

# Technical manual for Three-Axis-Counter MC530



**Hardware version: MC530 V0.1**

**Software version: MC530 V0.1**

## Directory

<b>1.</b>	<b>Safety</b>	<b>4</b>
1.1	Personal qualifications	4
1.2	Proper use	4
1.3	Safety Notes	5
1.4	Safety precautions	5
1.5	Warranty and conditions of supply	5
1.6	Disposal	5
<b>2.</b>	<b>Technical data</b>	<b>6</b>
<b>3.</b>	<b>Commissioning</b>	<b>7</b>
3.1	Installation	8
3.2	Connection	8
3.3	Measuring system supply voltage	12
3.4	Switching input logic	12
3.5	Output logic	12
3.6	Keypad and front panel	13
3.6.1	Display	13
3.6.2	Key functions	13
3.7	Display	14
3.7.1	Standard configuration	15
3.7.2	Other configurations	16
3.7.3	Difference and sum mode	16
3.8	Menu structure	17
3.8.1	Service level	17
3.8.2	Parameter level	18
3.9	Parameter	18
3.9.1	Entering parameters, changing the device functions	18
3.9.2	Parameter function	21
3.10	Parameter lists	21
3.10.1	User parameter	21
3.10.2	Device Parameter	21
3.10.3	Axis parameter	29
<b>4.</b>	<b>Special features</b>	<b>33</b>
4.1	Input functions	33
4.1.1	Inputs 1-3	33
4.1.2	Input 4	34
4.1.3	Inputs 5-6	34
4.2	Tolerance window	34

4.2.1	Parameter settings	34
4.2.2	Display and functions	35
4.2.3	Additional function: Arrangement via front panel	36
4.3	RS232 interface	36
4.3.1	Important parameters	36
4.3.2	Barcode scanner	36
4.4	Z-trace reference	38
4.5	Actual value storage	38
4.6	USB-Update	38
<b>5.</b>	<b>Illustration list</b>	<b>39</b>

## **1. Safety**

This operating guide contains instructions for ensuring safe and proper installation and operation. If you have any difficulties which cannot be resolved by consulting this guide, please contact the machine manufacturer or vendor for additional information.

hejm Automatisierungstechnik GmbH is not liable for any personal injury or equipment damage resulting from improper commissioning, incorrect operation, misunderstandings or errors contained in this guide or on the display.

hejm Automatisierungstechnik GmbH reserves the right to make technical changes to the equipment or operating guide without prior notice. Therefore, deviations in the agreement between the device and the device description cannot be precluded.

Pay particular attention to hazard notices in this operating guide.

This equipment description should be carefully read before commissioning.

Use of the operating guide presumes corresponding user qualifications.

### **1.1 Personal qualifications**

Commissioning, installation and operation are intended only for appropriately qualified personnel. The personnel must have qualifications which are appropriate to their function and activity, e.g.:

- Instruction and obligation to observe all application-related, regional and in-house regulations and requirements.
- Training in accordance with the standards of safety engineering in the use and maintaining of appropriate safety and occupational health and safety equipment.
- Courses in first aid, etc.

### **1.2 Proper use**

This position display has been developed solely for use on industrial machinery.

Any further use is considered improper. The manufacturer assumes no liability for damages resulting from such misuse. This risk is assumed solely by the user.

### 1.3 Safety Notes

The following symbols are used for hazards and other important notes:



The **Hazard** symbol warns of errors and hazards in commissioning and operation of the controller. This warning notice means a directly threatening hazard to the health of persons and contains special specifications and instructions as well as imperatives and prohibitions for preventing personal injury and damage to equipment.



The **Attention** symbol means a possible hazardous situation and contains special specifications and instructions as well as imperatives and prohibitions for preventing personal injury and damage to equipment.



The **Note** symbol indicates important and useful information and provides application tips.

### 1.4 Safety precautions

The device is powered with 24V and must be fused according to prevailing regulations.

### 1.5 Warranty and conditions of supply

Only the common conditions of supply for manufactures and services of the electrical industry are applied.

The warranty is 2 years.

### 1.6 Disposal

Do not dispose the device in your general trash. Use gathering places of your community to dispose the electric device.

