

Technical Information

PLUS+1[®] Mobile Machine Displays

DM430E Series



Revision history

Table of revisions

Date	Changed	Rev
December 2018	Added note in regards to keeping ambient light sensor area clean and uncovered for best operation. Changed note regarding Ingress Protection rating.	0102
December 2018	First edition	0101

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DM430E literature references

Reference literature

Literature title	Literature type	Literature number
<i>DM430E Series PLUS+1® Mobile Machine Displays</i>	Technical Information	BC00000397
<i>DM430E Series PLUS+1® Mobile Machine Displays</i>	Data Sheet	AI00000332
<i>DM430E Series Display - Engine Information Center (EIC) Software</i>	User Manual	AQ00000253
<i>PLUS+1® GUIDE Software</i>	User 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

Comprehensive technical literature is online at www.danfoss.com

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.
- Keep ambient light sensor area clean and uncovered for best operation.
- 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

DM430E Series Displays

The Danfoss DM430E Series Display is a 4.3" modernized display platform, expanding the PLUS+1® family of mobile machine management products. The DM430E Series 4.3" display is optimized for sunlight viewability with its high brightness, optical bonding, anti-glare coating and wide viewing angles. Develop your own software and layout using the PLUS+1® GUIDE (Graphical User Integrated Development Environment) and its Vector Based Screen Editor (VBSE). A basic graphic library is available.

Ruggedized for mobile machine markets, it brings a modern appearance at a cost-effective price point. DM430E variants include different button pads, several input options, dual CAN port options, a USB/RS232 connection on the rear of the display, and an optional EIC (Engine Information Center) application.

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.

Caution

Unwanted system failure may occur.

Refer to PLUS+1® GUIDE Software User Manual, **AQ00000026** for best programming practices.

<https://www.danfoss.com/en/products/software/dps/plus1-software/plus1-guide/#tab-overview>

LCD features

DM430E Series Display LCD

Description	Values			Unit	Notes
	Min.	Typ.	Max.		
Screen size		4.3		Inch	
Resolution		480 x 272		Pixels	
Aspect ratio		WQVGA			Wide Quarter Video Graphics Array
Luminance	700	800		cd/m ²	
Contrast ratio		500:1			
Viewing angle		± 70		Degree	Top, bottom, left, right
Color depth		24		Bits	8 bits per color

Ordering information

Model variants

Part number	Order code	Description
11197958	DM430E-0-0-0-0	4 Buttons, I/O
11197973	DM430E-1-0-0-0	4 Buttons, 2-CAN
11197977	DM430E-2-0-0-0	4 Buttons, Sensor Power, Secondary Power Input
11197960	DM430E-0-1-0-0	4 Buttons, I/O, USB/RS232
11197974	DM430E-1-1-0-0	4 Buttons, 2-CAN, USB/RS232
11197978	DM430E-2-1-0-0	4 Buttons, Sensor Power, Secondary Power Input, USB/RS232
11197961	DM430E-0-0-1-0	Navigation Buttons, I/O
11197975	DM430E-1-0-1-0	Navigation Buttons, 2-CAN
11197979	DM430E-2-0-1-0	Navigation Buttons, Sensor Power, Secondary Power Input
11197972	DM430E-0-1-1-0	Navigation Buttons, I/O, USB/RS232
11197976	DM430E-1-1-1-0	Navigation Buttons, 2-CAN, USB/RS232
11197980	DM430E-2-1-1-0	Navigation Buttons, Sensor Power, Secondary Power Input, USB/RS232
11197981	DM430E-0-0-0-1	4 Buttons, I/O, EIC Application
11197985	DM430E-1-0-0-1	4 Buttons, 2-CAN, EIC Application
11197989	DM430E-2-0-0-1	4 Buttons, Sensor Power, Secondary Power Input, EIC Application
11197982	DM430E-0-1-0-1	4 Buttons, I/O, USB/RS232, EIC Application
11197986	DM430E-1-1-0-1	4 Buttons, 2-CAN, USB/RS232, EIC Application
11197990	DM430E-2-1-0-1	4 Buttons, Sensor Power, Secondary Power Input, USB/RS232, EIC Application
11197983	DM430E-0-0-1-1	Navigation Buttons, I/O, EIC Application
11197987	DM430E-1-0-1-1	Navigation Buttons, 2-CAN, EIC Application
11197991	DM430E-2-0-1-1	Navigation Buttons, Sensor Power, Secondary Power Input, EIC Application
11197984	DM430E-0-1-1-1	Navigation Buttons, I/O, USB/RS232, EIC Application
11197988	DM430E-1-1-1-1	Navigation Buttons, 2-CAN, USB/RS232, EIC Application
11197992	DM430E-2-1-1-1	Navigation Buttons, Sensor Power, Secondary Power Input, USB/RS232, EIC Application

