

Technical Information

Displays

DP6XX Series



Revision history

Table of revisions

Date	Changed	Rev
August 2018	Corrected pin assignments	0501
July 2018	Corrected pin assignments for 12 pin and removed redundant topic Pinout	0401
November 2017	Minor update	0303
June 2016	Various updates from PAE; updated to Engineering Tomorrow design	0301
December 2015	Converted to Danfoss layout	0204
June 2011	DC supply current maximum ratings	BC
January 2007	Various	BB
August 2005	Various	BA
October 2005	First edition	AA

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DP6XX literature references

Reference literature

Literature title	Literature type	Literature number
<i>DP6XX Series PLUS+1® Mobile Machine Displays</i>	Technical Information	BC00000108
<i>DP6XX Series PLUS+1® Mobile Machine Displays</i>	Data Sheet	AI00000038
<i>PLUS+1® GUIDE Software User Manual</i>	Operation Manual	AQ00000026

Technical Information (TI)

A TI is comprehensive information for engineering and service personnel to reference.

Data Sheet (DS)

A DS is summarized information and parameters that are unique to a specific model.

PLUS+1® GUIDE User Manual

The Operation Manual (OM) details information regarding the PLUS+1® GUIDE tool used in building PLUS+1® applications. This OM covers the following broad topics:

- How to use the PLUS+1® GUIDE graphical application development tool to create machine applications
- How to configure module input and output parameters
- How to download PLUS+1® GUIDE applications to target PLUS+1® hardware modules
- How to upload and download tuning parameters
- How to use the PLUS+1® Service Tool

Latest version of technical literature

Danfoss product literature is online at: <https://www.danfoss.com/en/search/>

User liability and safety statements

OEM responsibility

The OEM of a machine or vehicle in which Danfoss products are installed has the full responsibility for all consequences that might occur. Danfoss has no responsibility for any consequences, direct or indirect, caused by failures or malfunctions.

- Danfoss has no responsibility for any accidents caused by incorrectly mounted or maintained equipment.
- Danfoss does not assume any responsibility for Danfoss products being incorrectly applied or the system being programmed in a manner that jeopardizes safety.
- All safety critical systems shall include an emergency stop to switch off the main supply voltage for the outputs of the electronic control system. All safety critical components shall be installed in such a way that the main supply voltage can be switched off at any time. The emergency stop must be easily accessible to the operator.

Safety statements

Display operation guidelines

- Disconnect your machine's battery power before connecting power and signal cables to the display.
- Before doing any electrical welding on your machine, disconnect all power and signal cables connected to the display.
- Do not exceed the display power supply voltage ratings. Using higher voltages may damage the display and can create a fire or electrical shock hazard.
- Do not use or store the display where flammable gases or chemicals are present. Using or storing the display where flammable gases or chemicals are present may cause an explosion.
- Software configures the keypad buttons on the display. Do not use these buttons to implement critical safety features. Use separate mechanical switches to implement critical safety features such as emergency stops.
- Design systems that use the display so that a communication error or failure between the display and other units cannot cause a malfunction that might injure people or damage material.
- The protective glass over the display screen will break if hit with a hard or heavy object. Install the display to reduce the possibility of it being hit by hard or heavy objects.
- Storing or operating a display in an environment that exceeds the display specified temperature or humidity rating may damage the display.
- Always clean the display with a soft, damp cloth. Use a mild dishwashing detergent as needed. To avoid scratching and discoloring the display, do not use abrasive pads, scouring powders, or solvents such as alcohol, benzene, or paint thinner.
- Danfoss graphical displays are not user serviceable. Return the display to the factory in case of failure.

User liability and safety statements

Machine wiring guidelines

Warning

Unintended movement of the machine or mechanism may cause injury to the technician or bystanders. Improperly protected power input lines against over current conditions may cause damage to the hardware. Properly protect all power input lines against over-current conditions. To protect against unintended movement, secure the machine.

Caution

Unused pins on mating connectors may cause intermittent product performance or premature failure. Plug all pins on mating connectors.

