



Instruction Manual
DD241PC

Digital process display

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Certified acc. to DIN EN ISO 9001: 2008

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1. Safety

The handling of the system assumes knowledge of the instruction manual.

1.1 Symbols Used

The following symbols are used in this instruction manual:



Indicates a hazardous situation which, if not avoided, may result in minor or moderate injuries.



Indicates a situation which, if not avoided, may lead to property damage.



Indicates a user action.



Indicates a user tip.

Measure

Indicates a hardware or a button/menu in the software

1.2 Warnings



Connect the power supply and the display device in accordance with the safety regulations for electrical equipment.

> Danger of injury

> Danger to or destruction of the display

The power supply must not exceed the specified limits.

> Danger of injury

> Damage to or destruction of the display.

NOTICE

Avoid shock and vibration to the display.

> Damage to or destruction of the display.

Protect the connection cable against damage.

> Failure of the display

1.3 Notes on CE Identification

The following applies to the DD241PC: EMC regulation 2004/108/EC

Products which carry the CE mark satisfy the requirements of the EMC regulation 2004/108/EC 'Electromagnetic Compatibility' and the European standards (EN) listed therein. The EC declaration of conformity is kept available according to EC regulation, article 10 by the authorities responsible at

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The display DD241PC is designed for use in industry and satisfies the requirements of the standards

- EN 61000-6-4: 2007
- EN 61000-6-2: 2006

The display satisfies the requirements if they comply with the regulations described in the instruction manual for installation and operation.

1.4 Proper Use

The display DD241PC is designed for use in industrial and laboratory areas.

- It is used for controlling and monitoring industrial processes.
- The system may only be operated within the limits specified in the technical data, see Chap. 2.4.
- Use the system in such a way that in case of malfunctions or failure personnel or machinery are not endangered.
- Take additional precautions for safety and damage prevention for safety-related applications.
- The overvoltages to which the units are subjected at the connection terminals must be limited to the value of the overvoltage category II, see Chap. 2.4!
- The unit may not be operated
 - in hazardous areas,
 - as medical units,
 - in applications expressly named in EN 61010!



1.5 Proper Environment

- Protection class:
 - Front side IP 65
- Operating temperature: 0 ... 50 °C (+32 ... +122 °F)
- Storage temperature: -20 ... 70 °C (-4 ... +158 °F)
- Humidity: Max. relative humidity 80 %, at 25 °C non-condensing
- EMC: acc. to EN 61000-6-4: 2007
EN 61000-6-2: 2006

2. Functions, Control Elements and LEDs

The DD241PC is an electronic counting, controlling and monitoring unit. It consists of:

- 6-digits display
- Connection: Single-channel for analog sensor, 0 (4) ... 20 mA ¹, 0 (2) ... 10 V ²
- Peak memory

Supplementary equipment model DD241PC(11)






- Interface RS232
- Two limit values as relay output.

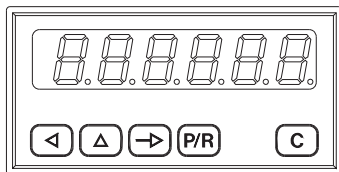
2.1 Description

The DD241PC is best suited for displaying measurements having process measuring signals 0/4 - 20 mA ¹ or 0/2 V - 10 V ². The 2-position scaling allows to allocate the process measuring signals to the desired display by simply setting the initial value to, for example, 0 and the final value to, for example, 2000, via the keyboard.

2.2 Components Control Panel LED Symbol Display

Control Panel

-  Shift key for display of functions, confirmation key
-  Key to select decade towards the left
-  Key to select decade upwards
-  Key to shift between programming/operating level
-  Reset



Display of operating parameters

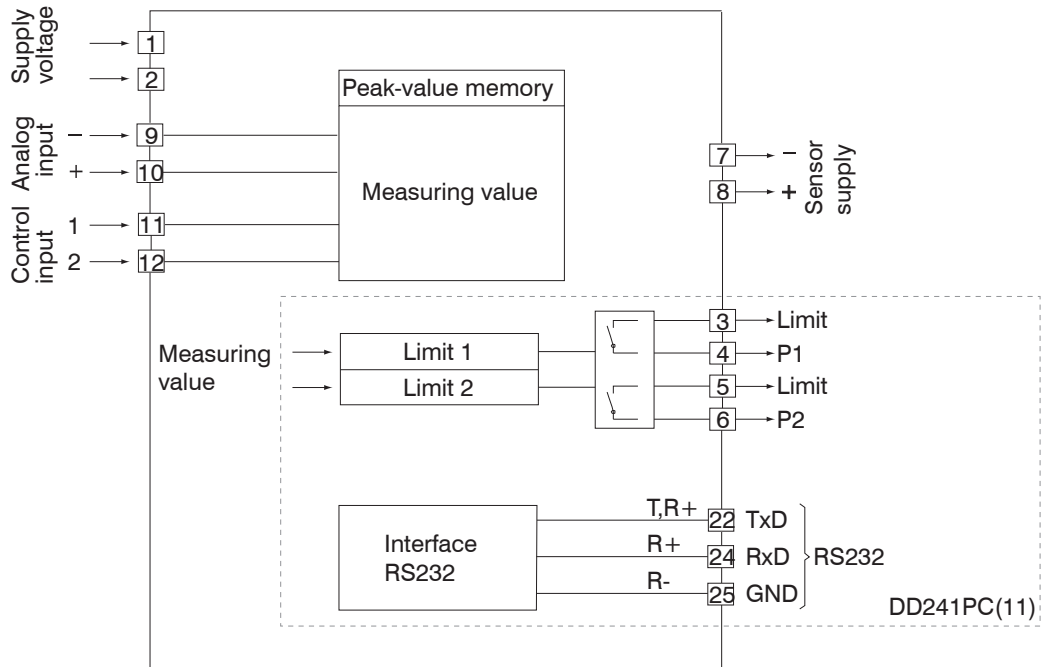
- F Current display status
- HIGH Peak memory
- bFd_n Display adjustment initial value
- bFu_P Display adjustment final value
- P1 Limit 1
- P2 Limit 2

Fig. 1 Display with control panel

- 1) Model DD241PC
- 2) Model DD241PC-U

2.3 Block Diagram

The block diagram shows the components together with its contacts and connections.



