.15 lbf]	3.4 N [0.76 lbf]
Maximum allowable force	50 N [11.24 lbf]	35 N [7.87 lbf]
Lever operating angle	30° ± 1° center return 60° ± 1° end return	
Lever action	Self centering or end return	
Expected life	> 5 million cycles	
Weight	0.045 kg [0.099 lb]	

Product specifications

Environmental parameters

Environmental parameters

Operating temperature	-25°C to 70°C [-13°F to 158°F]
Storage temperature	-40°C to 85°C [-40°F to 185°F]
Environmental sealing above the flange	IP 66 above panel, IP 40 below panel

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