ENGINEERING
TOMORROW

Electrical Installation

Joysticks
JS1 Heavy Duty

www.danfoss.com | PLUS+1®

Revision history

Table of revisions

Date	Changed	Rev
August 2018	Added Analog Cat 1, 3 information	0401
January 2018	Removed description for One 12 pin DEUTSCH connector topic and a row from Danfoss connector bag assemblies part numbers table; Added rows to Electrical—CAN, CAN+, and CANalog table	0301
December 2016	Added PVE information	0201
February 2016	First edition	0101

Contents

JS1-H description

A wide variety of new grip designs

The Danfoss JS1 platform offers a wide variety of new grip designs and were developed after extensive research detailing operator needs. The JS1 heavy duty joysticks (JS1-H) and compatible grips meet the demanding conditions typically found in mobile equipment environments. The available grips features provide a high degree of protection from chemicals, shock, vibration and EMC exposure. Danfoss joysticks are appropriate for both in-cabin and out of cabin applications and feature ergonomic forms that minimize machine operator fatigue. The JS1-H ergonomic left-hand, right-hand and ambidextrous grip design options enable efficient operation and comfortable human-machine interface with easy to use fingertip controls for maximum productivity. The grips feature a modular design that allows switch and proportional rollers locations flexibility.

Literature references

Electrical, mechanical, and function block literature references

Title	Description	Literature number
JS1 Heavy Duty Joysticks Electrical Installation	Product electrical installation information	**BC00000346**
JS1 Heavy Duty Joysticks Technical Information	Complete product electrical and mechanical specifications	**BC00000347**
JS1 J1939 Function Block User Manual	Compliant function blocks set-up information	**AQ00000202**
JS1 CANopen Function Block User Manual		**AQ00000203**

Latest version of technical literature

Danfoss product literature is online at: *www.danfoss.com*

Electrical specifications

Electrical—CAN, CAN+, and CANalog

Electrical—CAN, CAN+, and CANalog characteristics

Sensor type	Hall effect with redundant sensors
	Potentiometer
Resolution	12 bit
Supply voltage (V_s)	9 to 36 V_{DC}
Output	J1939 and CANopen protocols
Can+ Sensor Power	5.0 V_{DC} +/- 5% at 250 mA
CANalog volt reference	5.0 V_{DC} +/- 5% at 50 mA
Base maximum current consumption	120 mA at 9 V
CANalog analog outputs	0.5 to 4.5 V_{DC} at 1 mA max

Electrical—PVE (Standard and Extended)

Electrical—PVE (Standard and Extended) characteristics

Supply voltages	**U_{DC}**		9 to 36 V_{DC}
Maximum current consumption			8 A
Current consumption, no load			150 mA
Maximum load for push buttons and directional switches for all proportional functions			0.6 A
Neutral position switch			3 A
Sensor type			Hall effect with redundant sensors
			Potentiometer
Signal voltage U_S	**Minimum to maximum**		0.25 to 0.75
	Neutral position		0.50
Signal load in neutral position	**Load type**	**PVE**	**Other**
	Load impedance	>6 kΩ	>15 kΩ
Signal current at maximum movement	**U_{DC} = 12 V**	**6 kΩ**	**15 kΩ**
		± 0.6 mA	0.2 to 0.6 mA
	U_{DC}= 24 V	± 1.2 mA	0.4 to 1.2 mA
Signal current in neutral position	**U_{DC} = 12 V**	± 0 mA	± 0.4 mA
	U_{DC} = 24 V	± 0 mA	± 0.8 mA
Inverter	**Non inverted**		Output signal = U_s
	Inverted		Output signal = -1 x (U_s -0.5 x U_+) + 0.5 x U_+

Electrical—PVE (Extended only)

Electrical—PVE (Extended only) characteristics

Signal regulation U_s	**U_s Minimum (50%)**	0.37 to 0.63 at 100% movement
	U_+ Maximum (200%)	0.25 to 0.75 at 50% movement
Dead band compensation	**U_s Minimum**	0.00
	U_+ Maximum	0.06

Electrical specifications

Electrical—Analog Cat 1, Cat 3

Electrical—Analog Cat 1, Cat 3 characteristics

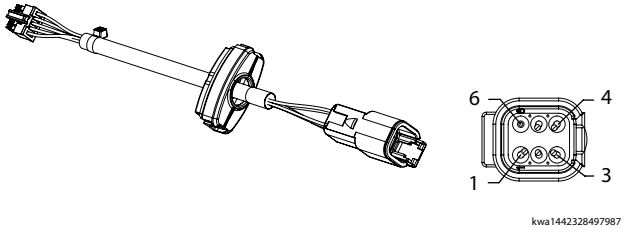
Sensor type	Hall effect with redundant sensors
Supply voltage (Vs)	4.5 to 5.5 V_{DC}
Output	10 to 90% of input voltage
Output impedance	1 mA max output current at 200 Ohm output impedance
Digital outputs	Vs-0.3 V_{DC}, maximum current 100 mA

Connector options and cabling

One 6 pin connector

Used only with CAN base.