2.4 Technical Data

Model	DD241PC	
Power supply	12 ... 30 VDC	
Power consumption	6 VA, 4 W	
Sensor supply	12 ... 26 VDC / max. 80 mA	
Display	LED, 7-segment display, 6-digits	
Digit height	14 mm	
Function	Digital display of 1 analog measured value	
Measurement principle	Analog, resolution 12 Bit	
Signal inputs	Comparator inputs	
Input logic	PNP	
Control inputs	2 inputs	
Control functions	Hold, Reset, TARA, etc.	
Data storage	> 10 years in EEPROM	
Analog input	DD241PC-U	0(2)...10 V, input resistance 20 kOhm
	DD241PC	0(4)... 20 mA, input resistance 250 Ohm
	Resolution 12 bit; temperature coeffic. typic ± 20 ppm/ $^{\circ}$ C	
Outputs relay	Normally open or closed, programmable (optional)	
Interface	RS232 (optional)	
General rating DIN EN 61010-1	Protection class II; overvoltage category II; pollution degree 2	
Electromagnetic compatibility (EMC)	EN 61000-6-4: 2007 and EN 61000-6-2: 2006	
Programmable parameter	2 limits, analog input; control inputs; Offset (maximum and minimum analog limit)	
Approval	UL/cUL, CE-conform	

Model	DD241PC
Operating temperature	-10 ... +50 °C (+14 ... +122 °F)
Storage temperature	-20 ... +70 °C (-4 ... +158 °F)
Humidity	Max. relative humidity 80 %, at 25 °C non-condensing
Core cross-section	1.5 mm ²
Protection class DIN EN 60529	IP 65 face with seal
Operating / keypad	Membrane with soft keys
Housing type	Housing for control panel installation
Dimensions	W X H x L: 96 x 48 x 124 mm
Cutout dimensions	96 x 45 mm (+0.6)
Installation depth	123.75 mm
Mounting	Front panel installation by clip frame
Weight	approximately 350 g (AC), 250 g (DC)
Housing material	Makrolon 6485 (PC)

3. Delivery

3.1 Unpacking

1 DD241PC

1 Instruction manual

➡ Check for completeness and shipping damage immediately after unpacking.

➡ In case of damage or missing parts, please contact the manufacturer or supplier.

3.2 Storage

Storage temperature: -20 ... +70 °C (-4 ... +158 °F)

Humidity: Max. relative humidity 80 %, at 25 °C non-condensing

4. Installation

- Pay attention to careful handling during mounting and operation.



In case of changes (including operating behavior) that impair safety, shut-down the units immediately. During installation work on the units, the power supply must always be disconnected. Installation work may only be carried out by appropriately trained experts.

- > Danger of injury
- > Damage to or destruction of the display

Following proper assembly and installation, the device is ready for operation.

4.1 Dimensional Drawing Display

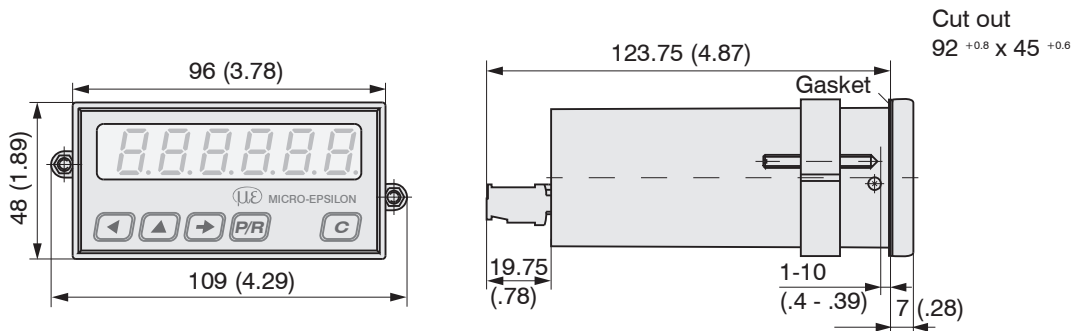


Fig. 2 Dimensional drawing of display DD241PC, dimensions in mm, not to scale

4.2 Connecting DD241PC

This chapter will explain how the contacts are assigned and give you some examples of connection. You will find actual tips and technical data for the various connections, see Chap. 4.2.1, see Chap. 4.2.2 et seq.

⚠ CAUTION

Litz contact only by means of connector sleeves with insulating enclosures for reasons of shock protection according to EN 61010.

Micro-Epsilon recommends to screen all sensor terminal leads and to ground the shield on one side.

The sensor leads should not be in the same wire loom as the MAINS supply and the output contact leads.

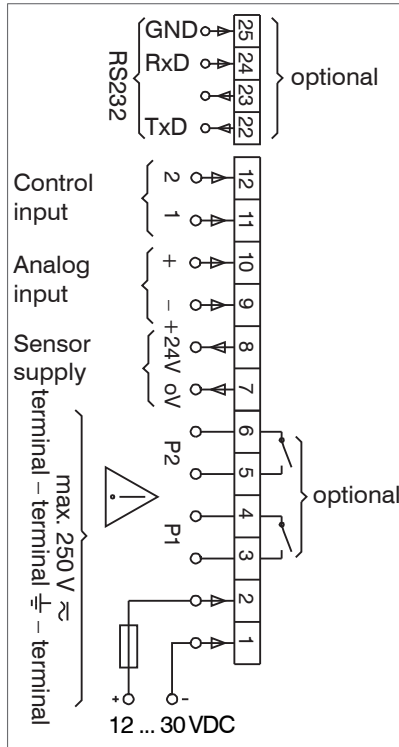


Fig. 3 Pin assignment

Pin	Function
1	Power supply 0 V
2	Power supply 12 ... 30 VDC
3	Relay output P1
4	Relay output P1
5	Relay output P2
6	Relay output P2
7	Sensor supply 0 V
8	Sensor supply +10 ... 26 VDC
9	Analog input -
10	Analog input +
11	Control input 1
12	Control input 2
22	TXD
24	RXD

Optional connections are indicated by brackets in the original image:

- Optional: Pins 3, 4, 5, 6 (Relay outputs P1 and P2).
- Optional: Pins 22, 24 (RS232 TXD and RXD).