Model code

A	B	C	D	E
DM430E				

Model code key

A—Model name	Description
DM430E	4.3" Color Graphical Display

B—Inputs/Outputs	Description
0	1 CAN Port, 4DIN/AIN, 2 MFIN
1	2 CAN Port, 2DIN/AIN, 2 MFIN
2	1 CAN Port, 2DIN/AIN, 2 MFIN, Sensor Power

C—M12 connector	Description
0	No USB Device, No RS232
1	USB Device, RS232

Ordering information

D—Button Pads	Description
0	4 Buttons, 6 LEDs
1	Navigation buttons, 2 Dual-color LEDs

E—Application key (EIC Application)	Description
0	No Application Key
1	Application Key (EIC Application)

Related products

Connector bag assembly

10100944	DEUTSCH 12-pin Connector Kit (DTM06-12SA)
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Connector and cable kit

11130518	Cable, M12 8-Pin to USB Device
11130713	Cable, M12 8-Pin to Lead Wires

Connection tools

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

Mounting kit

11198661	Panel mounting kit
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Software

11179523 (annual renewal with 11179524 to keep the software updates)	PLUS+1® GUIDE Professional Software (includes 1 year of software updates, a single user license, Service and Diagnostic Tool and Screen Editor)
Online	J1939 CAN EIC Engine Monitor Software*

* Requires a model with Application Key. See [Model variants](#) for model codes.

Input/output types and specifications

Input types

DM430E Series displays support the following pin types:

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

Each PLUS+1® Module input pin supports one of the above functional types. For pins with multiple functions, input configurations are user programmable using PLUS+1® GUIDE templates.

When using inputs in digital mode, it is advised to use the software selectable pull-up or pull-down resistors.

Digital/analog

Middle range

Description	Unit	Minimum	Typical	Maximum	Comment
Minimum discernible voltage	mV	—	—	0.03	—
Minimum discernible voltage	mV	5.64	5.78	5.92	—
Resolution	mV	—	1.4	—	—
Worst case offset and gain error	mV	—	—	±0.14	$V_{\text{Measure}} = 5.78 \text{ V}$
Non-linearity	mV	—	—	±8.5	—
Input impedance	kΩ	230	233	236	No pull up or pull down
Input impedance (5V/GND)	kΩ	13.9	14.1	14.3	Pull up or pull down
Input impedance (2.5V)	kΩ	7.1	7.3	7.4	Pull up and pull down

High range

Description	Unit	Minimum	Typical	Maximum	Comment
Minimum discernible voltage	mV	—	—	0.16	—
Minimum discernible voltage	mV	37.5	38.8	40.1	—
Resolution	mV	—	9.5	—	—
Worst case offset and gain error	mV	—	—	±1.3	$V_{\text{Measure}} = 38.8 \text{ V}$
Non-linearity	mV	—	—	±56.8	—
Input impedance	kΩ	108.2	109.3	110.4	No pull up or pull down ($V_{\text{in}} < 5.7 \text{ V}$)
Input impedance (5V/GND)	kΩ	13.0	13.2	13.4	Pull up or pull down ($V_{\text{in}} < 5.7 \text{ V}$)
Pull up and pull down input impedance (2.5V)	kΩ	6.9	7.0	7.1	Pull up and pull down ($V_{\text{in}} < 5.7 \text{ V}$)