Cabling and pin location: One 6 pin DEUTSCH DTM04 connector



One 6 pin pinout

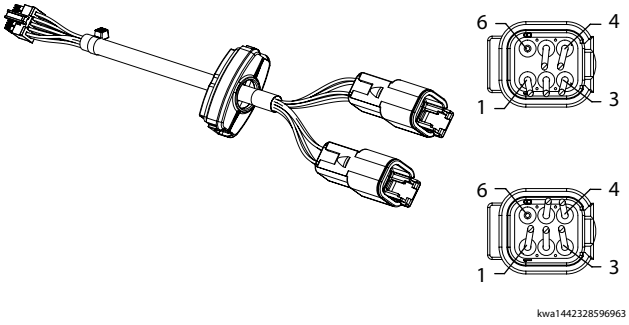
DEUTSCH DTM04 6 pin	Function
1	Ground
2	Power
3	CAN high
4	CAN low
5	CAN shield
6	NC

Connector options and cabling

Two 6 pin connectors

Used only in CAN base.

Cabling and pin location: Two 6 pin DEUTSCH DTM04 connectors



Two 6 pin pinout

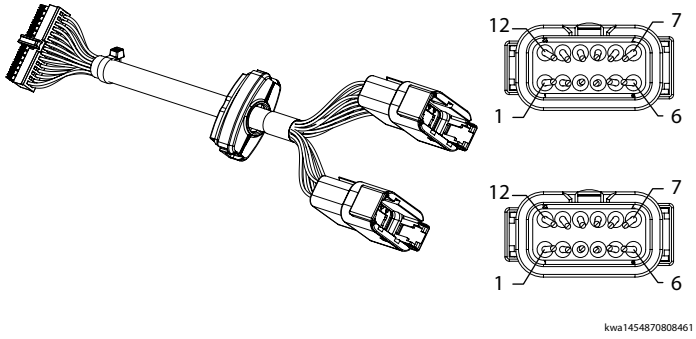
DEUTSCH DTM04 6 pin	DEUTSCH DTM04 6 pin	Function
1		Ground
2		Power
3		CAN high
4		CAN low
5		CAN shield
6		NC
	1	Ground
	2	Power
	3	CAN high
	4	CAN low
	5	CAN shield
	6	NC

Connector options and cabling

Two 12 pin connectors

Used only on CANalog, CAN+, PVE, Analog Cat 1, and Analog Cat 3 Standard base.

Cabling and pin location: Two 12 pin DEUTSCH DTM04 connectors



Standard, 12 pin A pinout (Gray)

DEUTSCH DTM04 12 PIN	PVE Standard	CANalog	CAN+	Analog Cat 1	Analog Cat 3
1	GND	GND	GND	GND	GND_ANA1
2	PWR	PWR	PWR	PWR_ANA	PWR_ANA1 (+5V only)
3	CAN high	CAN high	CAN high	Y1 (Prop 1)	Y1 (Prop 1)
4	CAN low	CAN low	CAN low	X1 (Prop 2)	X1 (Prop 2)
5	CAN shield	CAN shield	CAN shield	Analog 3A	Analog 3A
6	Proportional Y	NC	NC	Analog 4A	Analog 4A
7	Proportional X	Grip analog 3a	A/D 1	Button 1	Button 1
8	Proportional 3	Grip analog 3b	A/D 2	Button 2	Button 2
9	Push 7	Reference ground	Sensor ground	Button 3	Button 3
10	Push 8	5V reference	Sensor power	Button 4	Button 4
11	PVE power (neutral switch)	Grip analog 1a	A/D 3	PWR_ANA	PWR_ANA2 (+5V Only)
12	PVE power feedback	Grip analog 1b	A/D	GND	GND_ANA2

Standard, 12 pin B pinout (Black)