CAUTION

Fire protection:
Operate device on the MAINS with external fuse recommended on the rating plate. In case of disturbance, make sure that 8 A /150 VA (W) are never exceeded - as defined per EN 61010.

4.2.1 Connect Power Supply

Direct voltage connection

➡ Connect interference-free power supply.

ⓘ Do not use the supply voltage for the supply in parallel of drives, contactors, electrovalves, etc.

➡ Connect DC voltage according to terminal diagram at pin 1 (-) and pin 2 (+), see Fig. 3.

Voltage range 12 ... 30 VDC ±10 %, max. 5 % residual ripple.

Recommended external protection M 400 mA.

4.2.2 Relay Contacts

The signal outputs of limits (contacts 3, 4, and 5, 6) are floating relay contacts. The signal outputs can be assigned as per adjacent terminal diagram, see Fig. 4.

The response time depends on the prepared Update time in program line 28.

Max. rating 150 VA / 30 W	Max. voltage 250 VAC / 110 VDC	Max. current 1 A
------------------------------	-----------------------------------	---------------------

➡ Connect contacts 3, 4 and 5, 6 adequate.

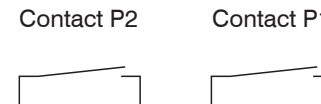


Fig. 4 Connection diagram signal outputs

CAUTION

The user must take care that, in case of disturbance, the contact rating of 8 A / 150 VA (W) is not exceeded. The output relay of the device (1 relay or more) may, in total, switch max. 5 x per minute. Admissible clicks as per interference suppression standards EN 61000-6-4 for the industrial sector. In case of higher switching rate, the user is responsible for and in charge of providing interference protection on site in consideration of the load to be switched.

4.2.3 Connect Sensors

➡ Connect sensor supply to contacts 7 and 8.

The sensor supply is not short-circuit proof.

Pin	Voltage	Max. admissible current
7	0 V	/
8	10 ... 26 VDC	85 mA



However, do not use sensor supply for unearthed inductors or capacitive loads.

> Damage to the output stage

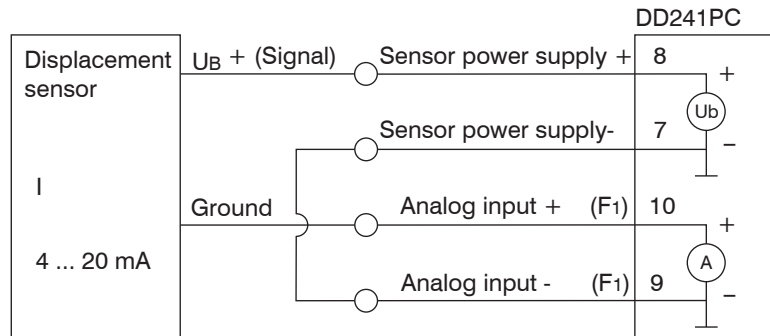


Fig. 5 2-wire current electronics

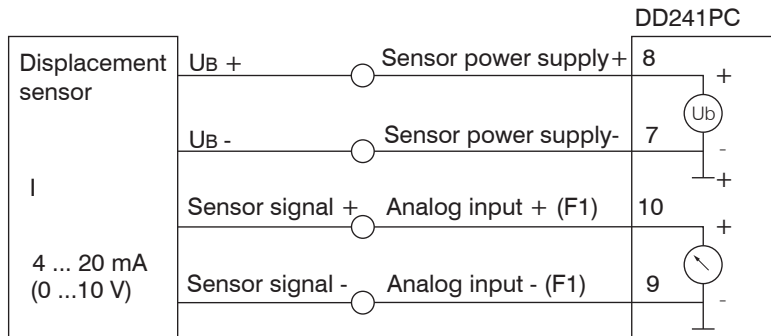


Fig. 6 4-wire current electronics, 4-wire voltage electronics

i Grounds of power supply and the analog input F1 are connected internally.

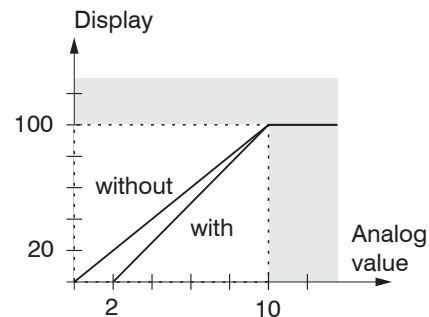
4.2.4 Assignment of Analog Inputs

➡ Assign the analog input to contacts 9 (-) and 10 (+)

The display adjustment (scaling) is effected at the front via the keyboard, see Chap. 6.5.

The setting with or without offset (2 V, 4 mA) is effected on programming line 26.

Model	Input resistance
0 (2) ... 10 V ¹	20 kOhm
0 (4) ... 20 mA ²	250 Ohm
1) Model DD241PC-U	
2) Model DD241PC	



Programming of the threshold in line 23

4.2.5 Assignment of Control Input

Contacts 11 and 12 are two control inputs - input logic PNP, rising edge. It is possible to choose the function of these control inputs on the programming lines 31 and 32. The functions are:

Hold, Reset – Peak memory, Programming disable, Keylock, Print and TARA.