## 2. Technical data

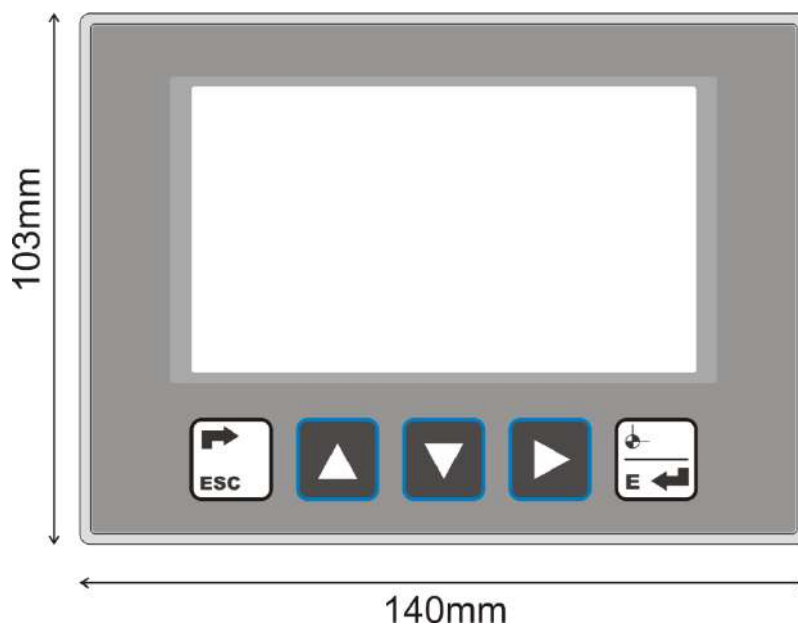


Fig. 1 Dimensions

<b>Supply voltage</b>	24 V DC
<b>Current draw</b>	
<b>Indicator</b>	4,3" TFT-Display Widescreen 16:10
<b>Input signals</b>	6 digital inputs 0 – 5 V            low active 10 - 30 V        high active
<b>Measuring systems</b>	Incremental measuring system Supply Voltage 5V or 24V at 24V BDD-Supply Voltage Measuring System 1: 1MHz A, A/, B, B/, Z, Z/ resp. A, B, Z Measuring System 2: 1MHz A, A/, B, B/, Z, Z/ resp. A, B, Z Measuring System 3: 40kHz A, A/, B, B/, Z resp. A, B, Z
<b>Output signals</b>	4 Output drivers 24V, 600 mA
<b>Interface</b>	RS232, USB
<b>Operating temperature</b>	
<b>Storage temperature</b>	
<b>Relative humidity</b>	
<b>Mounting orientation</b>	any
<b>Enclosure rating</b>	
<b>Dimensions</b>	140 x 103 x 65 mm <sup>3</sup> (W x L x D)

### 3. Commissioning



Most damage to the device is a result of faulty wiring and incorrect parameter values. Therefore commissioning is to be performed only by trained and expert personnel.

### 3.1 Installation

The device is established to a switchboard with a recess of 133.5mm x 92mm and has to be screwed in place with the provided mount.

### 3.2 Connection

The device is powered with 24V DC.

Before connecting, compare the part label on the back of the device with the desired connection voltage.



Electrical cables are to be routed in accordance with the respective national regulations (e.g. VDE). Route measuring, signal and power cables separately.

It is recommended to use a screened cable which should be connected with the ground of the device.

Ensure that no ground loops are created.

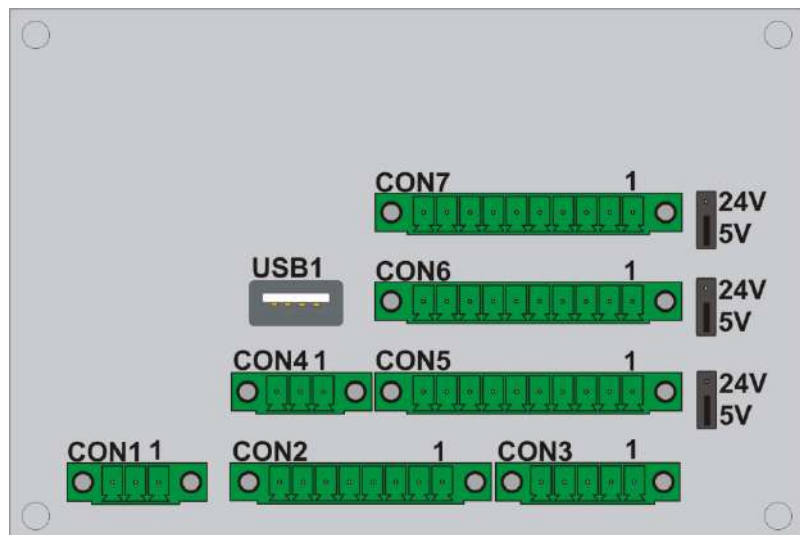


Fig. 2 Connection diagram

#### Connector and pin definition

Connect supply voltage to the device only as specified on the part label!

