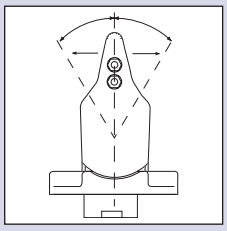
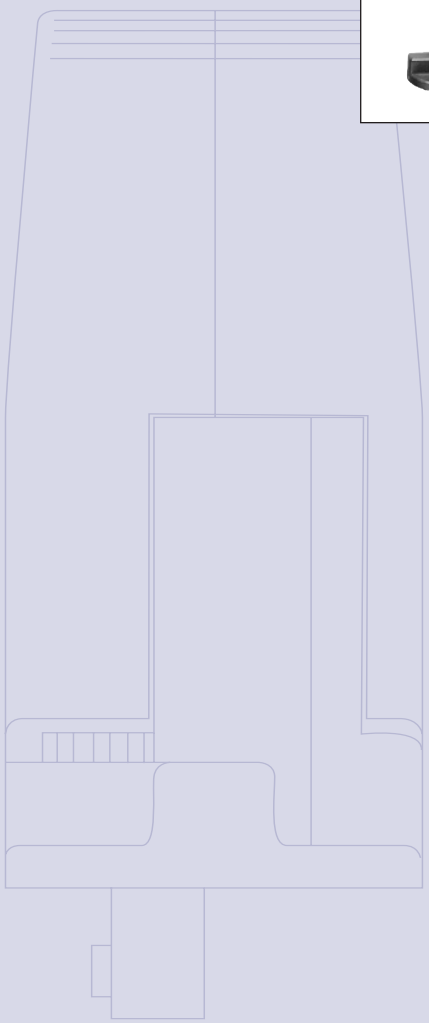
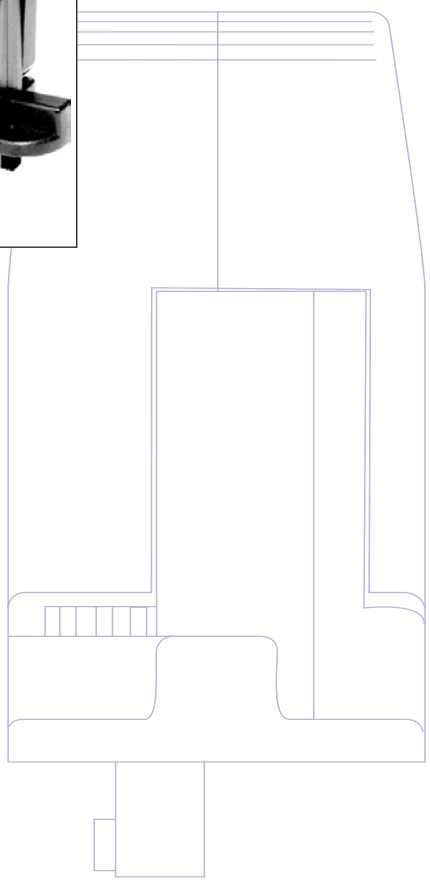
SAUER DANFOSS

JS120 Single Axis Fingertip Joystick

Technical Information







Version

Revisions

Date	Page	Change	Rev.
13 Feb, 2007		Lever length options; connector pin assignments	Rev-CA
12 May, 2006	7	Model code number	Rev-B
9 May, 2006	5	Typical contact resistance to ohms	Rev-A

Front cover illustrations: 2282, 2284, 2283, F005202, 2285

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Product Overview

The JS120 Joystick has been developed 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

- Single axis
- Spring return to center
- Spring return to one end of travel
- Width only 26.5 mm (1.04 in)
- Ergonomic design
- Choice of two lever heights
- Sealed to IP 66, above panel
- Choice of output voltage ranges
- Center switch
- Direction switches

Product Configuration

Product Configuration Model Code

The JS120 Product Configuration Model Code (model code) lists the various options for the JS120. The model code begins with the product family name, JS120, followed by the variant code for the desired options.

Model Code Summary

Product Configuration Model Code

A					B			
J	S	1	2	0	0	0	0	2

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 (continued)

Center Tap (Spring Return to Center Option)

A center tap 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 *Code B table,* page 4.