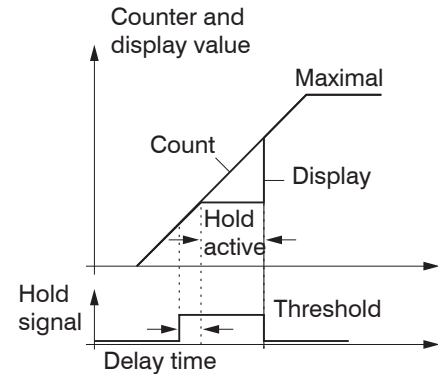
Hold input

The function Hold activates the display upon actuation of the input, with a delay of 0 to 9 seconds, as programmed in line 39. After deactivation of the input, the next display of Update will again show the current value.

For the models with relay, the limits P1 and P2 react to the value actually displayed. For the models with interface, the actually displayed value is transmitted.

i Level of the threshold ≤ 40 V

Input resistance	Selectable operating threshold
appr. 3 kOhm	≤ 3 V and ≤ 6 V



4.2.6 Assignment of RS232 Interface (Option)

The serial interface can perform the following functions:

- Retrieve data
- Program and retrieve parameters

Interface parameters are:

- Transmission speed (baud rate),
- Parity bit,
- Number of stop bits,
- address by which a master approaches the DD241PC.

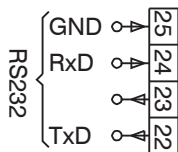
The interface parameters can be set on programming level (line 51 to 56).

Characteristics of the interfaces

RS232 Full-duplex transmission:

- asymmetric
- 3 lines
- Point-to-Point connection
- 1 transmitter and 1 receiver
- Distance of data transfer: max. 30 m

⏴ Assign contacts 22, 24 and 25 with the interface.



5. Operator Level

The following chapter will inform you on the operation. The device is automatically on the operator level after the supply voltage has been turned on.

On the operator level it is possible to:

- read and, if necessary, to clear the current display status
- read and, if necessary, to clear the peak
- adjust the display for the initial and final values
- to read and modify the limit values P1 and P2.

It is possible to disable all operation parameters on the programming level (line 11-16).

5.1 Key Functions



Only the measuring value display F1 is displayed by the factory setting. According to the settings in the programming field 2, see Chap. 6.3, this can be adjusted for the further parameters.

5.1.1 Parameter Reading

It is possible to switch to the next operation parameter with the  key.



5.1.2 Peak Value Reset

 Have the peak value displayed.

 Push  key.

5.1.3 Parameter Setting

 Have parameters displayed.

 Push  key and select desired decade.

The chosen decade position flashes.

 Push the  key and enter the desired value.

 To set further decades, repeat steps 2 and 3.

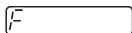
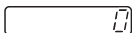
 Confirm the parameters entered via  key.

Should no confirmation occur within 15 s, the previous setting will remain valid.


5.1.4 Reading of Operation Parameter

➡ Push  key.


An info text will appear for approximately 1 s regarding the displayed operation parameter (e.g.: F for the current measurement).

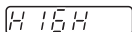
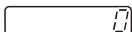



Measurement value display F1

After having turned on the device or upon selection via the  key, F appears for 1 second, afterwards the current measurement.


Reset

➡ Push  key (TARA function has to be activated, see Chap. 6.7).

HIGH - peak memory

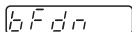
Read

➡ Push  key.

HIGH appears for 1 second in the display, afterwards the peak value.


Reset

➡ Push the  key.




bFdn-display adjustment initial value


Read

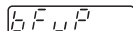
➡ Push  key.

bfdn appears for 1 second on the display, afterwards the initial value.

Example: When measuring rotational speed, 0 ... 10 V correspond to a speed of 0 ... 1000 rpm.

The setting of the initial value remains at 0.

i If you push the  key once more, the current measurement will be displayed again.





bFuP - display adjustment final value


Read  Push  key.

bFuP appears for 1 second on the display, afterwards the final value.

Example: When measuring rotational speed, 0 ... 10 V correspond to a speed of rpm.

The final value is set from 4095 to 1000.

Modify  Enter the final value via the  and  key, push the  key for confirmation.

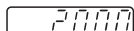



P1 - limit value P1

Read  Push the  key.

P1 appears for 1 second on the display, afterwards the limit P1.

Modify  Enter the limit P1 via keys  and  and push the  key for confirmation.

P2 - limit value P2

Read  Push the  key.

P2 appears for 1 second on the display, afterwards the limit P2.

Modify  Enter the limit P2 via keys  and  and push the  key for confirmation.

6. Programming Level

This chapter will inform you on how to program your device.

Operation parameters are set on the programming level. The programming level consists of 3 programming fields. Access is protected via a 4-character code.

1. Programming field

Here it is possible to select and modify all operation parameters. The operation parameters which are disabled for the operator are also displayed.

2. Programming field

The individual operation parameters for operator access on the operator level are disabled or enabled here.

3. Programming field

All functions and values conditioned by the machinery as well as interface parameters are programmed here.

6.1 Key Functions

Start programming

➡ Push **[P/R]** key.

The display shows **[CODE]**.



















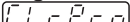
i

No code is entered when device is delivered ex-works; thus you may skip the code request by pushing the **[▶]** key. The code is set in programming line 40. Upon installation of a code, it will only be possible to switch to the programming level by using the correct code.

Enter code

➡ Enter code via the keys **[◀]** and **[▲]**. Push **[▶]** key for confirmation.

The device will now switch from the operator to the programming level.

