



 TM
COMPLIANT

ORGANIZATION AND HEADINGS

To help you quickly find information in this manual, the material is divided into sections, topics, subtopics, and details, with descriptive headings set in **red type**. Section titles appear at the top of every page in **large red type**. Topic headings appear in the left hand column in **BOLD RED CAPITAL LETTERS**. Subtopic headings appear in the body text in **bold red type** and detail headings in *italic red type*.

References (example: See *Topic xyz*, page XX) to sections, headings, or other publications are also formatted in *red italic type*. In **Portable Document Format (PDF)** files, these references represent clickable hyperlinks that jump to the corresponding document pages.

TABLES, ILLUSTRATIONS, AND COMPLEMENTARY INFORMATION

Tables, illustrations, and graphics in this manual are identified by titles set in *blue italic type* above each item. Complementary information such as notes, captions, and drawing annotations are also set in *blue type*.

References (example: See *Illustration abc*, page YY) to tables, illustrations, and graphics are also formatted in *blue italic type*. In PDF files, these references represent clickable hyperlinks that jump to the corresponding document pages.

SPECIAL TEXT FORMATTING

Defined terms and acronyms are set in **bold black type** in the text that defines or introduces them. Thereafter, the terms and acronyms receive no special formatting.

Black italic type is used in the text to emphasize important information, or to set-off words and terms used in an unconventional manner or alternative context. *Red* and *blue italics* represent hyperlinked text in the PDF version of this document (see above).

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ABOUT THIS MANUAL

PLUS+1 DP600 Graphical Terminals Family Technical Information

This manual is designed to be a comprehensive PLUS+1 DP600 Graphical Terminal family reference tool for vehicle OEM design, engineering and service personnel. Additional information can be found in the PLUS+1 DP600 Graphical Terminal Data Sheet.

What information is in this manual?

This manual provides technical details that are common to all DP600 Graphical Terminals, including general specifications, input and output parameters, environmental ratings and installation details.



**PLUS+1 FAMILY OF
MOBILE MANAGEMENT
PRODUCTS**

The PLUS+1 family of machine management products include vehicle controllers, graphical display terminals and operator input modules, including joysticks and finger paddles.

PLUS+1 DP600 Graphical Terminals provide external device inputs for cameras and multiple CAN busses for a wide range of vehicle and environment monitoring.

DP600 SERIES FEATURES

- Advanced transfective TFT screens
- 8 soft keys + 6 buttons for menu navigation, all backlit
- Inputs for armrest navigation button
- High brightness alarm LED
- Light sensor for backlight adjustment
- Anti-glare protective glass
- GORE-TEX™ membrane prevents moisture ingress and screen fogging
- Full ISO 11783 Virtual Terminal functionality
- High performance 32-bit microcontroller for smooth and flicker-free real time screen updates
- Rugged, shock-resistant construction fully protects against dust and moisture
- Onboard real-time clock
- On board flash/RAM memory for easy extending
- Two mounting options using enclosure

**MASTER MODEL CODE
 KEY**

A					B		C		D		E		F			
D	P	6	0	0	S	A	C	A	V	2	K	S	X	X	X	X

A. Model Name

DP600

B Screen Variant

SA	400 X 200 color advanced TFT transfective
SB	320 X 240 monochrome transfective

