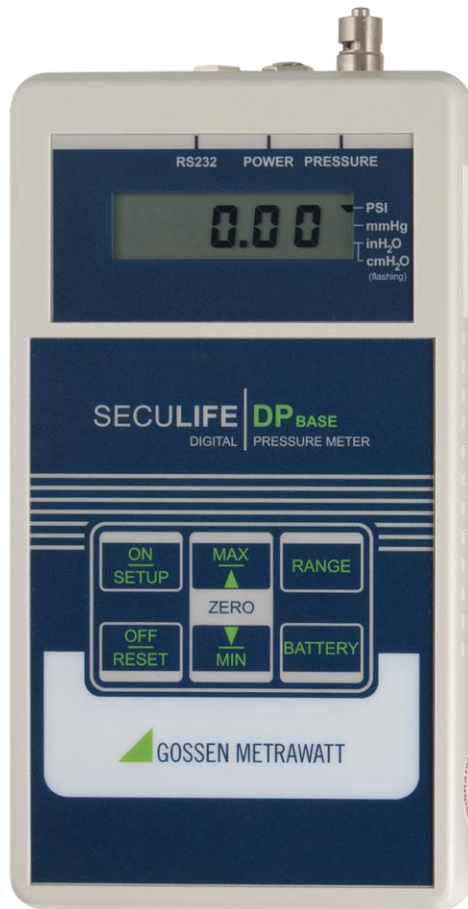


SECULIFE **DP**_{BASE}

DIGITAL PRESSURE METER

3-349-845-03

1/1.15



GMC-I Messtechnik GmbH
DP Base
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WARNING - USERS

The DP Base is for use by skilled technical personnel only.

WARNING - USE

The DP Base is intended for testing only and should never be used in diagnostics, treatment or any other capacity where it would come in contact with a patient.

WARNING - CONNECTIONS

All connections to patients must be removed before connecting the DUT to the DP Base. A serious hazard may occur if the patient is connected when testing with the DP Base. Do not connect anything from the patient directly to the DP Base or DUT.

WARNING - MODIFICATIONS

The DP Base is intended for use within the published specifications. Any application beyond these specifications or any unauthorized user modifications may result in hazards or improper operation.

CAUTION - INSPECTION

The DP Base should be inspected before each use for wear and should be serviced if any parts are in question.

CAUTION – MEDIA COMPATIBILITY

The DP Base is intended to be used with only non-corrosive, non-ionic, or otherwise pure fluids and/or gases that are compatible with sensor materials including glass, silicon, ceramic, epoxy, RTV, gold, aluminum and nickel.

CAUTION - SERVICE

The DP Base is intended to be serviced only by authorized service personnel. Troubleshooting and service procedures should only be performed by qualified technical personnel.

CAUTION - ENVIRONMENT

Exposure to environmental conditions outside the specifications can adversely affect the performance of the DP Base. Allow the DP Base to acclimate to specified conditions for at least 30 minutes before attempting to operate it.

CAUTION - CLEANING

Do not immerse. The DP Base should be cleaned by wiping gently with a damp, lint-free cloth. A mild detergent can be used if desired.

NOTICE – SYMBOLS

<u>Symbol</u>	<u>Description</u>
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	Center Negative
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NOTICE – ABBREVIATIONS

ANSI	American National Standards Institute
BCD	Binary Coded Decimal
C	Celsius
cmH ₂ O	Centimeter(s) water
°	Degree(s)
DUT	Device Under Test
DC	Direct Current
Euro	European
F	Fahrenheit
FS	Full Scale
inH ₂ O	Inche(s) of water
kg	kilogram(s)
μA	microampere(s)
mA	milliampere(s)
mBar	milliBar(s)
mm	millimeter(s)
mmHg	millimeter(s) of Mercury
NEDA	National Electronic Distributors Association
Lbs	pounds
PSI	pounds per square inch
USA	United States of America
VDC	Volts Direct Current

NOTICE – DISCLAIMER

GMC-I Messtechnik GmbH WILL NOT BE RESPONSIBLE FOR ANY INJURIES SUSTAINED DUE TO UNAUTHORIZED EQUIPMENT MODIFICATIONS OR APPLICATION OF EQUIPMENT OUTSIDE OF THE PUBLISHED INTENDED USE AND SPECIFICATIONS.