Wrong code	<p>If a wrong code has been entered, ERROR will be displayed as long as the  key remains pushed: After 15 seconds, the device switches automatically to the operator level.</p>
Correct code unknown	<p>If the correct code is unknown, please send counter back to the supplier or perform a reset of the factory setting.</p>
Select programming lines	<p> Select the programming line needed via the  key. The corresponding line number will displayed.</p> <p> Please keep the  key pressed for quick sweep.</p>
Switch back within programming lines	<p>By keeping the  key pressed and pushing the  key, it is possible to jump back within the programming lines.</p>
Change operation parameters	<p> Select decade to be modified via  key. The selected decade flashes.</p> <p> Enter value by pushing the  key.</p> <p> Push  key for confirmation.</p>
Modify operation parameters	<p> Leave programming at any time by pushing  key.</p>
Reset to factory setting	<p> Turn on device and push keys  and  simultaneously. All values already programmed are set back to factory setting. In factory setting,  is displayed.</p>

6.2 Programming Field 1

Here it is possible to select and modify all operation parameters. The operation parameters that are disabled for the operator are also displayed. The denomination of the selected line, e.g. F, is displayed for one second, afterwards its corresponding digit value.

➡ Continue to the next programming line via the \rightarrow key.

F

Measuring value display F1

1. line

0

HIGH

HIGH - peak memory

2. line

0

bFdn

bFdn display adjustment initial value

3. line

0

bFuP

bFuP display adjustment final value

4. line

4095

P1

P1 - limit value P1

5. line

1000

P2

P2 - limit value P2


DD241PC(11)
only

6. line

2000

- - - - -

The dash line signalizes the end of the first programming field.

➡ Continue to programming field 2 with the help of the  key.

6.3 Programming Field 2

Here it is possible to disable or enable the individual operation parameters. *StAt* is displayed.



The denomination of the selected line, e.g. *F*, *HIGH*, *bFdn*, *bFuP* appears for one second; afterwards the display jumps to *StAt* and the current status value.

Meaning of the status digits

- | | |
|----------------|--|
| 0 Free access | Operation parameter can be selected, read and modified, and/or cleared on the operator level. |
| 1 Display only | Operation parameter can be selected and read on the operator level. |
| 2 Disabled | Operating Parameter cannot be selected on the operator level.
The relevant functions remains valid. |

i Factory setting is always marked with a *.

Modify status

Enter relevant status digits with the keys  and  . Modified status digit is automatically saved when the next programming line is selected via the  key.

Measuring value display F1

F	0	* Free access	11. line
---	---	---------------	----------

StAt 0	1	Display only	
	2	Disabled	

HIGH - peak memory

HIGH	0	Free access	12. line
------	---	-------------	----------

StAt 2	1	Display only	
	2	* Disabled	

bFdn display adjustment initial value

bFdn	0	Free access	13. line
------	---	-------------	----------

StAt 2	1	Display only	
	2	* Disabled	

bFuP display adjustment final value

bFuP	0	Free access	14. line
------	---	-------------	----------

StAt 2	1	Display only	
	2	* Disabled	

P1 - limit value P1

P1

0 Free access

15. line

START 0

1 Display only

2 Disabled

P2 - limit value P2

P2

0 * Free access

16. line

2000

1 Display only

2 Disabled

- - - - -

The dash line signalsizes the end of the second programming field.

➡ Continue to programming field 3 with help of the ⏪ key.

DD241PC(11)
only

6.4 Programming Field 3

All functions and values conditioned by the machinery as well as interface parameters are programmed here.

The programming field 3 starts with programming line 23. The selected line number appears on the left display field. The programmed value appears in the right display field.

➡ Switch to the next programming line using the ⏪ key.

You can return within the programming lines by holding down the key and press the key.

i The factory setting is always marked with a *.

Operating threshold of control inputs (PNP, rising edge)



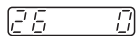
- 0 * Operating threshold ≤ 6 V 23. line
- 1 Operating threshold ≤ 3 V

Decimal point



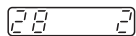
- 0 * no decimal point 24. line
- 1 00000.0
- 2 0000.00
- 3 000.000

Offset



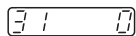
- 0 * no offset 26. line
- 1 Offset 4 mA. without monitoring < 4 mA
- 2 Offset 4 mA, with monitoring < 4 mA (display flashes)

Update time (repeated display and relay response time)



- 0 0.1 seconds 5 5 seconds 28. line
- 1 0.5 seconds 6 10 seconds
- 2 * 1 second 7 20 seconds
- 3 2 seconds 8 30 seconds
- 4 3 seconds 9 60 seconds

Function of control input 1 (contact 11)



- 0 * Hold 31. line
- 1 Reset peak memory
- 2 Programming disabled
- 3 Keylock
- 4 Print (only for interface option)
- 5 TARA function

Function of control input 2 (contact 12)

32. line

32 0

- 0 * Hold
- 1 Reset peak memory
- 2 Programming disabled
- 3 Keylock
- 4 Print (only for interface option)
- 5 TARA function

Assignment limit P1

33 0

- 0 * Upper limit
- 1 Lower limit

Assignment limit P2

34 0

- 0 * Upper limit
- 1 Lower limit

DD241PC(11)
only

33. line

34. line

Output logic for relay outputs

35 0

- 0 * Both outputs make contacts
- 1 P1 break contact, P2 make contact
- 2 P1 make contact, P2 break contact
- 3 Both outputs break contacts

DD241PC(11)
only

35. line

Hold delay time

39 0

- 0 * no delay
- 1 Delay 1 s (selection 1 ... 9 s)
- 2 Delay 9 s

39. line




Code settings

40 0

- 0 * Code not active
Max. 9999

40. line

Balancing analog input

41 0	0	* Standard	41. line
	1	Two-state balancing via  key	
	2	Two-state balancing via  and  key	

TARA function via keys

46 0	0	* Without TARA function	46. line
	1	With TARA function	

Baud rate

51 0	0	* 4800 Baud	51. line
	1	2400 Baud	
	2	1200 Baud	
	3	600 Baud	

Parity

52 0	0	* Even	52. line
	1	Odd	
	2	No	

Stop bits

53 0	0	*1	53. line
	1	2	

Address

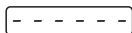
54 0	0	* from	54. line
	99	2	

Assignment output value via interface (line 31 or 32 = 4)

55 0	0	*F	55. line
	1	HIGH	



DD241PC(11)
only



The dash line signalizes the end of the third programming field.