C. Connector

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

D. Video Inputs

V0	No video inputs
V2	2 video inputs

E. Keypads

KS	Standard keypad with 8 soft and 6 function keys
-----------	---

F. Options/Special hardware or software

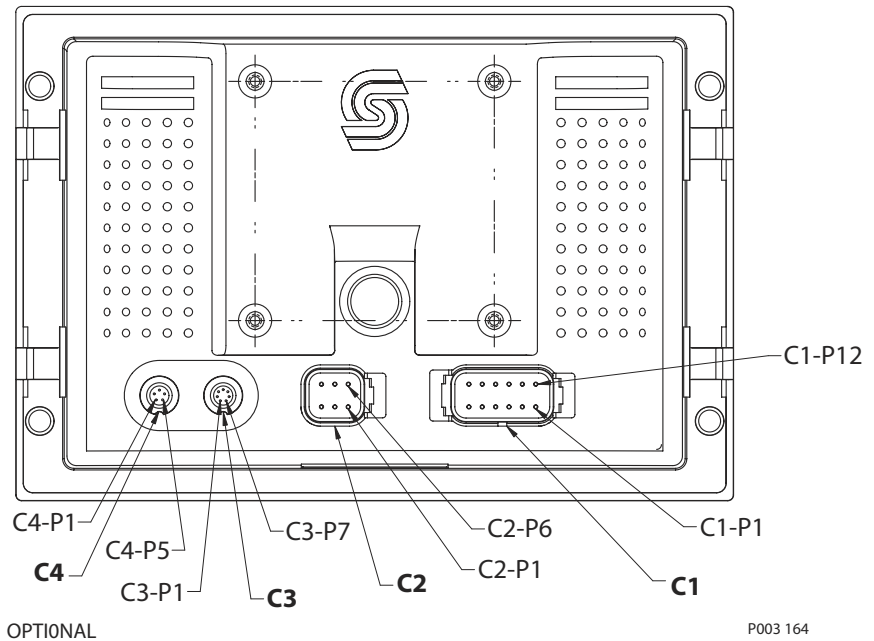
XXXX	None
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DP600 MODEL FEATURES GUIDE

DP600 Series Graphical Terminals

	Graphical Terminal	DP600	DP601	DP610	DP620	
Hardware	Processor	ARM 7				
	ROM	8 MB				
	RAM	8 MB				
	FRAM	8 MB (256k available for application data storage)				
	Real Time Clock	Date and Time accuracy: 1 second/24 hours Minimum back-up time: 30 days				
	Power Supply/Consumption	9–36 VDC/ 15W maximum				
Connector	Deutsch DTM 12-pin	•	•	•	•	
	Deutsch DTW 6-pin	•	•	•	•	
	Binder 7-pin (USB/RS232)	•	•	•	•	
	Binder 5-pin (video)	•	•	–	–	
	Maximum cable length	11 meters	11 meters	11 meters	11 meters	
Display	Resolution (dpi)	400 x 200	400 x 200	400 x 200	320 x 240	
	Size/Type	6.5 inch/ TFT Color	6.5 inch/ TFT Color	6.5 inch/ TFT Color	6 inch/ TFT Monochrome	
	Transflexive	•	•	•	•	
Environmental	IP rating	IP67 Note: Unused connections must have sealing plugs for IP rating to be valid				
	Operating temperature	–30° to +70° C (–22° to +158° F)	•	•	•	–
	–20° to +70° C (–4° to +158° F)	–	–	–	•	
	Storage temperature	–30° to +80° C (–22° to +176° F)				
	Vibration	5g				
	Shock	30g				
	EMC immunity	100 V/m				
	Electrostatic discharge	15 kV				
Communication	CAN 2.0B	2 Baud rates: 111 kbit, 250 kbit, 500 kbit, 1Mbit 2 pins for CAN shield (acc. to J1939)				
	ISOBUS ISO11783	–	•	–	–	
	USB 2.0	•	•	•	•	
	RS232	Baud rates: 1200, 2400, 9600, 19,200, 28,800, 38,400, 115,200 baud. No handshake available.				
Inputs/Outputs	Digital Inputs	3 2 inputs designed for 90° A/B encoder signals				
	Integrated ambient light sensor	•	•	•	•	
	Integrated high brightness LED	•	•	•	•	
	Video (composite PAL)	2	2	–	–	
	Digital output (0.5A)	1				

PIN SETTINGS



Connector C1

Pin	Function
C1-P1	Main power ground
C1-P2	Main power supply
C1-P3	RedCAN right bus – high
C1-P4	RedCAN right bus – low
C1-P5	CAN shield
C1-P6	CAN bus – high
C1-P7	CAN bus – low
C1-P8	Encoder supply
C1-P9	Encoder pulse A input
C1-P10	Encoder pulse B input
C1-P11	Encoder enter input
C1-P12	Buzzer – ground