**CON1 Supply voltage (+24V DC)**

Terminal strip, 3-pin

Pin 1	GND
Pin 2	+24V
Pin 3	

**CON2 Digital inputs**

Terminal strip, 8-pin

Pin 1	GND
Pin 2	+24V
Pin 3	Switching input 1, input voltage 0 – 24V Axis 1
Pin 4	Switching input 2, input voltage 0 – 24V Axis 2
Pin 5	Switching input 3, input voltage 0 – 24V Axis 3
Pin 6	Switching input 4, input voltage 0 – 24V RS232 Printer Mode
Pin 7	Switching input 5, input voltage 0 – 24V N/A
Pin 8	Switching input 6, input voltage 0 – 24V N/A

**CON3 Outputs**

Terminal strip, 5-pin

Pin 1	Output driver supply
Pin 2	Output 1
Pin 3	Output 2
Pin 4	Output 3
Pin 5	Output 4

**CON4 RS232**

Terminal strip, 3-pin

Pin 1 GND

Pin 2 TXD

Pin 3 RXD

**CON5 Measuring system axis 1**

Terminal strip, 10-pin

Pin 1 GND

Pin 2 +24V, if jumper is set to 24V

+5V, if jumper is set to 5V

Pin 3 Signal A

Pin 4 Signal A/ (only for RS422)

Pin 5 Signal B

Pin 6 Signal B/ (only for RS422)

Pin 7 Signal Z

Pin 8 Signal Z/ (only for RS422)

Pin 9 Shield (GND)

Pin 10 Shield (GND)

**CON6 Measuring system axis 2**

Terminal strip, 10-pin

Pin 1	GND
Pin 2	+24V, if jumper is set to 24V +5V, if jumper is set to 5V
Pin 3	Signal A
Pin 4	Signal A/ (only for RS422)
Pin 5	Signal B
Pin 6	Signal B/ (only for RS422)
Pin 7	Signal Z
Pin 8	Signal Z/ (only for RS422)
Pin 9	Shield (GND)
Pin 10	Shield (GND)

**CON7 Measuring system axis 3**

Terminal strip, 10-pin

Pin 1	GND
Pin 2	+24V, if jumper is set to 24V +5V, if jumper is set to 5V
Pin 3	Signal A
Pin 4	Signal A/ (only for RS422)
Pin 5	Signal B
Pin 6	Signal B/ (only for RS422)
Pin 7	Shield (GND)
Pin 8	Shield (GND)
Pin 9	Signal Z (only for use with 5V measuring systems)
Pin 10	Analog input 2

### 3.3 Measuring system supply voltage

To set the supply voltage to the desired level, the respective voltage must be selected by using the jumper. (Observe data sheet for measuring system!)

To get a 24V measuring system power, the jumper has to be in position 24V.

To get a 5V measuring system power, the jumper has to be in position 5V.

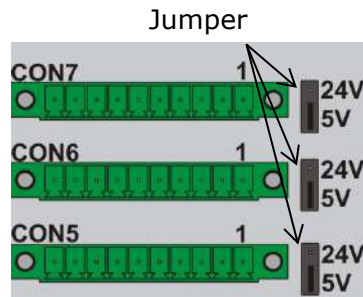


Fig. 3 Measuring system supply voltage

### 3.4 Switching input logic

The input logic is set through a parameter at the user-parameter menu.

The inputs can switch to GND or +24V

The inputs 1-3 are specific inputs of the axis 1-3. The functions of these inputs can be changed through the parameter menu (see 4.1 *Input functions*).

### 3.5 Output logic

The output logic is set through a parameter at the user-parameter menu.

The outputs can switch to GND or +24V.

### 3.6 Keypad and front panel

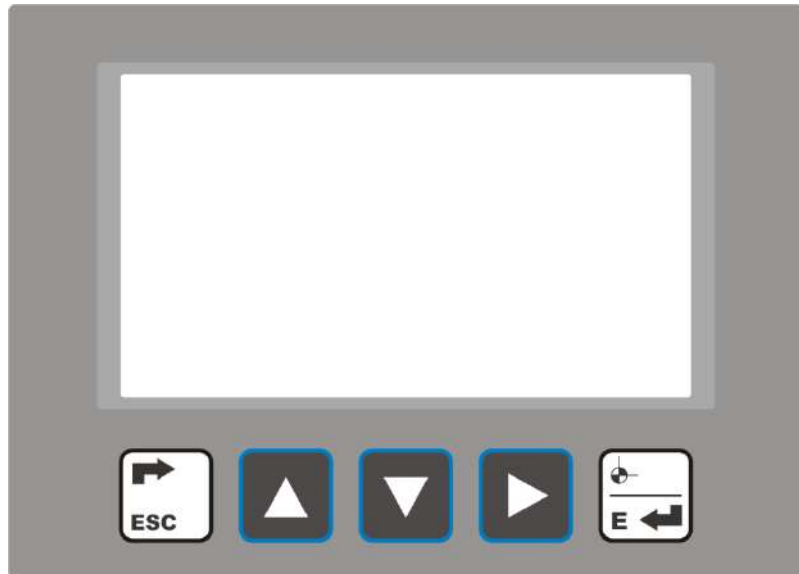


Fig. 4 Front Panel MC530

#### 3.6.1 Display

The display is used for visualizing the current position as well as the parameter values in the service levels.