Input/output types and specifications

Multifunction inputs

Low range analog

Description	Unit	Minimum	Typical	Maximum	Comment
Minimum discernible voltage	mV	—	—	13	—
Minimum discernible voltage	mV	379	404	430	—
Resolution	mV	—	0.1	—	—
Worst case offset and gain error	mV	—	—	±0.6	$V_{\text{Measure}} = 404 \text{ mV}$
Non-linearity	mV	—	—	±26	—
Input impedance	k Ω	232	233	234	No pull up or pull down
Input impedance (5V/GND)	k Ω	13.9	14.1	14.3	Pull up or pull down
Input impedance (2.5V)	k Ω	7.1	7.3	7.4	Pull up and pull down

Middle range analog

Description	Unit	Minimum	Typical	Maximum	Comment
Minimum discernible voltage	mV	—	—	0.03	—
Minimum discernible voltage	mV	5.69	5.78	5.88	—
Resolution	mV	—	1.4	—	—
Worst case offset and gain error	mV	—	—	±0.14	$V_{\text{Measure}} = 5.78 \text{ V}$
Non-linearity	mV	—	—	±8.5	—
Input impedance	k Ω	232	233	234	No pull up or pull down
Input impedance (5V/GND)	k Ω	13.9	14.1	14.3	Pull up or pull down
Input impedance (2.5V)	k Ω	7.1	7.3	7.4	Pull up and pull down

High range analog

Description	Unit	Minimum	Typical	Maximum	Comment
Minimum discernible voltage	mV	—	—	0.16	—
Minimum discernible voltage	mV	37.9	38.8	39.7	—
Resolution	mV	—	9.5	—	—
Worst case offset and gain error	mV	—	—	±0.95	$V_{\text{Measure}} = 38.8 \text{ V}$
Non-linearity	mV	—	—	±56.8	—

Input/output types and specifications

High range analog (continued)

Description	Unit	Minimum	Typical	Maximum	Comment
Input impedance	kΩ	109.1	109.3	109.5	No pull up or pull down (Vin < 5.7 V)
Input impedance (5V/GND)	kΩ	13.0	13.2	13.4	Pull up or pull down (Vin < 5.7 V)
Input impedance (2.5V)	kΩ	6.9	7.0	7.1	Pull up and pull down (Vin < 5.7 V)

Low range frequency (PPU)

Description	Unit	Minimum	Typical	Maximum	Comment
Range	Hz	0	—	10000	In steps of 1 Hz
Rising voltage threshold	mV	—	—	314	
Falling voltage threshold	mV	55	—	—	
Input impedance	kΩ	232	233	234	No pull up or pull down
Input impedance (5V/GND)	kΩ	13.9	14.1	14.3	Pull up or pull down
Input impedance (2.5V)	kΩ	7.1	7.3	7.4	Pull up and pull down

Middle range frequency (PPU)

Description	Unit	Minimum	Typical	Maximum	Comment
Range	Hz	0	—	10000	In steps of 1 Hz
Range (phase and quad)	Hz	0	—	5000	In steps of 1 Hz
Rising voltage threshold	V	—	—	4.25	Voltage required for frequency input
Falling voltage threshold	V	0.97	—	—	Voltage required for frequency input
Input impedance	kΩ	232	233	234	No pull up or pull down
Input impedance (5V/GND)	kΩ	13.9	14.1	14.3	Pull up or pull down
Input impedance (2.5V)	kΩ	7.1	7.3	7.4	Pull up and pull down

Resistance input

Description	Unit	Minimum	Typical	Maximum	Comment
Range	Ω	6	—	10000	In steps of 1 Ω
Measurement error	%	—	—	7.1	100Ω
		—	—	2.1	1kΩ
		—	—	5.4	10kΩ
Input impedance	Ω	1320	1320	1330	No pull up or pull down