Connector C3

Pin	Function
C3-P1	USB V bus
C3-P2	USB data –
C3-P3	USB data +
C3-P4	USB ground
C3-P5	Ground
C3-P6	RS-232 Rx/D
C3-P7	RS-232 Tx/D

Connector C2

Pin	Function
C2-P1	Redundant power ground
C2-P2	Redundant power supply
C2-P3	RedCAN left bus – high
C2-P4	RedCAN left bus – low
C2-P5	CAN shield
C2-P6	Analog in

Connector C4

Pin	Function
C4-P1	Video power ground
C4-P2	Video power 12/24 VDC out
C4-P3	Video input 1
C4-P4	Video ground
C4-P5	Video input 2

DIGITAL INPUTS

Digital Inputs

BIOS name	Variable type	Variable function	Function, Scaling	Miscellaneous
DigIn.SW_Soft1	Boolean	In	Switch on:set	Soft Key 1
DigIn.SW_Soft2	Boolean	In	Switch on:set	Soft Key 2
DigIn.SW_Soft3	Boolean	In	Switch on:set	Soft Key 3
DigIn.SW_Soft4	Boolean	In	Switch on:set	Soft Key 4
DigIn.SW_Esc	Boolean	In	Switch on:set	Esc
DigIn.SW_Left	Boolean	In	Switch on:set	Left
DigIn.SW_Ok	Boolean	In	Switch on:set	OK
DigIn.SW_Right	Boolean	In	Switch on:set	Right
DigIn.SW_Down	Boolean	In	Switch on:set	Down
DigIn.SW_Up	Boolean	In	Switch on:set	Up
DigIn.SW_Soft8	Boolean	In	Switch on:set	Soft Key 8
DigIn.SW_Soft7	Boolean	In	Switch on:set	Soft Key 7
DigIn.SW_Soft6	Boolean	In	Switch on:set	Soft Key 6
DigIn.SW_Soft5	Boolean	In	Switch on:set	Soft Key 5
DigIn.SW_c1p9	Boolean	In	Open:Clear Ground:Set	Internal 10Ω resistors are connected between these pins and c1p8. They will work as pull-up resistors to +5v when DigOut.c1p8 is set. They will work as pull-down resistors when to ground when c1p8 is externally connected to ground (DigOut.c1p8 should be cleared)
DigIn.SW_c1p10	Boolean	In	Open : Clear Ground:Set	
DigIn.SW_c1p11	Boolean	In	Open : Clear Ground:Set	
DigIn.SW_c1p8_Status	Boolean	In	Error (short circuit) = Set	Video supply short circuit detection status
DigIn.c4p2_Status	Boolean	In	DigOut.c4p2 set and short circuit to ground = Set DigOut.c4p2 set and no short circuit= Clear Status is unspecified when DigOut.c4p2 is clear	Video supply short circuit detection status
DigIn.SW_c1p2_Status	Boolean	In	Low voltage = Set	Main power supply status
DigIn.SW_c2p2_Status	Boolean	In	Low voltage = Set	Redundant power supply status

ANALOG INPUTS

Analog Inputs

BIOS name	Variable type	Variable function	Function, Scaling
Analn.LightInt	U16	In	Light sensor input Darkest: 0 Brightest: 255
Analn.Supply	U16	In	System supply voltage 0v= 0 36.3v=255
Analn.PCBTemp	U16	In	PCB temperature 126°= 0 -46°= 255
Analn.DLED_Sense	U16	In	Alarm LED current 0 mA= 0 330mA= 255
Analn.DispTemp	U16	In	TFT temperature 128°= 0 -53°= 255
AnalnDispBackLight	U16	In	Display backlight 0v= 0 3.3v= 255
Analn.c2p6	U16	In	Analog input 0v=0 6.6v=255 or 39.6= 255 Use Config.c2p6 to select voltage
Analn.LCDHiSupply	U16	In	+10v to TFT display 0v= 0 14.19v= 255

DIGITAL OUTPUTS

Digital Outputs

BIOS name	Variable type	Variable function	Function, Scaling
DigOut.c1p8	Boolean	Out	Set: Turn on the encoder power supply. +5v
DigOut.c1p12	Boolean	Out	Set: Drive output to GND Clear: Float output
DigOut.DLED	Boolean	Out	Set: Light up alarm LED
DigOut.KeyBackLight	Boolean	Out	Set: Light up keyboard backlight
DigOut.c4p2	Boolean	Out	Set: Turn on video power supply

Note: DigOut.c1p12 is recommended for buzzer use only.