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NOTICE – CONTACT INFORMATION

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GMC-I Messtechnik GmbH
DP BASE
DIGITAL PRESSURE METERS

The Model DP Base is a Microprocessor based Digital Pressure Meter. It measures both gas and liquid pressures and provide multiple engineering unit displays for the results. The following are highlights of some of the main features.

Main Features:

- -13.50 TO 100.00 PSI RANGE
- PRESSURE SCALES INCLUDE PSI, inH₂O, cmH₂O, AND mmHg
- DIGITAL CALIBRATION – NO POTS TO TURN
- 5 DIGIT LCD PLUS SCALE INDICATION
- BATTERY LIFE DISPLAY (0 to 100%)
- PROGRAMMABLE DIGITAL FILTER
- LCD CONTRAST IS SOFTWARE ADJUSTABLE
- 16 BIT PRESSURE MEASUREMENT
- DIGITAL ZERO ADJUST
- MAX and MIN PRESSURE VALUE STORAGE
- RS232 SERIAL COMMUNICATIONS

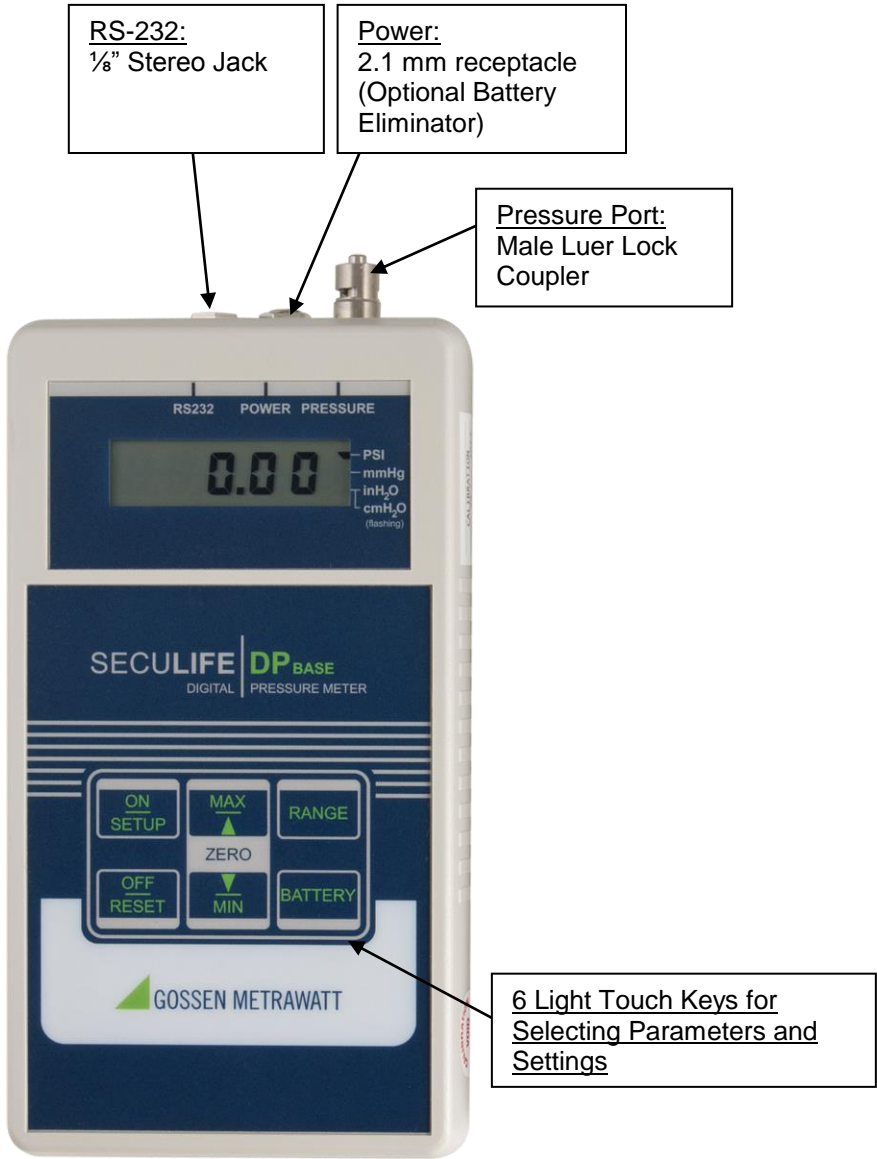
OPTIONAL ACCESSORIES:

- 20-21100 BATTERY ELIMINATOR (USA VERSION)
- 20-21101 BATTERY ELIMINATOR (EURO VERSION)
- 20-21102 RS-232 COMMUNICATIONS CABLE (1/8 STEREO PLUG TO DB-9F)
- 20-41339 USB COMMUNICATIONS ADAPTER (DB-9M to USB-A)
- 20-30106 SOFT-SIDED CARRYING CASE
- 20-01005 UNIVERSAL PRESSURE ADAPTER KIT
- 20-01006 YSI 700 TEMPERATURE PROBE

LAYOUT

This section looks at the layout of the DP Base and gives descriptions of the elements that are present.





DP Base Layout





DISPLAY INDICATORS

Several indicators are provided to identify the current mode and/or status.

PRESSURE UNITS – Pressure units are indicated by an identifier bar. The RANGE key will toggle the pressure units among PSI, mmHG, inH₂O and cmH₂O. The following is a breakdown of the available pressure units and the measurement range for each:

<u>Identifier Bar</u>	<u>Pressure Units</u>	<u>Range</u>
	PSIG	-13.50 to 100.00
	mmHg @ 20 °C	-701 to 5190
	inH ₂ O 20 °C	-374 to 2773
 (flashing)	cmH ₂ O 20 °C	-951 to 7043

 bar
 no bar

NOTE: If the measured pressure is outside of the range of the instrument, the display will display -HI- or -Lo-.

LOW BATTERY – When the battery life reaches 10 percent, the display will show the message “lo bat” for two seconds once every minute until the battery is replaced.

LINE POWER – The display will show “Line” instead of batter life remaining when the meter is powered from the optional Battery.

DEF CAL – This status screen displays on Power Up if the unit is out of Calibration. The unit will load default values, however the unit should be returned to BC Group for Calibration.

KEYS

Several tactile-touch keys are provided for system operation.



– The function of this key is dependent on the Current Operating Mode as follows:

POWER OFF – If this key is pressed while the power is turned OFF, the power will be turned ON

PRESSURE MEASUREMENT – If this key is pressed while the pressure is being displayed, the Setup Mode will be entered.

SETUP MODE – Pressing this key while in the Setup Mode will sequence the display through the available parameters.



– The function of this key is dependent on the Current Operating Mode as follows:

PRESSURE MEASUREMENT – If this key is pressed while the pressure is being displayed, the power will be turned OFF

SETUP MODE – Pressing this key while in the Setup Mode will exit the Setup Mode and automatically save all settings.

MIN/MAX MODE – Pressing this key when a MIN or MAX Value is being displayed (MIN or MAX key is held down) will cause that value in that capture register to be reset to the current reading.



– The function of this key is dependent on the Current Operating Mode as follows:

PRESSURE MEASUREMENT – If this key is pressed while the pressure is being displayed, the unit will display the maximum pressure detected since the capture register was last reset.


SETUP MODE – If this key is pressed in the Setup Mode, the value of the displayed setting will increment. Pressing and holding this key will cause the rapid automatic incrementing of the displayed setting.



– The function of this key is dependent on the Current Operating Mode as follows:

PRESSURE MEASUREMENT – If this key is pressed while the pressure is being displayed, the unit will display the minimum pressure detected since the capture register was last reset.