Input/output types and specifications

Current input (4-20 mA)

Description	Unit	Minimum	Typical	Maximum	Comment
Minimum discernible current	mA	—	—	0.12	—
Minimum discernible current	mA	28.2	28.9	29.7	—
Resolution	μA	—	7	—	—
Worst case offset and gain error	μA	—	—	±743	$I_{\text{Measure}} = 28.9 \text{ mA}$
Non-linearity	μA	—	—	±42	—
Input impedance	Ω	197	200	202	No pull up or pull down

CAN shield and analog input

CAN Shield

Description	Unit	Minimum	Typical	Maximum	Comment
Input impedance	—	—	0.68μF+1Ω	—	—

Analog input

Description	Unit	Minimum	Typical	Maximum	Comment
Minimum discernible voltage	mV	—	—	0.03	—
Minimum discernible voltage	mV	5.64	5.78	5.92	—
Resolution	mV	—	1.4	—	—
Worst case offset and gain error	mV	—	—	±0.14	$V_{\text{Measure}} = 5.78 \text{ V}$
Non-linearity	mV	—	—	±8.5	—
Input impedance	kΩ	230	233	236	—

Alarm output

Low side digital output

Description	Unit	Minimum	Typical	Maximum	Comment
Voltage	V	0	—	V_{in}	—
Current	mA	0	—	500	—

Input/output types and specifications

CAN communication

Description	Unit	Minimum	Typical	Maximum	Comment
Available Baud rates	kbps		50		With 120 Ω termination. The default baud rate is 250 kbps.
			100		
			125		
			250		
			500		
			1000		
Maximum input voltage range	V	-27	—	40	CAN+ and CAN-

USB communication

Description	Unit	Minimum	Typical	Maximum	Comment
Available Baud rates	Mbps	—	12	—	—
Maximum input voltage	V	-0.3	—	7.3	D+, D-, and VBUS

RS232 communication

Description	Unit	Minimum	Typical	Maximum	Comment
Available Baud rates	bps	—	2400	—	The default baud rate is 9600 bps.
			4800		
			9600		
			19200		
			38400		
			57600		
			115200		
Maximum input voltage	V	-25	—	25	Rx
		-13.2	—	13.2	Tx

Product ratings

DM430E 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 and humidity cycle	IEC 60068-2-38 (partial)	
Degree of protection	IEC 60529	

Chemical environment

Description	Applicable standard	Comment
Chemical resistance	ISO 16750-5	

Mechanical environment

Description	Applicable standard	Comment
Vibration	IEC 60068-2-64 test Fh	7.67g
Bump	IEC 60068-2-27 test Eb	
Shock	IEC 60068-2-27 test Ea	
Free fall	IEC 60068-2-31 test Ed	

Electrical/electromagnetic

Description	Applicable standard	Comment
EMC emissions	ISO 13766	Electromagnetic compatibility for earth moving machinery.
EMC immunity	ISO 13766	Electromagnetic compatibility for earth moving machinery.
ESD	EN61000-4-2	
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.

Supply voltage/maximum current ratings

DM430E graphical displays are designed to operate with a nominal 9 to 36 Vdc power supply with reverse polarity protection.

Supply voltage/maximum current ratings

Description	Unit	Minimum	Typical	Maximum	Comment
Operating temperature	°C	-30	—	+70	
Storage temperature	°C	-40	—	+85	
DC supply voltage	V	9	—	36	Normal operation.
		6	—	36	Cranking; reduced functionality.
		-36	—	36	Short circuit and reversed polarity protection.