ANALOG OUTPUTS

Analog Outputs

BIOS name	Variable type	Variable function	Function, Scaling
AnaOut.DispBackLight	U8	Out	Range: 0–100% 0%= Off 100%= Full brightness

OS MEASUREMENT

OS Measurements

BIOS name	Variable type	Variable function	Function, Scaling
OS.Start	Boolean	In	Set during the first processing time.
OS.LoopCnt	U32	In	Counter. 1 unit increments every processing time
OS.ExecTime	U16	In	Processing time (ms)
OS.ExecTimeOut	U16	Out	Requested processing time Range 0–500
OS.ExecTimeWork	U16	In	Actual work time during processing time
OS.ExecTimeAppl	U16	In	Actual time in application (ms)
OS.ExecTimeGraph	U16	In	Actual time updating in graphics routines (ms)
OS.ETime	U32	In	Time since power on (10ms)

ELECTRIC POTENTIAL INPUTS

Electric Potential Inputs

BIOS name	Variable type	Variable function	Function, Scaling
PotIn.Supply	U16	In	
PotIn.DispBackLight	U16	In	
PotIn.c2p6	U16	In	
PotIn.LCDHiSupply	U16	In	

ELECTRIC CURRENT INPUTS

Electric Current Inputs

BIOS name	Variable type	Variable function	Function, Scaling
Curln.DLED_Sense	U16	In	Alarm LED current Range: 0–330 mA

TEMPERATURE INPUTS

Temperature Inputs

BIOS name	Variable type	Variable function	Function, Scaling
TemIn.PCBTemp	S16	In	PCB Temperature Range: –46°–126° C
TemIn.DispTemp	S16	In	TFT Temperature Range: –53°–128° C

NON-VOLATILE RAM

Non-volatile RAM

BIOS name	Variable type	Variable function	Function, Scaling
EE.s16	S16	Bi	RAM Copy of EEPROM Range: 0–127 Occupies the same space in EEPROM but contains different data types.
EE.u16	U16	Bi	RAM Copy of EEPROM Range: 0–127
EE.u8	U8	Bi	RAM Copy of EEPROM Range: 0–255
EE.s32	S32	Bi	RAM Copy of EEPROM Range: 0–63
EE.u32	U32	Bi	RAM Copy of EEPROM Range: 0–63
EEWR	Boolean	Out	Positive edge=Write EE.16 to EEPROM Range: 0–127

RED CAN RELAYS

Red CAN Relays

BIOS name	Variable type	Variable function	Function, Scaling
CanRe.Load	Boolean	Out	Set= Red CAN load relay on
CanRe.BreakRight	Boolean	Out	Set= Red CAN break right relay activated
CanRe.BreakLeft	Boolean	Out	Set= Red CAN break left relay activated

CAN INTERFACES

The CAN controller MCP2515 is used as the interface to the CAN bus.
 Note: You can only connect to the PLUS+1 GUIDE Service Tool via CAN(0)
 CAN (0) is not connected to the same pins at DP600 as CAN (0) at MC24-10. See page 9 for pin out.