#### 3.6.2 Key functions



Fig. 5 ESC

Pressing the **ESC**-key will close the active menu and load the previous menu, or closes the active operation.



Fig. 6 Up

The **Up**-key is used to select a parameter at the parameter level.

If an input is requested, the chosen decade can be increased by pressing the **Up**-key.



Fig. 7 Down

If the cursor is enabled at the counter display, the **Up**-key is used to move the cursor vertically.

The **Down**-key is used to select a parameter at the parameter level.

If an input is requested, the chosen decade can be decreased by pressing the **Down**-key.

If the cursor is enabled at the counter display, the **Down**-key is used to move the cursor vertically.



Fig. 8 Right

With the **Right**-key it can be switched between the single menu items or is used to jump to the next parameter at the parameter level.

If an input is requested, the cursor can be moved one position to the right by pressing the **Right**-key.

If the cursor is enabled at the counter display, the **Right**-key is used to move it horizontally.



Fig. 9 Enter

At the menu level, the „**Enter**“-key is used to confirm the current selection, which causes to open the next menu level.

At the parameter level, the „**Enter**“-key is used to load the selected parameter, which can be edited afterwards.

After editing a parameter or reference value, the input is confirmed through pressing the „**Enter**“-key. The value will then be saved.

At the normal counter mode, the features of the single display panels can be executed by pressing the „**Enter**“-key. To activate a feature, the panel has to be selected with the cursor.

### 3.7 Display

After the device started, the display window shows the counter display of the MC530. Depending on the setting of the parameter P29 at the device parameter level, one of the selectable configurations is displayed.

### 3.7.1 Standard configuration

The default configuration of the MC530 is a 3-axes-display. Additional to the axes values, the axes symbols and the states of the inputs and outputs are displayed

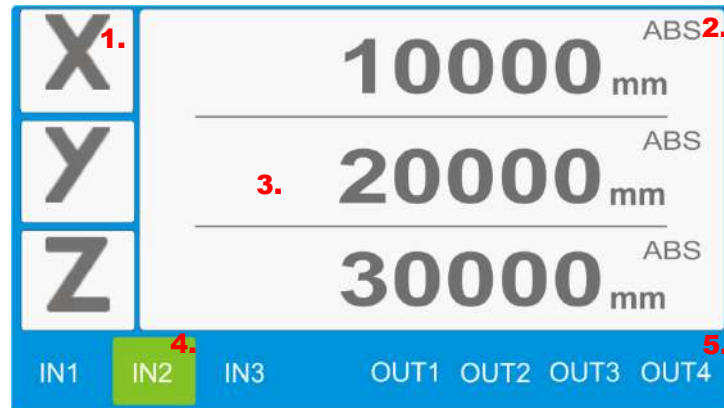


Fig. 10 Standard configuration

1. Axis symbolism
2. Absolute/Incremental shift
3. Current axis values
4. Active Input / Output
5. Inactive Input / Output

The cursor is activated through pressing one of the direction keys of the keyboard. The cursor can be moved vertically through the keys and horizontally through the key. Pressing the key activates the feature of the selected display field. Only the display fields with the axis symbolism and the absolute/incremental shift can be selected through the cursor.

If a field with an axis symbol is selected, by pressing the key the selected axis will be set to the reference value which is deposited at the parameter level. If the axis is in the incremental mode, the axis value will be set to "0".

If the field with the absolute/incremental shift is selected, the displayed axis value can be shifted from absolute to incremental or from incremental to absolute by pressing the key.

The absolute axis value will be kept, if the value is shifted from absolute to incremental.

The other displayed fields can't be selected with the cursor.

Below the axis symbolism and the axis values are the inputs and outputs displayed. Active inputs and outputs will be marked with green background color and inactive inputs and outputs are deposited with the standard background color of the display.

### 3.7.2 Other configurations

Changing the parameter P29 at the device parameter level affects the configuration of the display. There are seven several display configurations, which can be selected according to the requirements of the device.

There are respectively two different configurations for 3-axis-applications, 2-axis-applications and 1-axis-applications. The differences between these configurations are the size and arrangement of the single fields and displayed axis.



Fig. 11 1-/2-/3-axis configurations

### 3.7.3 Difference and sum mode

The difference and sum mode is only available with the display configuration “2-axis dif”, which can be selected through the parameter P29 at the device parameter level. This configuration is nearly similar to the default configuration, however are only two axis displayed. An additional value is displayed below these two axis, which is either the difference or the sum of axis 1 and axis 2. This additional value can be selected through the parameter p56 at the device parameter level.