Product ratings

Supply voltage/maximum current ratings (continued)

Description	Unit	Minimum	Typical	Maximum	Comment
DC supply current	mA	—	202	—	Vin = 9V
		—	144	—	Vin = 13.5V
		—	92	—	Vin = 27V
		—	86	—	Vin = 36V
+5V output voltage	V	4.75	5	5.09	Normal operation over temperature.
		0	—	36	Short circuit protection.
+5V output current	mA	—	—	100	
Short circuit pin voltage	V	0	—	36	All DEUTSCH connector pins.

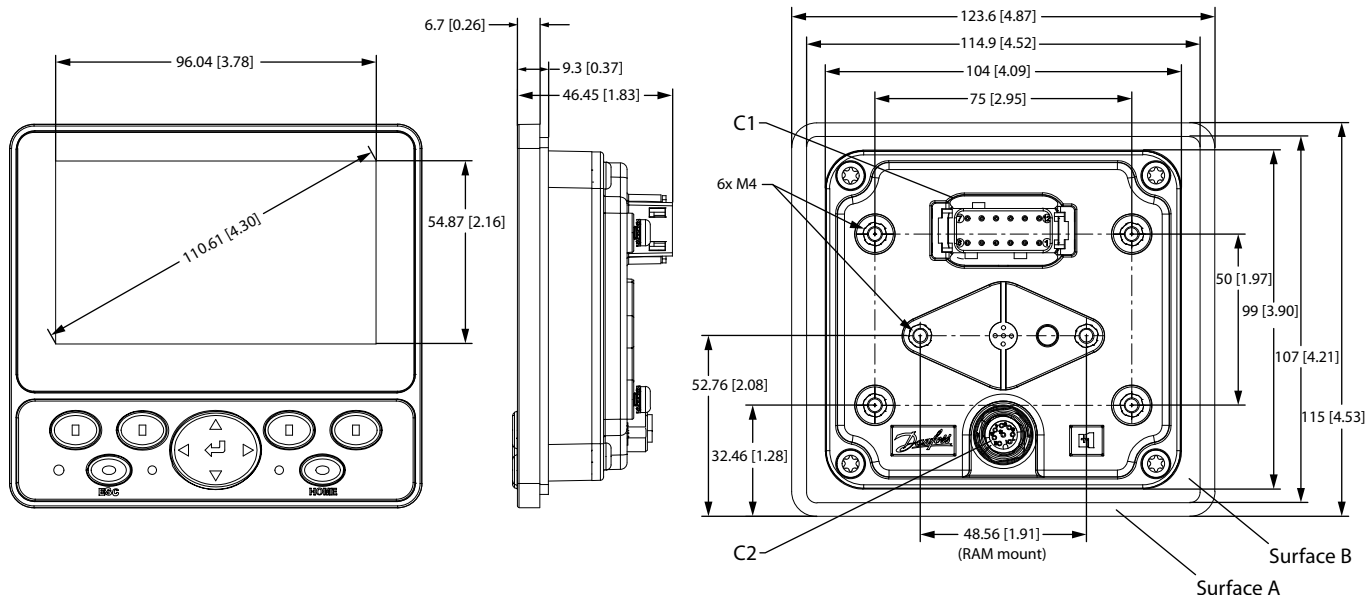
Ingress Protection (IP) rating

DM430E displays carry a full Ingress Protection rating of IP 67 only if the rear USB mating connector or seal plug and DEUTSCH mating connector is in place.

Installation

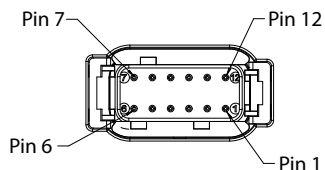
DM430E Series Displays dimensions

mm [in]