Position Switches

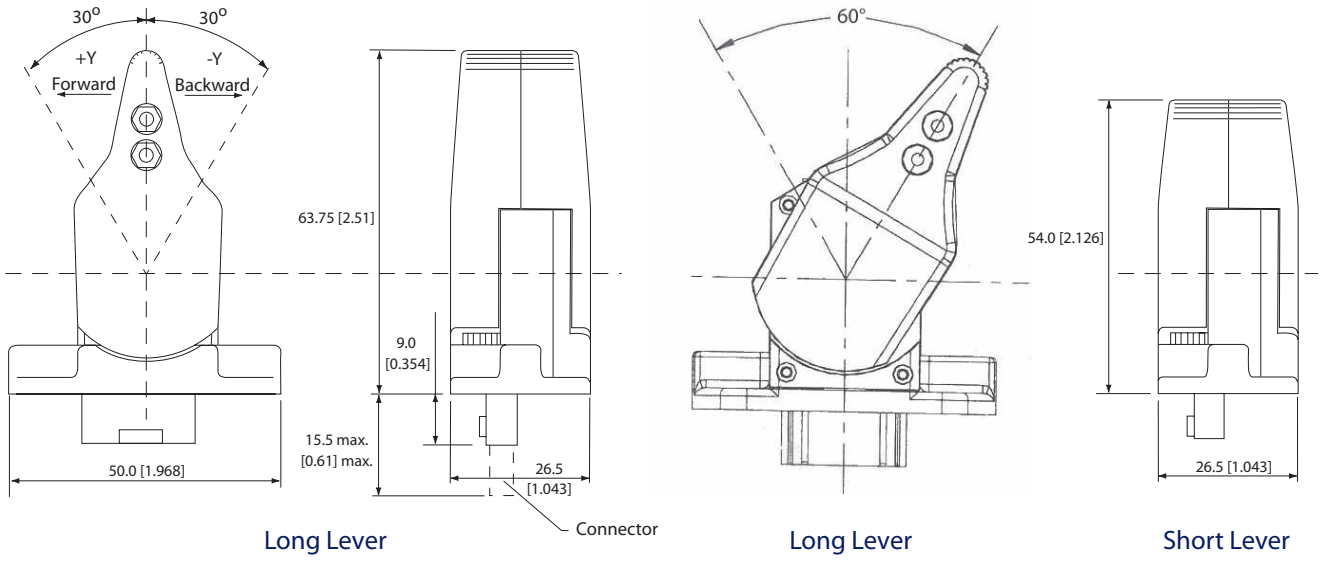
Position switches are a standard JS120 feature. The normally open switches close at the angles specified in the table below indicating forward and reverse travel of the lever. These switches are connected independently of the proportional potentiometric elements and can be terminated by the customer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

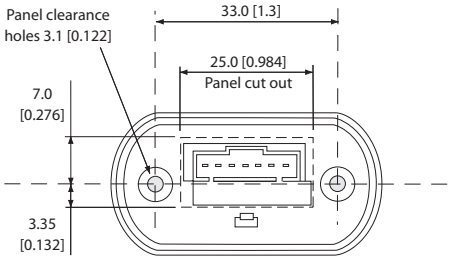
Dimensions and Mounting

Installation Dimensions in Millimeters [Inches]



Long Lever | Long Lever | Short Lever

Joystick fitted with 2 x M3 inserts
Maximum screw penetration 6 [0.236]



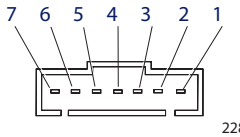
P005 290

The JS120 is designed to be fitted down into the panel, through the panel cutout, shown in *dimensions and mounting*, above.

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 (0.24 in) plus panel thickness.

Connector Pin Assignments

Pinout and Wiring Information

Bottom View, Joystick Connector			JS120-0002, 0003, 0005, 0006	JS120-0008, 0009, 0010, 0011
 2280	G	Pin 1	Direction switch common	Direction switch common
	F	Pin 2	Direction switch +Y (N/O)	Direction switch (N/O)
	E	Pin 3	Direction switch -Y (N/O)	Not used
	D	Pin 4	Power	Power
	C	Pin 5	Output voltage	Output voltage
	B	Pin 6	Ground	Ground
	A	Pin 7	Center tap	Not used

Mating Connector Details

Mating Connector – AMP MODU MTE Series

Connector	AMP Ordering Number
7 pin latching male	103957-6

Mating Connector Assembly

Type	Sauer-Danfoss Ordering Number
7 pin with 610 mm [24.02 in] leads	10101762

Marker on underside of mating connector indicates pin 1.

2281

Recommended Wiring Practice

- All wires must be protected from mechanical abuse.
- Use 85° C wire with abrasion resistant insulation.
- Separate high current wires such as solenoids, lights, alternators, or fuel pumps from control wires. Recommended minimum separation is 300 mm [11.8 in].
- Run wires along the inside of or close to metal machine frame surfaces where possible. This simulates a shield which will minimize the effects of EMI/RFI radiation.
- Do not run wires near sharp metal corners. Consider running wire through grommets when rounding a corner.
- Provide strain relief for all wires.
- Avoid running wires near moving or vibrating components.
- Avoid long, unsupported wire spans.
- All sensors have dedicated wired power sources and ground returns. They should be used.
- Sensor lines should be twisted about one turn every 100 mm [3.94 in].
- It is better to use wire harness anchors that will allow wires to float with respect to the machine frame rather than rigid anchors.

Installation Notes

- 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

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

For safety critical functions it is recommended that an independent momentary action *system enable* switch be used. This switch can be incorporated into the joystick as a *operator present* switch or can be a separate foot or hand operated momentary switch. All functions controlled by the joystick should be disabled when this switch is released.

The control system should look for the appropriate *system enable* switch input before the joystick is displaced from its neutral position. Functions enabled by the joystick should not be enabled until this input is received.

Mechanical Characteristics

Mechanical

Lever Type	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]	

Electrical Characteristics

Electrical

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

Environmental Characteristics

Environmental

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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520L0877 • Rev CA • Feb 2007

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