Fig. 12 Difference-/Sum-mode

By changing the parameter P56, the symbol of the difference and sum counter will also be changed. Also the calculation of the displayed value is changed.





Fig. 13 Difference





Fig. 14 Sum

### 3.8 Menu structure

The device menu is built-up in several menu levels. After starting the device, the standard display is shown. Through pressing the  key, the service menu can be reached.

By pressing the  key, a menu item can be selected through the cursor.

By pressing the  key, the selected item will be called.

By pressing the  key, the last menu will be re-opened.

#### 3.8.1 Service level

The menu items **user parameter**, **calibration level**, **parameter level**, **network level** and **information** are located at the service level.



Fig. 15 User  
parameter



Fig. 16 Reference



Fig. 17 Parameter  
level



Fig. 18  
Information

At the **user parameter** you can find parameters for changing the calculation of the measuring system and to change the active language.

At the **calibration level**, the single axes can be calibrated.

The axis- and device- parameter are located at the **parameter level**.

Information about the device can be found at the menu item **information**.

### 3.8.2 Parameter level

The parameter level includes the menu items **axis 1**, **axis 2**, **axis 3** and **device-parameter**.



Fig. 19 Axis 1



Fig. 20 Axis 2



Fig. 21 Axis 3



Fig. 22 Device parameter

The menu items **axis 1**, **axis 2** and **axis 3** contain specific parameters to configure the axis.

The **device parameter** contains parameter for general configuration of the device.



## 3.9 Parameter

When changing control and calibration parameters, always consider the effects on the overall system:



The parameters may be protected against unintended changes by using a security code.

The security code may be selected by the machine manufacturer himself.


### 3.9.1 Entering parameters, changing the device functions

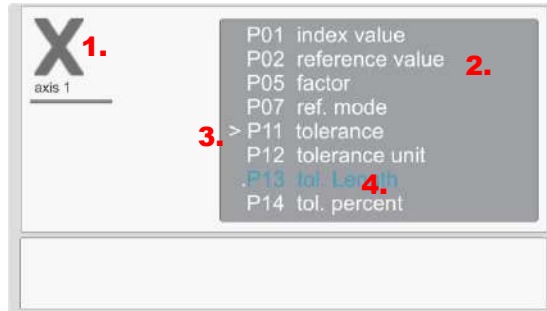
If the parameters have to be changed, the service level has to be opened. Afterwards one of the menu items **user parameter** or **parameter level** has to be opened. If the user parameter was chosen, the parameter choice for device specific functions (e.g. language) is displayed.

If the parameter level was chosen, an additional set of parameters has to be chosen afterwards.

The axis parameters are specific parameters for the respective axis (e.g. encoder direction).

The device parameters include general parameters of the device (e.g. input logic).

If a set of parameters is chosen, the choice is confirmed with the -key and the appropriate parameters are displayed.





**Fig. 23 Parameter selection**


1. Active parameter level
2. Parameter list
3. Cursor
4. Parameter that does not correspond to the default settings

At the upper left corner, the symbol shows which set of parameter is displayed. Below the symbol, there is the additional description of the current set of parameters.

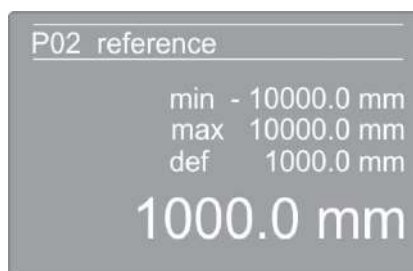
At the parameter list the available parameters are shown.

The cursor can be moved up and down with the   keys. The cursor is used to select one of the displayed parameters.

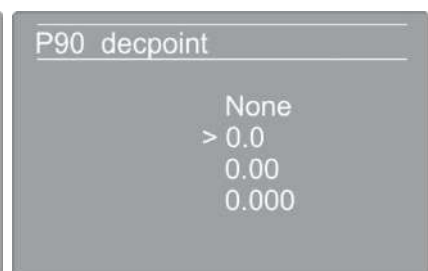
A parameter which is different to the default parameter value or got already changed will be deposited with a blue color.

To change the chosen parameter, confirm the choice with the  key. Through the confirmation, the parameter value is called and will be shown at the display.

Depending on the choice of the parameter, a standard parameter or a multiple choice parameter is displayed instead of the parameter list.




**Fig. 24 Standard parameter**



**Fig. 25 Multiple choice parameter**

Additional to the current value of the standard parameter, the minimum, maximum and default values are displayed

The multiple choice parameter is a selection which can be controlled with the cursor.

If a standard parameter is chosen, the input mode is activated through pressing the -key and a cursor appears below the current parameter value.