Pin assignments

12 pin DEUTSCH connector



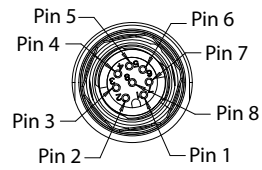
DEUTSCH DTM06-12SA 12 pin

C1 pin	DM430E-0-x-x-x	DM430E-1-x-x-x	DM430E-2-x-x-x
1	Power ground -	Power ground -	Power ground -
2	Power supply +	Power supply +	Power supply +
3	CAN 0 +	CAN 0 +	CAN 0 +
4	CAN 0 -	CAN 0 -	CAN 0 -
5	AnIn/CAN 0 Shield	AnIn/CAN 0 Shield	AnIn/CAN 0 Shield
6	DigIn/AnIn	DigIn/AnIn	DigIn/AnIn
7	DigIn/AnIn	DigIn/AnIn	DigIn/AnIn
8	DigIn/AnIn	CAN 1+	Sensor power
9	DigIn/AnIn	CAN 1-	Secondary power input*
10	Multifunction input (DigIn/AnIn/Freq/4-20 mA/Rheostat)	Multifunction input (DigIn/AnIn/Freq/4-20 mA/Rheostat)	Multifunction input (DigIn/AnIn/Freq/4-20 mA/Rheostat)
11	Multifunction input (DigIn/AnIn/Freq/4-20 mA/Rheostat)	Multifunction input (DigIn/AnIn/Freq/4-20 mA/Rheostat)	Multifunction input (DigIn/AnIn/Freq/4-20 mA/Rheostat)
12	Digital out (0.5A sinking)	Digital out (0.5A sinking)	Digital out (0.5A sinking)

* From controller (requires surge protection).

Installation

8 pin M12 connector



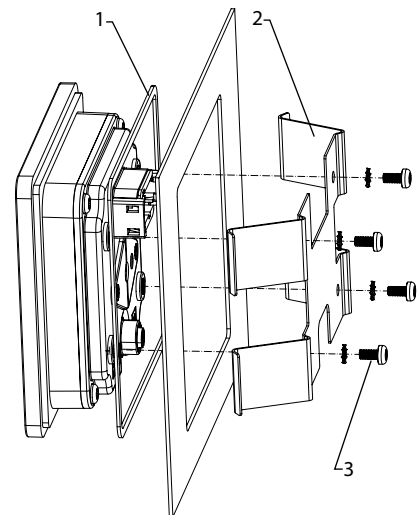
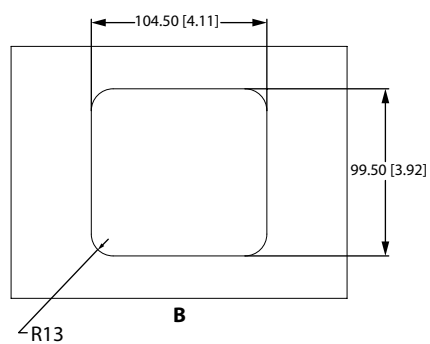
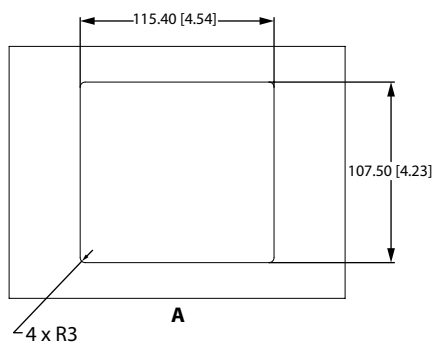
M12-A 8 pin

C2 pin	Function
1	Device Vbus
2	Device data -
3	Device data +
4	Ground
5	Ground
6	RS232 Rx
7	RS232 Tx
8	NC

Mounting

Recommended mounting procedure

mm [in]



Callout	Description
A	Panel opening for mounting on surface A
B	Panel opening for mounting on surface B
1	Panel seal
2	Panel bracket
3	Four screws

