



Electronic components & PHC systems

Additional information

This catalogue shows the product in the most standard configurations.
Please contact our Sales Dpt. for more detailed information or special requests.

WARNING!

All specifications of this catalogue refer to the standard product at this date.
Walvoil, oriented to a continuous improvement, reserves the right to discontinue, modify or revise the specifications, without notice.

**WALVOIL IS NOT RESPONSIBLE FOR ANY DAMAGE CAUSED BY AN
INCORRECT USE OF THE PRODUCT.**

2nd edition March 2016

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Electronic components

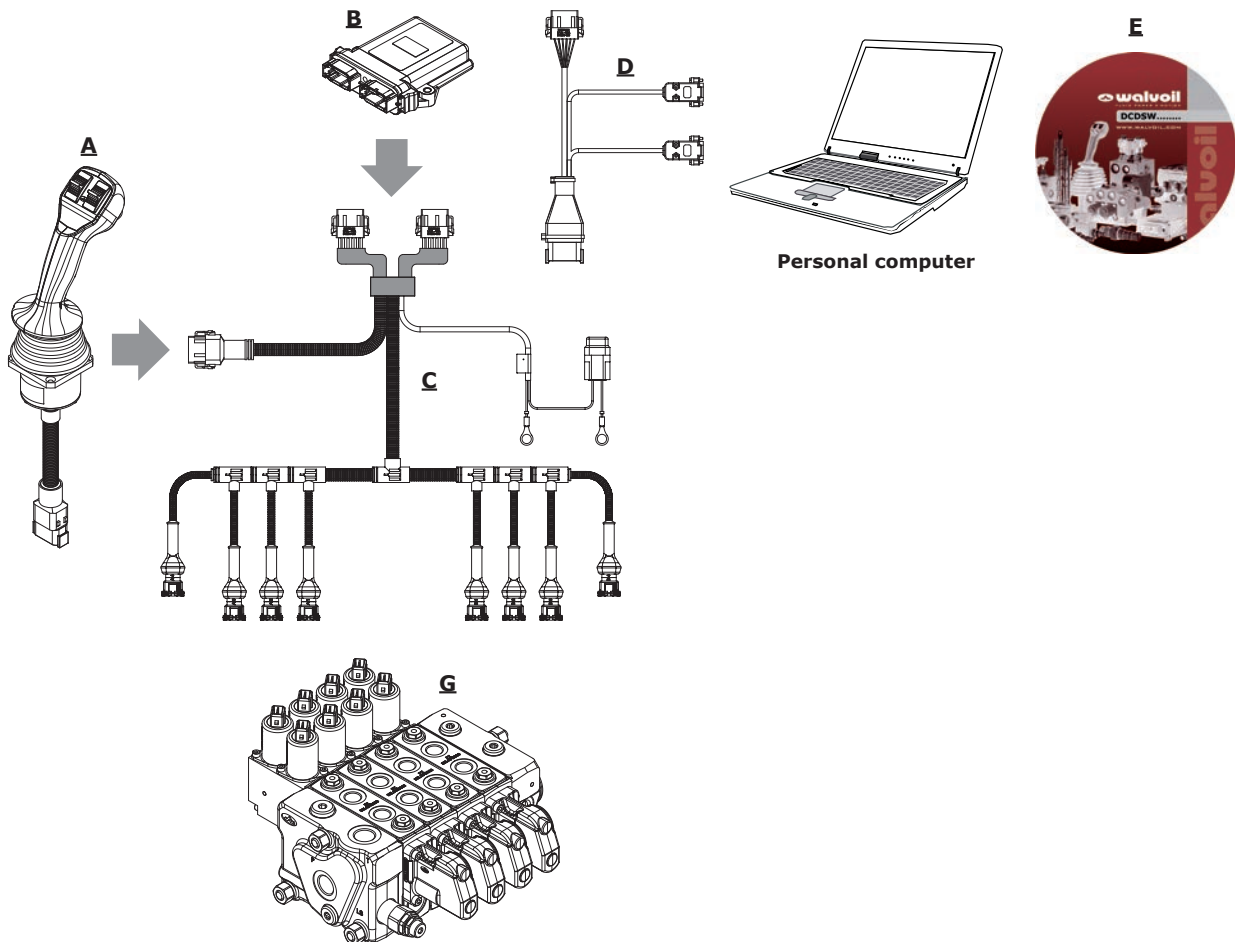
Introduction

Walvoil offers a wide range of electronic devices developed for control systems dedicated to earth moving, agricultural and industrial machines.

Our production includes: proportional joysticks, analog and CAN bus versions, control units and spool position sensors to control the proportional directional valves, with electro-hydraulic or mechatronic controls.

These components allow to implement the machine logic functionality and the system operational safety requested by the application.

Complete control systems are available as well. They were born thanks to the experience shared with important OEMs in their sector.



A - Proportional Joysticks

The AJW-CJW are proportional contactless joysticks for Walvoil handles.

The contactless technology guarantees long life and precise comfortable control.

The robust mechanical design is specifically tailored to off-highway operating machines.

Different output options are available for easy interfacing to the machine ECU (e.g. analog, CAN,....). The CAN version is standard CANopen. Redundant options for safety applications are available.

The MDN joysticks are compact, low profile control devices that provide precise fingertip control in one.

Compact dimensions make them suitable for installation with reduced operation space like armrests and remote control chest packs.

In applications where operation safety, long life and maintenance absence are decisive features, they provide reliability and operating simplicity.

B - CED Electronic Control Units

These control units are dedicated to PHC standard systems.

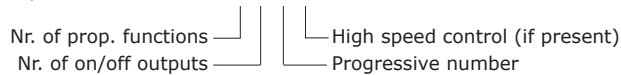
The relation between the unit inputs and outputs and the system logic functionality is predefined, not modifiable by the user.

Only the application working parameters can be modified to optimize the electro-hydraulic system installation on the machine.

This customization is made through a WST software tool.

The control units are protected against the battery overvoltage and reverse polarity, and input/output short-circuits to battery/ground. Outputs current are compensated and stabilized.

Description specification: **CED 4 0 0 X**



C - Harnesses

These are the connection harnesses for the predefined PHC standard systems.

The KCDs (Kit Connection Devices) provide the connections between the devices included into these systems, the electronic joystick, the electronic control unit and the main hydraulic valve.

They are made with single wires, mechanically protected by corrugated tube.

The power line connection to the system battery is fuse protected.

The connections to the devices are realized with DEUTSCH DTM and/or AMP JPT connectors.

The harnesses are suitable for a static or fixed installation, for agricultural, industrial and off highway applications.

Description specification: **KCD 04**



D - Accessories

A wide range of accessories is available to enable the interface among the electronic devices on this catalogue.

They are useful to let the user build the harness connection requested for and to allow the electronic components to work together.

The connectors are already preassembled with standard multipolar cables: just a simple electrical connection between wires is requested to implement the correct electrical schema.

The programming cables and software are available to dialog with the control units, for the optimal application parameters settings, and diagnostic purposes.

E - WST control unit programming software

The CED electronic control units are programmed in the Company with default operating parameters, suitable for most applications. For special applications, the WST (Walvoil Service Tool) software can be used together with a personal computer to optimize the control parameters for the electrohydraulic modules. For example, minimum and maximum output current values can be set for linear curves.

F - PHC electronic systems

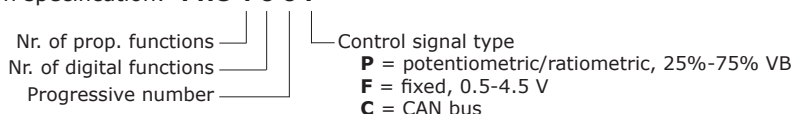
The PHCs (Power Hydraulic Control) are complete electronic systems, made of one or more joysticks, one or more control units, and their connection harness.

They can be used to control almost all Walvoil directional valves; they are designed to exploit the full potential, in terms of performances and safety, of the different system components.

For both the command devices (e.g. joysticks) and the control devices (e.g. control units), the redundancies on the input and output lines are managed by improving the robustness level of the application.

Thanks to a dedicated diagnostic tool, the WST software, the operator can set-up to the optimal configuration for the system, or make diagnostic on it.

Description specification: **PHC 4 0 0 F**



G - Directional control valve

Walvoil offers a wide range of directional control valves, monoblock, sectional, open center, Load Sensing, Flow Sharing, which can be configured with proportional electro-hydraulic and mechatronic controls.

Please contact our Sales Department to request for the documentation.



AJW analog joystick

- Hall effect contactless double axis joysticks
- The contactless technology guarantees long life and precise comfortable control
- Robust mechanical design; specifically tailored to off-highway operating machines
- Handles with additional proportional axis

Working conditions

Electrical specifications

AJW

Supply voltage		from 8 to 32 V regulated 5±0.1V
Current consumption	without grip	max. 20 mA at 32 V
Output signal	full range	from 0.5 to 4.5 V - 2.5 V in neutral
	tolerance (in neutral and full stroke)	±0.15 V both sides per axis
	redundancy signal (crossed)	from 4.5 to 0.5 V - 2.5 V in neutral
	max. load	< 1 mA

Mechanical specifications

Lever angle	operation	± 20° both axis
	tolerance	±1
Lever force (X,Y axis)	stroke end	6±1N (fully actuated 190 mm - 7.48 in above flange)
	on each axis (full stroke cycles)	>10 ⁶
Weight	without grip	0.50 Kg (1.10 lb)

Environmental specifications

Working temperature		from -40° C to +85° C (from -40° F to 185° F)
Storage temperature		from -40° C to +85° C (from -40° F to 185° F)
Weather protection	above fixing plan	IP65
EMC compatibility		100 V/m - ISO13766, ISO14982

"Dead man" switch features

Contact type		NA
Current rating (24 VDC)		200 mA resistive load
Mechanical life (nr. of operations)		10 ⁶
Electric life (nr. of operations)		3x10 ⁴
Operating force		3.4 N
Weather protection		IP67

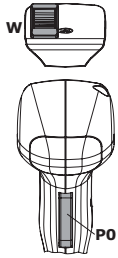
Test specifications

Mechanical vibration	random	from 5 to 500 Hz, 5,4x10 ⁴ to 0,56 g ² /Hz, 100 h each axis
	sinusoidal	40 m/s ² from 10 to 2000 Hz
	bumps	100 applications - 400 m/s ² x 6 ms
Humidity	96%	240 h
Thermal shock		100 cycles, from -40° C to 85° C and back, 50° C/min (100 cycles, from -40° F to 212° F and back, 122° F/min)
Salt spray	exposure	100 h

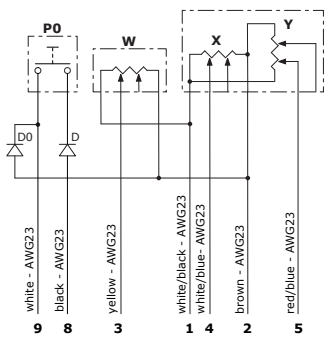
Control components

AJW and AJW-IP analog joystick

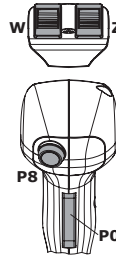
Configurations



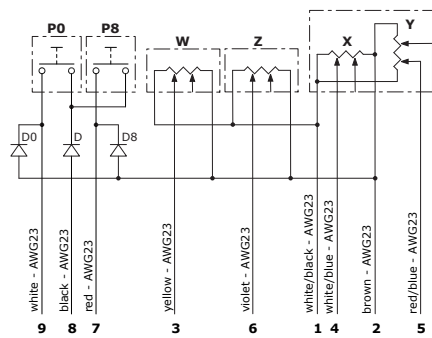
Code	183540027
Description	AJW2000A-PZA0100DQ-ORD-WN140/(D2F12035)-(TC-PROT)
Plate	1 ARW* type proportional roller (W)
Front zone	"dead man" switch (P0)



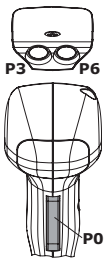
Pin	Function
1	VJ+
2	VJ-
3	W axis
4	X axis
5	Y axis
6	plugged
7	plugged
8	VJ+
9	P0 dead man
10	plugged
11	plugged
12	plugged



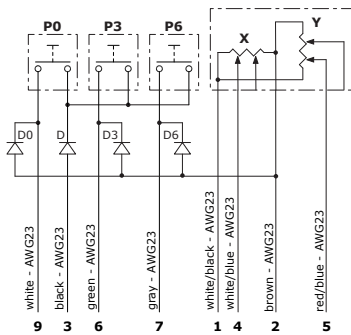
Code	183540028
Description	AJW2000A-PZTM0200BQ-ORD-8R2D-WN140-ZN140/(D2F12035)-(TC-PROT)
Plate	2 ARW* type proportional rollers (W-Z)
Front zone	1 T* type push-button with spring return (P8), "dead man" switch (P0)



Pin	Function
1	VJ+
2	VJ-
3	W axis
4	X axis
5	Y axis
6	Z axis
7	P8 push-button
8	VJ+
9	P0 dead man
10	plugged
11	plugged
12	plugged



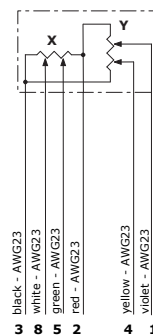
Code	183540029
Description	AJW2000A-PTA2000CQ-ORD-3R2D-6R2D/(D2F12035)-(TC-PROT)
Plate	2 T* type push-buttons with spring return (P3-P6)
Front zone	"dead man" switch (P0)



Pin	Function
1	VJ+
2	VJ-
3	P3 push-button
4	X axis
5	Y axis
6	P6 push-button
7	plugged
8	VJ+
9	P0 dead man
10	plugged
11	plugged
12	plugged



AJW-IP	
Code	183540058
Description	AJW2027A-S/D2F08050



Pin	Function
1	Yr
2	Vcc (5V)
3	GND
4	Y axis
5	Xr
6	plugged
7	plugged
8	X axis

NOTE (*): for component features see next page

Electric device features

ARW type proportional roller

Supply voltage	from 8 to 32 VDC
Max. current consumption	< 24 mA
Max. output current	1 mA
Output signal (range)	0,5 - 4,5 V
Output signal (central position)	2,5V
Signal tolerance (central position and stroke end)	±100 mV
Minimum load	10 KΩ
Actuator deflection angle	± 35° (±1°)
Mechanical life (nr. of operations)	10 ⁶
Operating force	2 N
Mechanical vibration	IEC 68-2
Mechanical shock	EN 60068-2-29 (pulse 400m/s ² x 6 ms, 100 times)
Weather protection	IP67-IP69K
EMC compatibility	ISO 13766 ISO 14982

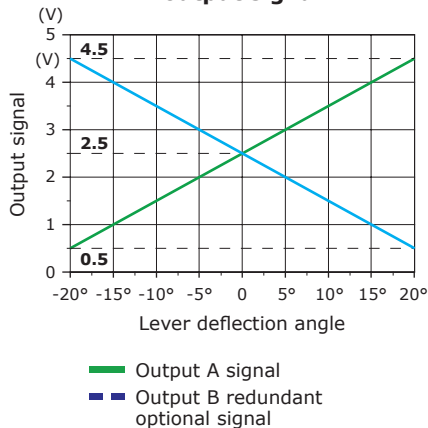


T type ON/OFF push-button

Execution	spring return
Contact type	normally open
Current rating	200 mA resistive load @ 12 VDC
Mechanical life (nr. of operations)	10 ⁶
Electric life (nr. of operations)	20x10 ⁴
Weather protection	IP64



**Proportional roller
output signal**

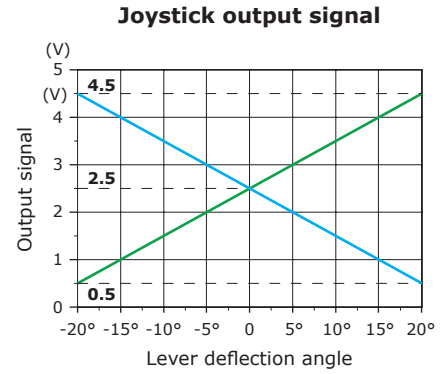
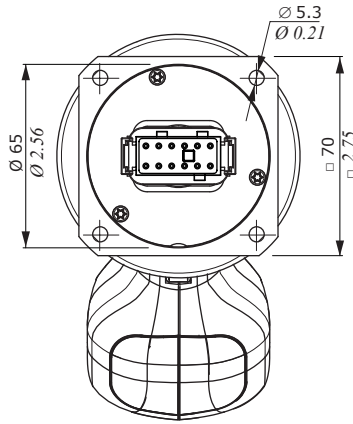
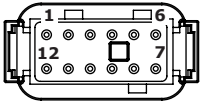


Control components

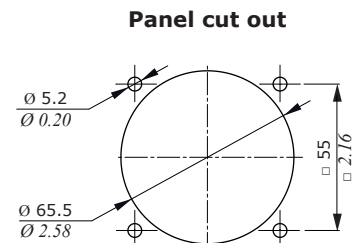
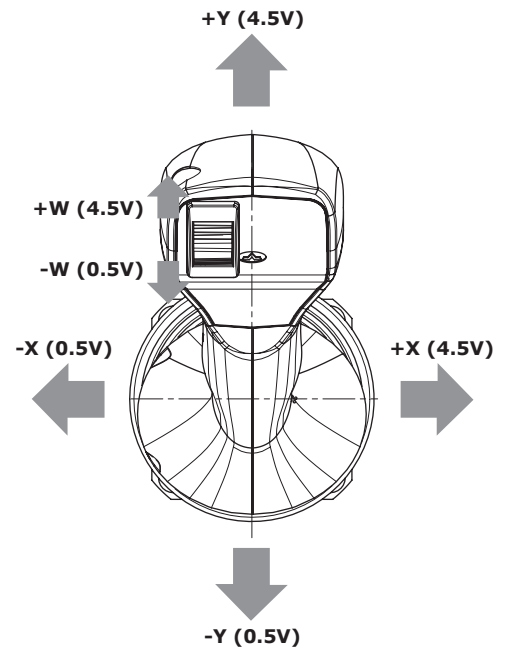
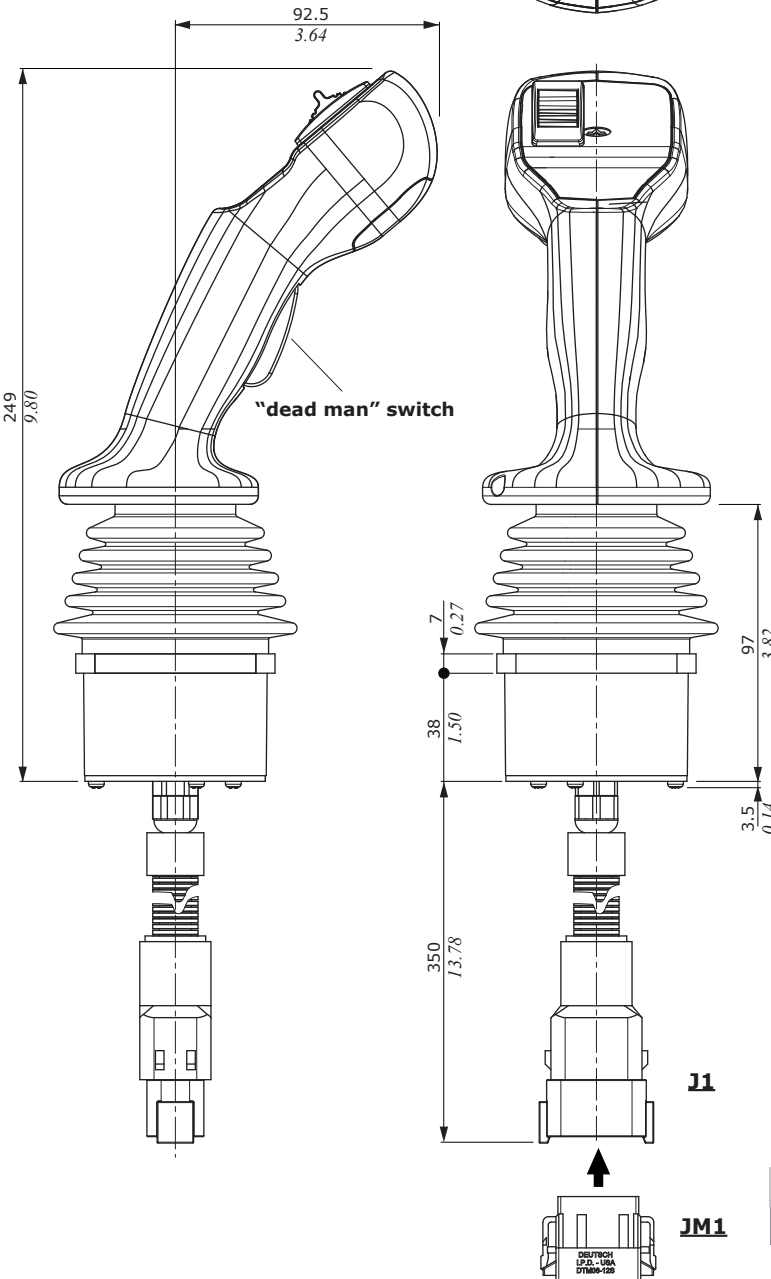
AJW analog joystick

Dimensions and features

DTM04-12PA
Deutsch connector



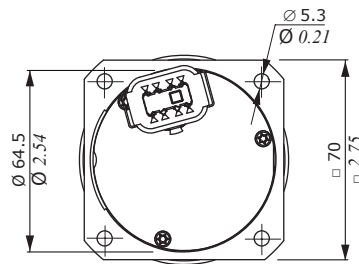
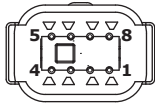
— Output A signal
— Output B redundant optional signal



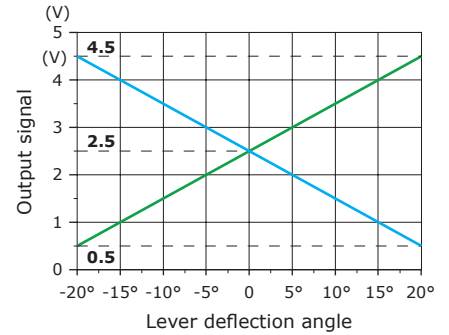
Mating connector	
Name	Type
JM1	DTM06-12SA Deutsch

Dimensions and features

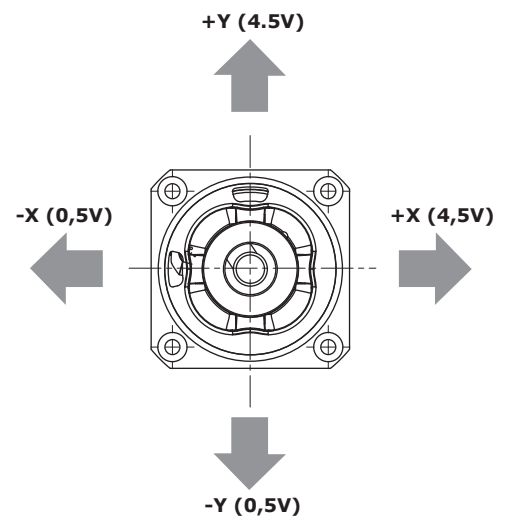
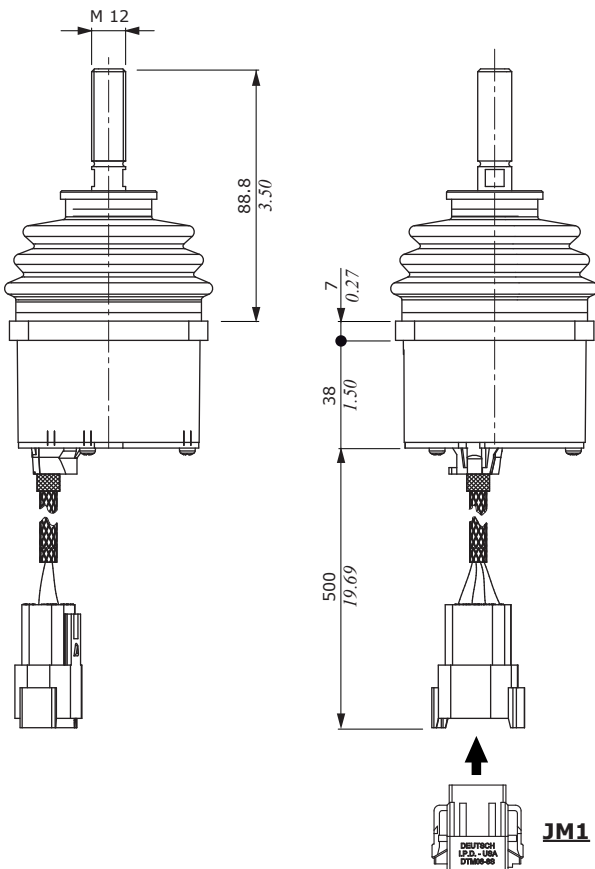
DTM04-8P
Deutsch connector