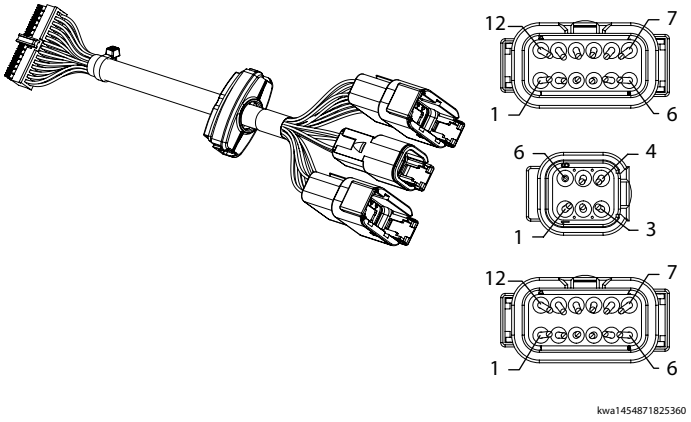
DEUTSCH DTM04 12 PIN	PVE Standard	CANalog	CAN+	Analog Cat 1	Analog Cat 3
1	Direction Ya	NC	Digital input 7	NC	NC
2	Direction Yb	NC	NC	NC	NC
3	Direction Xa	NC	NC	Y2	Y2
4	Direction Xb	NC	NC	X2	X2
5	Push 1	NC	NC	Analog 3B	Analog 3B
6	Push 2	NC	NC	Analog 4B	Analog 4B
7	Proportional 4	Grip analog 2a	Digital input 1	Button 5	Button 5
8	Push 3	Grip analog 2b	Digital input 2	Button 6	Button 6
9	Push 4	Y1	Digital input 3	Button 7	Button 7
10	Proportional 5	X1	Digital input 4	Button 8 / OPS	Button 8 / OPS
11	Direction 5a	Y2	Digital input 5	Analog 5A	Analog 5A
12	Direction 5b	X2	Digital input 6	Analog 5B	Analog 5B

Connector options and cabling

Two 12 pin and one 6 pin connectors

Used only on PVE Extended base.

Cabling and pin location: Two 12 pin and one 6 pin DEUTSCH DTM04 connectors



Extended, 12 pin A pinout (Gray)

DEUTSCH DTM04 12 PIN	PVE Extended	Analog Cat 1	Analog Cat 3
1	Ground	GND	GND_ANA1
2	Power	PWR_ANA	PWR_ANA1 (+5V only)
3	CAN high	Y1 (Prop 1)	Y1 (Prop 1)
4	CAN low	X1 (Prop 2)	X1 (Prop 2)
5	CAN shield	Analog 3A	Analog 3A
6	Proportional Y	Analog 4A	Analog 4A
7	Proportional X	Button 1	Button 1
8	Proportional 3	Button 2	Button 2
9	Push 7	Button 3	Button 3
10	Push 8	Button 4	Button 4
11	PVE power (neutral switch)	PWR_ANA	PWR_ANA2 (+5V Only)
12	PVE power feedback	GND	GND_ANA2

Extended, 12 pin B pinout (Black)

DEUTSCH DTM04 12 PIN	PVE Extended	Analog Cat 1	Analog Cat 3
1	Direction Ya	NC	NC
2	Direction Yb	NC	NC
3	Direction Xa	Y2	Y2
4	Direction Xb	X2	X2
5	Direction 3A/Push 1	Analog 3B	Analog 3B
6	Direction 3B/Push 2	Analog 4B	Analog 4B
7	Proportional 4	Button 5	Button 5
8	Direction 4A/Push 3	Button 6	Button 6
9	Direction 4B/Push 4	Button 7	Button 7
10	Proportional 5	Button 8 / OPS	Button 8 / OPS
11	Direction 5A/Push 5	Analog 5A	Analog 5A
12	Direction 5B/Push 6	Analog 5B	Analog 5B

Connector options and cabling

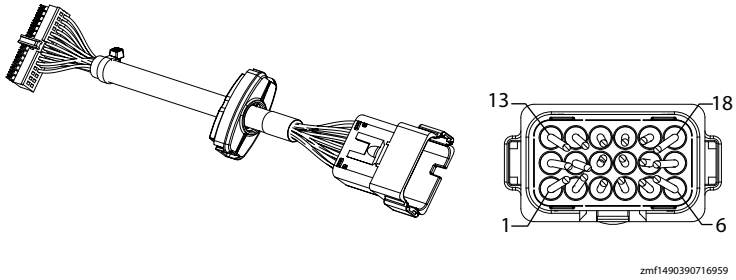
Extended, 6 pin pinout

DEUTSCH DTM04 6-pin	PVE	Analog Cat 1	Analog Cat 3
1	Power	Button 9	Button 9
2	Push 9	Button 10	Button 10
3	Push 10	Button 11	Button 11
4	Push 11	Button 12	Button 12
5	Push 12	open	open
6	NC	NC	NC

One 18 pin connector

Used only on CAN+ or CANalog base.