CAN Interfaces

BIOS name	Variable type	Variable function	Function, Scaling	Miscellaneous
CAN (n)			CAN channel, (n)= 0–1 Redundant CAN bus, (n)=0 Non-redundant CAN bus, (n)=1	
Elements				
.Baudrate	U32	Out	Bus baud Supported bauds: 111,111 125KB 250KB 500KB 1,000,000KB	Default 250KB baud An invalid value results in a fallback to the default baud
.BusOff	Boolean	In	Set= If CAN controller is in Bus Off mode.	
.Reset	Boolean	Out	Set= Resets the CAN controller and recovers from Bus Off mode	
.Msg (m)			CAN mailbox m= 0–23	
Elements				
.Data	U8	Bi	CAN message data byte o= 0–7	
.Id	U32	Bi	CAN ID for this mailbox. Every ID should be unique for the mailbox.	
.Mask	U32	Out	CAN mask for this mailbox 0= don't care	Note: Not yet implemented Default: FFFFFFFFH
.Length	U8	Bi	Message data length If Rx, Input If Tx, output	
.Tx	Boolean	Out	Request transmit of message (n), if Tx	
.Rx	Boolean	In	Message buffer (n) has been updated in last processing session, if Rx	
.TransmitMode	Boolean	Out	Set= The mailbox is used to transmit CAN data	Default: False
.ReceiveMode	Boolean	Out	Set= This mailbox is used to receive CAN data	Default: False
.ExtendedMode		Out	Set= Extended ID is used for this mailbox	Default: False

REAL TIME CLOCK

Real Time Clock

Bios Name	Variable Type	Variable Function	Function, Scaling
Time.Hour	U8	Bi	0–23, Real-time clock hours
Time.Minute	U8	Bi	0–59, Real-time clock minutes
Time.Second	U8	Bi	0–59, Real-time clock seconds
Time.Stop	Boolean	Out	Clear: Read Time from real-time clock Set: Do not update OS variables.
Time.Set	Boolean	Out	Set: Write date and time to real-time clock
Date.Year	U16	Bi	Real-time clock year
Date.Month	U8	Bi	1–12, Real-time clock month
Date.Day	U8	Bi	1–31, Real-time clock day.
Date.DayOfWeek	U8	Bi	0–6, Real-time clock weekday
Date.Stop	Boolean	Out	Clear: Read date from real-time clock. Set: Do not update OS variables.
Date.Set	Boolean	Out	Set: Write date and time to real-time clock.

HARDWARE IDENTITY

Hardware Identity

Bios Name	Variable Type	Variable Function
HW.EAN (n)	U8	(n)= 0–5, a 12 digit BCD coded number (LSB first), which is an EAN code. n=6 is the EAN code checksum.
HW.SER (n)	U8	(n)= 0–5, a 12 digit BCD-coded number (LSB first) that is a serial number.
Clock Ticks		
Use Time and Date if long term accuracy is important		
CK1S	Boolean	Set during one processing time every second
CK60S	Boolean	Set during one processing time every minute

ENCODER

The encoder function samples both the A & B signals from the encoder and increment/decrement activity from the counter according to the phase sequence. The counter is incremented/decremented on every low to high and high to low edge of the A signal. Some encoders with detents give a complete pulse between detents and the counter will be incremented/decremented by a factor of two for every detent. The counter is incremented when the A signal is the leading phase and decremented when the B signal is the leading phase.

The encoder group contains variables that handle the encoder. The Encoder power supply control is placed among digital output variables. The enter button/power supply status are found in the digital input group

Note: The encoder is only suitable for user interface functions (e.g., menu navigation, value adjustments) because there is no guarantee that all pulses will be detected and thus the detected direction may be false. The rate of pulses should be kept at a few tens per second to minimize the loss of detected position changes.

Encoder

BIOS Name	Variable Type	Variable Function	Function, Scaling
Encoder.Steps	S16	In	The change of the edge counts value from the previous loop of the application program. The sign of the value indicates direction
Encoder.Reset	Boolean	Out	Set=Set value to 0 or to the limit value that is nearest to 0 if not in the min to max range.
Encoder.Preset	Boolean	Out	Set=Set value to PresetValue or to the limit value that is nearest to PresetValue if not in the min. to max range.
Encoder.PresetValue	S16	Out	See Encoder.Preset
Encoder.Wraparound	Boolean	Out	Clear=
Encoder.MaxLimit	S16	Out	
Encoder.Min Limit	S16	Out	
Encoder.Value	S16	In	

VIDEO INPUTS

The Video In group contains variables that handle video output. The video input power supply control is placed among the digital output variables. The power supply status in the digital inputs group.