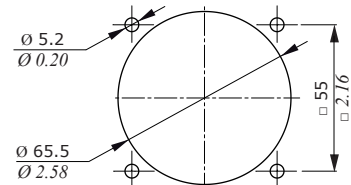
Joystick output signal



— Output A signal
— Output B redundant optional signal



Panel cut out



Mating connector

Name	Type
JM1	Deutsch DTM06-8S

NOTE (*): Weather protection IP67-IPX9K above the panel, IP57-IPX9K below the panel



CJW CAN bus joystick

- Contactless single or double axis joysticks
- CAN bus models
- The contactless technology guarantees long life and precise comfortable control
- Robust mechanical design; specifically tailored to off-highway operating machines
- Handles with additional proportional axis

Working conditions

Electrical specifications

CJW

Supply voltage		from 8 to 31 V
Current consumption	without grip	max. 100 mA @ 31 V
Output CAN protocols		CANopen Safety, SAE J1939, CANopen, CAN 2.0A and 2.0B, ISOBUS (AUX-N compliant)

Mechanical specifications

Lever angle	operation	$\pm 20^\circ$ both axis
	tolerance	± 1
Lever force (X,Y axis)	stroke end	$6 \pm 1N$ (fully actuated 190 mm - 7.48 in above flange)
Operating life	on each axis (full stroke cycles)	$> 10^6$
Weight	without grip	0.50 Kg (1.10 lb)

Environmental specifications

Working temperature		from $-40^\circ C$ to $+85^\circ C$ (from $-40^\circ F$ to $185^\circ F$)
Storage temperature		from $-40^\circ C$ to $+85^\circ C$ (from $-40^\circ F$ to $185^\circ F$)
Weather protection	on the fixing plan	IP65
EMC compatibility		100 V/m - ISO13766, ISO14982

"Dead man" switch features

Contact type		NA
Current rating (24 VDC)		200 mA resistive load
Mechanical life (nr. of operations)		10^6
Electric life (nr. of operations)		3×10^4
Operating force		3.4 N
Weather protection		IP67

Test specifications

Mechanical vibration	random	from 5 to 500 Hz, $5,4 \times 10^4$ to $0,56 g^2/Hz$, 100 h each axis
	sinusoidal	$40 m/s^2$ from 10 to 2000 Hz
	bumps	100 applications - $400 m/s^2 \times 6 ms$
Humidity	96%	240 h
Thermal shock		100 cycles, from $-40^\circ C$ to $85^\circ C$ and back, $50^\circ C/min$ (100 cycles, from $-40^\circ F$ to $212^\circ F$ and back, $122^\circ F/min$)
Salt spray	exposure	100 h

Control components

CJW CAN bus joystick

Configurations

	Code	183530011
	Protocol	CANopen
	Description	CJW2010A-PZTM0200BQ-0R-8R2-WN140-ZN140/A8F12
	Plate	2 ARW* type proportional rollers (W-Z)
Front zone	"dead man" switch (P0), 1 push-button with spring return (P8)	

See page 16

	Code	183530012
	Protocol	CANopen
	Description	CJW2010A-PZTA2101BQ-0R-1R2-2R2-URL-ZN140/A8F12-<JOYSTICK SX>
	Plate	1 ARW* type proportional roller (Z), 2 T* type push-buttons with spring return (P1-P2), 1 LED (LU); left configuration
Front zone	"dead man" switch (P0)	

See page 16

	Code	183530057
	Protocol	SAE J1939
	Description	CJW2010A-PZTM0200BQ-0R-8R2-WN140-ZN140/A8F12
	Plate	2 ARW* type proportional rollers (W-Z)
Front zone	"dead man" switch (P0), 1 push-button with spring return (P8)	

See page 16

	Code	183530013
	Protocol	CANopen
	Description	CJW2010A-PZTA2101CQ-0R-4R2-5R2-URL-WN140/A8F12-<JOYSTICK DX>
	Plate	1 ARW* type proportional roller (W), 2 T* type push-buttons with spring return (P1-P2), 1 LED (LU); right configuration
Front zone	"dead man" switch (P0)	

See page 16

	Code	183530058
	Protocol	CANopen Safety
	Description	CJW2010A-PZTM0200BQ-0R-8R2-WN140-ZN140/A8F12
	Plate	2 ARW* type proportional rollers (W-Z)
Front zone	"dead man" switch (P0), 1 push-button with spring return (P8)	

See page 16

	Code	183530045
	Protocol	SAE J1939
	Description	CJW2034A-AMH0402AQ-0R3(A)-6N5(K)-7RB(A)-8N5(K)-ALV-CLR/D2F08035(TC)
	Plate	2 LED (L1-L3) 1M type push-button with detent (P0)
Front zone	2M type push-button (P6-P8), 1K type push-button with spring return (P9)	

See page 17

	Code	183530044
	Protocol	SAE J1939
	Description	CJW2034A-AMH0703AQ-0R3(A)-4RB(A)-5RB(A)-6RB(A)-7RB(A)-8RB(A)-9RB(A)-ALV-BLY-CLR/F1F05150(TC)
	Plate	3 LED (L1-L2-L3), 1M type pushbutton with detent (P0)
Front zone	4M type pushbutton with spring return (P6-P7-P8-P9)	
Lateral zone	2M type pushbutton with spring return (P4-P5)	

See page 18

	Code	183530043
	Protocol	ISOBUS
	Description	CJW2044A-AMH1003AQ-0R3(A)-1RB(A)-2RB(A)-3RB(A)-4RB(A)-5RB(A)-6RB(A)-7RB(A)-8RB(A)-9RB(A)-ALV-BLY-CLR/A3M09030(TC)
	Plate	3 LED (L1-L2-L3), 1M type push-button with detent (P0)
Front zone	4M type push-button with spring return (P6-P7-P8-P9)	
Lateral zone	5M type push-button with spring return (P1-P2-P3-P4-P5)	

See page 19

NOTE (*): for component features see next page

Electric device features

ARW type proportional roller

Supply voltage	from 8 to 32 VDC
Max. current consumption	< 24 mA
Max. output current	1 mA
Output signal (range)	0,5 - 4,5 V
Output signal (central position)	2,5V
Signal tolerance (central position and stroke end)	±100 mV
Minimum load	10 KΩ
Actuator deflection angle	± 35° (±1°)
Mechanical life (nr. of operations)	10 ⁶
Operating force	2 N
Mechanical vibration	IEC 68-2
Mechanical shock	EN 60068-2-29 (pulse 400m/s ² x 6 ms, 100 times)
Weather protection	IP67-IP69K
EMC compatibility	ISO 13766 ISO 14982



T type ON/OFF push-button

Execution	spring return
Contact type	normally open
Current rating	200 mA resistive load @ 12 VDC
Mechanical life (nr. of operations)	10 ⁶
Electric life (nr. of operations)	20x10 ⁴
Weather protection	IP64



M type ON/OFF push-button

Execution	spring return, with detent
Contact type	normally open
Current rating	200 mA @ 12 VDC resistive load
Mechanical life (nr. of operations)	10 ⁶
Electric life (nr. of operations)	5x10 ⁵
Mechanical life (nr. of operations)	IP67
Electric life (nr. of operations)	10 mA

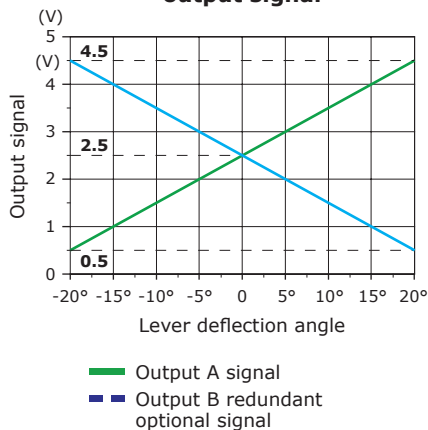


K type ON/OFF push-button

Execution	spring return
Contact type	normally open
Current rating	5 A resistive load @ 12 VDC
Mechanical life (nr. of operations)	10 ⁵
Electric life (nr. of operations)	25x10 ³
Weather protection	IP64



**Proportional roller
output signal**



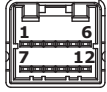
Control components

CJW CAN bus joystick

Dimensions and features

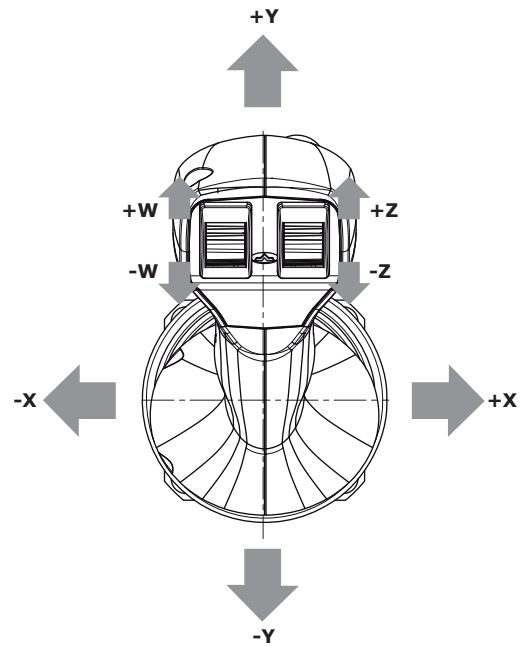
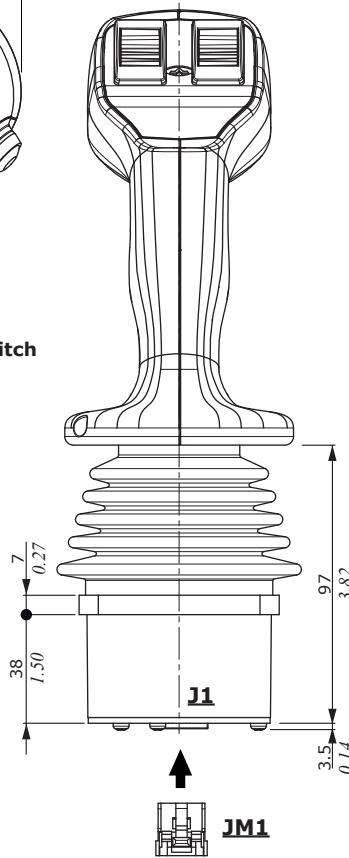
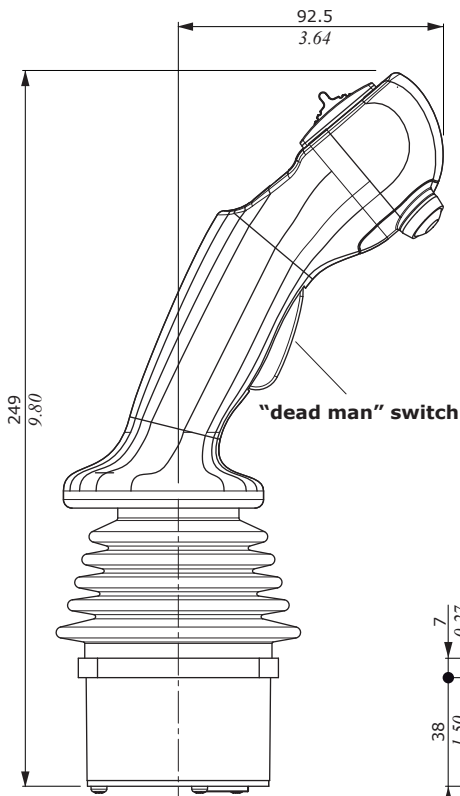
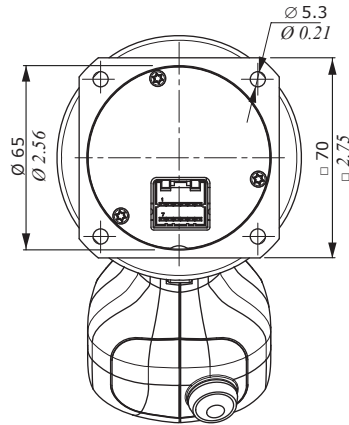
For configuration see page 14.

Multi-lock 040 series
Tyco connector
 (tin plated contacts)

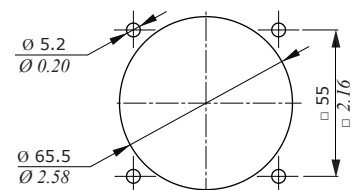


J1 connector PIN-OUT

Pin	Function	Pin	Function
1	not conn.	7	not conn.
2	not conn.	8	not conn.
3	CAN_L	9	not conn.
4	CAN_H	10	not conn.
5	VJ-	11	VJ+
6	not conn.	12	not conn.



Panel cut out



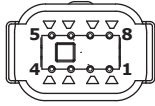
Mating connector

Name	Type
JM1	Multilock series 040 Tyco

Dimensions and features

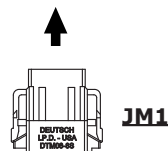
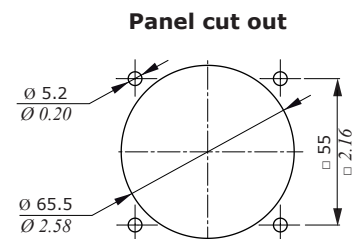
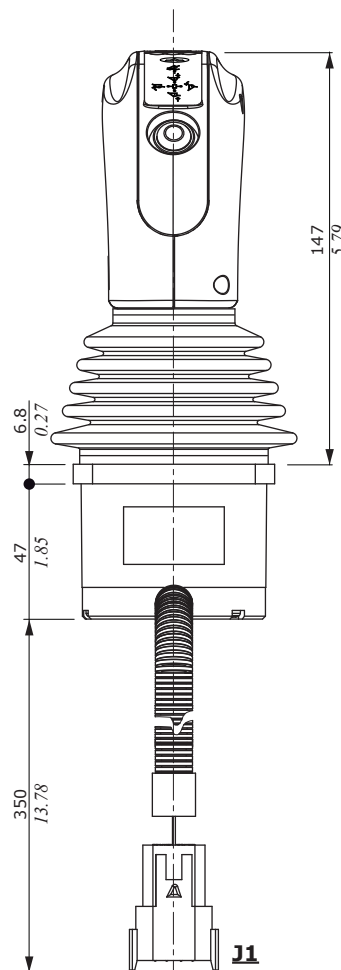
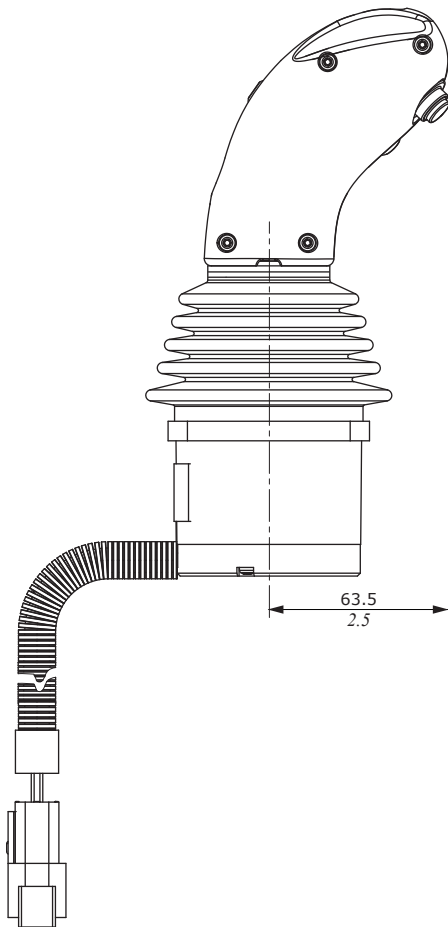
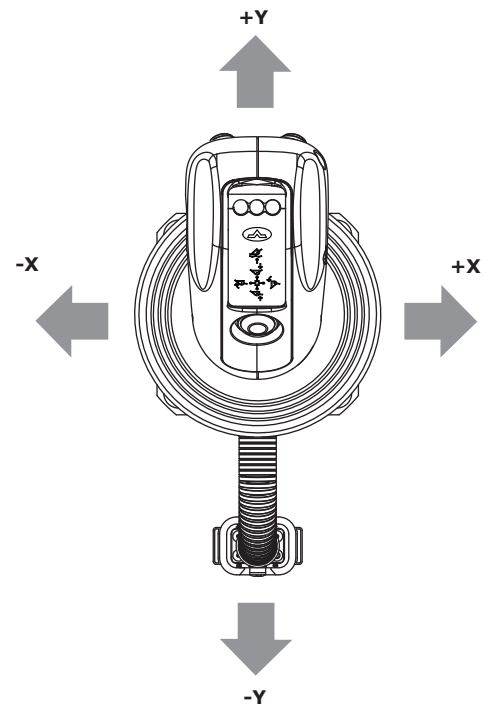
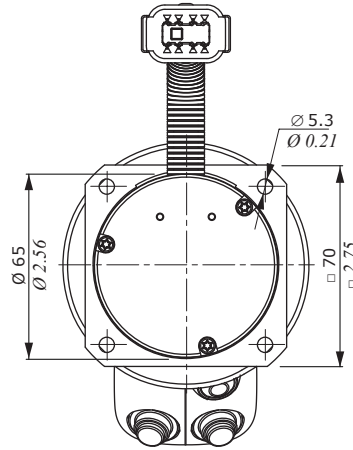
For configuration see page 14.

DTM04-8P
Deutsch connector
 (nichel plated contacts)



J1 connector PIN-OUT

Pin	Function	Pin	Function
1	VJ+	5	Push-button P8
2	CAN_L	6	Push-button P6
3	CAN_H	7	VJ+
4	VJ-	8	plugged



Mating connector

Name	Type
JM1	DTM06-8S Deutsch

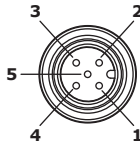
Control components

CJW CAN bus joystick

Dimensions and features

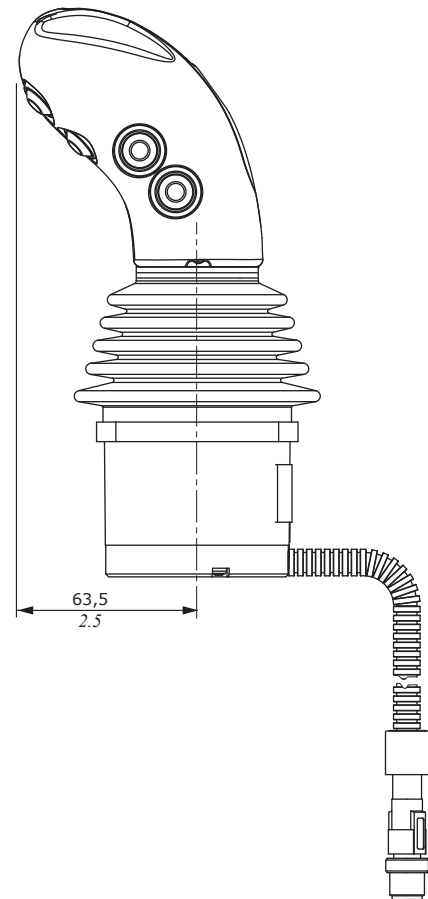
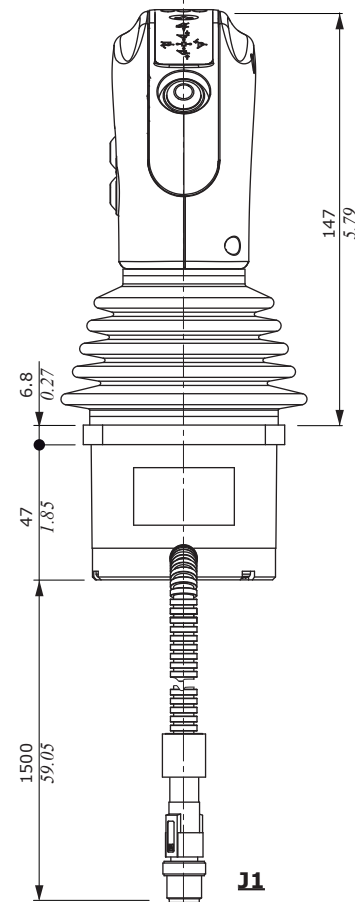
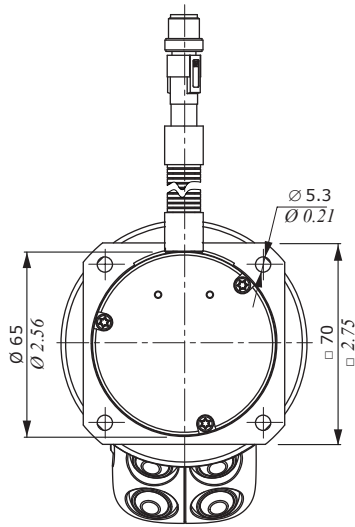
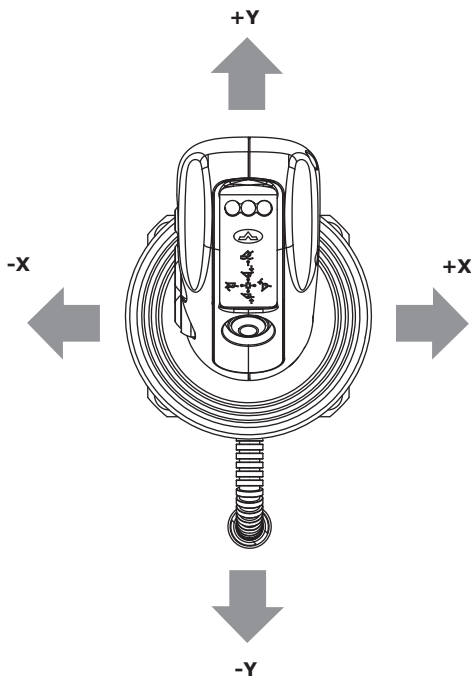
For configuration see page 14.

**M12-5P
male connector**

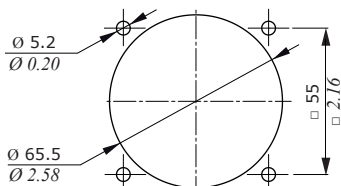


**J1 connector
PIN-OUT**

Pin	Function
1	CAN_H
2	CAN_L
3	VJ+
4	VJ-
5	VK+



Panel cut out



J1

JM1

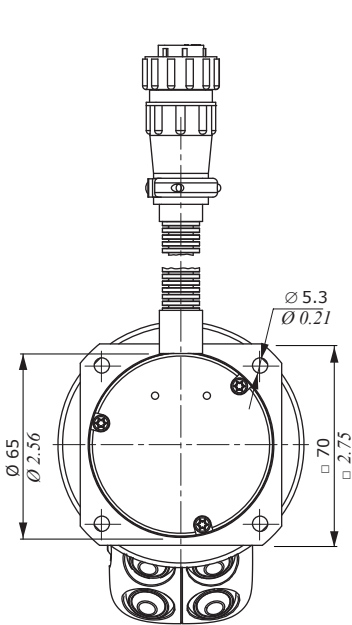
Mating connector

Name Type

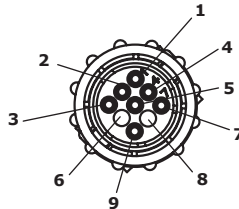
JM1 5 poles - M12 female

Dimensions and features

For configuration see page 14.