Cabling and pin location: One 18 pin DEUTSCH connector (DT16-18SB-K004)



18 pin pinout

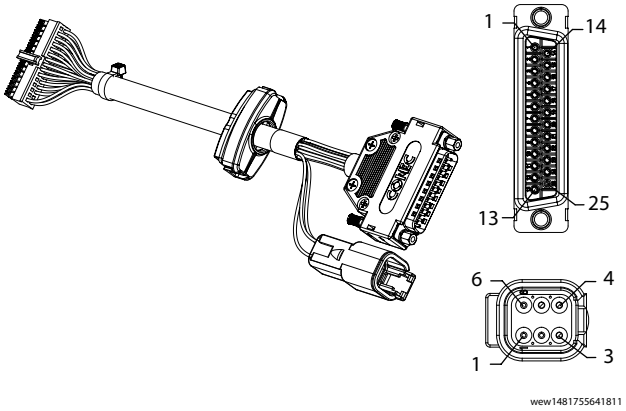
DEUTSCH 18 pin	CAN+ function	CANalog function
1	Ground	Ground
2	Power	Power
3	CAN Hi	CAN Hi
4	CAN Lo	CAN Lo
5	CAN Shield	CAN Shield
6	Digital input 7	Not connected
7	Vref ground	Reference ground
8	Vref +5V	Reference +5V
9	Analog in 1	Grip analog 3a
10	Analog in 2	Grip analog 3b
11	Analog in 3	Grip analog 1a
12	Analog in 4	Grip analog 2a
13	Digital input 1	Grip analog 1b
14	Digital input 2	Grip analog 2b
15	Digital input 3	Proportional Y-axis 1
16	Digital input 4	Proportional X-axis 1
17	Digital input 5	Proportional Y-axis 2
18	Digital input 6	Proportional X-axis 2

Connector options and cabling

One 25 pin SUB-D and one 6 pin connectors

Used only on PVE base, with PP2, PR2, STT, and STP grips as Prof 1 replacements.

Cabling and pin location: One 25 pin SUB-D and one 6 pin DEUTSCH DTM04 connectors; Code number: 11173403-T



25 pin SUB-D pinout

25 pin SUB-D	Function
1	PVE power (neutral switch)
2	PVE power (neutral switch)
3	Power
4	Direction 5a/Push 5
5	Proportional 3
6	Direction 3a/Push 1
7	Proportional Y
8	Proportional X
9	Direction Xa
10	PVE Power feedback
11	Direction Yb
12	Push 8
13	Push 7
14	PVE power (neutral switch)
15	Power
16	Power
17	Direction 5b/ Push 6
18	Proportional 4
19	Direction 3b/Push 2
20	Direction 4a/Push 3
21	Direction 4a/Push 4
22	Ground
23	Direction Xb
24	Direction Ya
25	NC

Connector options and cabling

6 pin DEUTSCH DTM04 pinout

6 pin DEUTSCH DTM04	Function
1	NC
2	NC
3	CAN high
4	CAN low
5	CAN shield
6	NC

Mating connectors bag assemblies

Danfoss connector bag assemblies part numbers (Must be ordered separately from joystick)

Description	Danfoss part number
One 6 pin DEUTSCH connector	10101551
Two 6 pin DEUTSCH connectors	11177980
Two 12 pin DEUTSCH connectors (GRY/BLK)	10100945
Two 12 pin and One 6 pin DEUTSCH connectors (GRY/BLK)	11176538