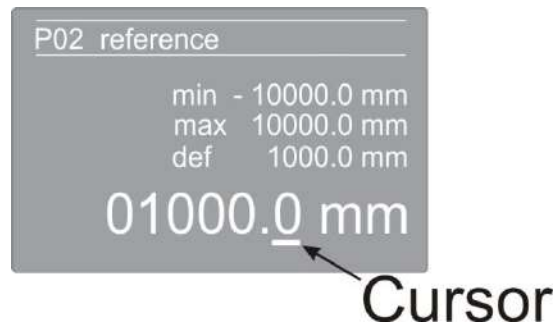










Fig. 26 Parameter input


The cursor can be switched to the next decade by pressing the -key. The chosen decade can be incremented with the -key or decremented with the -key.

If a negative input is possible, the leading sign can be switched by the cursor. The leading sign will only be displayed with negative values. The leading sign decade is the first decade at the left.

To finish the input confirm the inserted value with the -key. The Value will be saved.

To discard the input value, press the -key. The inserted value will be deleted and the parameter value will be set on the last saved value.

If a multiple choice parameter is chosen, the cursor can be moved up and down with the  -keys. Through pressing the -key the current selection will be saved.

With pressing the -key, the current parameter will be closed and the parameter list is displayed.

If the parameters are saved through a security code, the user has to insert the right code before the parameters can be changed. The input of the code works similar as the input of the standard parameter.



Changes in the parameter setting can result in malfunction, stopping or failure. Changes to the parameter settings should therefore be made only by knowledgeable personnel.



### 3.9.2 Parameter function

The parameters shown in the following are all shown according to the pattern

*Parameter number    Name    [Unity/ Minimum, maximum Value]  
Parameter description*

Parameters in which Pxx is entered as the unit refer to the unit specified in parameter Pxx.

## 3.10 Parameter lists

### 3.10.1 User parameter

**P00**    *Language [Multiple Choice Parameter]*

Changing between the available languages

**P04**    *Adjustment British-Metric [Multiple Choice Parameter]*

Changing between the unity systems. Metric, British and British with rounding

### 3.10.2 Device Parameter

**P09**    *Variable Icons [Multiple Choice Parameter]*

If this parameter is set to "On", the standard bitmaps of the axis will be replaced with the bitmaps which were loaded to the device via USB.

If no bitmaps were loaded, the storage of the bitmaps is empty and nothing will be displayed.

(see: *USB-Update*)

**P21**    *Security code for Parameter [- / 0, 999999]*

Entering a value at this parameter causes that all the parameters of the axis and the device level can be changed only after a security input. The security code is equal to the entered value.

If the value of this parameter is written to "0", the security request is off.

**P22**     *Security code for reference level [ - / 0, 999999]*

Entering a value at this parameter causes that the axis can be referenced through the reference level, only after a security input.

If the value of this parameter is written to "0", the security request is off.

**P29**     *Display configuration [Multiple Choice Parameter]*

Changing this parameter will change the counter display.

There are different display configurations for 1-, 2- and 3-axis displays.

**P31**     *Output 1 low [ - / -100000, 100000]*

This value must not be changed as long as the tolerance window of axis 1 is active.

If output 1 is referred to an input, this value will not be considered.

If the deposited value is exceeded by the displayed value, output 1 will be activated. If the displayed value falls below the deposited value, output 1 will be deactivated. The deposited value has to be lower than the value in parameter P32. If the value of this parameter is the same or higher than the value of P32, output 1 can't switch.

The displayed value is referred to the axis deposited at the parameter P43.

**P32**     *Output 1 high [ - / -100000, 100000]*

This value must not be changed as long as the tolerance window of axis 1 is active.

If output 1 is referred to an input, this value will not be considered.

If the deposited value is exceeded by the displayed value, output 1 will be deactivated. If the displayed value falls below the deposited value, output 1 will be activated. The deposited value has to be higher than the value in parameter P31. If the value of this parameter is the same or lower than the value of P31, output 1 can't switch.

The displayed value is referred to the axis deposited at the parameter P43.

**P33**     *Output 2 low [ - / -100000, 100000]*

This value must not be changed as long as the tolerance window of axis 2 is active.

If output 2 is referred to an input, this value will not be considered.

If the deposited value is exceeded by the displayed value, output 2 will be activated. If the displayed value falls below the deposited value, output 2 will be deactivated. The deposited value has to be lower than the value in parameter P34. If the value of this parameter is the same or higher than the value of P34, output 2 can't switch.

The displayed value is referred to the axis deposited at the parameter P44.

**P34**     *Output 2 high [ - / -100000, 100000]*

This value must not be changed as long as the tolerance window of axis 2 is active.

If output 2 is referred to an input, this value will not be considered.

If the deposited value is exceeded by the displayed value, output 2 will be deactivated. If the displayed value falls below the deposited value, output 2 will be activated. The deposited value has to be higher than the value in parameter P33. If the value of this parameter is the same or lower than the value of P33, output 2 can't switch.