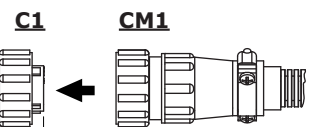
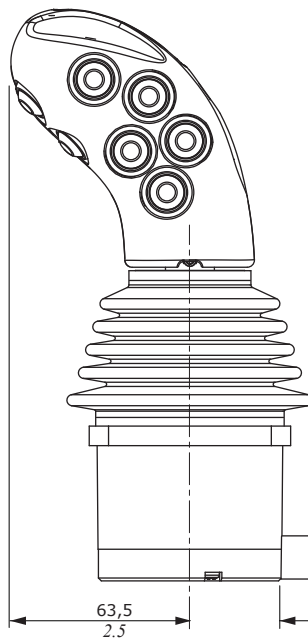
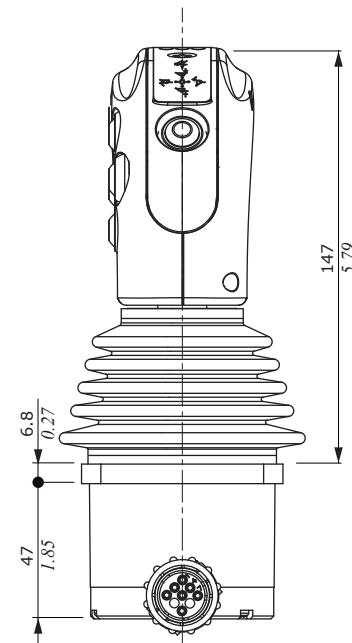
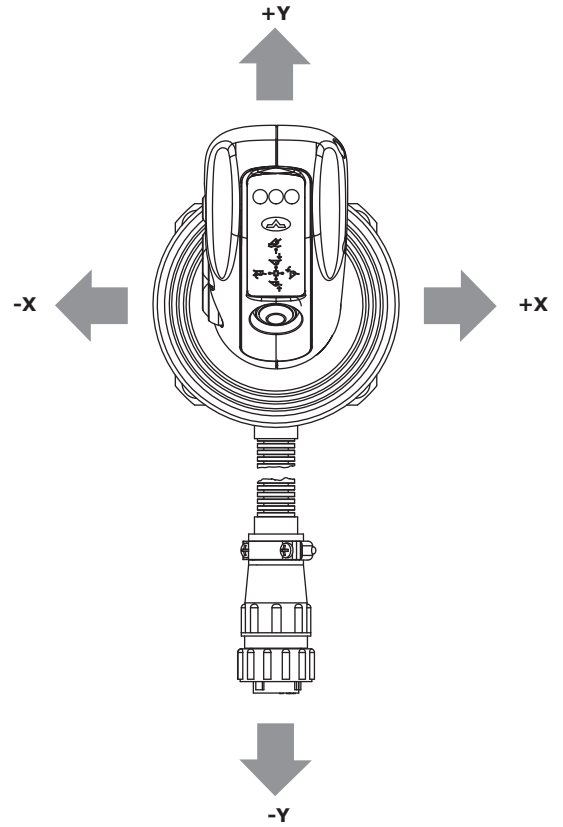


CPC-9P
AMP MPF connector
(selective gold plated contacts)

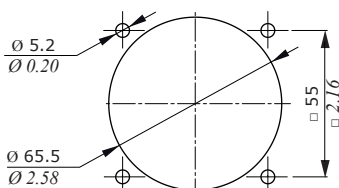


C1 connector PIN-OUT

Pin	Function	Pin	Function
1	VJ+	6	not conn.
2	CAN_L	7	VJ+
3	CAN_L	8	not conn.
4	CAN_H	9	VJ-
5	CAN_H		



Panel cut out



Mating connector

Name	Type
CM1	AMP CPC - 9 FPM



Potentiometric joysticks

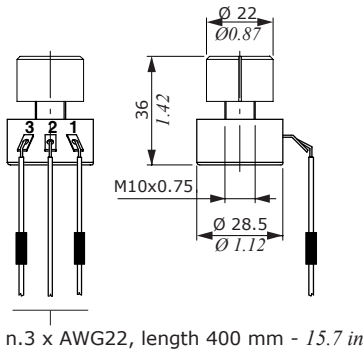
- Potentiometric/ratiometric signal
- Analog proportional signal
- On/off redundant, or neutral, signal
- Robust construction

Working conditions		
General features	PTM104	MDN142
Type	rotative potentiometer	single axis joystick
Max. supply voltage (V _{in})	35VDC	35VDC
Power absorption	0.4 W @ 40°C (104°F)	0.25W @ 25°C (77°F)
Connector	flying leads	Dupont Dubox
Lever deflection - Working angle	300° ± 5°	±30°
Average lifetime (nr. of operations)	10 ⁴	>5x10 ⁶
Working temperature	from -40° C to +70° C (from -40° F to 158° F)	from -25° C to +70° C (from -13° F to 158° F)
Weather protection (on the fixing plan)	nd	IP66
Analog track		
Total resistance	5KΩ ±20%	5KΩ ±20%
Output signal range (V _{out} /V _{in} %)	from 50% to 75%	from 25% to 75%
Central position signal (V _{out} /V _{in} %)	50% ACKW	50%
Directional and center switch off		
Switch center gap	/	2.5° either directions
Max. load current	nd	2mA

Control components

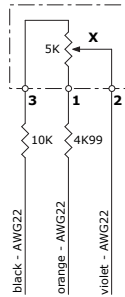
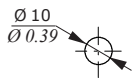
PTM104 rotative potentiometer

Dimensions and features



n.3 x AWG22, length 400 mm - 15.7 in

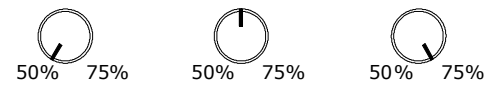
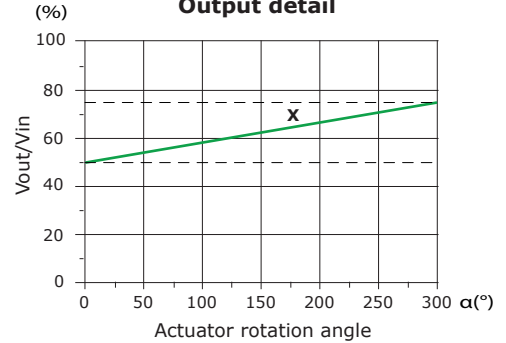
Panel cut out



Pin	Wire	Description
1	orange	Supply + (VJ+)
2	violet	Proportional signal (X)
3	black	Supply - (VJ-)

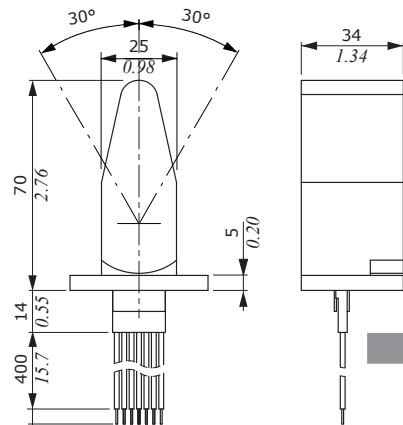
Ordering codes	
Description	Code
PTM104 potentiometer	5POT100005

Output detail



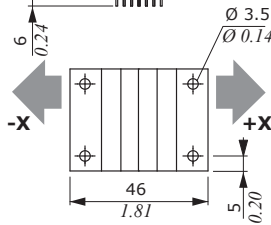
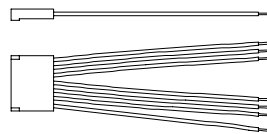
MDN142 potentiometric joystick

Dimensions and features

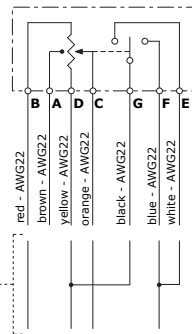
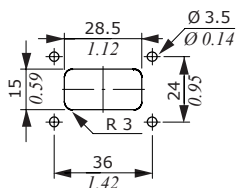


Connecting cable

7 poles cable included in the joystick, with Dubox Housing 65240-007 type female connector and AWG22 wires with tin-plate terminals.

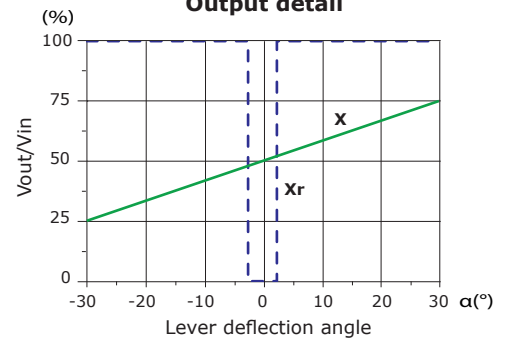


Panel cut out



Interface: to use the joystick redundancy option, this wiring is required

Output detail



— Output X signal
 ■ Output Xr redundant signal

Ordering codes	
Description	Code
MDN142 complete joystick	VJOY200001
7 poles cable, as spare part	W0450003

Pin	Wire	Description
A	brown	Center proportional signal
B	red	Supply - (VJ-)
C	yellow	Supply + (VJ+)
D	orange	Proportional signal (X)
E	white	Signal redundancy - (Xr)
F	blue	Signal redundancy + (Xr)
G	black	Common redundancy

CED100X - CED400X electronic control units



- 12/24 VDC applications
- "Dead man" switch management
- Float function management
- Fast/Slow function management
- From one (1 input / 2 outputs) on CED100X to four (4 input / 8 outputs) proportional functions on CED400X
- Designed for PHC electronic systems

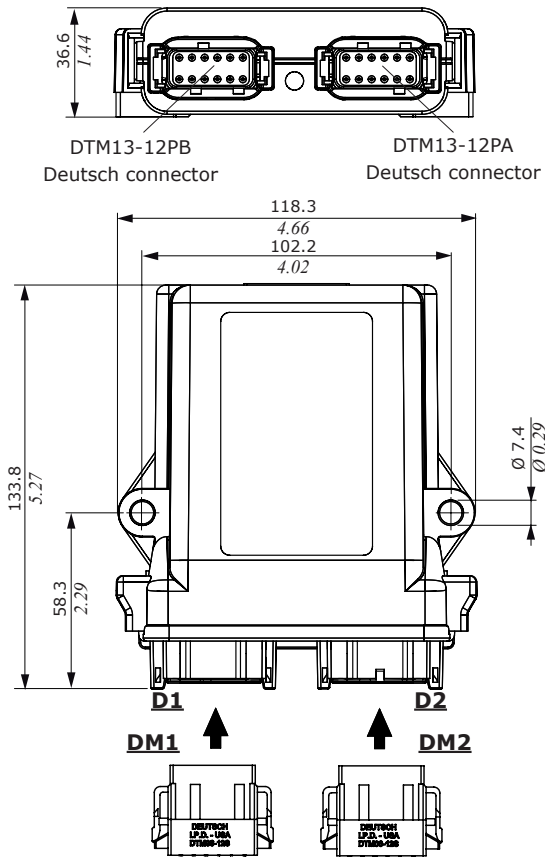
Working conditions		
General features	CED100X	CED400X
Supply voltage	from 8 to 32 V	from 8 to 32 V
Current consumption	<100 mA	<100 mA
Max. current output	6 A - 12 VDC	6 A - 12 VDC
Interface	RS232, 9600, 8, n, 1	RS232, 9600, 8, n, 1
EMC compatibility	ISO13766, ISO14982	ISO13766, ISO14982
Environmental compatibility	IEC60068-2-6/27/29	IEC60068-2-6/27/29
Working temperature	from -40 to +85°C (<i>from -40°F to 185°F</i>)	from -40 to +85°C (<i>from -40°F to 185°F</i>)
Protection degree	IP67 with mating connector attached	IP67 with mating connector attached
Weight	0.3 Kg (<i>0.66 lb</i>)	0.3 Kg (<i>0.66 lb</i>)
Analog inputs		
Number	up to 4	up to 4
Signal type	0/VB or from 0 to 5 V	0/VB or from 0 to 5 V
Digital inputs		
Number	up to 6	up to 6
Signal type	0/VB, from 0 to 50 KHz	0/VB, from 0 to 50 KHz
Proportional outputs		
Number	1 pair	4 pairs
Type	2HSD + 1LSD*	8HSD* + 4LSD*
Signal	PWM on LSD*	PWM on LSD*
Frequency	from 50 to 300 Hz, amplitude from 100 to 300 mA	from 50 to 300 Hz, amplitude from 100 to 300 mA
Max. load	2 A	2 A

NOTE (*): HSD - High Side Driver
LSD - Low Side Driver

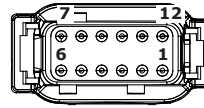
Electronic control units

CED100X - CED400X electronic control units

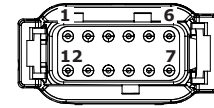
Dimensions and pin-out



D1 connector



D2 connector



Connector PIN-OUT

Pin	function	D1 connector		D2 connector		
		CED100X	CED400X	function	CED100X	CED400X
1	VK+	•	•	OUT_8	-	•
2	AI_4	•	•	OUT_2	•	•
3	AI_3	•	•	OUT_4	-	•
4	DI_1	•	•	OUT_3	-	•
5	RX	•	•	OUT_6	-	•
6	CAN_L	•	•	OUT_5	-	•
7	CAN_H	•	•	GND_3	-	•
8	TX	•	•	GND_2	-	•
9	DI_2	•	•	GND_1	•	•
10	AI_1	•	•	GND_4	-	•
11	AI_2	•	•	OUT_1	•	•
12	VB-	•	•	OUT_7	-	•

Mating connectors

Name Type

DM1 DTM06-12SA Deutsch

DM2 DTM06-12SB Deutsch

• available
- not available

CED100X control unit code

Code **183331001 (*)**

Description CED100X/PHC100F/v43.03

Notes Supply voltage 8-32V
1 prop. functions (2 outputs - 2A)

NOTE (*): Optimized software for 12V operation

CED400X control unit codes

Code **183334003 (*)**

Description CED400X/PHC400F/v43.03

Notes Supply voltage 8-32V
4 prop. functions (8 outputs - 2A)

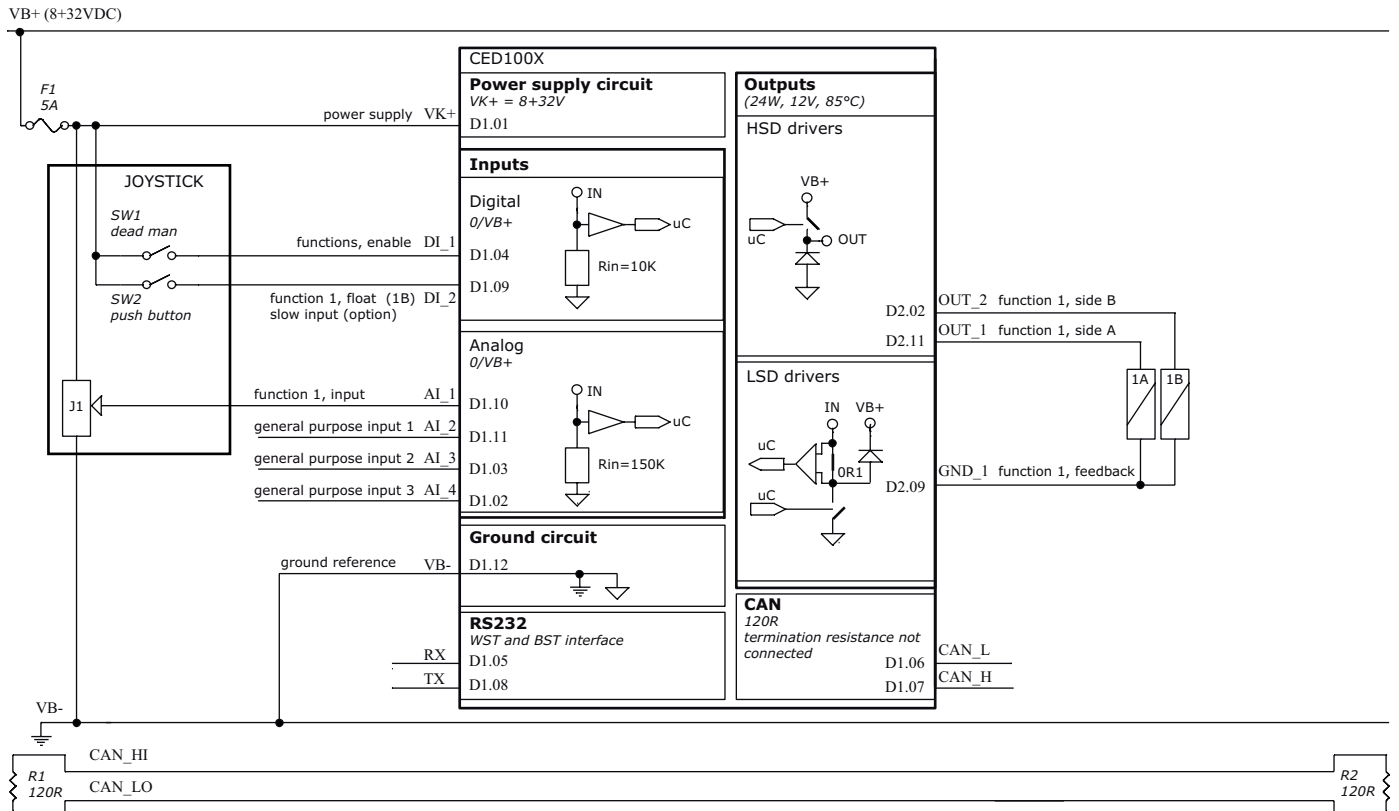
Code **183338007**

Description CED400X/PHC400C/v73.01

Notes Supply voltage 8-32V, CANopen interface,
4 proportional functions (8 outputs - 2A)

NOTE (*): Optimized software for 12V operation

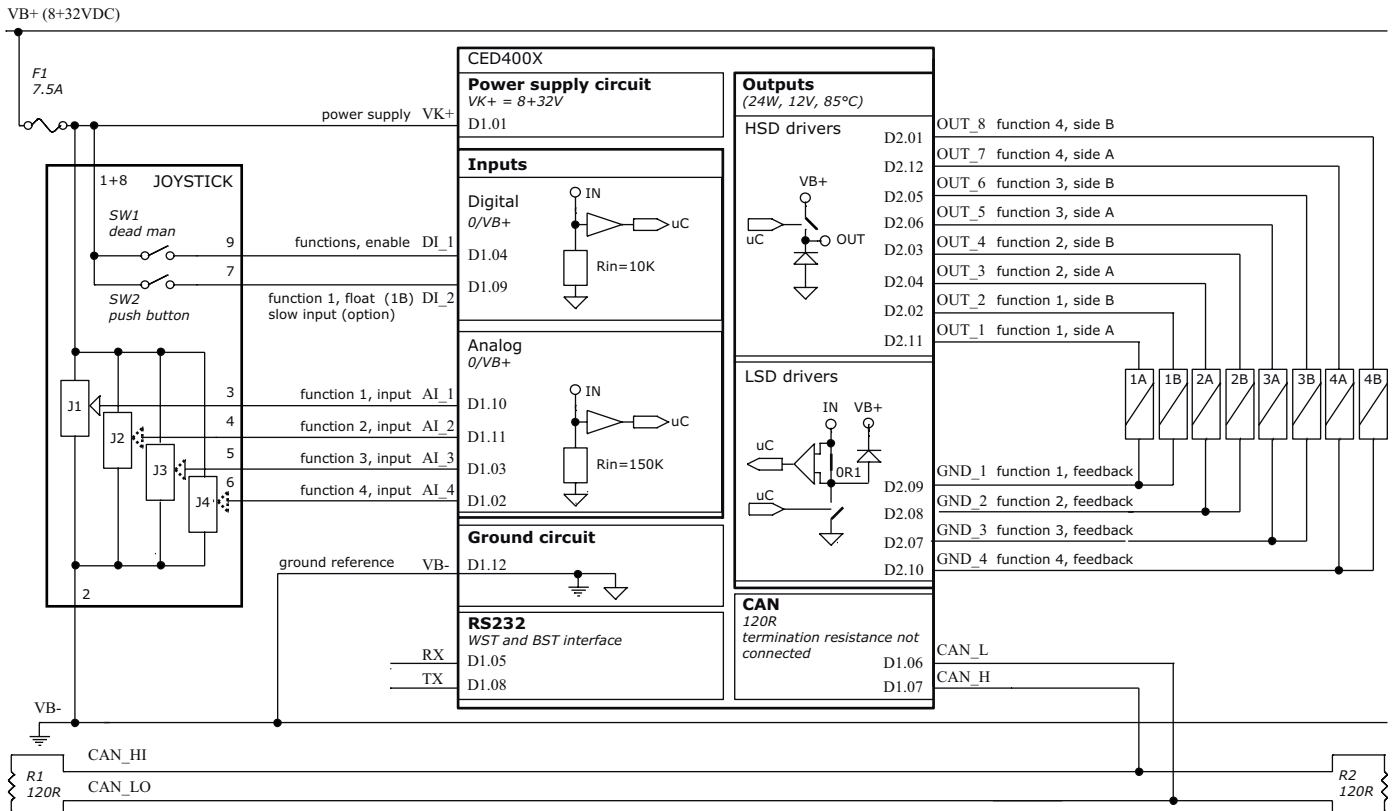
CED100X system diagram



Electronic control units

CED100X - CED400X electronic control units

CED400X system diagram





CED040 electronic control unit

- 12VDC applications
- Designed for PHC electronic systems
- Four digital outputs control (by 4 relays)

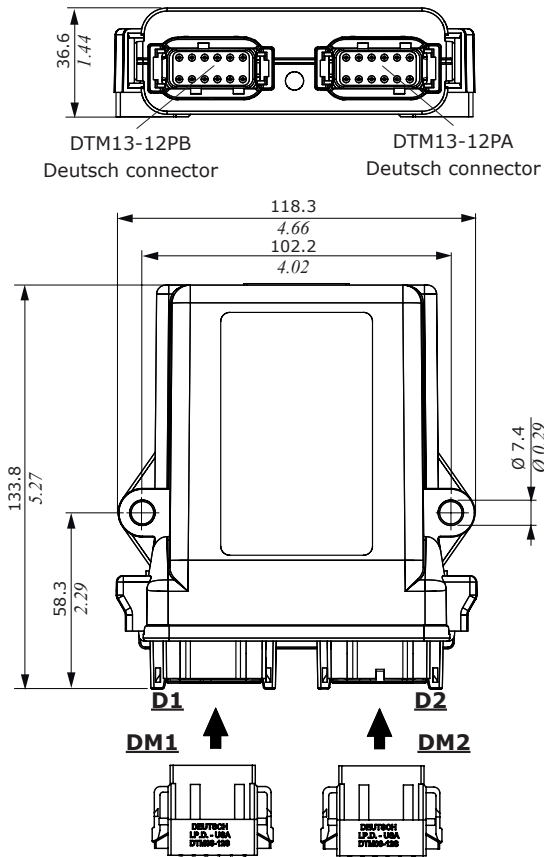
Working conditions	
General features	CED040
Supply voltage	from 9 to 16 V
Current consumption	50 mA (no-load current) 15A (max. supply)
Max current output	15 A (2 output)
Interface	CAN 2.0 A - B
EMC compatibility	150 V/m - ISO13766, ISO14982
Environmental compatibility	IEC60068-2-6/27/29
Working temperature	from -40 to +85°C (<i>from -40°F to 185°F</i>)
Protection degree	IP67 with mating connector attached
Weight	0.3 Kg (<i>0.66 lb</i>)
Analog inputs	
Number	3
Signal type	from 0.5 to 4.5 V
Digital inputs	
Number	6
Signal type	0/VB
ON/OFF outputs	
Number	4
Type	relay (HSD*)
Max. load	7.5 A

NOTE (*): HSD - High Side Driver

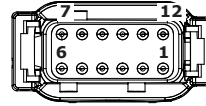
Electronic control units

CED040 electronic control unit

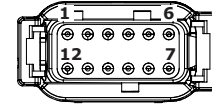
Dimensions and pin-out



D1 connector



D2 connector



Connectors PIN-OUT

Pin	Function	
	D1 connector	D2 connector
1	OUT_1	OUT_L
2	VB-	DI_5
3	CAN_H	DI_1
4	CAN_L	VJ-
5	AI_4	AI_3
6	AI_5	AI_2
7	VK+	AI_1
8	VK+	VJ+
9	OUT_2	DI_2
10	OUT_3	DI_3
11	OUT_4	DI_4
12	OUT_1	DI_6