- Protect wires from mechanical abuse, run wires in flexible metal or plastic conduits.
- Use 85° C (185° F) wire with abrasion resistant insulation and 105° C (221° F) wire should be considered near hot surfaces.
- Use a wire size that is appropriate for the module connector.
- Separate high current wires such as solenoids, lights, alternators or fuel pumps from sensor and other noise-sensitive input wires.
- Run wires along the inside of, or close to, metal machine surfaces where possible, this simulates a shield which will minimize the effects of EMI/RFI radiation.
- Do not run wires near sharp metal corners, consider running wires through a grommet when rounding a corner.
- Do not run wires near hot machine members.
- Provide strain relief for all wires.
- Avoid running wires near moving or vibrating components.
- Avoid long, unsupported wire spans.
- Ground electronic modules to a dedicated conductor of sufficient size that is connected to the battery (-).
- Power the sensors and valve drive circuits by their dedicated wired power sources and ground returns.
- Twist sensor lines about one turn every 10 cm (4 in).
- Use wire harness anchors that will allow wires to float with respect to the machine rather than rigid anchors.

Machine welding guidelines

Warning

High voltage from power and signal cables may cause fire or electrical shock, and cause an explosion if flammable gasses or chemicals are present.

Disconnect all power and signal cables connected to the electronic component before performing any electrical welding on a machine.

The following is recommended when welding on a machine equipped with electronic components:

- Turn the engine off.
- Remove electronic components from the machine before any arc welding.
- Disconnect the negative battery cable from the battery.
- Do not use electrical components to ground the welder.
- Clamp the ground cable for the welder to the component that will be welded as close as possible to the weld.

Overview

PLUS+1® Mobile Machine Displays are designed to provide flexible, expandable, powerful and cost effective total machine management system displays for a wide variety of vehicle applications.

DP6XX Series Displays

Features

- External NAV button allows navigation through all DP6XX functions. Mount NAV button so that the driver can navigate securely in all situations during work and travel.
- Built-in real-time clock enables machine use time tracking as well as data logging.
- CAN, RedCAN, RS-232, and USB interfaces as a gateway for updating and diagnosing all machine control systems.
- Powerful 32-bit microprocessor produces smooth, flicker-free movements of gauges and readouts in the display screen.
- Anti-glare display screen and sensor-controlled backlight levels provide superior legibility under all operating conditions, whether freestanding or dash-mounted.
- Video input option allows display of inputs from two standard composite video observation cameras.
- Rugged, shock-resistant construction protects against dust and resists the effects of moisture by fresh water.
- GORE-TEX® membrane vent keeps moisture from fogging its display screen.
- High brightness LED and digital alarm output alert the operator to alarm states under all operating conditions.
- Complete system software updates are possible through the CAN network.
- Environmental and EMC standards are met according to Danfoss standards defined for mobile applications.
- High performance 32 bit microcontroller for real-time screen updates.
- Smooth and flicker-free/accurate movement of virtual gauges and needles.
- Ample onboard flash/RAM memory.
- Data logging capabilities.
- USB port for fast software download and uploads.
- Same outside dimensions for screen variants.
 - Color: advanced TFT 400 x 240 pixels, transfective, 256 colors
 - Monochrome: LED 320 x 240 pixels, transfective
- Two mounting options.
 - Flush mount in dashboard
 - Stand alone on post according to VESA standard 75mm x 75mm [2.953 in x 2.953 in]
- Fully integrated connectors and silicone keypad provide water and dust protection from all sides.
- Designed to withstand high-levels of shock/vibration.
- Extremely wide storage and operating temperature range.
- Keypad with 14 buttons (8 soft-keys + 6 buttons for navigation).
- All buttons have green backlight design for low light and night use.
- Ultra-bright red/amber/green alarm LED.
- 2 shielded Binder connectors for USB, RS-232 and camera inputs.
- 2 CAN ports, one fully compatible to RedCAN™, for enhanced safety and reliability in mobile control systems.
- Integrated light sensor for automatic backlight adjustment.
- 2 DEUTSCH DTM connectors.
- Works with either 12 Vdc or 24 Vdc power supplies.

Overview

PLUS+1® GUIDE

PLUS+1® GUIDE (Graphical User Integrated Development Environment) is a complete toolbox that generates downloadable applications for all programmable PLUS+1® Compliant products.

A screen editor allows easy development of applications by programmers without formal software development training. The expertise from a software engineer is not needed to find your way around in PLUS+1® GUIDE.