The displayed value is referred to the axis deposited at the parameter P44.

**P35**     *Output 3 low [ - / -100000, 100000]*

This value must not be changed as long as the tolerance window of axis 3 is active.

If output 3 is referred to an input, this value will not be considered.

If the deposited value is exceeded by the displayed value, output 3 will be activated. If the displayed value falls below the deposited value, output 3 will be deactivated. The deposited value has to be lower than the value in parameter P36. If the value of this parameter is the same or higher than the value of P36, output 3 can't switch.

The displayed value is referred to the axis deposited at the parameter P45.

**P36**     *Output 3 high [ - / -100000, 100000]*

This value must not be changed while the tolerance window of axis 3 is active.

If output 3 is referred to an input, this value will not be considered.

If the deposited value is exceeded by the displayed value, output 3 will be deactivated. If the displayed value falls below the deposited value, output 3 will be activated. The deposited value has to be higher than the value in parameter P35. If the value of this parameter is the same or lower than the value of P35, output 3 can't switch.

The displayed value is referred to the axis deposited at the parameter P45.

**P37**     *Output 4 low [ - / -100000, 100000]*

If output 4 is referred to an input, this value will not be considered.

If the deposited value is exceeded by the displayed value, output 4 will be activated. If the displayed value falls below the deposited value, output 4 will be deactivated. The deposited value has to be lower than the value in parameter P38. If the value of this parameter is the same or higher than the value of P38, output 4 can't switch.

The displayed value is referred to the axis deposited at the parameter P46.

**P38**     *Output 4 high [ - / -100000, 100000]*

If output 4 is referred to an input, this value will not be considered.

If the deposited value is exceeded by the displayed value, output 4 will be deactivated. If the displayed value falls below the deposited value, output 4 will be activated. The deposited value has to be higher than the value in parameter P37. If the value of this parameter is the same or lower than the value of P37, output 4 can't switch.

The displayed value is referred to the axis deposited at the parameter P46.

**P39** *Interval time output 1 [seconds / 0.00, 2.50]*

This value must not be changed as long as the tolerance window of axis 1 is active.

The interval time 1 can be chosen between 0 and 2.50 seconds.

The output 1 will be switched as explained at the parameters P31 and P32. However, the output 1 will only be deactivated after expiration of the interval time 1.

**P40** *Interval time output 2 [seconds / 0.00, 2.50]*

This value must not be changed as long as the tolerance window of axis 2 is active.

The interval time 2 can be chosen between 0 and 2.50 seconds.

The output 2 will be switched as explained at the parameters P33 and P34. However, the output 2 will only be deactivated after expiration of the interval time 2.

**P41** *Interval time output 3 [seconds / 0.00, 2.50]*

This value must not be changed as long as the tolerance window of axis 3 is active.

The interval time 3 can be chosen between 0 and 2.50 seconds.

The output 3 will be switched as explained at the parameters P35 and P36. However, the output 3 will only be deactivated after expiration of the interval time 3.

**P42** *Interval time output 4 [seconds / 0.00, 2.50]*

The interval time 4 can be chosen between 0 and 2.50 seconds.

The output 4 will be switched as explained at the parameters P37 and P38. However, the output 4 will only be deactivated after expiration of the interval time 4.

**P43**     *Reference to Output 1 [ - / Multiple Choice Parameter]*

This value must not be changed as long as the tolerance window of axis 1 is active.

With this parameter an axis can be selected to which output 1 refers to.

If the output refers to an input, the output is activated as soon as the input is activated.

If the tolerance window of axis 1 is active, the output will automatically refer to axis 1.

**P44**     *Reference to Output 2 [ - / Multiple Choice Parameter]*

This value must not be changed as long as the tolerance window of axis 2 is active.

With this parameter an axis can be selected to which output 2 refers to.

If the output refers to an input, the output is activated as soon as the input is activated.

If the tolerance window of axis 2 is active, the output will automatically refer to axis 2.

**P45**     *Reference to Output 3 [ - / Multiple Choice Parameter]*

This value must not be changed as long as the tolerance window of axis 3 is active.

With this parameter an axis can be selected to which output 3 refers to.

If the output refers to an input, the output is activated as soon as the input is activated.

If the tolerance window of axis 3 is active, the output will automatically refer to axis 3.

**P46**     *Reference to Output 4 [ - / Multiple Choice Parameter]*

With this parameter an axis can be selected to which output 4 refers to.

If the output refers to an input, the output is activated as soon as the input is activated.

**P56** *Count mode [ - / Multiple Choice Parameter]*

The difference/sum value can only be displayed if the configuration „2-axis dif“ is selected through the parameter P29.

**Differential counter:**

Difference Value = Current value of axis 1 – Current value of axis 2

**Sum counter:**

Sum Value = Current value of axis 1 + Current value of axis 2

It is important that the unity and the resolution (decimal point) of the axis are similar.