Mating connectors

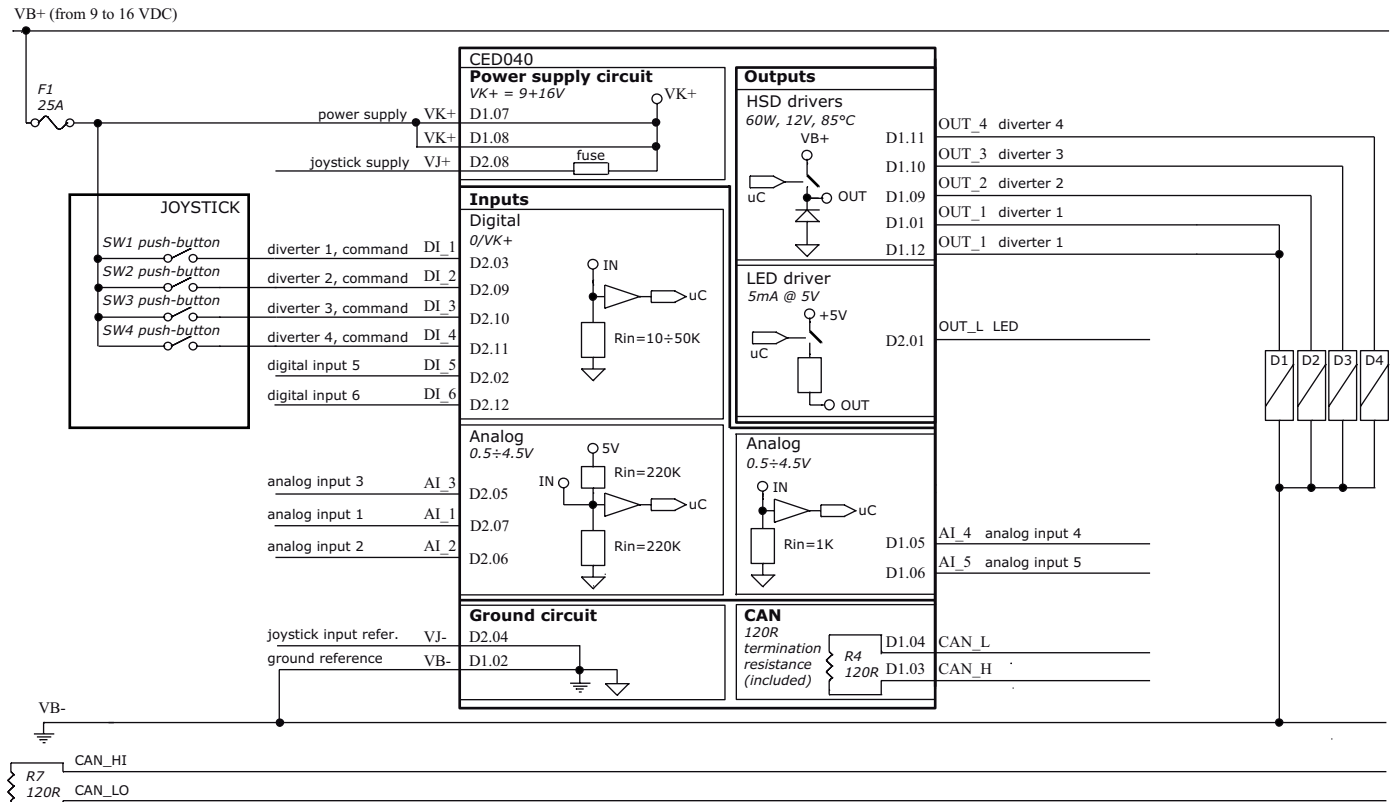
Name	Type
DM1	DTM06-12SA Deutsch
DM2	DTM06-12SB Deutsch

CED040 control unit code

Code	183360009
Description	CED040/PHC040P-12V/v5.00
Notes	Supply voltage 12V, 2 ON-OFF functions (4 outputs - 5A)
Code	183360010
Description	CED040/PHC250C-12V/v6.00
Notes	Supply voltage 12V, 3 ON-OFF outputs (5A)

System diagram

CED040/PHC040P configuration



Electronic control units

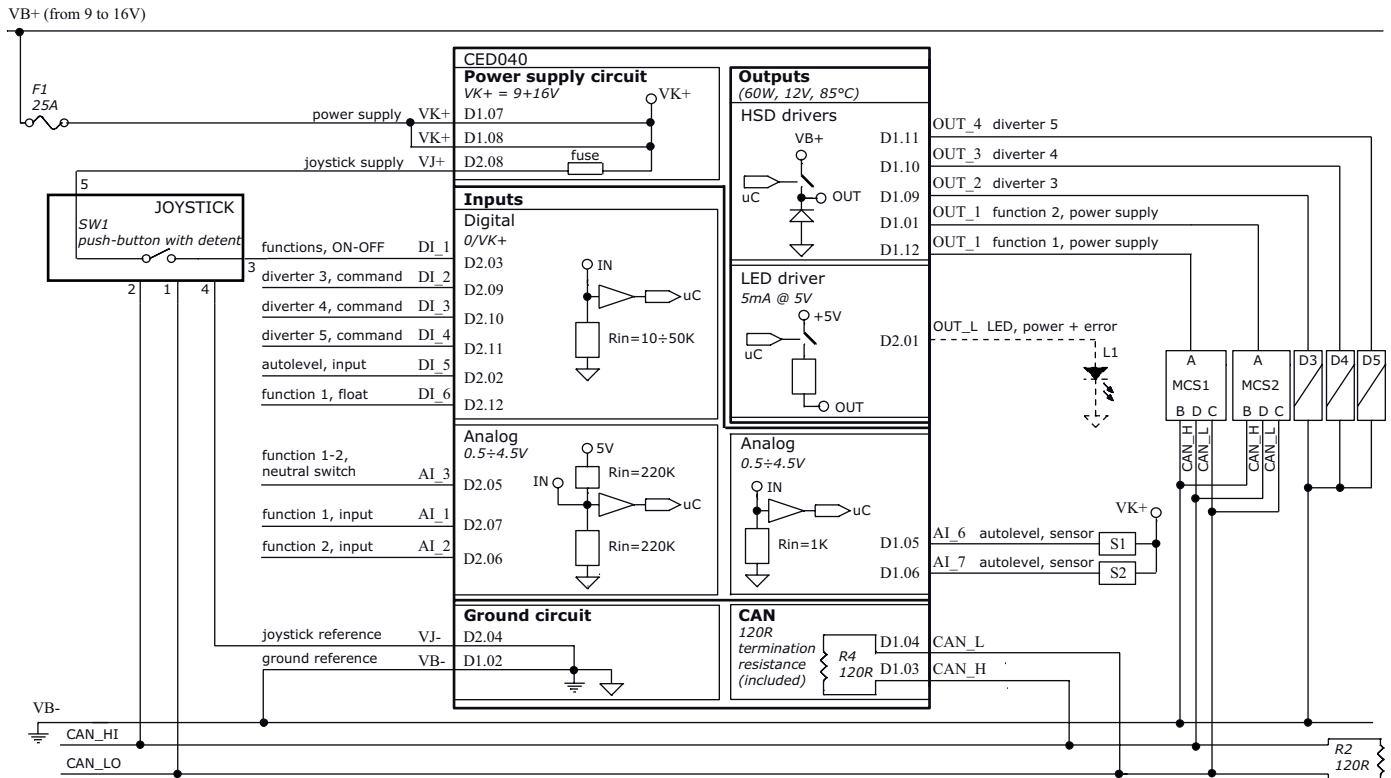
CED040 electronic control unit

System diagram

CED040/PHC250C configuration

The CED040 control unit is also available in dedicated configuration for front loader application, for SDM122/DLM22 series with mechatronic control.

For information, please contact our Sales Department.



CED160 electronic control unit



- 12VDC applications
- 'Dead man' switch management
- Float function management
- Fast/Slow function management
- One proportional function control (1 input / 2 outputs)
- Six digital outputs control (through six relays)
- Designed for PHC electronic systems

Working conditions

General features	CED160
Supply voltage	from 9 to 16 V
Current consumption	50 mA (no-load current) 15A (max. supply)
Max. current output	7.5 A
Interface	CAN 2.0 A - B, 125-250 Kbit/sec
EMC compatibility	150 V/m - ISO13766, ISO14982
Environmental compatibility	IEC60068-2-6/27/29
Working temperature	from -40 to +85°C (from -40°F to 185°F)
Protection degree	IP67 with mating connector attached
Weight	0.3 Kg (0.66 lb)

Analog inputs

Number	3
Signal type	from 0.5 to 4.5 V

Digital inputs

Number	6
Signal type	0/VB

Proportional outputs

Number	1 couple
Type	HSD*
Signal	PWM
Frequency	from 50 to 300 Hz
Max. load	2 A

ON/OFF outputs

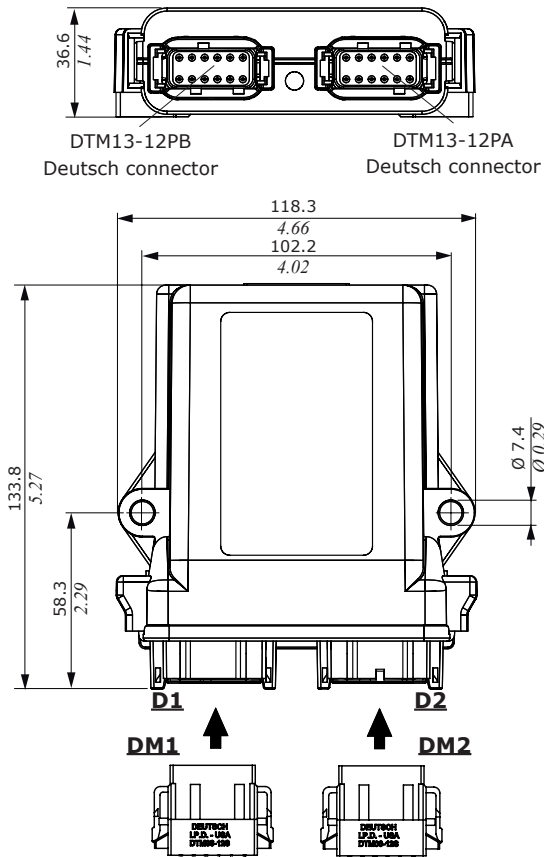
Number	6
Signal type	relay (HSD*)
Max. load	7.5 A

NOTE (*): HSD - High Side Driver
LSD - Low Side Driver

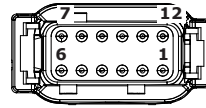
Electronic control units

CED160 electronic control unit

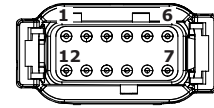
Dimensions and pin-out



D1 connector



D2 connector



Connector PIN-OUT

Pin	Function	
	D1 connector	D2 connector
1	OUT_1	DI_5
2	VB-	DI_6
3	CAN_H	DI_1
4	CAN_L	GND_P
5	OUT_5	AI_3
6	OUT_6	AI_2
7	VK+	AI_1
8	VK+	OUT_B
9	OUT_2	DI_2
10	OUT_3	DI_3
11	OUT_4	DI_4
12	OUT_1	OUT_A

Mating connectors

Name	Type
DM1	DTM06-12SA Deutsch
DM2	DTM06-12SB Deutsch

CED160 control unit code

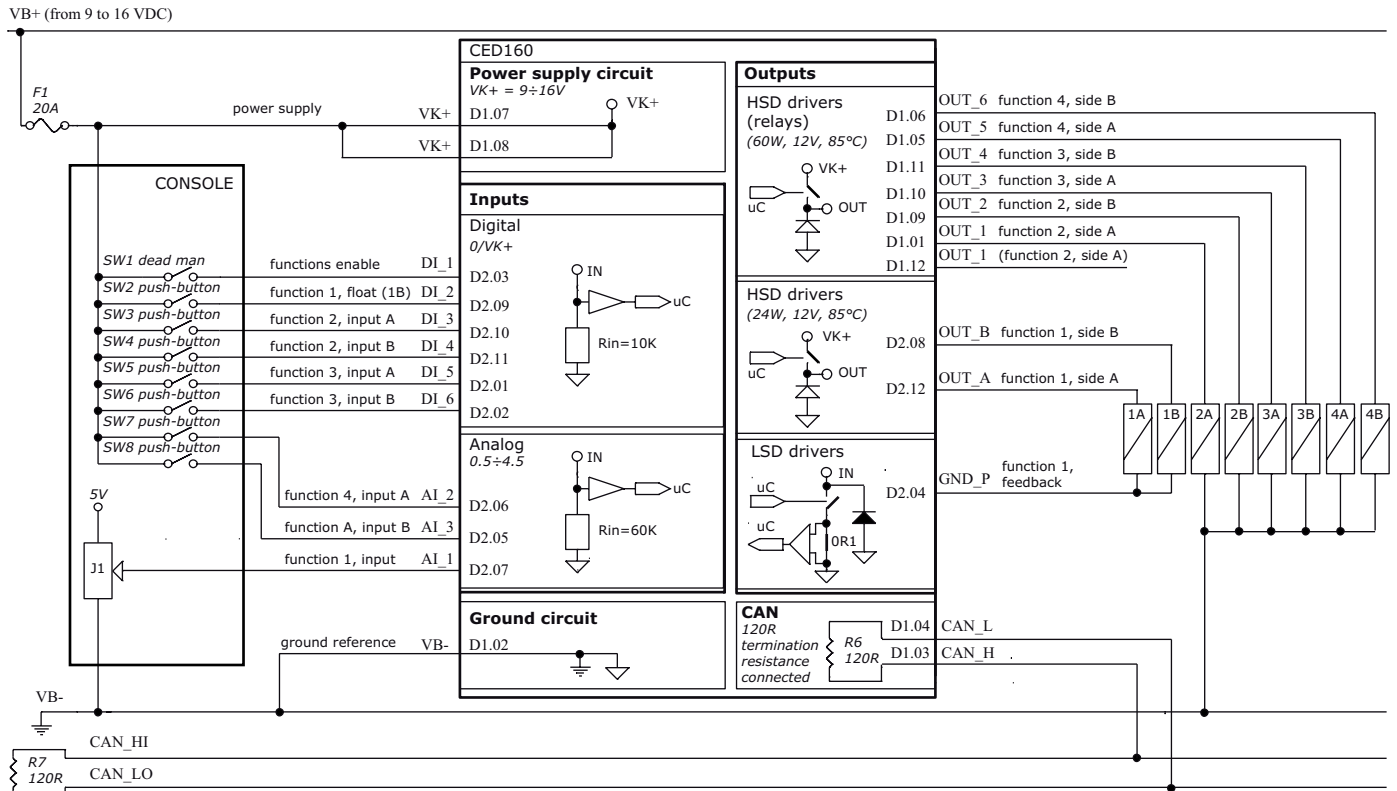
Code 183360008

Description CED160/PHC160F-12V/v4.00

Notes Supply voltage 12V, 1 prop. function (2 outputs - 2A), 3 ON-OFF functions (6 outputs - 5A)

System diagram

Standard circuit configuration



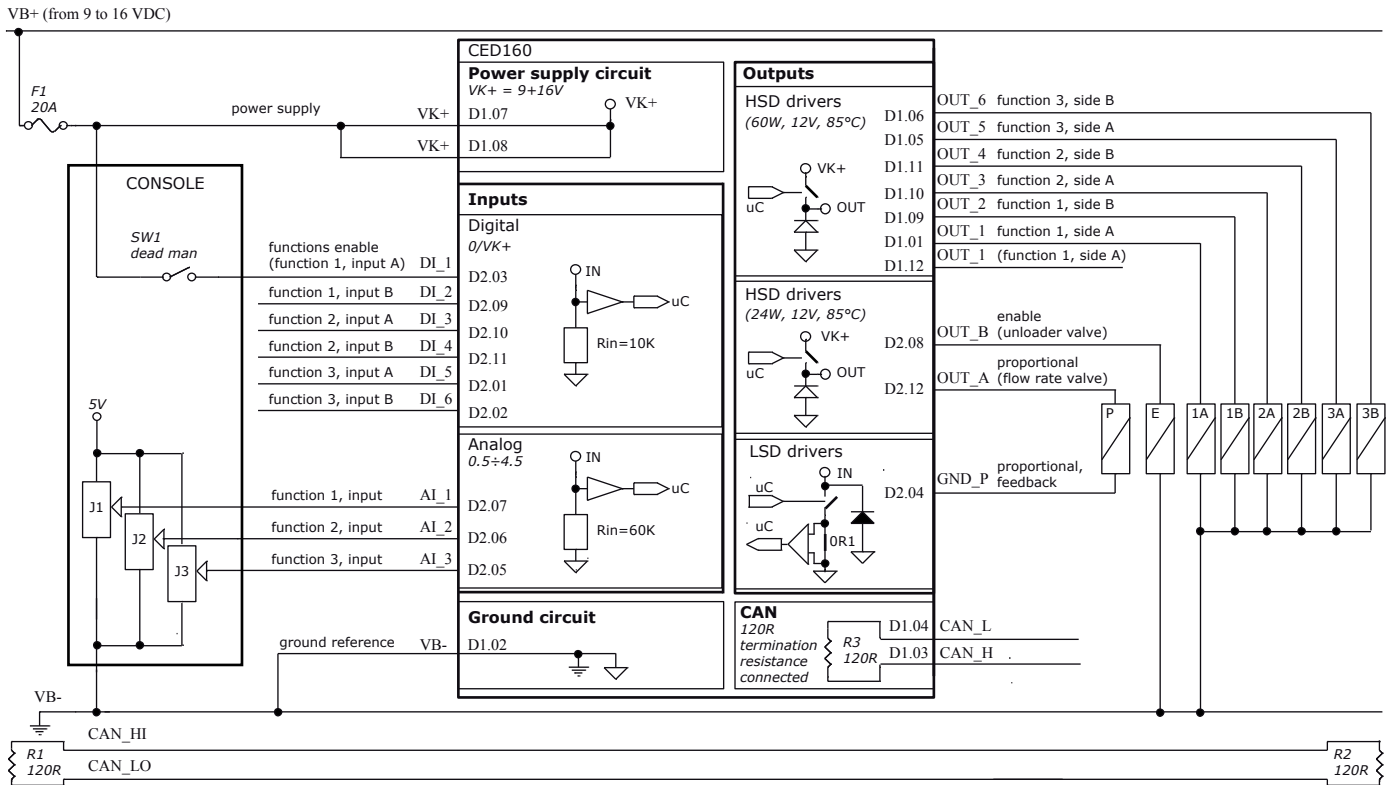
Electronic control units

CED160 electronic control unit

System diagram

Specific circuit configuration

The CED160 control unit is also available in dedicated configuration for the SDE series with direct acting solenoid control. For information, please contact our Sales Department.





CED252 electronic control unit

- 12VDC applications
- 'Dead man' switch management
- Float function management
- Automatic function management
- Two proportional function controls (3 inputs / 4 outputs)
- Five digital output controls
- Designed for front-end loader applications
- Available with ISOBUS (ISO-11783) standard certified protocol (AUX-N compliant)

Working conditions

General features	CED252
Supply voltage	from 9 to 16 V
Current consumption	> 100 mA
Max. current output	21 A - 12 VDC
Interface	RS232, 9600, 8, n, 1 CAN 2.0 A - B, 125-250 Kbit/sec
EMC compatibility	200 V/m - ISO13766, ISO14982, 2000/2/EC, CE
Environmental compatibility	IEC60068-2-6/27/29
Working temperature	from -40 to +85°C (from -40°F to 185°F)
Protection degree	IP67
Weight	0.8 Kg (1.8 lb)

Analog inputs

Number	up to 11
Signal type	up to 6, from 0 to 30 VDC up to 5, from 0 to 5 VDC

Digital inputs

Number	1
Signal type	from 0 to 30 VDC

Proportional outputs

Number	5 x HSD
Signal type	PWM - (HSD*)
Frequency	100-150-220 Hz
Max. load	5 x 2A

ON/OFF outputs

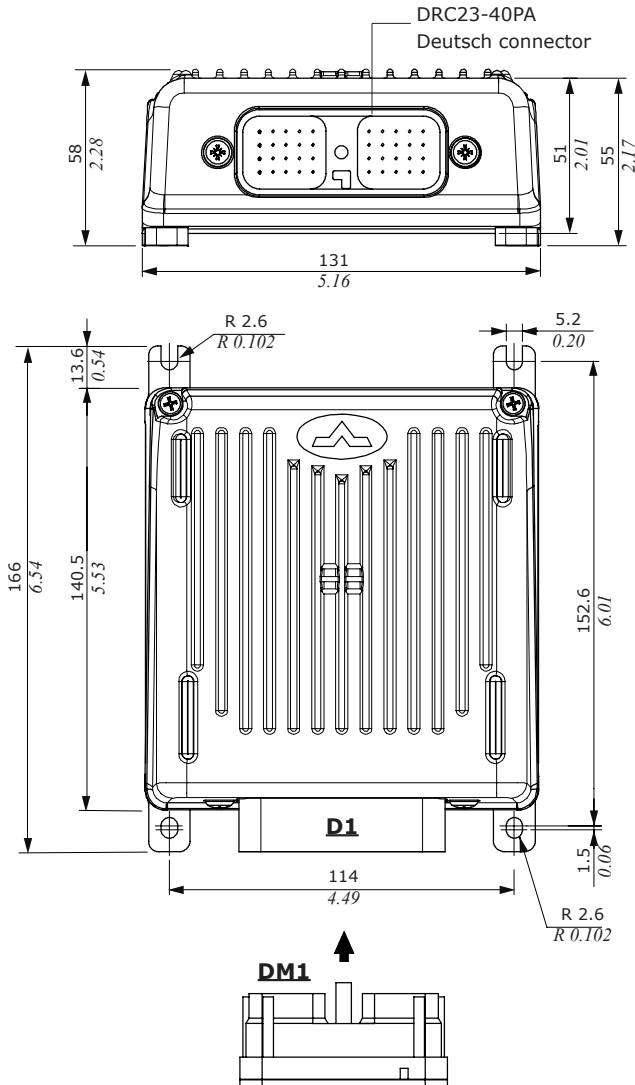
Number	5 x HSD*
Signal type	0/VB
Max. load	5 A

NOTE (*): HSD - High Side Driver

Electronic control units

CED252 electronic control unit

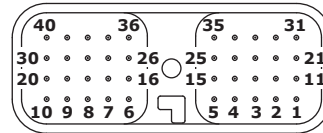
Dimensions and pin-out



Mating connectors

Name	Type
DM1	DRC26-40SA Deutsch

D1 connector



D connector PIN-OUT

Pin	function	Pin	function	Pin	function	Pin	function
1	OUT_8	11	OUT_7	21	OUT_10	31	OUT_6
2	OUT_9	12	OUT_1	22	OUT_2	32	OUT_3
3	VK+	13	GND_1	23	OUT_5	33	OUT_4
4	VK+	14	VK+	24	GND_2	34	VJ+
5	GND_3	15	VB+	25	VEM+	35	VS+
6	VB-	16	VJ-	26	AI_11	36	AI_1
7	AI_3	17	AI_2	27	AI_8	37	AI_5
8	AI_6	18	AI_7	28	AI_4	38	AI_9
9	AI_10	19	GND	29	RX	39	TX
10	VS-	20	CAN_SH	30	CAN_H	40	CAN_L



CED252 control unit code

Code	183350025
Protocol	SAE J1939
Description	CED252/PHC251C/v4015
Notes	Supply voltage 12V, 2 prop. function (4 outputs - 2A), 3 ON-OFF outputs (5A)