SETUP MODE – If this key is pressed in the Setup Mode, the value of the displayed setting will decrement. Pressing and holding this key will cause the rapid automatic decrementing of the displayed setting.

ZERO () – This function is a combination of two keys:



If both keys are depressed and held for 5 seconds, the pressure display will be zeroed.



– The function of this key is to select the desired display engineering units. When viewing pressure it will sequence through the four pressure ranges (PSI, inH₂O, cmH₂O and mmHg)



– If this key is pressed while the pressure is being displayed, the unit will display the percent (0 to 100) of battery life remaining.

SETUP MODE

The Setup Mode allows the user to adjust the configuration of the meter. The Setup Mode is entered by pressing The ON/SETUP key when the unit is on. The parameter and the current value will alternately flash in the display. The following table indicates the Parameters that are available, their meaning and available setting range:

<u>PARAMETER</u>	<u>DESCRIPTION</u>	<u>RANGE</u>
CONT	CONTRAST	0 - 15
AOFF	AUTO OFF TIMER	0 - 30 MINUTES
BEEP	KEY BEEP LENGTH	0 - 15
FCON	DIGITAL FILTER CONSTANT	1 - 255

CONT – This parameter controls the contrast of the LCD display. A Higher setting will cause the display to darken. A lower setting will cause the display to lighten.

AOFF – This parameter determines the period of user inactivity before the meter is automatically turned OFF. A timer is started when the meter is turned ON and is reset each time a key is pressed. When the timer reaches the value set in this parameter, the meter is automatically turned OFF.

NOTE: Setting this parameter to 0 disables the Auto Off feature.

NOTE: The meter will not automatically turn off when powered by the Battery Eliminator, regardless of AOFF setting.

BEEP – This parameter controls the length of the audio feedback beep (click) that occurs when a key is depressed. A Higher setting will cause a longer (louder) beep. If the value is set to 0, the beep is eliminated.

FCON – This parameter controls the Filter Constant. The software has a Digital Filter that averages the pressure readings to produce a stable display. This setting determines the number of samples that are averaged in the digital filter. Increasing this setting will cause a more stable display. However, it will also cause a slower response to small changes in pressure. The best setting is the smallest number that provides a stable display.

COMMUNICATIONS

Since the meter does not handle a great deal of data, the RS-232 communications link has been optimized to allow the user, through very simple instructions, to control and request data from the meter. Refer to Specifications section for RS-232 Settings (Baud, etc).

Data transmitted/received is in standard ASCII format, and all numerical values are in BCD format. All commands sent to the unit should be terminated with a “Carriage Return” character (<CR> or in hexadecimal, 0x0D). All commands and responses are echoed by the unit for confirmation of communication, and are terminated with “Carriage Return” and “Line Feed” characters (<CR><LF> or in hexadecimal, 0x0D0A). If an invalid command is received, the unit will respond with the characters “??”.

The following section describes the protocol used by the meter in detail:

R - <u>READ</u>	<p>The READ command allows the user to read system settings and data.</p> <p><u>Usage:</u></p> <p style="text-align: center;">R(Location)(CR)</p> <p>Where:</p> <ul style="list-style-type: none"> R - READ command Location - contains two digits indicating the data location to be read CR - Carriage Return <p><u>Example:</u></p> <table style="margin-left: auto; margin-right: auto; border: none;"> <thead> <tr> <th style="text-align: left; padding: 2px;"><u>Data Sent</u></th> <th style="text-align: left; padding: 2px;"><u>Data Returned</u></th> <th style="text-align: left; padding: 2px;"><u>Meaning</u></th> </tr> </thead> <tbody> <tr> <td style="padding: 2px;">R11<CR></td> <td style="padding: 2px;">R11<CR><LF> -0011<CR><LF></td> <td style="padding: 2px;">Echo of Command Sent -0.11 PSI measured</td> </tr> </tbody> </table>	<u>Data Sent</u>	<u>Data Returned</u>	<u>Meaning</u>	R11<CR>	R11<CR><LF> -0011<CR><LF>	Echo of Command Sent -0.11 PSI measured
<u>Data Sent</u>	<u>Data Returned</u>	<u>Meaning</u>					
R11<CR>	R11<CR><LF> -0011<CR><LF>	Echo of Command Sent -0.11 PSI measured					
W - <u>WRITE</u>	<p>The WRITE command allows the user to update the system settings.</p> <p><u>Usage:</u></p> <p style="text-align: center;">W(Location – 2 digits)(Data – 5 digits)(CR)</p> <p>Where:</p> <ul style="list-style-type: none"> W - WRITE command Location - contains two digits indicating the data location to be written Data – five-digit field containing the data to be written at the Location set above CR - Carriage Return 						