Terminate programming

It is possible to terminate programming at any time by pushing **[P/R]** key. The device switches the back to the operator level.

➡ Simultaneously press the keys **[◀]** and **[▶]** and turn on the device.

Reset to factory settings

All values already programmed are set back to factory setting. **CLrPro** is then displayed.

6.5 Two-state Balancing (Standard)

An initial value and a final value is assigned to the analog signal with the standard balancing.

6.5.1 Programming

➡ Change the programming (in program field 2 and 3) compared with the factory setting as follows:

Line 13 = 0 Free access for **bFdN** - Display balancing initial value

Line 14 = 0 Free access for **bFuP** - Display balancing final value

Line 26 Program offset

Line 41 = 0 Two-state balancing via **[C]** key

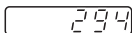
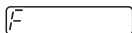
➡ Please perform the two-state balancing as follows:



➡ Activate the programming level by pushing the **[P/R]** key.

➡ Insert **Code** or skip with the **[▶]** key.

Current measuring value



Display shows for 1 second, then its corresponding digit value.

➡ Push the **[C]** key.

1) The current measured value is displayed.

Peak memory



Display shows for 1 second, then its corresponding digit value.

➔ Push the **C** key.

Balancing lower position value



Display shows for 1 second, then its corresponding digit value.

➔ Push the **C** key.

Input value flashes.



Key **◀** = Select decade

Key **△** = Insert value

Key **▶** = Confirm

Key **C** = Set value to 000000

Key **P/R** = Finish programming



Example:

➔ Push **◀** key 1 x and **△** key 1 x.

➔ Confirm with **▶** key.

Final result: Initial value 10

➔ Push the **▶** key.

Balancing upper position value

6FUP

4095

Display shows for 1 second, then its corresponding digit value.

➔ Push the **C** key.

Insert value flashes.

~~4095~~

Key **◀** = Select decade

Key **△** = Insert value

Key **▶** = Confirm

Key **C** = Set value to 000000

Key **P/R** = Finish programming

~~500~~

500

Example:

➔ Push the **C** key.

The value is set to 000000.

➔ Push **◀** key 2 x and **△** key 5 x.

➔ Confirm with **▶** key.

Final result: Initial value 500

➔ Push the **P/R** key.

You are again in the operator level.

6.6 Two-state Balancing (teach-IN)

The two-state balancing allows flexible calibration of display to the analog signal of the sensor. The balancing state 1 and state 2 can be placed anywhere in the positive measuring range for the two-state balancing, see Fig. 7, see Fig. 8.

Programming

➡ Change the programming (in program field 2 and 3) compared with the factory setting as follows:

Line 13 = 0 Free access for bFdn - Display balancing initial value

Line 14 = 0 Free access for bFuP - Display balancing final value

Line 26 Program offset

Line 41 = 1 Two-state balancing via key

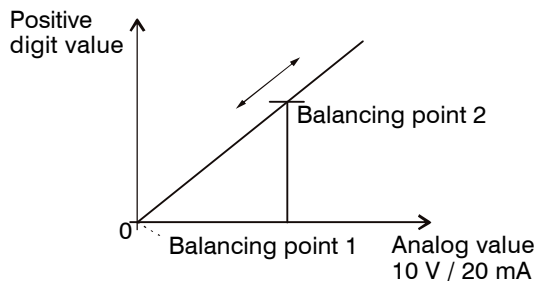


Fig. 7 Positive digit value

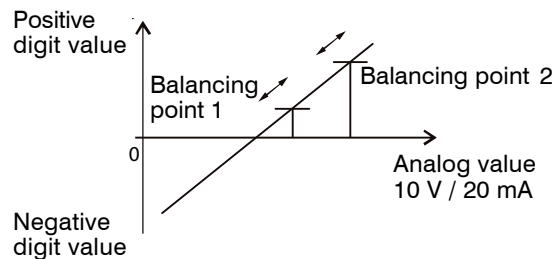


Fig. 8 Positive and negative digit value

6.6.1 Operation

➡ Please perform the two-state balancing as follows:



Measuring value display F1

After turning on the device or when selecting via the key, F will appear for 1 second, then the current measurement.

Set connected signal encoder to first teach position

➡ Select state 1:



➡ Push key.

APdn - Display balancing state 1
Display shows APdn for 1 second, then 0.

➡ Initiate balancing:



➡ Push key.

dn (down) shows the value computed for state 1.

➡ Confirm:



➡ Push key.

dn Pro, state 1 is programmed.

Set signal encoder to second teach position

➡ Select state 2:



➡ Push key.

APuP - Display balancing state 2
Display shows APuP for 1 second, then 4095.

➡ Start input:

➡ Push key.

➡ Set default value to zero:

➡ Push key.

00000

➡ Select 3rd decade:

➡ Enter digit 3:

➡ Confirm value 300:

300

uPXXXX

➡ Confirm:

uP Pro

300


F

300


Ready to enter the 2nd learn position, for example 300

➡ Push  key 2 x.


➡ Push  key 3 x.

➡ Push  key.

Initiate balancing:

➡ Push  key.

uP - shows the value computed for state 2.

➡ Push  key.

uP Pro, state 2 is programmed.

➡ Push  key till F is displayed.

End of balancing, ready for operation

6.7 TARA Function

The TARA function allows a balancing of the displayed value F to the value 0, comparable with a balance, which can be set to 0 constantly.

Activating the function:

The TARA function is deactivated according to standard. The activation follows in line 46.

Perform the TARA function via keyboard:

➡ Select measuring value display F.

➡ Push key.

Display value F is set to 0.

i If you want to execute the TARA function once only, for example for setting of a plant, a further zero setting can be avoided by setting to status 1, see line 11.