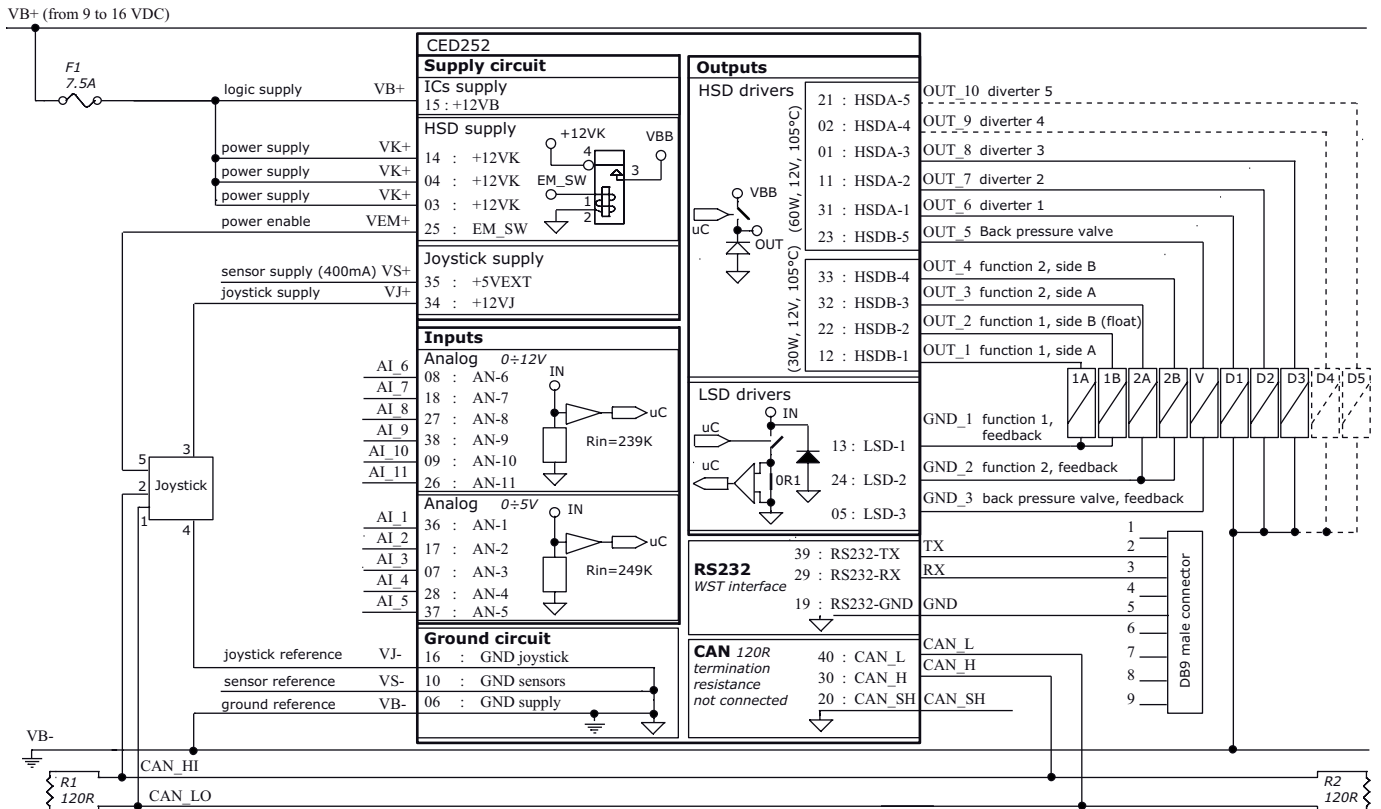
CED252 control unit code, ISOBUS certification

Code	183350030
Protocol	ISOBUS
Description	CED252/ISOBUS/LOADER/v4033.02
Notes	Supply voltage from 9 to 16V, 5 x HSD* proportional outputs (2A), 5 x HSD* ON-OFF outputs (5A)

NOTE (*): HSD - High Side Driver

System diagram

Standard circuit configuration

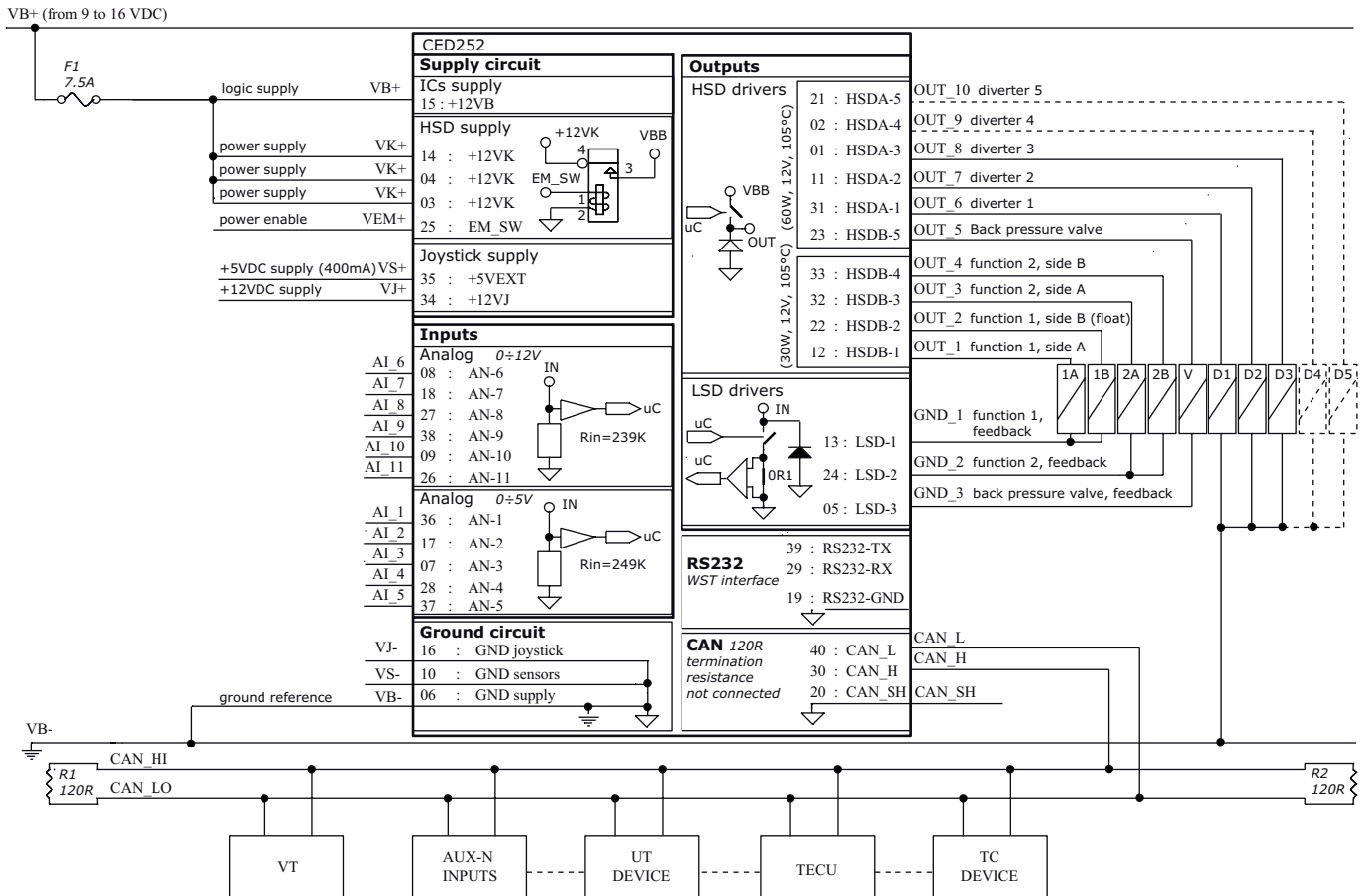


Electronic control units

CED252 electronic control unit

System diagram

ISOBUS circuit configuration





Harnesses

- Dedicated to predefined PHC systems
- Power-line connection with fuse protection
- Suitable for static or fixed installation

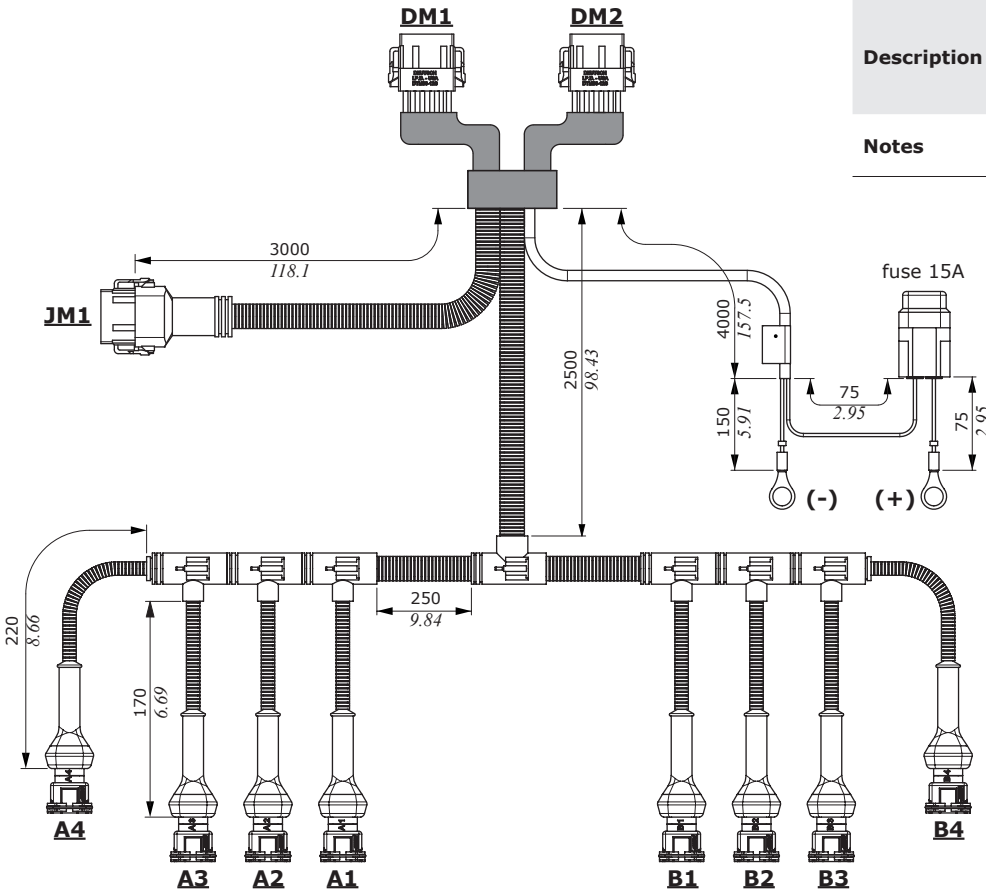
Working conditions

General features

Working temperature	from -30°C to 105°C (<i>from -22°F to 221°F</i>)	
Working features	fixed laying, motor, agricultural and civil environment	
Electrical insulation	rule	CEI 20-11, R3 type
	directive	2000/53/CE
Conductor section	DIN 72551-6, A and B type	
Max. load current (continuative)	AWG22	up to 1 A
	AWG20	up to 2.5 A
	AWG17	up to 5 A
	AWG15	up to 10 A
	AWG13	up to 20 A

KCD04-PHC400F

Dimensions and wiring



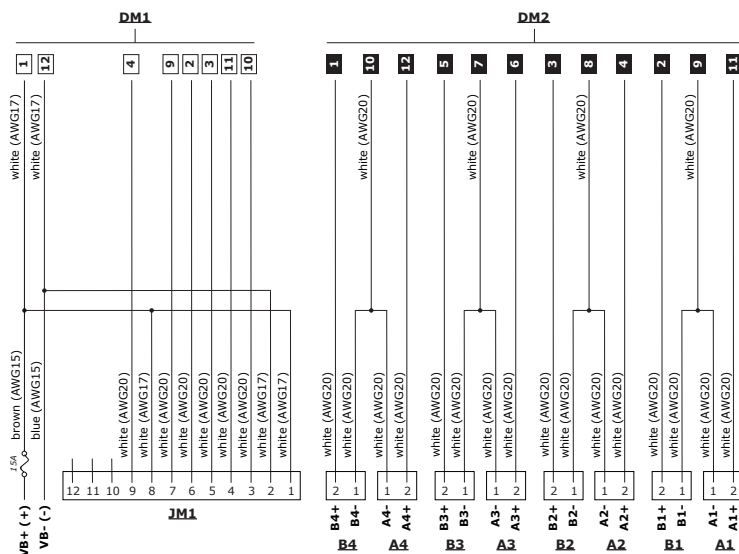
KCD04-PHC400F harness

Code 183480118

Description KCD04/(D2M12-D2M12)-01D2M12300(TC)-02(4)T1F02300(TC)-03(4)T102300(TC)-AU1F15400(TC)

Notes AJW and CED400X connection, for 4 proportional functions

Electrical wiring



Connector types

ID	Connection to	Type
DM1	CED	DTM06-12SA Deutsch
DM2	CED	DTM06-12SB Deutsch
JM1	Joystick	DTM06-12SA Deutsch
A1 to B4	proportional solenoid valves	AMP JPT, 2 poles

Connector PIN-OUT

Pin	DM1 connector		DM2 connector		JM1 conn. Function
	Name	Function	Name	Function	
1	VB+	VB+	OUT_8	B4+	VJ+
2	AI_4	joystick 4	OUT_2	B1+	VJ-
3	AI_3	joystick 3	OUT_4	B2+	joystick 1
4	DI_1	dead man	OUT_3	A2+	joystick 2
5	plugged	plugged	OUT_6	B3+	joystick 3
6	plugged	plugged	OUT_5	A3+	joystick 4
7	plugged	plugged	GND_3	A3- / B3-	float
8	plugged	plugged	GND_2	A2- / B2-	VJ+
9	DI_2	float	GND_1	A1- / B1-	dead man
10	AI_1	joystick 1	GND_4	A4- / B4-	plugged
11	AI_2	joystick 2	OUT_1	A1+	plugged
12	VB-	VB-	OUT_7	A4+	plugged

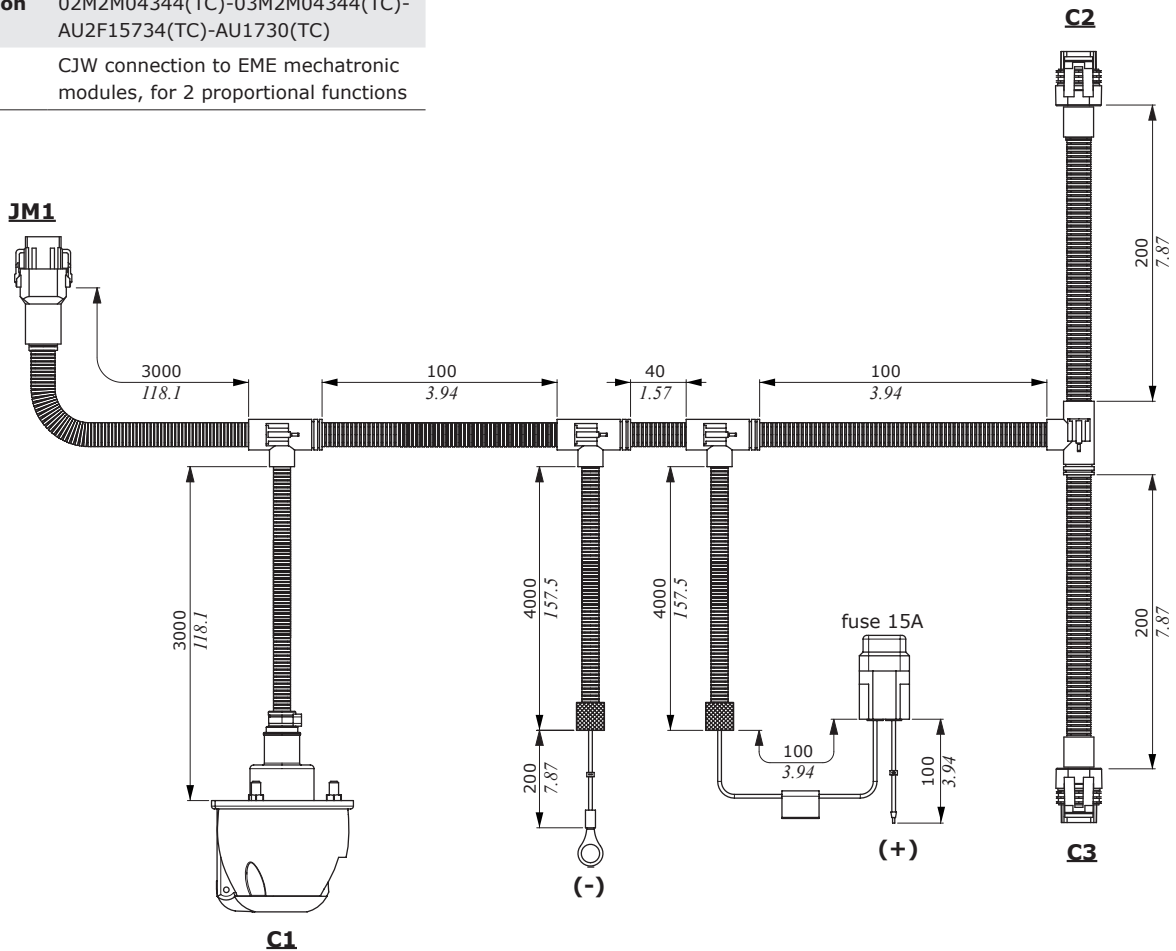
Dimensions and wiring

KCD05-PHC220C harness

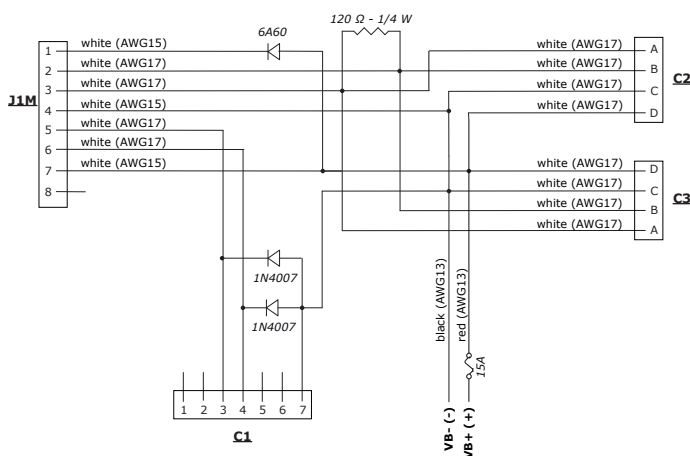
Code 183480165

Description KCD05/D2M06-01CCF07600(TC)-02M2M04344(TC)-03M2M04344(TC)-AU2F15734(TC)-AU1730(TC)

Notes CJW connection to EME mechatronic modules, for 2 proportional functions



Electrical wiring



Connector types

ID	Connection to	Type
C1	ON/OFF valves	8JB001941002 Hella
JM1	Joystick	DTM06-8S Deutsch
C2+C3	Mechatronic modules	M-PACK150_2 Packard, 4 poles

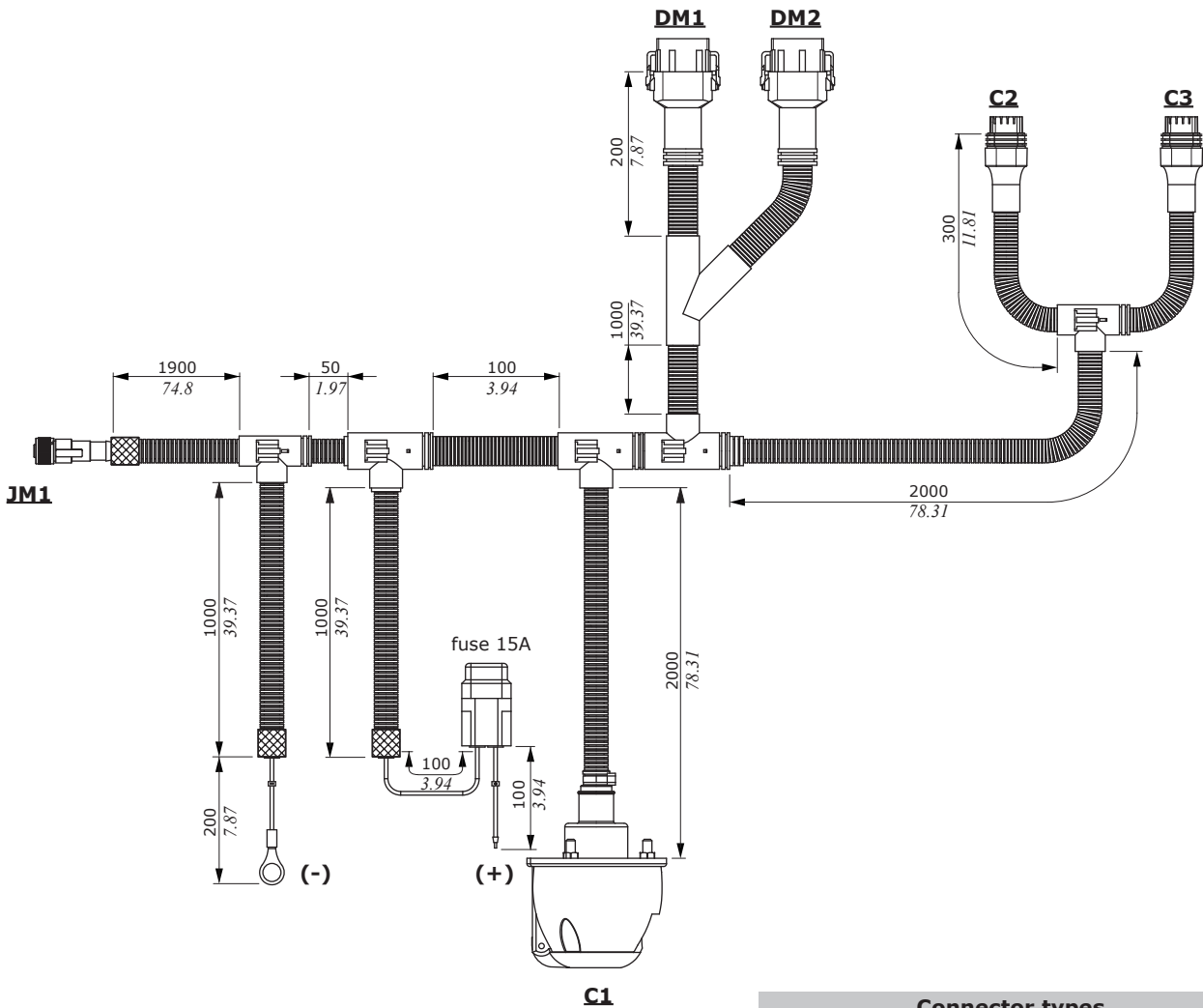
Connectors PIN-OUT

Pin	Functions		
	C1 conn.	JM1 conn.	C2+C3 conn.
1	not connected	VJ+	CAN_H
2	not connected	CAN_L	CAN_L
3	ON-OFF 3	CAN_H	VB-
4	ON-OFF 4	VB-	VB+
5	plugged	ON-OFF 3	/
6	plugged	ON-OFF 4	/
7	VB-	VJ+	/
8	/	plugged	/

KCD05-PHC250C

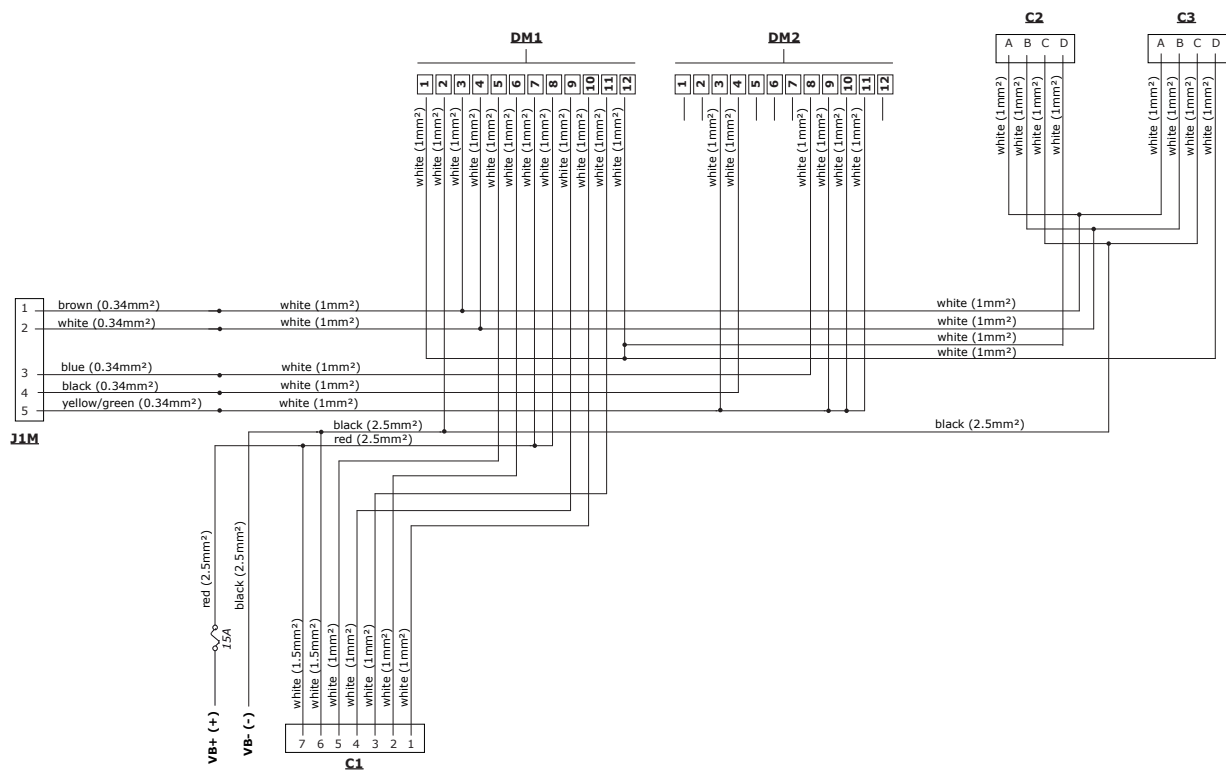
Dimensions and wiring

KCD05-PHC250C harness	
Code	183480166
Description	KCD06/(D2M12-D2M12)-01F1F05330(TC)-02CCF07320(TC)-03M2M04350(TC)-04M2M04350(TC)-AU2F15250(TC)-AU1250(TC)
Note	CJW, CED040 and EME mechatronic modules connection, for 2 proportional functions