Video frames can be captured in two ways: Overlay mode and Off-screen mode

Overlay mode

Overlay mode is selected when set is chosen in the *VideoIn.Overlay* variable. This is the default setting. Overlay mode provides full frame refresh rate, but the following conditions must be met:

- The size of the video frame must be 320 x 240
- The entire video frame must be inside the display window
- Bitmaps cannot be drawn on top of the video frame

Off-screen mode

Off-screen mode is selected when clear is chosen in the *VideoIn.Overlay* variable or when any Overload condition has not been met.

In the off-screen mode:

- The video image will behave like a regular bitmap graphic
- The image is scalable
- The video refresh rate is limited to the processing time of the application

Video In

BIOS name	Variable type	Variable function	Function, Scaling	Miscellaneous
VideoIn.Image	PXO	In		It is encouraged to only show one instance of the video image
VideoIn.Width	U16	Out	0-320	Default: 320
VideoIn.Height	U16	Out	0-240	Default: 240
VideoIn.Channel	U8	Out	0-1	Default: 0
VideoIn.Overlay	Boolean	Out		Default: Set
VideoIn.Failure	Boolean	In	Clear= The video input is OK and can be used. Set= Video input circuit error detected. The video input is disabled as long as this flag is set. The video input will automatically recover and clear this flag when the error source is removed.	

SERIAL PORTS
RS232

Serial Port/RS232

There are $n + 1$ Tx and Rx buffers defined for each serial port. Specifically, in the OS the buffer $n=0$ is available for the application.

NOB Protocol

NOB Protocol is the default OS mode for the DP600 family. Serial port routines are implemented according to NOB protocol. The addresses $F0h-FFh$ are reserved for diagnostic (logging and programming) functions.

NOB Protocol

BIOS name	Variable type	Variable function	Function, Scaling	Miscellaneous
AsyncSetMode	Boolean	Out	Clear= NOB protocol mode on	Default mode setting
UART(0).baud	U32	Out	Baud values valid: 110/1200/2400/4800/ 9600/14,400/19,200/ 38,400/57,600/76,800/ 115,200	Default baud: 9600 An invalid value results in a fallback to the default baud
UART(0).TwoStopBits	Boolean	Out	Set= two stop bits Clear= one stop bit	Default clear
UART(0).TxMsg(0).SrcAddr	U8	Out	Tx Own address	
UART(0).TxMsg(0).TgtAddr	U8	Out	Tx Target address	
UART(0).TxMsg(0).Len	U8	Out	Tx Message length	
UART(0).TxMsg(0).Tx	Boolean	Out	Set= Send message	
UART(0).TxMsg(0).Rdy	Boolean	In	Set= Ongoing transmission	
UART(0).TxMsg(0).Data(1)	U8	Out	Data buffer	
UART(0).RxMsg(0).SrcAddr	U8	Bi	Rx Source address	
UART(0).RxMsg(0).OwnAddr	U8	Out	Rx Own address	
UART(0).RxMsg(0).Rx	Boolean	In	Data received during last processing time	
UART(0).RxMsg(0).Len	U8	In	Length of the received message	
UART(0).RxMsg(0).Data(1)	U8	In	Data buffer, 1= 0-127	

Asynchronous Mode

Serial port routines in asynchronous mode are available.

When *UART(0).TxMsg(0).Tx* is set 0.

For receiving data, bytes coming in on the serial port are placed in the buffer *UART(0).RxMsg(0)*. The number of received bytes are stored in *UART(0).RxMsg(0).Len*. *UART(0).RxMsg(0).Len* can be zeroed by setting *UART(0).RxMsg(0).Clear*. The data should be handled and the clear flag set before the length variable reaches the maximum size of the data buffer to avoid loss of incoming data.

It is possible to switch between NOB protocol and Asynchronous mode while the application is running; however, logging and programming via the serial port is not available while the Asynchronous mode is on. Asynchronous mode is switched on by setting the *AsyncSerMode* variable.