Display features

Display

Description	DP600	DP610	DP620
Resolution (dpi)	400 x 240 pixels		320 x 240 pixels
Size/type	6.5 in/TFT Color		6 in/LCD Monochrome
Feature	Transflective		

Ordering information

Model variants

A	B	C	D	E	Part number
DP600	SA	CA	V2	KS	10100890
DP610	SA	CB	V0	KS	10100889
DP620	SB	CB	V0	KS	10100888

Model code

A			B			C			D			E	
D	P	6										K	S

Model code key

A—Model name

Code	Description
DP600	PLUS+1* Mobile Machine Displays
DP610	
DP620	

B—Screen variant

Code	Description
SA	400 x 240 color advanced TFT transfective
SB	320 x 240 monochrome transfective

C—Connector

Code	Description
CA	C1 + C2 + C3 + C4 (only with video option D = V2)
CB	C1 + C2 + C3 (without video option D = V0)

D—Video inputs

Code	Description
V0	No video inputs
V2	Supports two external video signals (one at a time) as input (Either PAL or NTSC format)

E—Keypad

Code	Description
KS	Standard keypads with 8 soft- and 6 function-keys

Related products

Electrical parts

10100728	5-pin male Binder connector (includes 2m cable)
10100729	7-pin male Binder connector (includes 2m cable)

Ordering information

Electrical parts (continued)

10100738	DTM06-12SA, 12-pin DEUTSCH connector
10100739	DTM06-6S 6-pin DEUTSCH connector
10100741	WM 12S locking plug for 10100738 DEUTSCH connector
10100742	WM6S locking plug for 10100739 DEUTSCH connector
10100743	0462-201-20141, DEUTSCH terminal for DTM06-xS
10103497	USB cable

Electrical connection kits

10100868	DP600 connection kit <i>Contents:</i> 10100728 5-pin male Binder connector 10100729 7-pin male Binder connector 10100944 12-pin DEUTSCH connection kit 10103494 6-pin DEUTSCH connection kit
10100944	12-pin DEUTSCH connection kit <i>Contents:</i> 10100738 DTM06-12SA 12-pin DEUTSCH connector 10100743 DEUTSCH terminal 10100741 WM 12S locking plug
10103494	6-pin DEUTSCH connection kit <i>Contents:</i> 10100739 DTM06-6S 6-pin DEUTSCH connector 10100743 DEUTSCH terminal 10100742 WM 6S locking plug
10103495	DEUTSCH IP67 Seal Kit
10103496	Binder IP67 Seal Kit

Connection tools

10100744	DEUTSCH stamped contacts terminal crimp tool, size 20
10100745	DEUTSCH solid contacts terminal crimp tool

Software

PLUS+1° GUIDE Professional Software (includes 1 year of software updates, a single user license, Service and Diagnostic Tool and Screen Editor)	11179523 (annual renewal with 11179524 to keep the software updates)
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Input/output types and specifications

Input types

This series of displays support the following pin types:

- Digital or Analog (DIN/AIN)
- Multifunction (DIN/AIN/FreqIN, Rheo, 4–20 mA)
- Analog or Temperature or Rheostat (AIN/Temp/Rheo)
- Fixed Range Analog or CAN shield (AIN/CAN shield)

This series of displays have input pins that support multiple functions. Pins that support multiple input types are user-configurable using PLUS+1® GUIDE software.

Digital/analog

High level digital input

Description	Unit	Minimum	Maximum	Typical	Comment
Voltage range	V	0 to 69.3	0 to 84.7	—	—
Input resistance	kΩ	—	—	105	no pull up/down
				13	With pull up to 5 V
				13	Pull down to ground
				7	With pull up and down to 5 V
Programmable low threshold voltage	V	0	?	—	—
Programmable high threshold voltage	V	0	?	—	—
Rise time	μs	—	—	20	—
Fall Time	μs	—	—	20	—

High level analog input

Description	Unit	Minimum	Maximum	Typical	Comment
Voltage range	V	0 to 69.3	0 to 84.7	—	—
Input resistance	kΩ	—	—	105	no pull up/down
				13	With pull up to 5 V
				13	Pull down to ground
				7	With pull up and down to 5 V
Analog voltage error (± 300 mV + U _{in} × 3.4%)	mV	0	—	± 260	U _{in} = 0 V
				± 2920	U _{in} = 70 V
Bandwidth	kHz	—	—	6	—

Input/output types and specifications

Multifunction

Low level digital input

Description	Unit	Minimum	Maximum	Typical	Comment
Voltage range	V	0	63	—	—
Input resistance	kΩ	—	—	233	no pull up/ down
				14	With pull up to 5 V
				14	Pull down to ground
				73	With pull up and down to 5 V
Programmable low threshold voltage	V	0	?	—	—
Programmable high threshold voltage	V	0	?	—	—
Rise time	μs	—	—	20	—