DEUTSCH mating connector bag assemblies contents

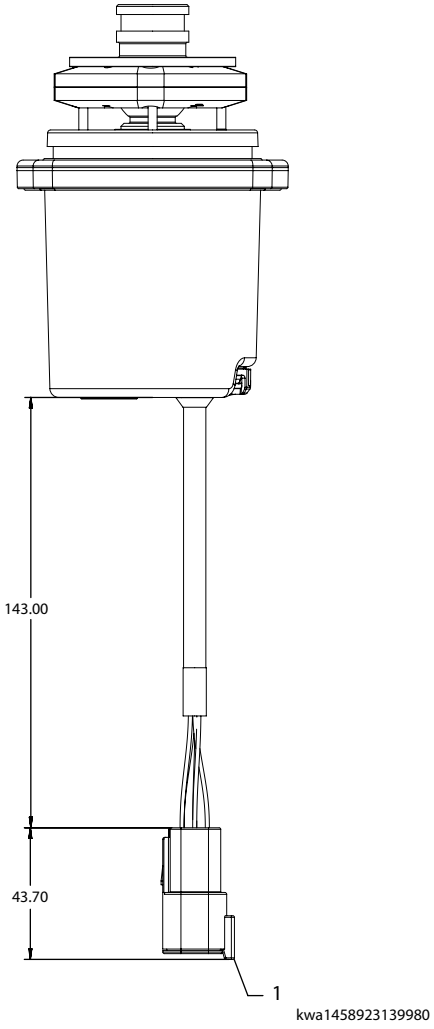
Description	6 pin module	12 pin module (GRY)	12 pin module (BLK)
Crimp tool	HDT-48-00	HDT-48-00	HDT-48-00
Contacts	0462-201-2031	0462-201-2031	0462-201-2031
Connector plug	DTM06-6S,GRY	DTMO6-12SA, GRY	DTMO6-12SB, BLK
Wedge	WM-6S	WM-12S	WM-12S
Strip length	3.96 to 5.54 mm (0.156 to 0.218 in)	3.96 to 5.54 mm (0.156 to 0.218 in)	3.96 to 5.54 mm (0.156 to 0.218 in)
Rear seal maximum insulation OD	3.05 mm (0.120 in)	3.05 mm (0.120 in)	3.05 mm (0.120 in)
Sealing plugs	0413-204-2005	0413-204-2005	0413-204-2005

Connector options and cabling

Cable assemblies

All cable assemblies for JS1-H are 185 mm from the bottom of the case to the end of the connector.

JS1-H cable length in millimeters



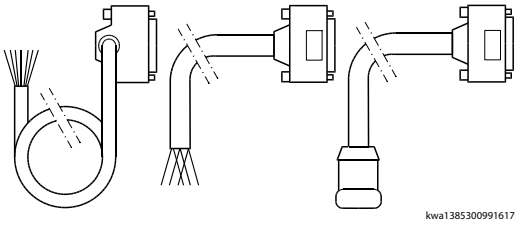
1. DEUTSCH DTM04 receptacle

Compatible mating cables available for different applications

Code no. 162B....	Length mm	Plug type	Type
6013	4000	Leads	Vertical SUB-D
6014	4000	Leads	Horizontal SUB-D
6015	500	Clipper	–
6016	230	TRIM TRIO	–
6017	230	Tabs	PVRE compatibility

Connector options and cabling

Cable assemblies - first is vertical view, followed by horizontal views



ENGINEERING
TOMORROW

Products we offer:

- Bent Axis Motors
- Closed Circuit Axial Piston Pumps and Motors
- Displays
- Electrohydraulic Power Steering
- Electrohydraulics
- Hydraulic Power Steering
- Integrated Systems
- Joysticks and Control Handles
- Microcontrollers and Software
- Open Circuit Axial Piston Pumps
- Orbital Motors
- PLUS+1® GUIDE
- Proportional Valves
- Sensors
- Steering
- Transit Mixer Drives

Danfoss Power Solutions is a global manufacturer and supplier of high-quality hydraulic and electronic components. We specialize in providing state-of-the-art technology and solutions that excel in the harsh operating conditions of the mobile off-highway market. Building on our extensive applications expertise, we work closely with our customers to ensure exceptional performance for a broad range of off-highway vehicles.

We help OEMs around the world speed up system development, reduce costs and bring vehicles to market faster.

Danfoss – Your Strongest Partner in Mobile Hydraulics.

Go to www.powersolutions.danfoss.com for further product information.

Wherever off-highway vehicles are at work, so is Danfoss. We offer expert worldwide support for our customers, ensuring the best possible solutions for outstanding performance. And with an extensive network of Global Service Partners, we also provide comprehensive global service for all of our components.

Please contact the Danfoss Power Solution representative nearest you.

Comatrol
www.comatrol.com

Turolla
www.turollaocg.com

Hydro-Gear
www.hydro-gear.com

Daikin-Sauer-Danfoss
www.daikin-sauer-danfoss.com

Local address:

Danfoss
Power Solutions (US) Company
2800 East 13th Street
Ames, IA 50010, USA
Phone: +1 515 239 6000

Danfoss
Power Solutions GmbH & Co. OHG
Krokamp 35
D-24539 Neumünster, Germany
Phone: +49 4321 871 0

Danfoss
Power Solutions ApS
Nordborgvej 81
DK-6430 Nordborg, Denmark
Phone: +45 7488 2222

Danfoss
Power Solutions Trading (Shanghai) Co., Ltd.
Building #22, No. 1000 Jin Hai Rd
Jin Qiao, Pudong New District
Shanghai, China 201206
Phone: +86 21 3418 5200