Connector types		
ID	Connection to	Type
DM1	CED	DTM06-12SA Deutsch
DM2	CED	DTM06-12SB Deutsch
JM1	Joystick	5 poles M12 - female
C1	ON/OFF valves	8JB001941002 Hella
C2+C3	Mechatronic modules	M-PACK150_2 Packard, 4 poles

Dimensions and wiring



Connectors PIN-OUT							
Pin	DM1 connector		DM2 connector		JM1 conn.	C1 conn.	C2+C3 con.
	Name	Function	Name	Function	Function	Function	Function
1	OUT_1	VEME+	OUT_L	plugged	CAN_H	ON-OFF 3	CAN_H
2	VB-	VB-	DI_5	plugged	CAN_L	sensor 2	CAN_L
3	CAN_H	CAN_H	DI_1	VK+	VJ+	ON-OFF 1	VB-
4	CAN_L	CAN_L	VJ-	VJ-	VJ-	ON-OFF 2	VEME+
5	AI_6	sensor 1	AI_3	plugged	VK+	sensor 1	/
6	AI_7	sensor 2	AI_2	plugged	/	VB-	/
7	VK+	VB+	AI_1	plugged	/	VB+	/
8	VK+	VB+	VJ+	VJ+	/	/	/
9	OUT_2	ON-OFF 2	DI_2	VK+	/	/	/
10	OUT_3	ON-OFF 3	DI_3	VK+	/	/	/
11	OUT_4	ON-OFF 1	DI_4	VK+	/	/	/
12	OUT_1	VEME+	DI_6	plugged	/	/	/

KCD09-PHC251C

Dimensions and wiring

KCD09-PHC251C harness

Code 183480167

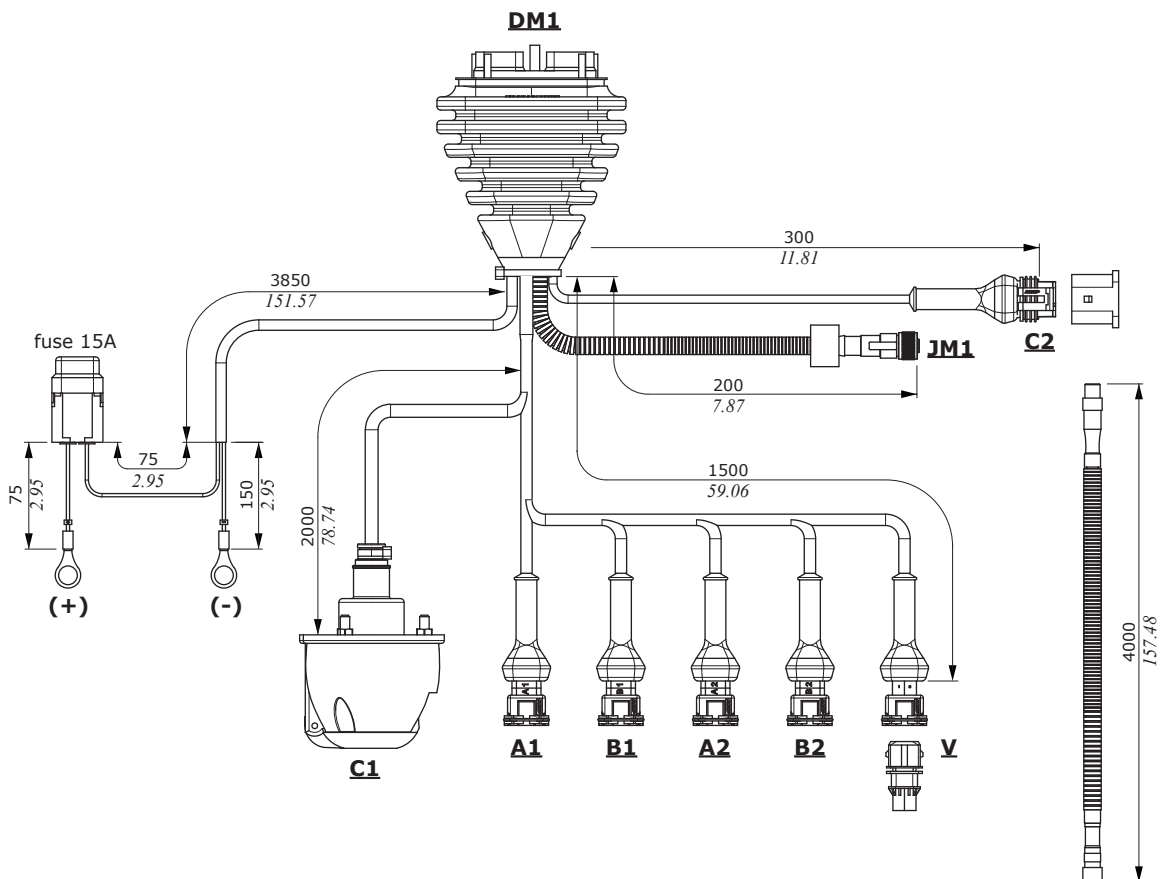
Description KCD09/CD3F40(SOF)-01T1F02150-02T1F02150-03T1F02150-04T1F02150-05T1F02150(TAP)-06CCF07200-07F1F05020(TC)-08A1M03030(TAP)-AU1F15400

Note CJW and CED252 connection, for 2 proportional functions

Code 183490001

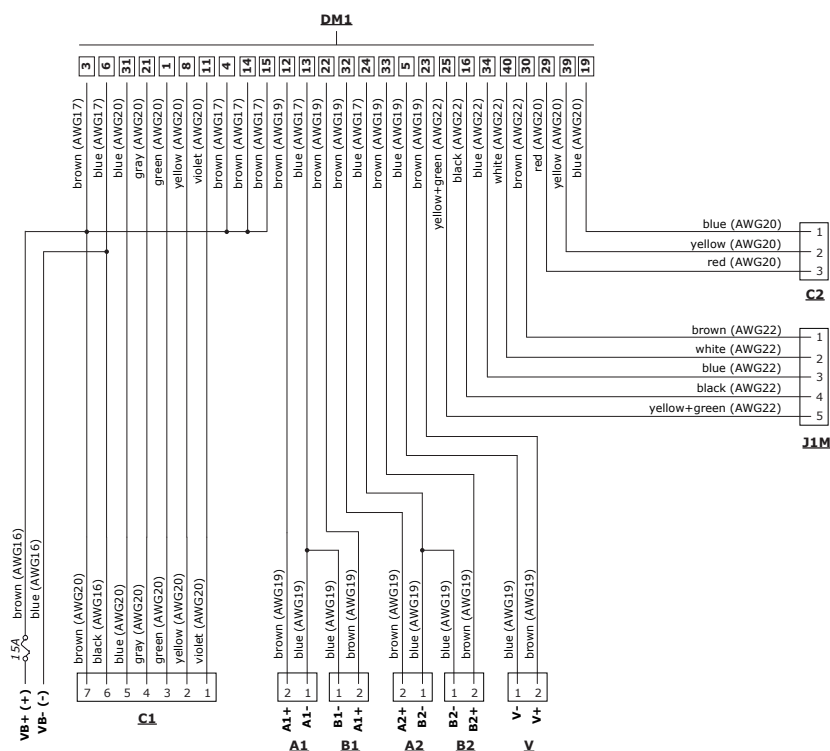
Description F1M05-F1F05(TC) L=4m (157.48 in)

Note extension for CJW connection



Connector types		
ID	Connection to	Type
DM1	CED	DRC26-40SA Deutsch
JM1	Joystick	5 poles M12 - female
C1	ON/OFF valves	8JB001941002 Hella
C2	programmazione	Superseal AMP, 3 poles, male
A1-B1 A2-B2 V	proportional solenoid valves	JPT AMP, 2 poles

Dimensions and wiring



Connectors PIN-OUT			
Pin	JM1 conn. Function	C1 conn. Function	C2 conn. Function
1	CAN_H	ON-OFF 1	RS232-GND
2	CAN_L	sensor 1	RS232-Tx
3	VJ+	ON-OFF 2	RS232-Rx
4	VJ-	ON-OFF 3	/
5	EM-SW	sensor 2	/
6	/	VB-	/
7	/	VB+	/

DM1 connector PIN-OUT											
Pin	Name	Function	Pin	Name	Function	Pin	Name	Function	Pin	Name	Function
1	OUT_8	ON-OFF 2	11	OUT_7	ON-OFF 1	21	OUT_10	ON-OFF 3	31	OUT_6	sensor 2
2	OUT_9	non coll.	12	OUT_1	A1+	22	OUT_2	B1+	32	OUT_3	A2+
3	VK+	VK+	13	GND_1	A1- / B1-	23	OUT_5	V+	33	OUT_4	B2+
4	VK+	VK+	14	VK+	VK+	24	GND_2	A2- / B2-	34	VJ+	VJ+
5	GND_3	V-	15	VB+	VB+	25	VEM+	EM-SW	35	VS+	non coll.
6	VB-	GND	16	VJ-	VJ-	26	AI_11	not conn.	36	AI_1	non coll.
7	AI_3	not conn.	17	AI_2	not conn.	27	AI_8	not conn.	37	AI_5	non coll.
8	AI_6	sensor 1	18	AI_7	not conn.	28	AI_4	not conn.	38	AI_9	non coll.
9	AI_10	not conn.	19	GND	RS232-GND	29	RX	RS232-Rx	39	TX	RS232-Tx
10	VS-	not conn.	20	CAN_SH	not conn.	30	CAN_H	CAN_H	40	CAN_L	CAN_L

KCD03+KCD03-PHC640C

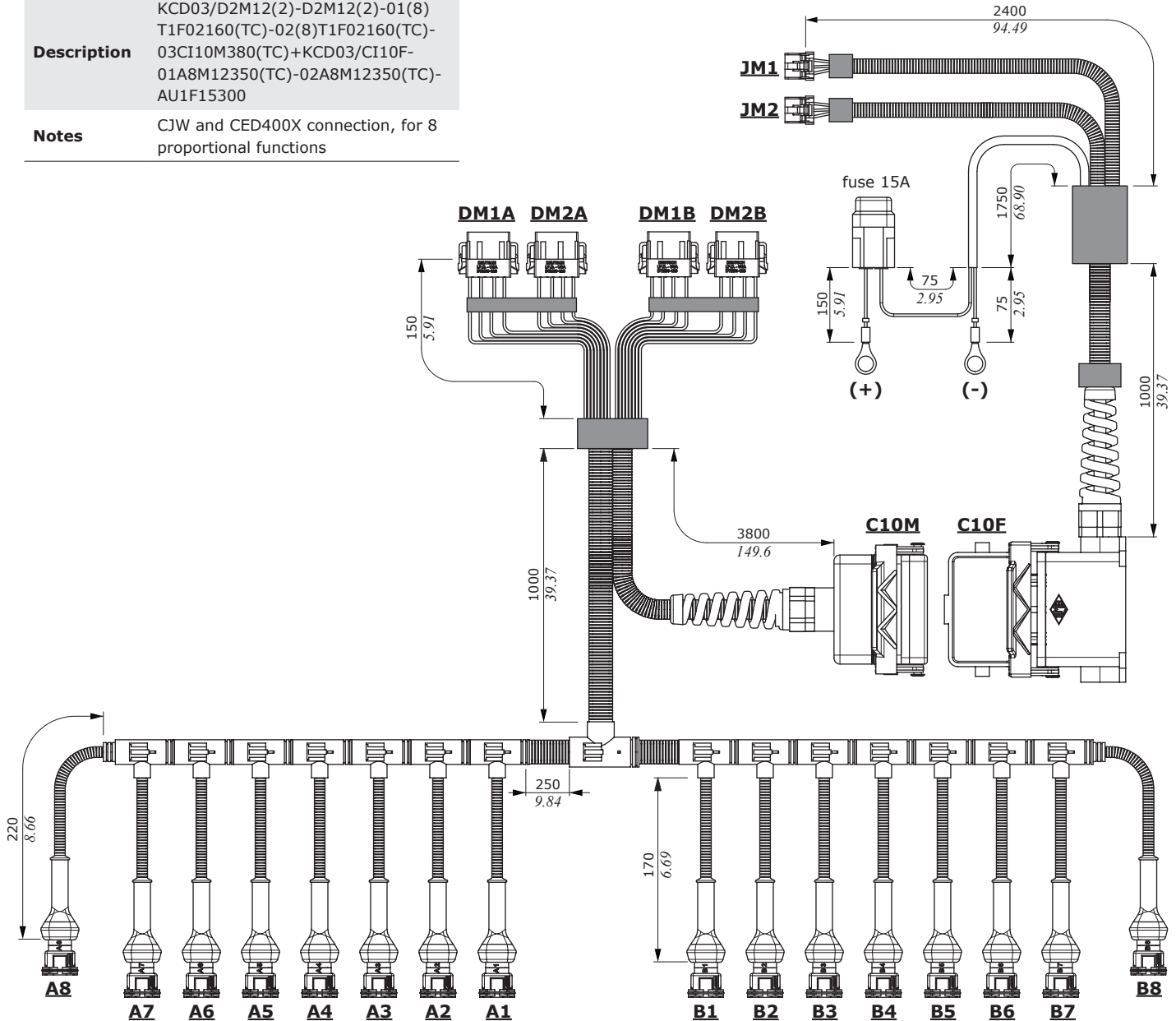
Dimensions and wiring

KCD03+KCD03-PHC640C harness

Code 183480169

Description KCD03/D2M12(2)-D2M12(2)-01(8) T1F02160(TC)-02(8)T1F02160(TC)-03CI10M380(TC)+KCD03/CI10F-01A8M12350(TC)-02A8M12350(TC)-AU1F15300

Notes CJW and CED400X connection, for 8 proportional functions

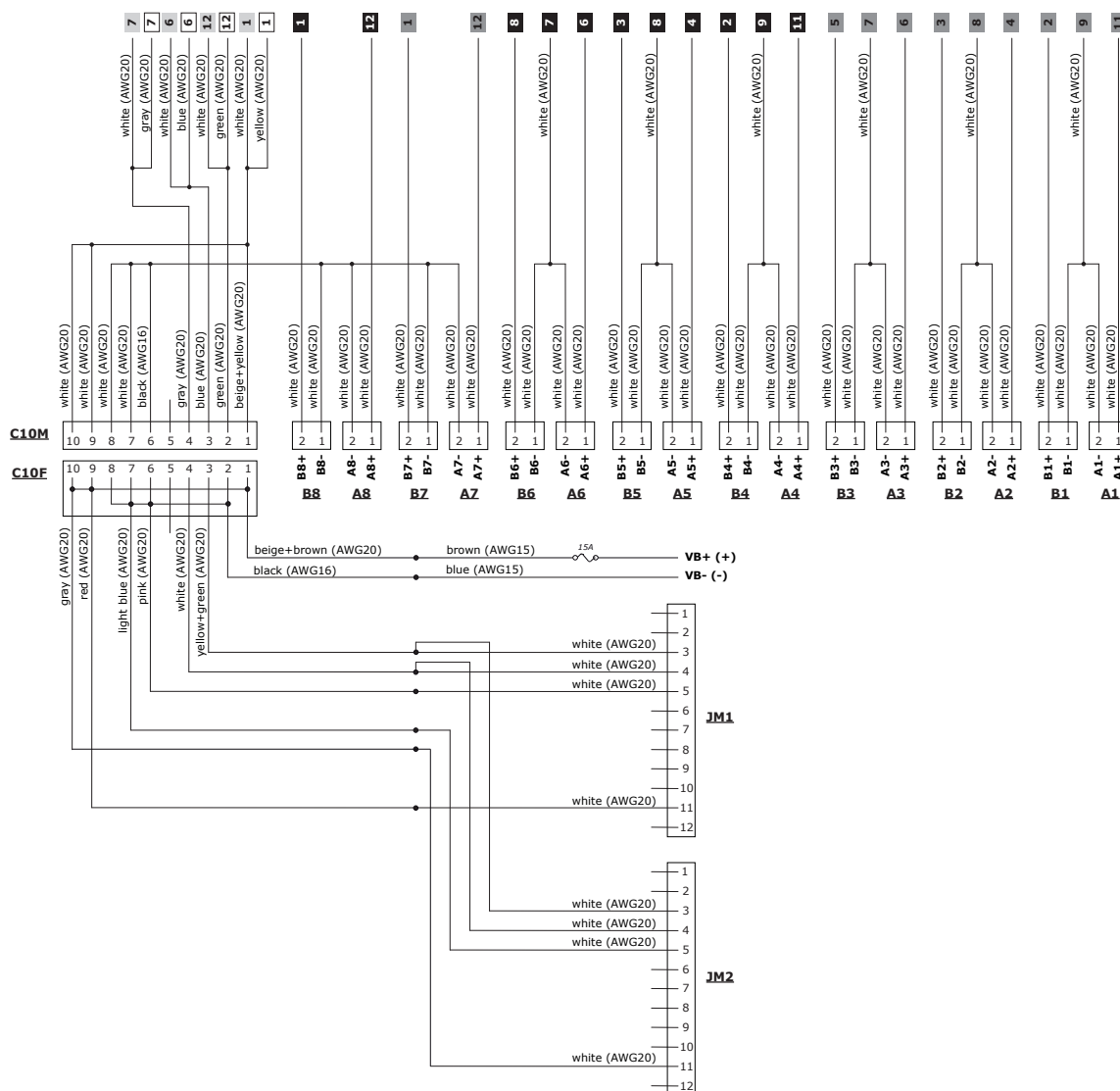


Connector types		
ID	Connection to	Type
DM1A+DM1B	CED	DTM06-12SA Deutsch
DM2A+DM2B	CED	DTM06-12SB Deutsch
C10M	cable extension	CNM10+CHV10L+CHC10LG Ilme
C10F	cable extension	CNF10+CHP10LS Ilme
JM1+JM2	joystick	Multilock 040 series Tyco, 12 poles
A1 to B8	proportional solenoid valves	JPT AMP, 2 poles

Dimensions and wiring

- 1** DM1A connector
- 1** DM2A connector
- 1** DM1B connector
- 1** DM2B connector

Electrical wiring

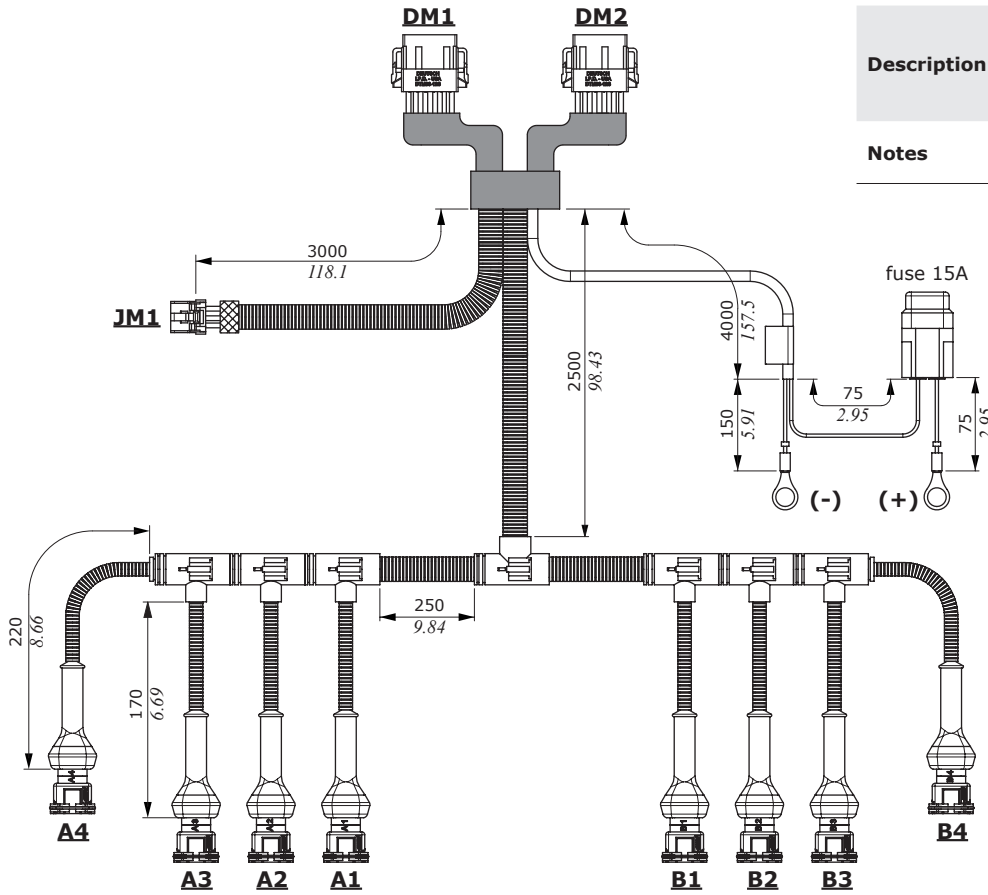


Connector PIN-OUT

Pin	DM1A connector		DM2A connector		DM1B connector		DM2B connector		JM1+JM2 con.	C10M+C10F con.
	Name	Function	Name	Function	Name	Function	Name	Function		
1	VB+	VB+	OUT_8	B7+	VB+	VB+	OUT_8	B8+	not connected	VB+
2	plugged	plugged	OUT_2	B1+	plugged	plugged	OUT_2	B4+	not connected	VB-
3	plugged	plugged	OUT_4	B2+	plugged	plugged	OUT_4	B5+	CAN_L	CAN_L
4	plugged	plugged	OUT_3	A2+	plugged	plugged	OUT_3	A5+	CAN_H	CAN_H
5	plugged	plugged	OUT_6	B3+	plugged	plugged	OUT_6	B6+	VJ-	not connected
6	CAN_L	CAN_L	OUT_5	A3+	CAN_L	CAN_L	OUT_5	A6+	not connected	VB-
7	CAN_H	CAN_H	GND_3	A3- / B3-	CAN_H	CAN_H	GND_3	A6- / B6-	not connected	VB-
8	plugged	plugged	GND_2	A2- / B2-	plugged	plugged	GND_2	A5- / B5-	not connected	VB-
9	plugged	plugged	GND_1	A1- / B1-	plugged	plugged	GND_1	A4- / B4-	not connected	VJ+
10	plugged	plugged	GND_4	plugged	plugged	plugged	GND_4	plugged	not connected	VJ+
11	plugged	plugged	OUT_1	A1+	plugged	plugged	OUT_1	A4+	VJ+	/
12	VB-	VB-	OUT_7	A7+	VB-	VB-	OUT_7	A8+	VJ-	/

KCD04-PHC400C

Dimensions and wiring



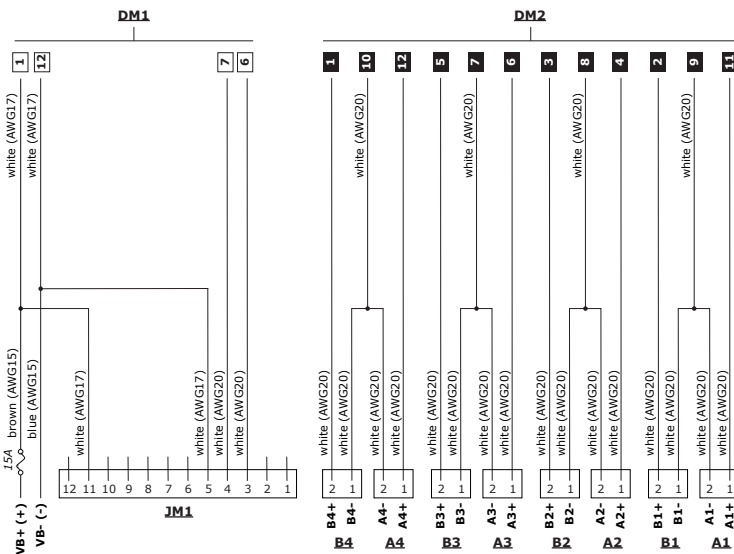
KCD04-PHC400C harness

Code 183480168

Description KCD04/(D2M12-D2M12)-01A8M12300(TC)-02(4) T1F02300(TC)-03(4)T102300(TC)-AU1F15400(TC)

Notes CJW and CED400X connection, for 4 proportional functions

Electrical wiring



Connector types

ID	Connection to	Type
DM1	CED	DTM06-12SA Deutsch
DM2	CED	DTM06-12SB Deutsch
JM1	Joystick	Multilock Series 040 Tyco, 12 poles
A1 - B4	Proportional solenoid valves	JPT AMP, 2 poli

Connector PIN-OUT

Pin	DM1 connector		DM2 connector		JM1 con. Function
	Name	Function	Name	Function	
1	VB+	VB+	OUT_8	B4+	not conn.
2	plugged	plugged	OUT_2	B1+	not conn.
3	plugged	plugged	OUT_4	B2+	CAN_L
4	plugged	plugged	OUT_3	A2+	CAN_H
5	plugged	plugged	OUT_6	B3+	VJ-
6	CAN_L	CAN_L	OUT_5	A3+	not conn.
7	CAN_H	CAN_H	GND_3	A3- / B3-	not conn.
8	plugged	plugged	GND_2	A2- / B2-	not conn.
9	plugged	plugged	GND_1	A1- / B1-	not conn.
10	plugged	plugged	GND_4	A4- / B4-	not conn.
11	plugged	plugged	OUT_1	A1+	VJ+
12	VB-	VB-	OUT_7	A4+	not conn.