Low level analog input

Description	Unit	Minimum	Maximum	Typical	Comment
Voltage range	V	0	63	—	—
Input resistance	kΩ	—	—	233	no pull up/ down
				14	With pull up to 5 V
				14	Pull down to ground
				7.3	With pull up and down to 5 V
Analog voltage error	mV	—	—	± 0.5	$U_{in} = 0\text{ V}$
				± 19	$U_{in} = 5\text{ V}$
Bandwidth	kHz	—	—	6.8	—

High level digital input

Description	Unit	Minimum	Maximum	Typical	Comment
Voltage range	V	0	70	—	—
Input resistance	kΩ	—	—	105	no pull up/ down
				13	With pull up to 5 V
				13	Pull down to ground
				7	With pull up and down to 5 V
Programmable low threshold voltage	V	0	?	—	—
Programmable high threshold voltage	V	0	?	—	—

Input/output types and specifications

High level digital input (continued)

Description	Unit	Minimum	Maximum	Typical	Comment
Rise time	μs	—	—	20	—
Fall time	μs	—	—	20	—

High level analog input

Description	Unit	Minimum	Maximum	Typical	Comment
Voltage range	V	0	70	—	—
Input resistance	kΩ	—	—	105	no pull up/ down
				13	With pull up to 5 V
				13	Pull down to ground
				7	With pull up and down to 5 V
Analog voltage error (± 300 mV + U _{in} × 3.4%)	mV	—	—	± 100	U _{in} = 0 V
				± 2760	U _{in} = 70 V
Bandwidth	kHz	—	—	7.1	—

Resistance input

Description	Unit	Minimum	Maximum	Typical	Comment
Resistance range	kΩ	0	10	—	—
Input resistance	Ω	—	1.33	—	Pull up to 5V
Resistance error	Ω	—	± 5 ± 9	—	R = 0 kΩ R = 10 kΩ

Current input

Description	Unit	Minimum	Maximum	Typical	Comment
Current range	—	0 to 53	0 to 65	—	Shut off at 50 mA
Input resistance	Ω	—	—	100	2.0V at 20 mA input current
Current error (± 3.5%)	mA	—	± 0.08 ± 0.7	—	I _{in} = 0 mA I _{in} = 20 mA

Frequency input

Description	Unit	Minimum	Maximum	Typical	Comment
Frequency range	kHz	0	10	—	—

Input/output types and specifications

USB

USB input/output parameters

Description	Unit	Minimum	Typical	Maximum	Comment
2.0 full speed	Mbit/s	—	12	—	—
Vbus input voltage	Volt	—	> 4.4	—	—
Vbus input resistance	kΩ	—	70	—	Vbus > 5.25 V
Short circuit protection (No damage)	V	0	—	70	—
Vbus output voltage	V	4.75	—	5.25	—
Vbus output current	A	—	0.5	—	—
Vbus short current	A	—	—	1.1	—

Video

Video output

Description	Unit	Minimum	Typical	Maximum	Comment
Short circuit protection	V	0	—	70	—
12 V output voltage (9 V > Ubat > 70 V)	V	11.5	12	12.7	—
12 V output current	A	—	0.5	—	Vbus > 5.25 V
24 V output voltage (9 V > Ubat > 70 V)	V	23	24	26	—
24 V output current	A	—	—	0.25	—
Video formats	NTSC, PAL, SECAM	—	—	—	Composite video

To power the camera up, it is recommended to use the display as power supply. If using a different power supply, it should meet the specification of the camera in regards of the voltage type and range, the current and voltage amount it can supply to its load, stability of the output voltage and current under varying line and load conditions, operating/storage temperature ranges.

[The use of a different power supply for the camera can create "noise" on the signal line which will affect its functionality.](#)

CAN shield/analog inputs

CAN shield

Description	Unit	Minimum	Maximum	Typical	Comment
Input impedance	—	—	—	1 μF + 1 Ω	—

Analog input (5 V only)

Description	Unit	Minimum	Maximum	Typical	Comment
Voltage range	V	0	5.4	—	—
Input resistance	kΩ	—	—	233	—
Analog voltage error ± (20 mV + U _{in} × 1.6 %)	mV	—	± 20 ± 120	—	U _{in} = 0 V U _{in} = 5 V
Bandwidth	kHz	—	—	2	—

Input/output types and specifications

CAN/RedCAN communication

CAN/RedCAN

Description	Unit	Minimum	Maximum	Typical	Comment
Available Baud rates	kbps	0.01	100	50	With 120 Ω termination
				100	
				125	
				250	
				500	
				1000	
Maximum input voltage range	V	0	70	—	—