Asynchronous Mode

BIOS name	Variable type	Variable function	Function, Scaling	Miscellaneous
AsyncSerMode	Boolean	Out	Set= Asynchronous mode on	Default clear
UART(0).Baud	U32	Out	Baud values valid: 110/1200/2400/4800/ 9600/14,400/19,200/ 38,400/57,600/76,800/ 115,200	Default 9600 An invalid value results in a fallback to the default baud
UART(0).TwoStopBits	Boolean	Out	Set= two stop bits Clear= one stop bit	Default clear
UART(0).TxMsg(0).Len	U8	Out	Tx message length	
UART(0).TxMsg(0).Tx	Boolean	Out	Set= send message	
UART(0).TxMsg(0).Rdy	Boolean	In	Set= no on going transmission	
UART(0).TxMsg(0).Data(1)	U8	Out	Data buffer, 1= 0–127	
UART(0).RxMsg(0).Rx	Boolean	In	Data received during last processing time	
UART(0).RxMsg(0).Len	U8	In	Length of received message	
UART(0).RxMsg(0).Data(1)	U8	In	Data buffer, 1= 0–127	
UART(0).RxMsg(0).Clear	Boolean	Out	Set= UART(0).RxMsg(0).Len to 0	
UART(0).RxMsg(0).Index	U8	Out	Index for the first byte in RxMsg(0).Data, IRxMsg(0).Data(0)=RxMsg(0).Data(Index) 1= 0–127-Index	
UART(0).RxMsg(0).Data(1)	U8	In	Data buffer which starts at byte number 'Index' in the buffer UART(0).RxMsg(0).Data IRxMsg(0).Data(1)=RxMsg(0).Data(Index+1)	Note: Cannot be logged by the Service and Diagnostic Tool

PRINT SCREEN

Print Screen

BIOS name	Variable type	Variable function	Function, Scaling
PrintScreenImage	PXO	In	Clipboard image
PrintScreen	Boolean	Out	Set= Copy current display to clipboard

PORTS

Ports

BIOS name	Variable type	Variable function	Function, Scaling
Ports.Graphic400x240	Port	In	Defines a port to the graphical 400x200 pixel display
Ports.Graphic320x240	Port	In	Defines a port to the graphical 320x240 display.. DP620 only

FONTS

Fonts

BIOS name	Variable type	Variable function	Function, Scaling
Fonts.CourierNew10	Font	In	Built-in Font, 10 pt
Fonts.CourierNew12	Font	In	Built-in Font, 12 pt.
Fonts.Courier16	Font	In	Built-in Font, 16 pt.
Fonts.LCD5X7	Font	In	

COLORS

Colors

The display shows colors in a 256 color mode. The display uses a default palette that corresponds to the Microsoft Windows standard color palette, unless a shown image has its own color palette. The palette of the last shown image will be the current palette.

Besides the predefined colors, a color can be given as a palette number between 0–255 or as an RGB code where the three most significant bytes in a 32 bit number corresponds to a tone combination of red, green and blue. Example: 0x0000FF00 is Pure Blue. Note that 0x00000000 is equal to the palette number 0 (which is often Black). To specify Black, 0x01010100 could be used, or select *Colors.Black* from the variable menu. When RGB code is used the display will use the nearest color in the color palette.

Colors

BIOS name	Variable type	Variable function	Function, Scaling
Colors.Black	Color	In	
Colors.White	Color	In	
Colors.Transparent	Color	In	Use when opening a transparent window

**GRAPHIC DRAWING
 MODE**

Graphic Drawing Mode

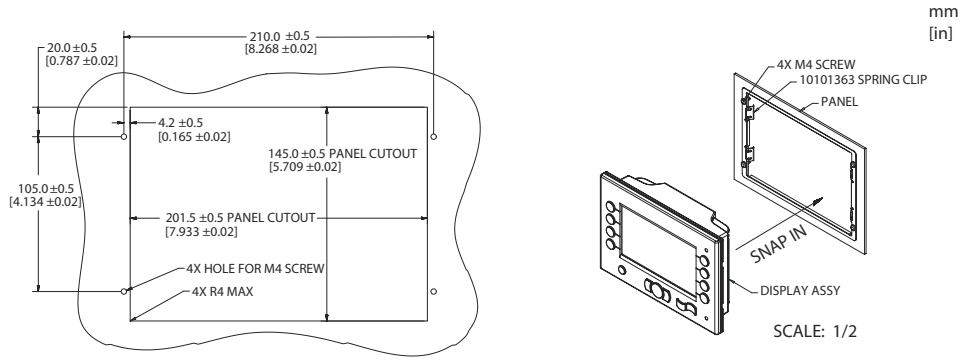
Control how graphical objects in the application drawing are rendered to the display. It is possible to draw the objects as they are placed in the horizontal plane in the drawing either from left to right or right to left. The insertion point for text output is also affected by this signal.