Accessories

- Preassembled connector kits for the control unit interface
- Preassembled connector kits for the joystick interface
- Preassembled connector kits for the solenoid valve interface
- Control unit programming cables
- Spool position sensors
- Control unit programming software

Programming cables

These cables are used to connect a personal computer running our WST software to the electronic control unit for the directional control valve.

The programming cable is installed between the electronic control unit (D1 connector) and the harness (D1A connector), as shown in the picture.

Cable kit

In addition to the pre-configured cables of the KCD series, Walvoil offers the opportunity to assemble custom cables.

Using the suitable pre-assembled connector kit, you can meet the needs of connecting electronic components and electro-proportional controls on Walvoil directional valves.

Spool position sensors

Accuracy, reliability and repeatability are the main features of Walvoil position sensors.

On/off type, linear analog or Can bus, they find their natural application as spool position control on the controls in the directional valve range.

Control unit programming software (Walvoil Service Tool)

CED series electronic control units are programmed in the Company with default operating parameters, suitable for most applications.

For special applications, WST software can be used together with a personal computer to optimize the control parameters for the electrohydraulic modules.

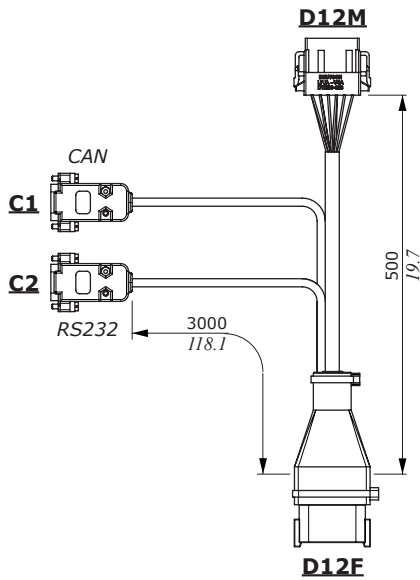
Accessories

Programming cables

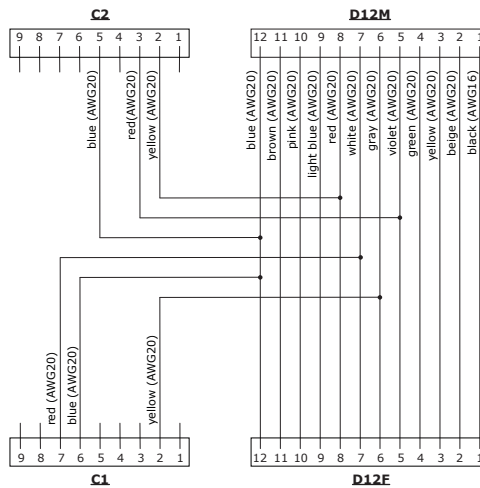
For CED100X-400X control units

Code	VCAV600018
Description	CED100X-400X programming cable
Notes	RS232 and CAN bus programming

Connector types		
ID	Type	Connection to
D12M	DTM06-12SA Deutsch	CED100X - CED400X control units
D12F	DTM04-12PA Deutsch	Harness
C1+C2	SUB-D 9 poles, female	Personal computer



Electrical wiring

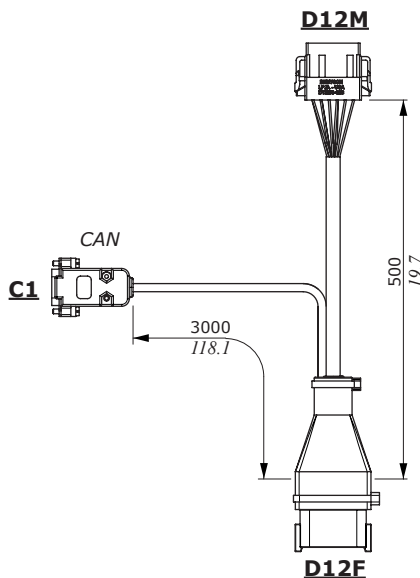


Connector PIN-OUT		
Pin	Functions	
	C1 conn.	C2 conn.
1	not connected	not connected
2	CAN_L	Tx
3	not connected	Rx
4	not connected	not connected
5	not connected	GND
6	GND	not connected
7	CAN_H	not connected
8	not connected	not connected
9	not connected	not connected

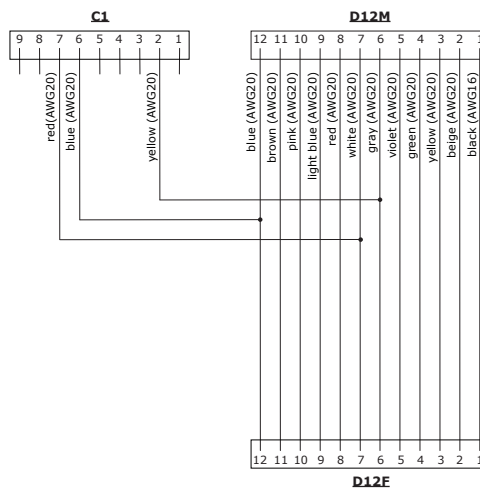
For CED040-CED160 control unit

Code	VCAV600021
Description	CED040-CED160 programming cable
Notes	CAN bus programming

Connector types		
ID	Type	Connection to
D12M	DTM06-12SA Deutsch	CED040-CED160 control units
D12F	DTM04-12PA Deutsch	Harness
C1	SUB-D 9 poles, female	Personal computer



Electrical wiring

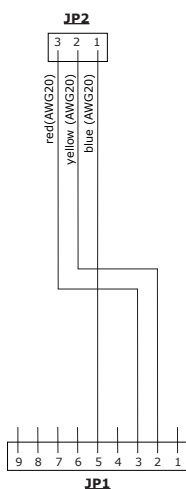
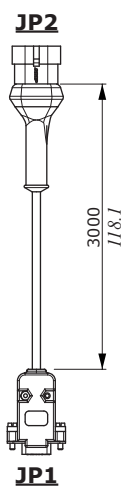


C1 connector PIN-OUT	
Pin	Functions
1	not connected
2	CAN_L
3	not connected
4	not connected
5	not connected
6	GND
7	CAN_H
8	not connected
9	not connected

For CED252 control unit

Code	VCAV600014
Description	CED252 programming cable
Notes	RS232 programming

Electrical wiring



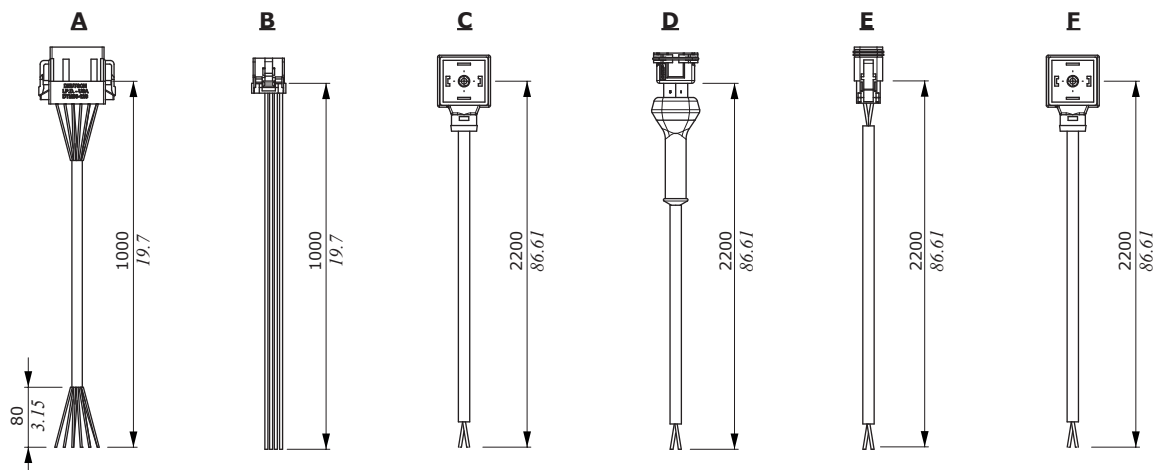
Connector PIN-OUT

Pin	Functions	
	JP1 conn.	JP2 conn.
1	not connected	GND
2	Tx	Tx
3	Rx	Rx
4	not connected	/
5	GND	/
6	not connected	/
7	not connected	/
8	not connected	/
9	not connected	/

Connector types

ID	Type	Connection to
JP1	SUB-D 9 poles, female	Personal computer
JP2	AMP Supereal, 3 poles	CED252 control unit

Cable kit



Cable kit types

ID	Code	Connector	Connection to
A	YCON140041	DTM06-12S Deutsch	CED100X-CED400X-CED040-CED160 control units, AJW joysticks
A	YCON140067	DTM06-12SB Deutsch	CED100X-CED400X-CED040-CED160 control units
B	YCON140073	Multilock series 040 Tyco	CJW joysticks
C	VCAV100008	ISO4400	Solenoid valves
D	VCAV100011	JPT AMP	Solenoid valves
E	VCAV100071	DT06-2S Deutsch	Solenoid valves
F	VCAV100007	ISO4400	Solenoid valves

Wire colour and section

Pin	A cable	B cable	C cable	D cable	E cable	F cable
1	brown (AWG20)	not connected	brown (AWG18) Valve -	blue (AWG18) Valve +	blue (AWG18) Valve +	brown (AWG18) Valve -
2	white (AWG20)	not connected	blue (AWG18) Coil 1 +	brown (AWG18) Valve -	brown (AWG18) Valve -	blue (AWG18) Coil 1 +
3	violet (AWG20)	green (AWG20) CAN_H	black (AWG18) Coil 2 +	/	/	/
4	pink (AWG20)	yellow (AWG20) CAN_L	yellow green (AWG18) GND	/	/	/
5	red (AWG20)	black (AWG20) GND	/	/	/	/
6	gray (AWG20)	not connected	/	/	/	/
7	beige (AWG20)	not connected	/	/	/	/
8	blue (AWG20)	not connected	/	/	/	/
9	light blue (AWG20)	not connected	/	/	/	/
10	yellow (AWG20)	not connected	/	/	/	/
11	green (AWG20)	red (AWG20) VB+	/	/	/	/
12	black (AWG16)	gray (AWG20) GND	/	/	/	/

Spool position sensors

8MG type



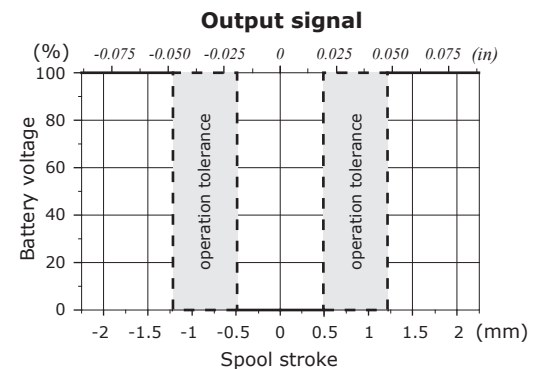
Precision ball switch for spool direction and neutral position detection, with NO and NC circuits in single and redundant configuration. This sensor is available on wide ranges of valves.

Main features are:

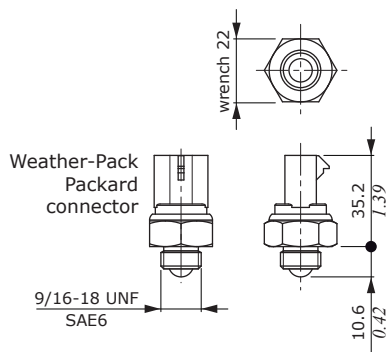
- wide output current range (10 mA to 5A);
- heavy duty construction, corrosion resistant;
- long mechanical life (10^6 cycles).

Working conditions

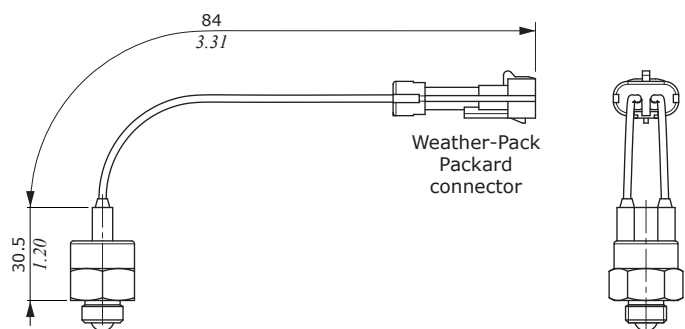
Voltage rating	from 5 to 24 VDC	
Current rating	from 10 mA to 5A	
Electrical life	5x10 ⁵	
Mechanical life	10 ⁶	
Connector type	integrated	Packard Weather-Pack
	with flying leads	Packard Weather-Pack Deutsch DT series AMP Superseal
Weather protection	IP67	
Working temperature	from -40°C to 120°C (from -40°F to 248°F)	



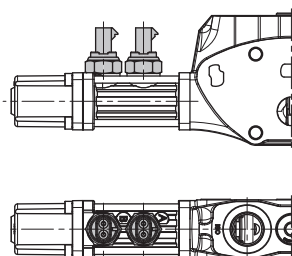
Sensor with integrated connector



Sensor with connector and flying leads



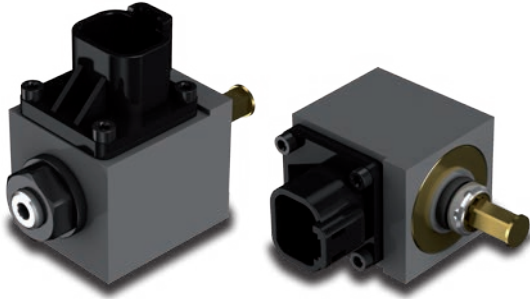
Example of sensor in 8MG control with SD8 working section



IMPORTANT: The sensor can be ordered exclusively through the controls assembled on the monoblock and sectional valves. These controls, in different configurations, are available on the full range of Walvoil directional valves.

Spool position sensors

SPSD type



The SPSP position sensor converts the spool movements into an electric digital signal.

Main features are:

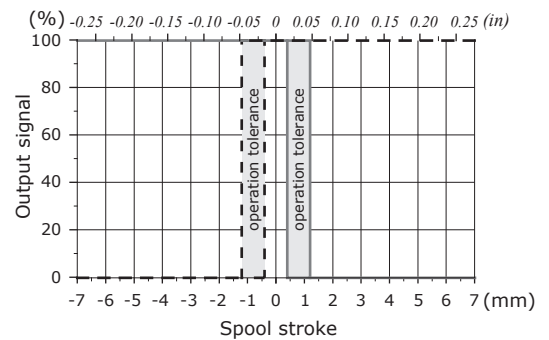
- contactless technology guarantees a long mechanical life;
- available for the complete range of valves.

Typical applications:

- cranes
- telehandlers
- aerial platforms
- front-end loaders (mid-mount)

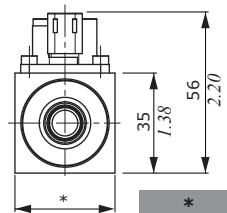
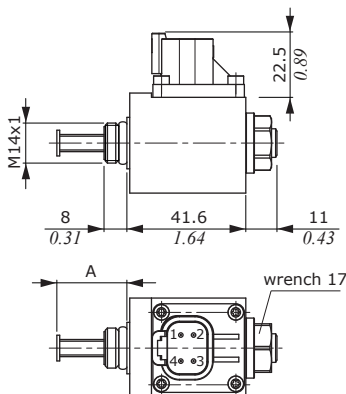
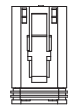
Working conditions	SPSD	SPSD-S
Voltage supply	from 9 to 32 VDC	
Current absorption	< 10 mA (no load)	
Mechanical life	3x10 ⁶	
Connector type	DT04-4P Deutsch	
Weather protection	IP67 / IP69K	
Working temperature	from -40°C to 105°C (from -40°F to 221°F)	
Working pressure	350 bar (5100 psi)	
Max. electrical stroke	±10 mm (±0.39 in)	±5.5 mm (±0.22 in)
Max. mechanical stroke	±10 mm (±0.39 in)	±5.5 mm (±0.22 in)
Output signal	type	PNP
	max. current	6 mA
EMC compatibility	ISO 13766 / ISO 14982	
Mechanical vibrations, shock, bumps	IEC 68-2-6,-27,-29	

Output signal (SPSD example) vs. spool stroke



Mating connector

Code	Type
5CON140072	DT06-4S Deutsch



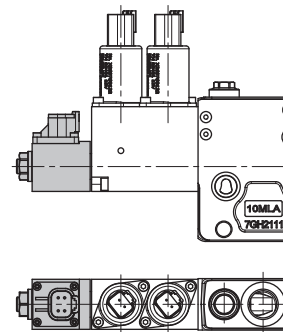
*	mm	in
SPSD	35	1.38
SPSD-S	31	1.22

A = feeler neutral position.
As for the sensor model, the dimension can be 16 or 21.5 mm (0.63 or 0.85 in)

Connector PIN-OUT

Pin	Functions
1	Out A
2	GND
3	VB+
4	Out B

Example of sensor in 8EZ control with DPX100 working section

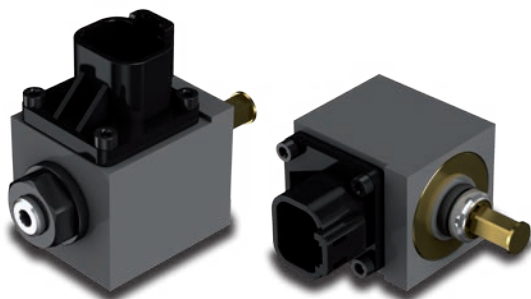


IMPORTANT: The sensor can be ordered exclusively through the controls assembled on the monoblock and sectional valves.

These controls, in different configurations, are available on the full range of Walvoil directional valves.

Spool position sensors

SPSL type



The SPSL position sensor converts the spool movements into a voltage linear signal.

Main features are:

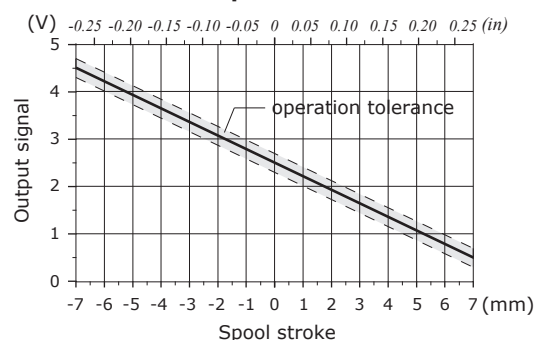
- contactless technology guarantees a long mechanical life;
- available for the complete range of valves.

Typical applications:

- cranes
- telehandlers
- aerial platforms
- front-end loaders (mid-mount)

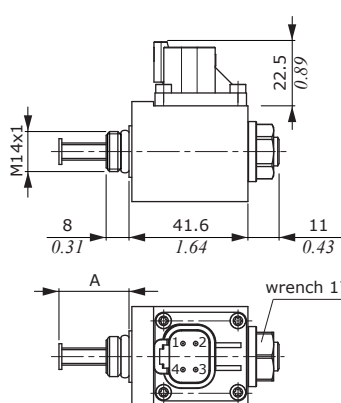
Working conditions	SPSL	SPSL-S
Voltage supply	from 9 to 32 VDC or 5 VDC	
Current absorption	< 10 mA (no load)	
Mechanical life	3x10 ⁶	
Connector type	DT04-4P Deutsch	
Weather protection	IP67 / IP69K	
Working temperature	from -40°C to 105°C (from -40°F to 221°F)	
Working pressure	350 bar (5100 psi)	
Max. electrical stroke	±10 mm (±0.39 in)	±5.5 mm (±0.22 in)
Max. mechanical stroke	±10 mm (±0.39 in)	±5.5 mm (±0.22 in)
Output signal	range	from 0.5 to 4.5 V
	linearity	± 5%
spool in neutral	2.5 ± 0.2 V	
max. current	1 mA	
EMC compatibility	ISO 13766 / ISO 14982	
Mechanical vibrations, shock, bumps	IEC 68-2-6,-27,-29	

Output signal (SPSL example) vs. spool stroke

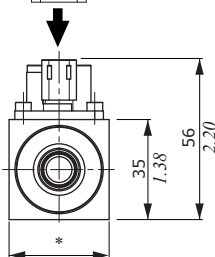
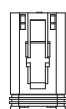


Mating connector

Code	Type
5CON140072	DT06-4S Deutsch



A = feeler neutral position.
As for the sensor model, the dimension can be 16 or 21.5 mm (0.63 or 0.85 in)

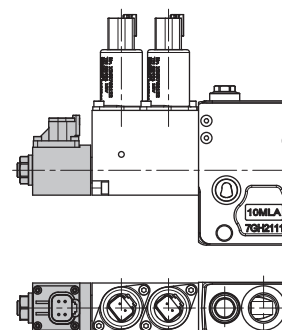


*	mm	in
SPSL	35	1.38
SPSL-S	31	1.22

Connector PIN-OUT

Pin	Functions	
	5V supply	8-32V supply
1	+ 5V	signal OUT
2	not connected	GND
3	GND	VB+
4	signal OUT	not connected

Example of sensor in 8EZ control with DPX100 working section



IMPORTANT: The sensor can be ordered exclusively through the controls assembled on the monoblock and sectional valves.

These controls, in different configurations, are available on the full range of Walvoil directional valves.