Product ratings

Specifications

Characteristics

Operating voltage range	9 to 70 VDC
Power consumption	15 W max
Digital Inputs (3)	$U_{in} < 1.5$ VDC logical low $U_{in} > 1.5$ VDC logical high 2 inputs designed for 90° A/B encoder signals, menu NAV button
Option: Video inputs (2)	Standard composite PAL video signal input.
Output for buzzer (1)	low side, max 0.5 A
Camera power output	12V, Max. output current: 400 mA
Camera video input	Composite video, 1V peak-peak
CAN interface for external NAV	2 CAN ports according to CAN specification 2.0 B (active). 250 kbit standard setting (recommended) Baud rates: 111 kbit, 250 kbit, 500 kbit, 1 Mbit 2 pins for CAN shield according to J1939. One CAN port, fully compatible to Danfoss RedCAN standard.
Encoder inputs	Logical inputs: 5V Logical 0: $U_{in} < 1.5$ V Logical 1: $U_{in} > 3.5$ V Input impedance: 100k Ω Max. frequency input: 100 Hz
Encoder supply	5V, Max. output current 400 mA
Communication	USB RS-232: Baud rates: 1200, 2400, 9600, 19200, 28800, 38400, 115200 baud. No handshake available.
Memory	8MB RAM 8K FRAM parameter memory (256 byte available for application data storage).
Electrical connections	1 Deutsch DTM 12-pin connector, Code C1 1 Deutsch DTM 6-pin connector, Code C2 1 Binder 7-pin connector for USB/RS-232, Code C3 1 Binder 5-pin connector for video-signals, Code C4
Operating temperature	DP600; DP610: -30 °C — +70°C [-22°F — +158° F] DP620: -20 °C — +70°C [-4°F — +158°F]
Storage temperature	DP600; DP610: -40 °C — +85°C [-40°F — +185° F] DP620: -30 °C — +80°C [-22°F — +176°F]
Moisture Ingression	IP67, in accordance with SS-EN 60 529 Unused connections must have sealing plugs for IP rating to be valid.
Vibration	IEC 60068-2-64-Fh with severity according to IEC TR 60721-4-5 environmental class 5M3
Shock	IEC 60068-2-27-Ea with severity according to IEC TR 60721-4-5 environmental class 5M3; free fall according to IEC 68-2-32Ed
Electrical	Automotive transients ISO 7637/1-2 Automotive transients ISO 7637/3
EMC emission	EN 61000-6-3
EMC immunity	EN 61000-6-2

Product ratings

Characteristics (continued)

Membrane switches	14 keys 1 million cycles endurance Pressure force: 300 gram (+/- 30 grams)
Real time clock	Date & Time Backup time: minimum 1 month Accuracy: 1 sec/24 hours
Programmable ambient light sensor	OSRAM SFH3410
Faceplate	Ultra bright faceplate-integrated red LED alarm

Supply voltage/maximum current ratings

DP6XX graphical displays are designed to operate with a nominal 9 to 63 Vdc power supply with reverse polarity protection.

Supply voltage

Description	Unit	Minimum	Maximum	Comment
DC supply voltage	Volt	9	70	With reverse polarity protection
DC supply current (circuit board only)	mA	2.5		UBat = 8V
		30		UBat = 14V
		70		UBat = 28V
		40		UBat = 70V
Power supply interruption (without rebooting)	ms	34		
		36		
		46		
		100		
Load dump protection, 12V systems, % pulses, cycle time 100 s, criteria C	V	87		According to ISO 7637-2
	Ω	1		
	ms	200		
	ms	5		
Load dump protection, 28V systems, % pulses, cycle time 100 s, criteria C	V	183		According to ISO 7637-2
	Ω	3		
	ms	200		
	ms	10		
Load dump protection, 36V systems, % pulses, cycle time 100 s, criteria C	V	200		According to ISO 7637-2
	Ω	4.3		
	ms	200		
	ms	10		
Load dump protection, 48V systems, % pulses, cycle time 100 s, criteria C	V	200		According to ISO 7637-2
	Ω	6.3		
	ms	200		
	ms	10		

5 V reference output

Description	Unit	Minimum	Maximum
Output voltage	V	4.8	5.2
Output current	A	0.5	—

Product ratings

5 V reference output (continued)

Description	Unit	Minimum	Maximum
Output short circuit	A	—	0.9
Short circuit protection	V	0	70