GraphicDrawingMode

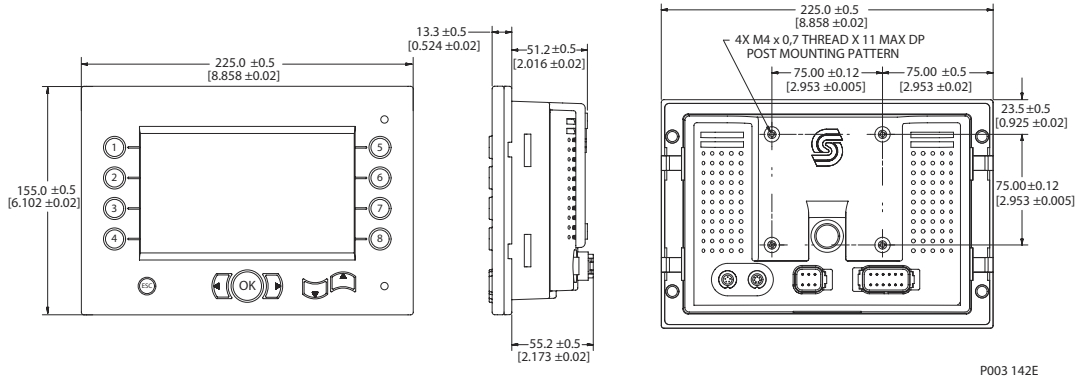
BIOS name	Variable type	Variable function	Function, Scaling	Miscellaneous
GraphicDrawingMode	Bit	Out	Clear= Screen editor mode. Left to right drawing order. Text insertion point is the upper left corner of the font. Set=µGraph mode. Right to left drawing order. Text insertion point is the lower left corner of the font.	Default set

Installation Diagram

INSTALLATION DIAGRAM



PANEL MOUNTING OPTION



Two mounting options:

- Flush mounted into dashboard using Sauer-Danfoss spring clip frame.
- Stand-alone on post, according to VESA standard 75 mm x 75 mm [2.953 in x 2.953 in].

**APPLICATION
AND OPERATING
CONSIDERATIONS**

- Disconnect your machine's battery power before connecting power and signal cables to the DP600.
- Before doing any electrical welding on your machine, disconnect all power and signal cable cables connected to the DP600.
- Do not exceed the DP600's power supply voltage ratings. Using higher voltages may damage the DP600 and can create a fire or electrical shock hazard.
- Do not use or store the DP600 where flammable gases or chemicals are present. Using or storing the DP600 where flammable gases or chemicals are present may cause an explosion.
- Software configures the keypad buttons on the DP600. 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 DP600 so that a communication error or failure between the DP600 and other units cannot cause a malfunction that might injure people or damage material.
- The protective glass over the DP600 display screen will break if hit with a hard or heavy object. Install the DP600 to reduce the possibility of it being hit by hard or heavy objects.
- If you break the protective glass of the DP600 screen, remove the DP600 and immediately return it to Sauer-Danfoss for service.
- Storing or operating a DP600 in an environment that exceeds the DP600 specified temperature or humidity rating may damage the DP600.
- Always clean the DP600 with a soft, damp cloth. Use a mild dishwashing detergent as needed. To avoid scratching and discoloring the DP600, do not use abrasive pads, scouring powders, or solvents such as alcohol, benzene, or paint thinner.
- The DP600 is not user serviceable. Return the DP600 to the factory in case of failure.

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