	<p><u>Examples:</u></p> <table border="0"> <thead> <tr> <th><u>Data Sent</u></th> <th><u>Data Returned</u></th> <th><u>Meaning</u></th> </tr> </thead> <tbody> <tr> <td>W172<CR></td> <td>W172<CR><LF></td> <td>Echo of Command Sent (Set Pressure units to "inH₂O")</td> </tr> <tr> <td>W1700002<CR></td> <td>W1700002<CR><LF></td> <td>Echo of Command Sent (Set Pressure units to "inH₂O")</td> </tr> <tr> <td>W01100<CR></td> <td>W01100<CR><LF> ??<CR><LF></td> <td>Echo of Command Sent Invalid Command Response (Location 01 is Read Only)</td> </tr> </tbody> </table>	<u>Data Sent</u>	<u>Data Returned</u>	<u>Meaning</u>	W172<CR>	W172<CR><LF>	Echo of Command Sent (Set Pressure units to "inH ₂ O")	W1700002<CR>	W1700002<CR><LF>	Echo of Command Sent (Set Pressure units to "inH ₂ O")	W01100<CR>	W01100<CR><LF> ??<CR><LF>	Echo of Command Sent Invalid Command Response (Location 01 is Read Only)
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W1700002<CR>	W1700002<CR><LF>	Echo of Command Sent (Set Pressure units to "inH ₂ O")											
W01100<CR>	W01100<CR><LF> ??<CR><LF>	Echo of Command Sent Invalid Command Response (Location 01 is Read Only)											
<p>U - <u>UPLOAD</u></p>	<p>The UPLOAD command allows the user to read all of the selected device data from locations 1 through 16 with a single command. The data returned will be formatted as a single block per location separated by a carriage return, line feed character sequence (CRLF – equivalent to hexadecimal 0x0D0A). See the table below for details on the data structure.</p> <p><u>Usage:</u></p> <p style="text-align: center;">U(CR)</p> <p>Where: U – UPLOAD command CR - Carriage Return</p>												
<p>Q - <u>QUICKSEND</u></p>	<p>QUICKSEND is a feature that allows the user to receive an automatic update of all of the meter data without any further user interaction. When the QUICKSEND command is received, the feature is turned ON and the meter will automatically send all of the device data every half second. The Quicksend feature is toggled ON and OFF with the QUICKSEND command. See the table below for details on the data structure.</p> <p><u>Usage:</u></p> <p style="text-align: center;">Q(CR)</p> <p>Where: Q – QUICKSEND command CR - Carriage Return</p>												
<p>V - <u>VERSION</u></p>	<p>The VERSION command allows the user to read the Software Version that the unit is currently running.</p> <p><u>Usage:</u></p> <p style="text-align: center;">V(CR)</p> <p>Where: V – VERSION command CR - Carriage Return</p>												