Electronic components environmental testing criteria

Climate environment

Description	Applicable standard	Comment
Storage temperature	IEC 60068-2-1, test Ab, IEC 60068-2-2 test Bb	
Operating temperature	IEC 60068-2-1, test Ab, IEC 60068-2-2 test Bd	
Thermal cycle	IEC 60068-2-2, test Na, IEC 60068-2-38 (partial)	
Humidity	IEC 60068-2-78, IEC 60068-2-30 test Db	Damp heat steady state and cyclic.
Degree of protection	IEC 60529	

Chemical environment

Description	Applicable standard	Comment
Salt mist	IEC 60068-2-58 test Kb	
Chemical resistance	ISO 16750-5	

Mechanical environment

Description	Applicable standard	Comment
Vibration	IEC 60068-2-6 test Fc, IEC6008-2-64 test Fh	
Bump	IEC 60068-2-29 test Eb	
Shock	IEC 60068-2-27 test Ea	
Free fall	IEC 60068-2-32 test Ed	

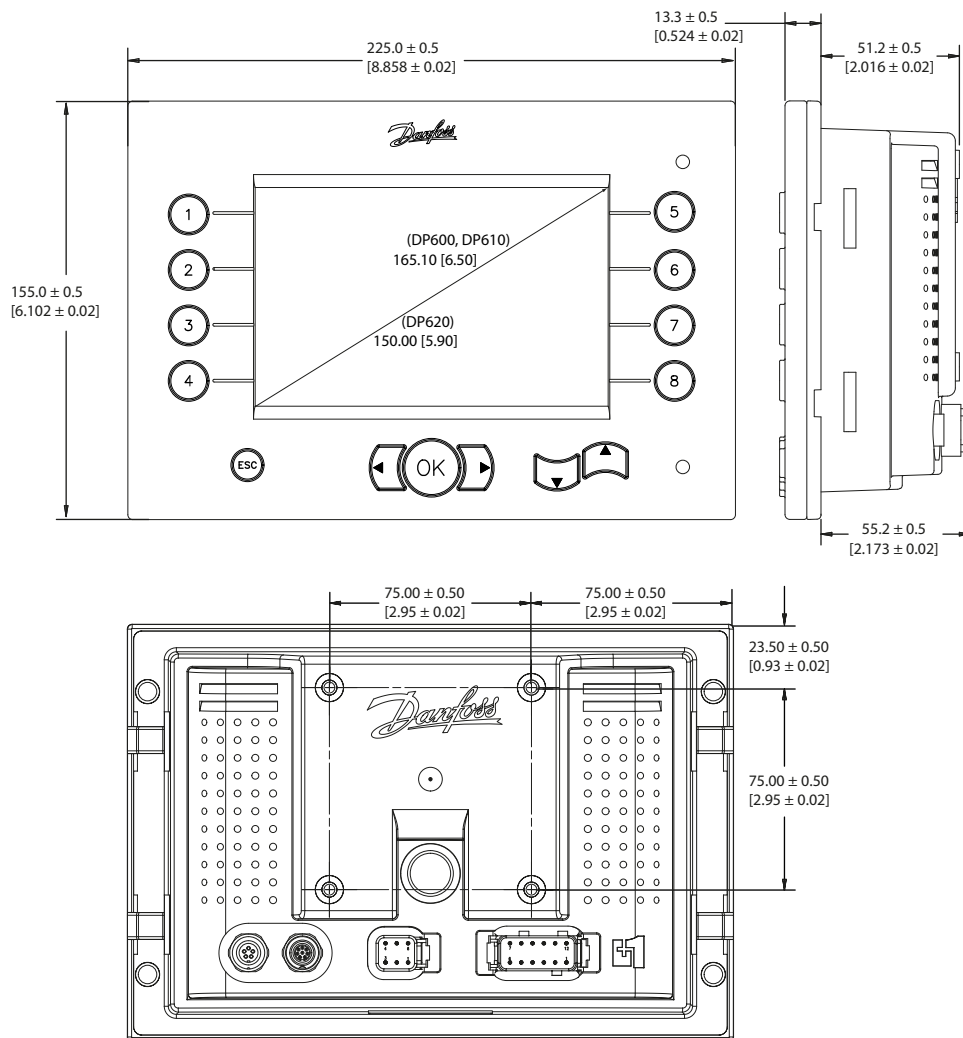
Electrical/electromagnetic

Description	Applicable standard	Comment
EMC emission	ISO 13766, SAE J1113-13	Electromagnetic compatibility for earth moving machinery.
EMC immunity	ISO 13766	Electromagnetic compatibility for earth moving machinery.
Electrostatic discharge	EN 60-1 000-4-2	
Auto electrical transients	ISO 7637-2, ISO 7637-3	
Short circuit protection	Danfoss test	Inputs and outputs survive continuous short circuit. Normal function resumes when short is removed.
Reversed polarity protection	Danfoss test	Survives reverse polarity at supply voltage for at least five minutes.