Return to absolute display values:

➡ Set line 46 to 0 (without TARA function) in the programming mode.

➡ Change in RUN mode again.

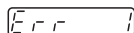
During switching to RUN mode the internal offset value is deleted, so that the absolute value is shown again at analog output.

Performing the TARA function via the external control input:

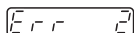
The TARA function can be activated for the adequate control input via the selection 5 of the control inputs 1 or 2:

Line 31/32	Function of control input 1 (contact 11)
0	*Hold
1	Reset peak memory
2	Programming disabled
3	Keylock
4	Print
5	TARA function

7. Errors



and



must be rectified at the factory.

8. RS232 (Option)

The serial interface can do the same job as DD241PC display and keyboard. The interface is for polling data and alteration of programmed parameters. In general the DD241PC is operated by PC or PLC when applying the serial interface, however another device with similar characteristics will do as well.

8.1 Transmission Protocol

Transmission is effected character by character in ASCII code. Every sign consists of 8 bits. Bit number 8 is the parity bit, i.e. in case of „no parity“ bit number 8 is always broadcasted as zero. Please consider the following when setting the data bits at the PC end:

Parity	Data bits
Even	7
Odd	7
No	8

Upon each PC query the DD241PC is replying by serial interface, provided the data transfer was finalized correctly. The sign transmission is initiated by a start sign <STX> (= 2Hex) and finalized by a stop sign <ETX> (= 3Hex). In addition, the DD241PC transmits a <CR> (carriage return = 0DHex) after <ETX>. This enables the reading of complete data blocks by one command (with standard languages). <STX> is followed by the designated DD241PC device address. Thus, the DD241PC can be addressed directly in a serial network. The address is followed by the line number (position) for optional readout or programming respectively by the sign “P” for a programming command and the corresponding data or parameters.

The protocol is split into 3 groups as shown below:

a) Read memory (READ instruction):

<STX> address line <ETX> [<CR>]

b) Write memory (WRITE instruction):

<STX> address line P data <ETX> [<CR>]

c) Special commands:

<STX> address parameter <ETX> [<CR>]

<STX> start of text (02Hex)

address 00 ... 99 (device address)

line 01 ... XX (see operating plan)

P programming command

data programming data

parameter special commands

<ETX> end of text (03Hex)

<CR> 0DHex (control signs „carriage return“)

„CR“ is optional but will always be returned by DD241PC.

General example:

General: <STX> address line <ETX> (address = 00; line = 02)	
ASCII:	<STX>0002<ETX>
Hex:	02H,30H,30H,30H,32H,03H

i The blanks between the individual signs of a command are only for better understanding. The PC input has to be without blanks. Control signs (inferior to 20Hex) are in brackets. In case the PC is transmitting a wrong protocol the DD241PC will reply an error message, provided the device is still able to communicate. For further details, see Chap. 8.5.

8.2 Memory Reading

All memory cells provided with a line number in the programming plan can be read (except for the separating lines marked by dashes). The protocol: <STX> address line <ETX> [<CR>] can be applied to each line. However, the DD241PC replies, may vary in length of the protocol from line to line. This depends on the data length of the respective memory. The DD241PC enables readout in both RUN and in PGM mode. The only difference in reply affects the mode parameter: a "R" or "P" as described below is transmitted.

Reply to a read command (general):

<STX> Address line mode [VZ] data <ETX> <CR>

Mode P = DD241PC is in programming mode

R = DD241PC is in RUN mode

VZ Pre-sign. Only transferred if negative value.

Data Max. digit number, with leading zeros without decimal point
(Exception: Line 6 - with decimal point)

Examples for memory reading

The following protocol applies to the examples:

Device address = 35; DD241PC mode = R (RUN)

Measured value readout (line = 01), displayed value = 1500	
Query:	<STX>3501<ETX>
Reply:	<STX>3501R001500<ETX><CR>

Readout of display adjustment bFuP (line = 04), setting = 1000	
Query:	<STX>3504<ETX>
Reply:	<STX>3504R001000<ETX><CR>

Update time readout (line = 28), setting = 2	
Query:	<STX>3528<ETX>
Reply:	<STX>3528R2<ETX><CR> (2 corresponds to 1 second)

Read out of device address (line = 54, value = 35)	
Query:	<STX>3554<ETX>
Reply:	<STX>3554R35<ETX><CR>

8.3 Memory Programming

All memory cells provided with a line number in the programming plan enable programming, except for the separating lines (marked by dashes) and the lines 1 – 6. The protocol: <STX> address line P [VZ] data <ETX> [<CR>] is applicable to each line. The DD241PC reply after each individual programming procedure is the same as for line reading.

All memory cells enable programming in both RUN and programming mode.

Programming in RUN mode

The data in the lines 23, 26, 28, 39, 51 - 54 and 56 are only internally memorized after switching from PGM mode into RUN mode. Switching to PGM mode, see Chap. 8.4.2. The remaining lines are active immediately after programming.

All data programmed in RUN mode are only taken into the non-volatile memory after switching from PGM mode to RUN mode. If there is no PGM/RUN switchover the former data are active again after mains failure.

Write command (general):

<STX> address line P [VZ] data <ETX> [<CR>]

Examples for programming

The following protocol applies to the examples:

Device address = 35; DD241PC mode = R (RUN)

Programming the display adjustment bFuP (line = 04), setting = 1000)	
Command:	<STX>3504P001000<ETX>
Reply:	<STX>3504R001000<ETX><CR>

Programming the update time (line = 28, setting = 3)	
Command:	<STX>3528P3<ETX>
Reply:	<STX>3528R3<ETX><CR>

Programming the code (line = 40, setting = 1234)	
Command:	<STX>3540P1234<ETX>
Reply:	<STX>3540R1234<ETX><CR>

Programming the device address (line = 54, new device address = 27)	
Command:	<STX>3554P27<ETX>
Reply:	<STX>3554R27<ETX><CR>

8.4 Special Commands

Special commands, except for the command „delete measured and maximum value“, are instructions that do not relate to a certain line number (memory cell in the operating plan).