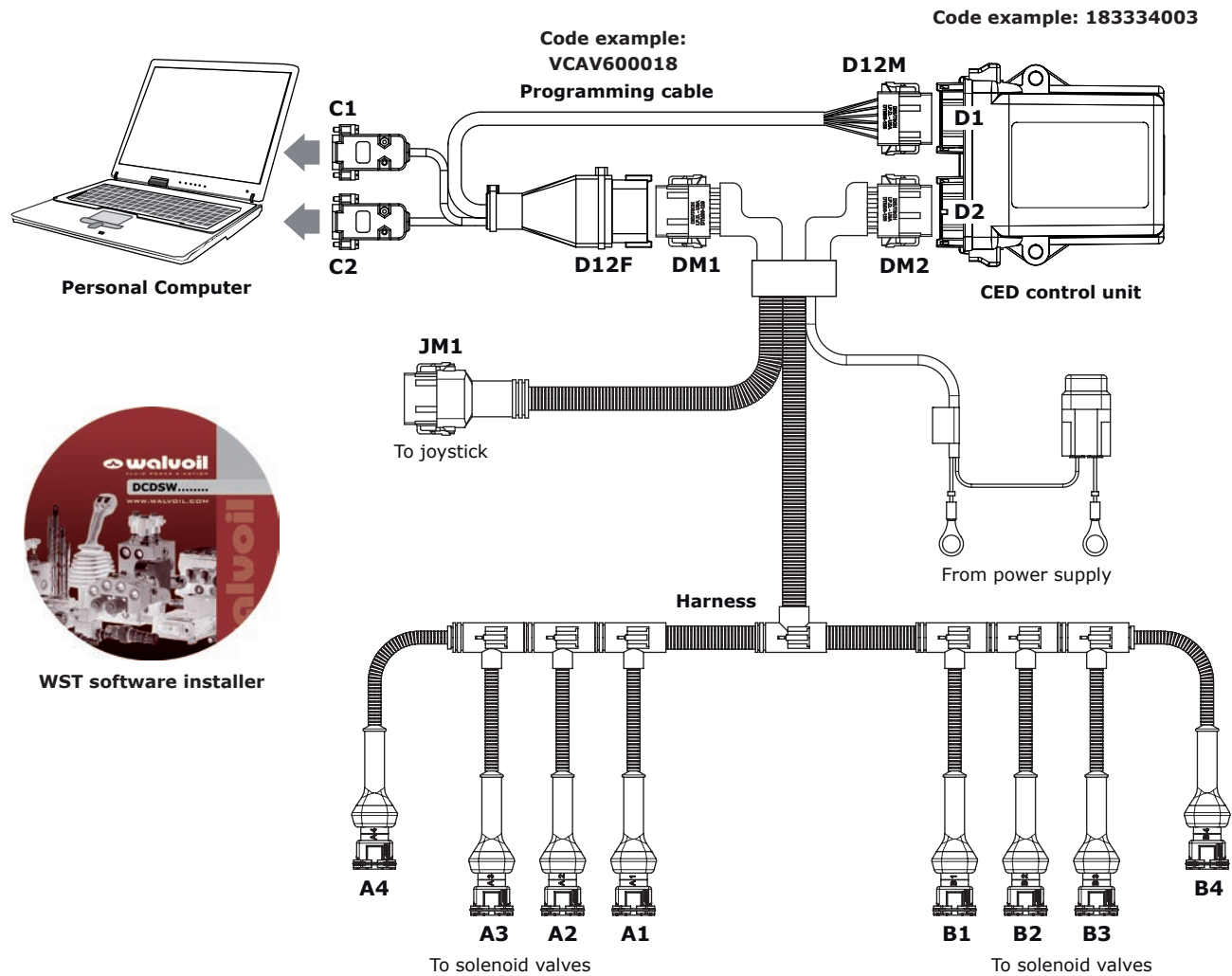
Control unit programming software

Walvoil Service Tools

CED series electronic control units are programmed in the Company with default operating parameters, suitable for most applications.

For special applications, the WST (Walvoil Service Tool) software can be used together with a personal computer to optimize the control parameters for the electrohydraulic modules. For example, minimum and maximum output current values can be set for linear curves.

You can download the WST installer software through Walvoil website with prior authorization, or you can request it on a CD. Its code is **DCDSW0170051**. Please, contact our Sales Department.



WST software installer



PHC electronic systems

- Complete electronic control systems, plug-and-play
- Pre-setted functionality
- Customization on request
- Applicable on a wide range of directional valves
- Robust construction
- Suitable for general applications

Working conditions		PHC400F	PHC220C	PHC250C	PHC251C	PHC400C	PHC640C	PHC400P
General features	System type	•						•
		potentiometric						
		ratiometric						
		CAN bus	•	•	•	•	•	
	Proportional functions (nr.)	4	2	2	2	4	6	4
	Float function management	•	•	•	•	•	•	•
	Digital outputs (nr)	/	2	3	3	/	2	/
	"Dead man" switch management	•	/	/	/	•	•	/
	Return to dig	/	/	•	•	/	/	/
	Fast-Slow	/	/	/	•	/	/	/

PHC electronic systems

PHC400F

System description

The system can be used for 12VDC or 24VDC applications.

It allows to drive up to four functions/sections on the directional valve, all the controls are proportional.

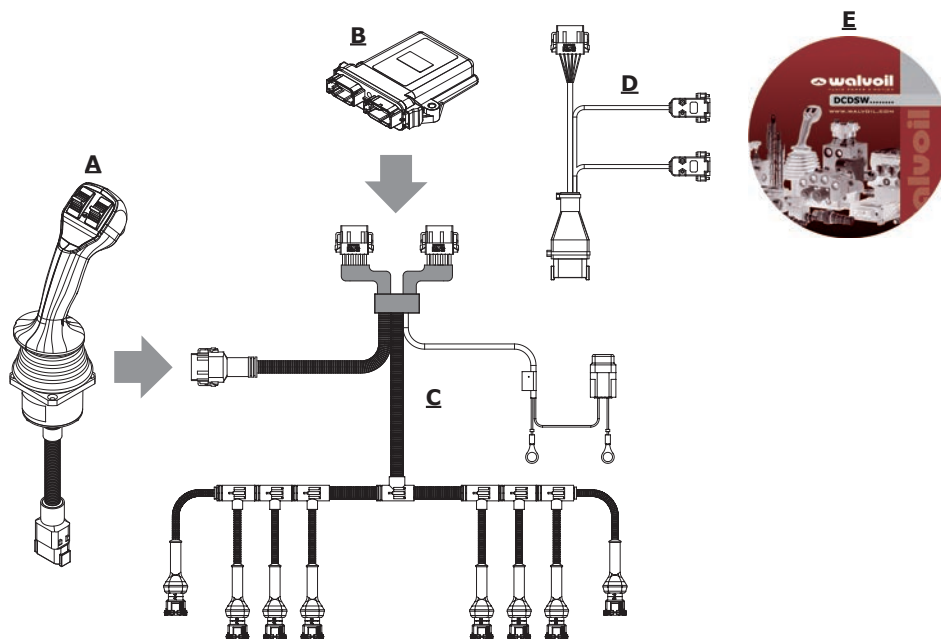
The control signals come from an analog AJW joystick. CED400X control unit drives the directional valve.

The "dead man" switch enables all the functions; the float and the fast/slow signals are used to control the float and fast/slow functions.

Acceleration and decelerations ramp times are programmable and applicable to the machine movements for those applications that require to manage heavy loads.

Through a dedicated WST software, a few customizations can be set to adjust the system dynamic.

Code	1XSE40002
Description	PHC400F electronic system
Notes	12-24V application, 4 proportional functions (1 floating)



PHC400F parts

ID	Code	Type	Qty
A	183540028	AJW analog joystick: 4 proportional axis, "dead man" switch, 1 push-button	1
B	183334003	CED400X/PHC400F/v43.02 electronic control unit	1
C	183480118	KCD04 harness	1
D	VCAV600018	CED400X programming cable	1
E	DCDSW0170051	PHC/v2.0 SYSTEM WST software	1

System description

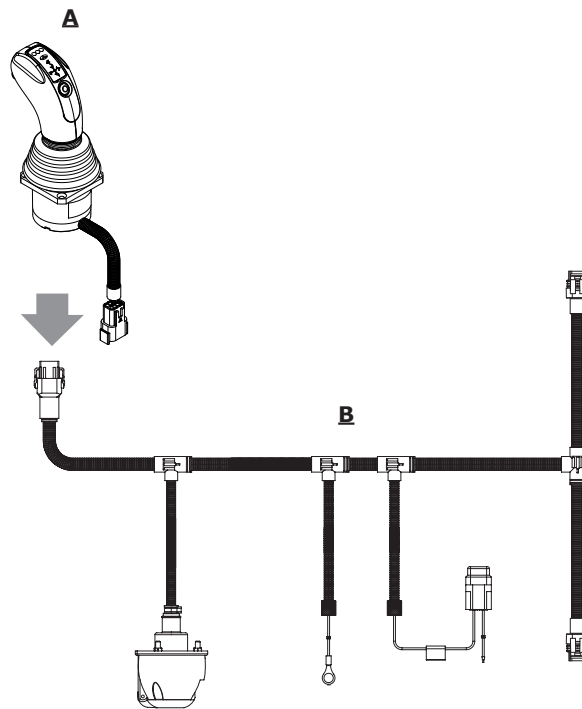
The system can be used for the front-end loader application, 12VDC.

It allows to drive up to two functions/sections on the directional valve, all the controls are proportional.

The control signals come from a CAN bus CJW joystick, that drives two mechatronic EME controls, which drive the directional valve.

The float signal is used to control the float function on the directional valve, two external diverter valve can be driven with one push-buttons from the joystick handle.

Code	1XSE21002
Description	PHC220C electronic system
Notes	12V application, 2 proportional functions (1 for floating), 4 th function through diverter valves



PHC210C parts

ID	Code	Type	Qty
A	183530045	CJW SAE J1939 joystick: 2 proportional functions, 2 ON/OFF switch, 3 push-buttons	1
B	183480165	KCD05 harness	1

PHC250C

System description

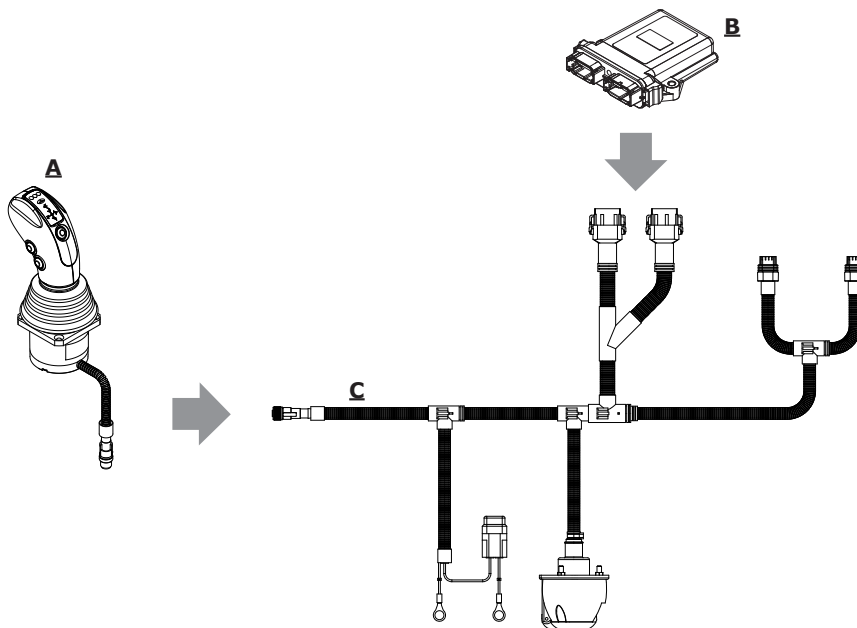
The system can be used for the front-end loader application, 12VDC.

It allows to drive up to two functions/sections on the directional valve, all the controls are proportional.

The control signals come from a CJW CAN bus joystick, that drives two mechatronic EME controls, which drive the directional valve.

The float and return to dig functions are available on the directional valve, three external diverter valves can be driven with the push-buttons from the joystick handle.

Code	1XSE21006
Description	PHC250C electronic system
Notes	12V application, 2 proportional functions (1 floating), 3 rd , 4 th and 5 th function for diverter valves, return to dig sensors



PHC250C parts

ID	Code	Type	Qty
A	183530044	CJW SAE J1939 joystick: 2 proportional functions, 1 ON/OFF switch, 6 push-buttons	1
B	183360010	CED040/PHC250C-12V/v06.00 electronic control unit	1
C	183480166	KCD05 harness programming cable	1

System description

The system can be used for the front-end loader application, 12VDC.

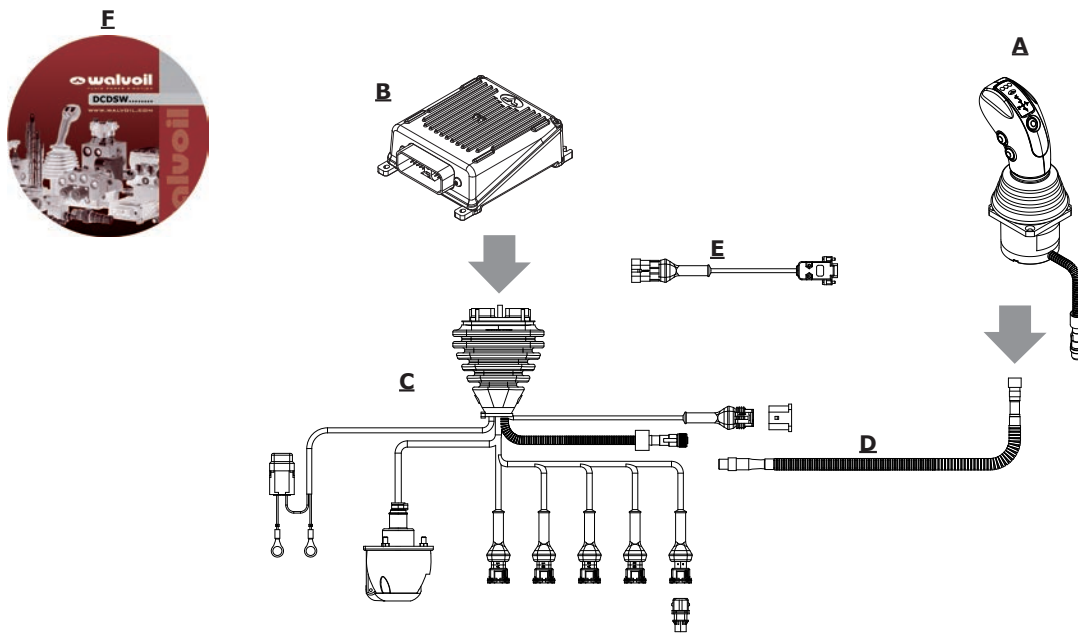
It allows to drive up to two functions/sections on the directional valve, all the controls are proportional.

The control signals come from a CJW CAN bus joystick. CED252 control unit drives the directional valve.

The float, Fast/Slow and return to dig functions are available on the directional valve, three external diverter valves can be driven with the push-buttons from the joystick handle.

Through a dedicated WST software, the diagnostic on the system can be executed.

Code	1XSE21007
Description	PHC251C electronic system
Notes	12V application, 2 proportional functions (1 floating), 3 rd , 4 th and 5 th function for diverter valves, return to dig sensors



PHC251C parts				
ID	Code	Type		Qty
A	183530044	CJW SAE J1939 joystick: 2 proportional functions, 1 ON/OFF switch, 6 push-buttons		1
B	183350025	CED252/PHC251C/v40.25 electronic control unit		1
C	183480167	KCD09 harness		1
D	183490001	extension for joystick connection , L=4m (157.48 in)		1
E	VCAV600014	CED252 programming cable		1
F	DCDSW004005	WST/FLC/v11.01 software		1

PHC electronic systems

PHC400C

System description

The system can be used for 12VDC or 24VDC applications.

It allows to drive up to four functions/sections on the directional valve, all the controls are proportional.

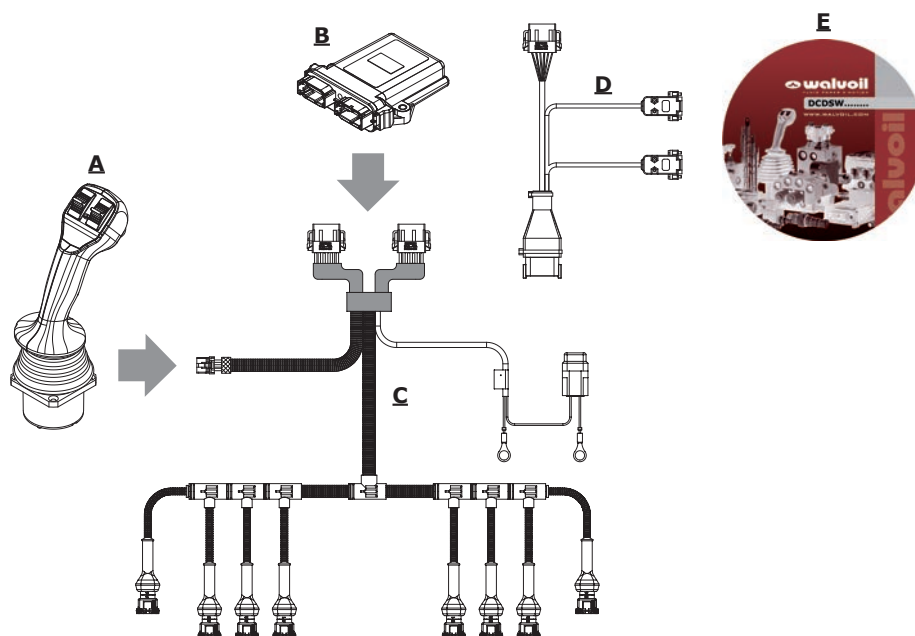
The control signals come from a CAN bus CJW joystick. CED400X control unit drives the directional valve.

The "dead man" switch enables all the functions; the float and the fast/slow signals are used to control the float and fast/slow functions.

Acceleration and decelerations ramp times are programmable and applicable to the machine movements for those applications that require to manage heavy loads.

Through a dedicated WST software, a few customizations can be set to adjust the system dynamic.

Code	1XSE40003
Description	PHC400C electronic system
Notes	12-24V application, 4 proportional functions (1 floating)



PHC400C parts

ID	Code	Type	Qty
A	183530011	CJW CAN bus joystick: 4 proportional axis, "dead man" switch, 1 push-button	1
B	183338007	CED400X/PHC400C/v73.01 electronic control unit	1
C	1834800168	KCD04 harness	1
D	VCAV600018	CED400X programming cable	1
E	DCDSW0170088	PHC/v2.0 SYSTEM WST software CAN bus	1

System description

The system can be used for 12VDC or 24VDC applications.

It allows to drive up to eight functions/sections on the directional valve; six controls are proportional, two controls are on/off actuated.

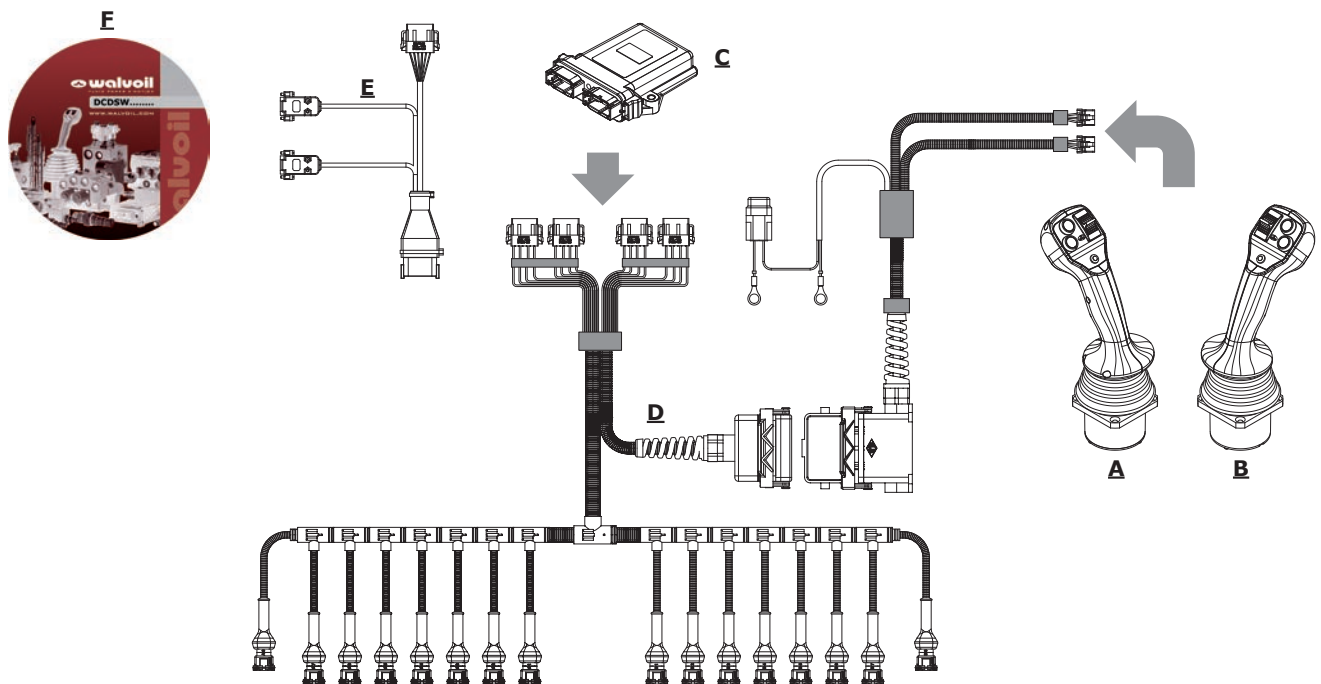
The control signals come from a CAN bus CJW joystick. CED400X control units drive the directional valve.

The "dead man" switch enables all the functions.

Acceleration and decelerations ramp times are programmable and applicable to the machine movements for those applications that require to manage heavy loads.

Through a dedicated WST software, a few customizations can be set to adjust the system dynamic.

Code	1XSE4004
Description	PHC640C electronic system
Notes	12-24V application, 6 proportional functions, 2 on/off functions



PHC640C parts			
ID	Code	Type	Qty
A	183530012	CJW CAN bus joystick: 3 proportional functions, "dead man" switch, 2 push-buttons, 1 LED, left configuration	1
B	183530013	CJW CAN bus joystick: 3 proportional functions, "dead man" switch, 2 push-buttons, 1 LED, right configuration	1
C	183338007	CED400X/PHC400C/v73.01 electronic control unit	1
D	183480169	KCD03 harness	1
E	VCAV600018	CED400X programming cable	1
F	DCDSW0170088	PHC/v2.0 SYSTEM WST software CAN bus	1

PHC400P

System description

The system can be used for 12VDC or 24VDC applications.

It allows to drive up to four functions/sections on the directional valve, all the controls are proportional.

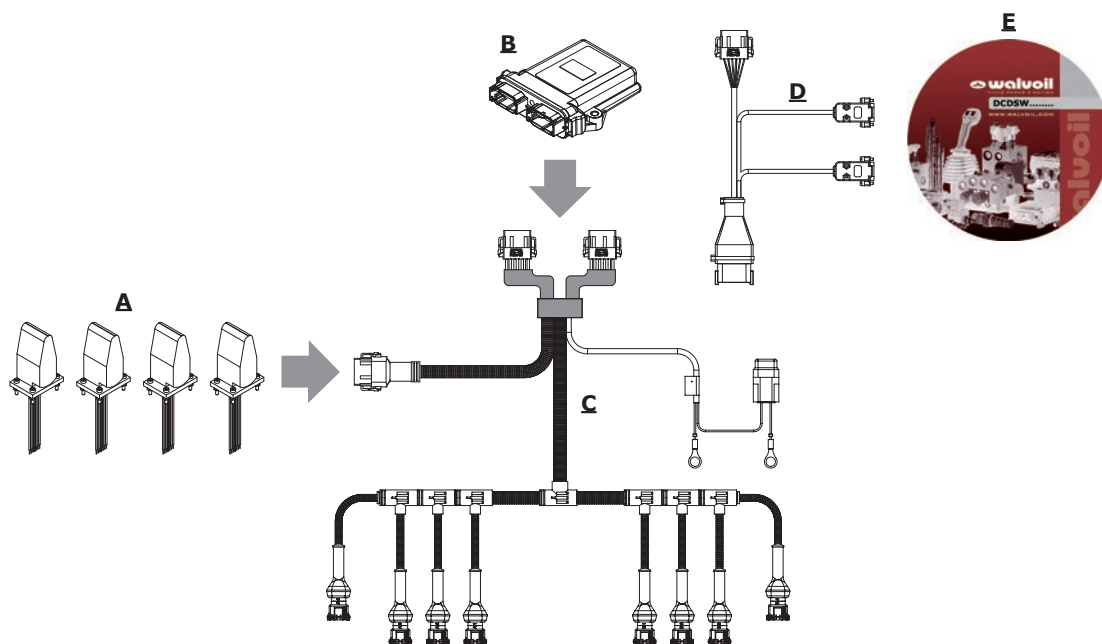
The control signals come from four single axis analog joysticks. CED400X control unit drives the directional valve.

The 'operator presence' switch enables all the functions, the float and the fast/slow commands are used to control the float and fast/slow functions.

Acceleration and decelerations ramp times are programmable and applicable to the machine movements for those applications that require to manage heavy loads.

Through a dedicated WST software, a few customizations can be set to adjust the system dynamic.

Code	1XSE40005
Description	PHC400P electronic system
Notes	12-24V application, 4 proportional functions (1 floating)



PHC400P parts

ID	Code	Type	Qty
A	VJOY200001	MDN142 potentiometric joystick: 1 proportional axis with redundancy	4
B	183334003	CED400X/PHC400F/v43.02 electronic control unit	1
C	183480118	KCD04 harness	1
D	VCAV600018	CED400X programming cable	1
E	DCDSW0170051	PHC/v2.0 SYSTEM WST software	1

2nd edition March 2016

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