Installation

Dimensions

DP600, DP610, DP620 Series Displays dimensions in millimeter [inches]



kwa1463500663772

Installation

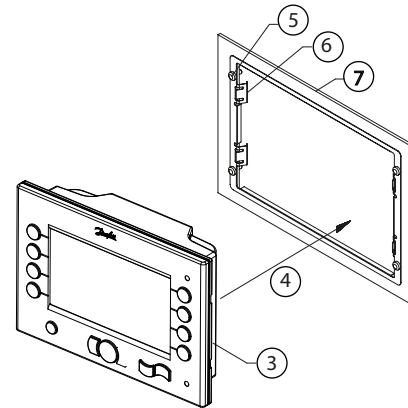
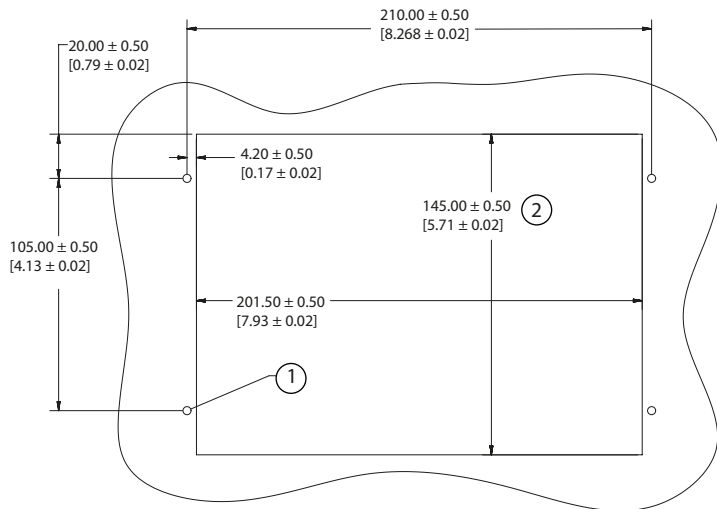
Two mounting options

Flush mounted

Use the DP600 panel mounting spring clip to flush-mount display into a dashboard.

Panel cutout and panel mounting spring clip

mm [in]



1. 4 holes for M4 x 4 screws
2. Panel cutout
3. Display assembly
4. Snap in
5. M4 x 4 screw
6. Spring clip
7. Panel