8.4.1 Delete Measured and Maximum Value

The measured value (line 1) or the maximum value (line 2) can be cleared by following special command.

These lines do not allow programming. All remaining lines in the programming plan (except the separating lines) are deleted by entering 0 (see above). The delete command is equal with a reset by the C-key. The DD241PC reply to deletion is the same as the read command for the respective line.

General: <STX> address line <ETX>	
Example:	Delete maximum value memory HIGH (line 2)
	Address = 35, line = 02, status = RUN mode
Command:	<STX>3502<ETX> = 7FHex
Reply:	<STX>3502R000000<ETX><CR>

8.4.2 Switching DD241PC to PGM or RUN Mode

This command is for switching between PGM and RUN mode by each query. Replied are the current line number and the active status after command accomplishment.

General: <STX> address <DC1> <ETX>	
Example:	Address = 35, status = RUN mode, current line = 1
	Command: <STX>35<DC1><ETX> <DC1> = 11Hex
	Reply: <STX>35P<ETX><CR>
Repeating the command means switching to RUN mode again.	
	Command: <STX>35<DC1><ETX>
	Reply: <STX>35R<ETX><CR>

8.4.3 Switching to Next Line

This instruction allows to switch the display to its corresponding next line. The function is available in the RUN mode as well as in the PGM mode. The contents of the current line (after switching) are returned as answer.

Example: address = 35, status = RUN mode, switch from line 1 to line 2	
Command:	<STX>35<LF><ETX> <LF> = 10Hex
Reply:	<STX>3502R000100<ETX><CR>

8.4.4 Identification Reading

Identification can only be read. The address is followed by two parameters: command parameter "I" (for identification) and selection parameter "T" (device type and software version) or "D" (date and hardware version) or "V" (version number) for the several identification data.

Readout device type and program number:	
Address = 35, type = DD241PC, program number = 01	
Command:	<STX>35IT<ETX>
Reply:	<STX>35PCD41 01<ETX><CR>

Read date and version number:	
Address = 35, date = 09.09.06, version = 1	
Command:	<STX>35ID<ETX>
Reply:	<STX>35090906 1<ETX><CR>

8.5 Error Messages

If the DD241PC is receiving a wrong data protocol by the PC (for example not existing line or letters instead of numbers) the DD241PC will reply by a corresponding error message, provided the device is still able to communicate. To enable an error message at least the control sign <STX> as well as the address have to be correct. Otherwise the DD241PC is not addressed and therefore unable to return an error message to the PC.

If there is no reply upon a PC query, neither an error message, this means a fatal error. The reason may be missing of a control sign <STX> or address or the interface parameters of PC and DD241PC do not coincide.

General structure

<STX> address line status <CAN> error number <ETX> <CR>

Example:

Address = 35, line = 09 (void line), error number = 2

<STX>3509R<CAN>2<ETX><CR>

Both positions „line“ and „status“ are being omitted in the case of an error reply.

Error description

Error 1: Format error (<ETX> at incorrect place), for example if the data format is not kept during programming (i.e. during programming of the limit value only 5 data digits instead of 6 are being transferred).

Error 2: Line (position) not existing or separating line

Error 3: Parameter error (void values in the protocol). For example, the limit value contains characters or other void signs or the stated value is beyond the permitted range.

8.6 Used Control Signs

Control sign	Hex	Decimal
<STX>	02	02
<ETX>	03	03
<LF>	0A	10
<CR>	0D	13
<DC1>	11	17
<CAN>	18	24
	7F	127

9. Warranty

All components of the device have been checked and tested for perfect function in the factory. In the unlikely event that errors should occur despite our thorough quality control, this should be reported immediately to MICRO-EPSILON.

The warranty period lasts 12 months following the day of shipment. Defective parts, except wear parts, will be repaired or replaced free of charge within this period if you return the device free of cost to MICRO-EPSILON. This warranty does not apply to damage resulting from abuse of the equipment and devices, from forceful handling or installation of the devices or from repair or modifications performed by third parties. No other claims, except as warranted, are accepted. The terms of the purchasing contract apply in full. MICRO-EPSILON will specifically not be responsible for eventual consequential damages.

MICRO-EPSILON always strives to supply the customers with the finest and most advanced equipment. Development and refinement is therefore performed continuously and the right to design changes without prior notice is accordingly reserved. For translations in other languages, the data and statements in the German language operation manual are to be taken as authoritative.

10. Service, Repair

If the display is defective, please send the affected parts back for repair or exchange.

Where the cause of a fault cannot be precisely defined, always send the entire process display to:

MICRO-EPSILON MESSTECHNIK
GmbH & Co. KG
Königbacher Str. 15
94496 Ortenburg / Germany
Telefon: +49/8542/168 - 0
Fax: +49/8542/168 - 90
info@micro-epsilon.de
www.micro-epsilon.com

11. Decommissioning, Disposal

➡ Disconnect all cables between display and control and processing units.

The DD241PC is produced according to the directive 2011/65/EU, „RoHS“.

➡ Do the disposal according to the legal regulations (see directive 2002/96/EC).

12. Factory Setting

The following parameters are programmed in the DD241PC at the factory:

F actual measuring value	free access
High peak memory	disabled
bFdn, bFuP	Display adjustment initial value disabled
Threshold	Control inputs 6 V
Decimal point	no
Offset	no
Update time	Repeated display 1 s
Control input 1	Function Hold
Control input 2	Function Reset peak value memory
Hold delay time	no
Balancing analog input	Standard
TARA function	off

Additional parameters for DD241PC(11)

Baud rate	4800
Parity	even
Stopp bit	no
P1 upper limit 1	1000, free access
P1 upper limit 2	2000, free access
Relais outputs logic	NOC



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