X - <u>CANCEL</u>	<p>The CANCEL command is simply a way to re-establish proper control, should a communications error occur or an incorrect command be transmitted. For the most part, an incorrect command will simply be ignored and the meter will return to listening for future commands. However, a prior command may be cancelled midstream by transmitting the CANCEL command anytime.</p> <p><u>Usage:</u></p> <p style="text-align: center;">X</p> <p>This command does not require a carriage return, nor will it acknowledge with a carriage return. However, it will echo an 'X' character to indicate that the CANCEL command has been received.</p> <p>NOTE: The VERSION or CANCEL commands may also be utilized as an acknowledgement of the meter being on line.</p>
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LOCATION	ACCESS	DESCRIPTION	RANGE
01	R	% BATTERY LIFE REMAINING	0-100
02	R/W	CONTRAST	0-15
03	R/W	AUTO POWER OFF	0-30
08	R/W	FILTER CONSTANT	0-255
10	R	MODEL	0 = DPM-2001 1 = DPM-2001+ 2 = DPM-2100
11	R	PRESSURE	See Note 1
12	R	MAX PRESSURE	See Note 1
13	R	MIN PRESSURE	See Note 1
14	R/W	PRESSURE UNITS	0=PSI 1=mmHg 2=inH2O 3=cmH2O

Note 1 – The units for the pressure data is determined by the setting in Location 14. This may be set via the Write command or manually using the Range Key. See Specifications Page for Ranges.

MANUAL REVISIONS

<u>Revision #</u>	<u>Program #</u>	<u>Revisions Made</u>
Rev 01	DT7325CA	Preliminary Manual
Rev 02	DT7325CA	Misc. Edits
Rev 03	DT7325CA	Battery Eliminator Updated
Rev 04	DT7325CB	Status Display Graphics Updated
Rev 05	DT7325CD	Accuracy Specifications Updated
Rev 06	DT7325CG	Program Upgrades, Color Overlays Updated
Rev 07	DT7325CG	Misc. Edits
Rev 08	DT7325CI	Format Updated, Specifications Updated, Misc. Edits
Rev 09	DT7325CI	Specifications Updated

LIMITED WARRANTY

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SPECIFICATIONS

PRESSURE	
RANGE	-13.50 to 100.00 PSI -701 to 5190 mmHg @ 20 °C -374 to 2773 inH ₂ O @ 20 °C -951 to 7043 cmH ₂ O @ 20 °C
RESOLUTION	0.01 PSI 1 mmHg @ 20 °C 1 inH ₂ O @ 20 °C 1 cmH ₂ O @ 20 °C
MAXIMUM OVERPRESSURE	200 PSI
ACCURACY	± 0.1% FS
DIGITAL FILTER	1 – 255 samples
COMPATIBLE MEDIA	Only non-corrosive, non-ionic, or otherwise pure fluids and/or gases that are compatible with sensor materials including glass, silicon, ceramic, epoxy, RTV, gold, aluminum and nickel.
CONNECTIONS	Male Luer Coupler

PHYSICAL		
DISPLAY	5 Digit, 7-Segment Non-Backlit LCD	
CONSTRUCTION	ENCLOSURE	ABS Plastic
	OVERLAY	Lexan, Back Printed
MEMORY	SETUP	EEPROM, All Parameters
	RETENTION	10 Years w/o Power
SIZE	7.69 x 3.97 x 1.82 Inches (195.3 x 100.8 x 46.2 mm)	
WEIGHT	≤ 1 Lbs (0.45 kg)	

ENVIRONMENTAL		
OPERATING RANGE	0 to 50 °C (32 to 122 °F)	
STORAGE RANGE	-40 to 60 °C (-40 to 140 °F)	
ELECTRICAL		
BATTERY	9V Alkaline (ANSI/NEDA 1604A or equivalent)	
BATTERY ELIMINATOR	9 V, 50 mA DC  20-21100 (USA Version) 20-21101 (Euro Version)	
POWER CONSUMPTION	ON	< 15 mA
	OFF	< 40 µA
BATTERY LIFE	CONTINUOUS	80 hours
	OFF	1 year
RS-232 COMMUNICATIONS	BAUD	115200
	DATA BITS	8
	START BITS	1
	STOP BITS	1
	PARITY	none
	HANDSHAKING	none
	CONNECTIONS	1/8 Stereo Receptacle for use with 20-21102 RS-232 Cable

NOTES

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NOTES



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