Installation

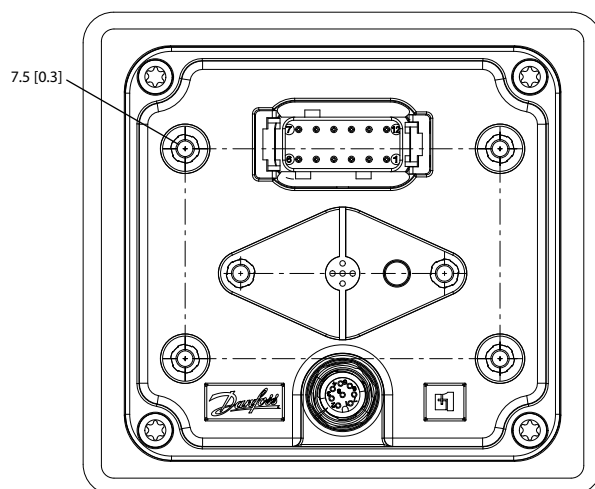
Fastening

! Caution

- Use of non-recommended screws can cause damage to housing.
- Excessive screw torque force can cause damage to housing. Maximum torque: 0.9 N m (8 in-lbs).
- Reassembly with self-tapping screws can damage existing threads in housing.
- Oversized panel cutouts can jeopardize product IP rating.
- Ensure the vent is not covered. This excludes the RAM mount option.

Fastening hole depth

mm [in]



Fastening hole depth: 7.5 mm (0.3 in). Standard M4x0.7 screw may be used.

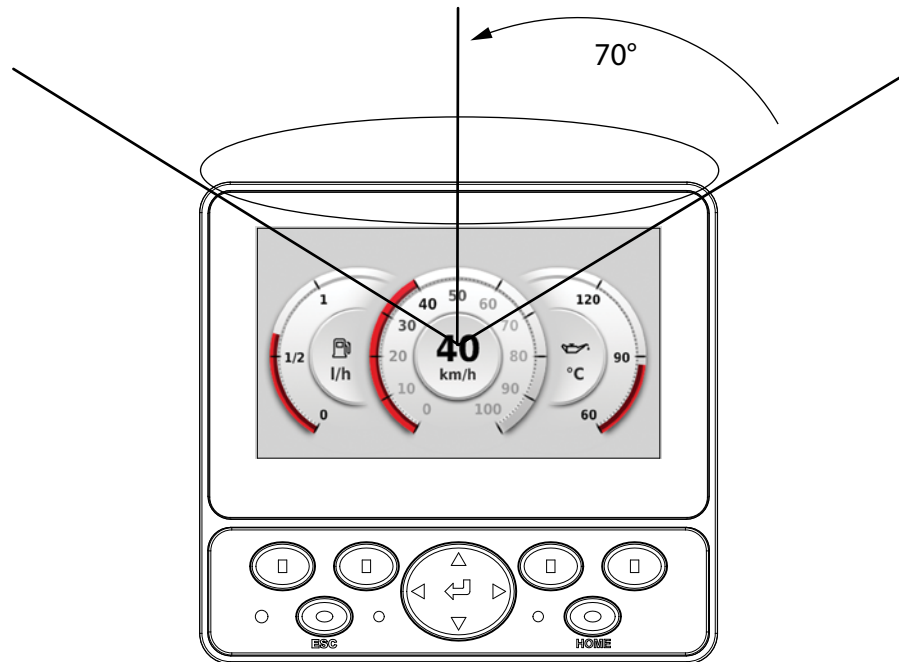
Maximum torque: 0.9 N m (8 in-lbs).

Installation

Visibility and viewing radius

Due to the display nature of the TFT-LCD screen, the optimal viewing angle for the DM430E series graphical display is at a maximum radius of 70° from either side of the screen.

Optimal viewing angle



Display faulty application recovery

The boot loader is always executed when the unit is powered. The boot loader checks if the application has the completely downloaded flag set and in that case starts to execute it after a delay of 200 ms. The delay gives an opportunity for the PLUS+1® Service Tool to prevent the call to the application. This allows a non functional application to be replaced by the boot loader. This recovery function is activated by the **Communication > Recover ECU** menu in the PLUS+1® Service Tool.

Cleaning

Do not pressure wash. Clean using a dry, soft, lint-free cloth, such as a micro-fiber cloth.

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