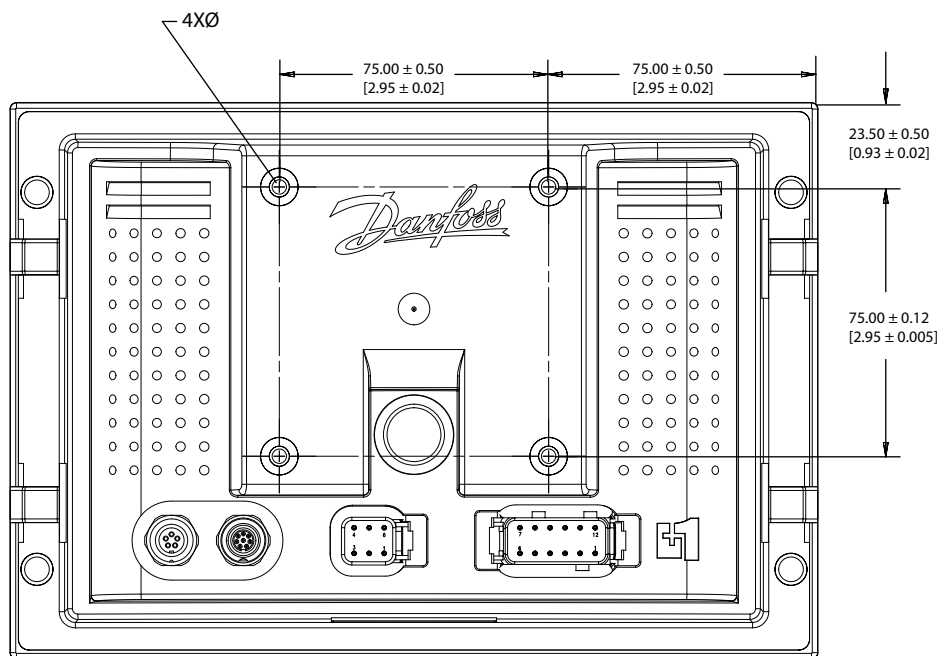
Installation

Stand-alone on post

Mount according to VESA (Video Electronics Standards Association) Mount Standards The VESA hole pattern for this display is: 75.00 mm x 75.00 mm (02.95 in x 02.95 in).

Post mounting option

mm [in]

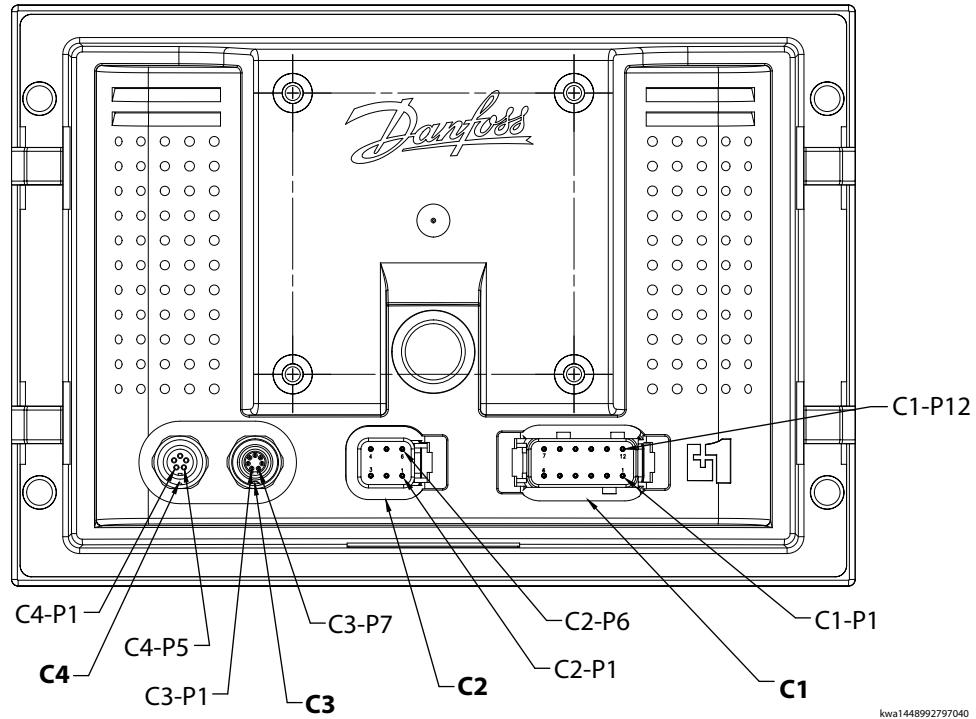


4XØ Hole x 4 for M4 screw x 0.7 mm (0.03 in) x 11 mm (0.43 in) maximum depth

Installation

Pin assignments

DP6XX series, pin assignments



kwa1448992797040

Pin connectors

C4



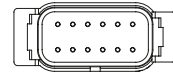
C3



C2



C1



Pin assignments

Binder 702 series 5-pin		Binder 702 series 8-pin		DEUTSCH DTMO6 6-pin		DEUTSCH DTMO6 12-pin	
C4 pin	Function	C3 pin	Function	C2 pin	Function	C1 pin	Function
1	Video power ground	1	USB power bus	1	Redundant power ground	1	Main power ground
2	Video power 12/24 Vdc out	2	USB data -	2	Redundant power supply	2	Main power supply
3	Video input 1	3	USB data +	3	RedCAN left bus - CAN0 +	3	CAN bus - CAN1 +
4	Video ground	4	USB ground	4	RedCAN left bus - CAN0 -	4	CAN bus - CAN1 -
5	Video input 2	5	Ground	5	CAN shield	5	CAN shield
		6	RS-232 RxD	6	Analog in	6	RedCAN right bus - CAN0 +
		7	RS-232 TxD			7	RedCAN right bus - CAN0 -
						8	Encoder supply
						9	Encoder pulse A input
						10	Encoder pulse B input
						11	Encoder enter input
						12	Buzzer - ground

Products we offer:

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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.

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