According to the selected mode of this parameter, a difference or sum symbol will be displayed with the calculated value.

**P60** *Function input 1 [ - / Multiple Choice Parameter]*

This parameter controls how the display of axis 1 is affected by the input 1. (see 4.1. *Input functions*)

**P61** *Function input 2 [ - / Multiple Choice Parameter]*

This parameter controls how the display of axis 2 is affected by the input 2. (see 4.1. *Input functions*)

**P62** *Function input 3 [ - / Multiple Choice Parameter]*

This parameter controls how the display of axis 3 is affected by the input 3. (see 4.1. *Input functions*)

**P70** *Input logic [ binary / 0, 111111]*

0/1    0/1    0/1    0/1    0/1    0/1

MSB

LSB

The LSB accords to input 1 and the MSB accords to input 6. All further inputs will be dedicated from LSB to MSB to the other decades.

If a decade of an input is 0, the input will be switched when a high signal is applied at the input.

If a decade of an input is 1, the input will be switched when a low signal is applied at the input.



**P99** *Factory boot [ - / Multiple Choice Parameter]*

Selecting the factory boot will set all parameters to their default value.

**3.10.3 Axis parameter**

**P01** *Demand value [ P91 / -100000, 100000]*

The tolerance window and the calculation of the tolerance range are referred to this parameter.

**P02** *Reference value [ P91 / -100000, 100000]*

Value the counter proposes when the reference level is activated or the axis is set to when the Set function is activated.

**P05** *Travel distance for factor calculation [Length / 0, 100000]*

Contains any desired travel distance.

The device requires these two parameters in order to be set for various mechanical variations such as drives, spindle travel, etc.

1. Any desired travel distance in the desired unit and resolution (P05).
2. The number of pulses sent from the measuring system to the controller when traveling this distance (P06).

The controller can count without error over the entire range only if these data are entered in P05 and P06 without rounding error.

Therefore you should always select a travel distance for which a whole-number of pulses is sent by the measuring system.

**P06** *Impulse / Travel distance[ measuring system resolution / 0, 100000]*

Number of pulses per travel distance specified in P05 (the factor is automatically calculated from P05 and P06).

Example 1: The measuring system in use sends 100 pulses to the controller over a distance of 1.00 mm. Setpoints, actual values, etc. should be send in increments of 1/100 mm. This means each pulse arriving from the measuring system must be offset against the actual value. Therefore P05 and P06 should be set to the same value (e.g. 1, 1 or 10,10 resp. 100, 100).

Example 2: The system again has a resolution of 1/100 mm. Setpoints and actual values should resolve however only to one decimal place, i.e. in 1/10 mm. This means that over a distance of 1 (0.1 mm) 10 pulses are sent from the measuring system to the controller. Therefore set P05 to a factor of 10 less than P06 (e.g. 1, 10 or 10,100 resp. 100, 1000).

Example 3: A machine with spindle drive has the following benchmark data: Spindle pitch 5.0 mm / Encoder with a resolution of 20 pulses per revolution. You want setpoints and actual values to be resolved to one decimal place, i.e. in 1/10 mm. This means that over a distance of 50 (5.0 mm) 20 pulses are sent from the measuring system to the controller. Therefore you should set P05 to 50 and P06 to 20.

**P07**     *Reference mode [ - / Multiple Choice Parameter ]*

If the reference mode is active and a Z-impulse is detected, the actual value of the axis is set to the reference value which is deposited at the parameter P02 "Reference value".

**P11**     *Tolerance window [ - / Multiple Choice Parameter ]*

This parameter activates/deactivates the tolerance window of the axis.

**P12**     *Tolerance unit [ - / Multiple Choice Parameter ]*

This parameter defines if the tolerance range will be calculated with a length or a percentage.

**P13**     *Tolerance length [Length / 0,100000 ]*

If parameter P12 is set to length, the tolerance range will be calculated with the deposited value in this parameter.

**P14**     *Tolerance percent [Percent / 0.0,100.0 ]*

If parameter P12 is set to percentage, the tolerance range will be calculated with the deposited percentage in this parameter.

**P15** *Tolerance rule [ - / Multiple Choice Parameter]*

This parameter includes additional calculation rules of the calculation of the tolerance range.

Depending on the settings of this Parameter, the tolerance range is allowed to be higher and lower than the demand value, is allowed to be higher and equal than the demand value or is allowed to be lower and equal than the demand value.

**P26** *Encoder direction [ - / Multiple Choice Parameter]*

Changing this parameter causes the count direction to be reversed.

**P40** *Measuring system selection [ - / Multiple Choice Parameter]*

**Only for axis 1 and axis 2!**

**When using as a 3-axis counter, the settings in Axis1 and Axis2 have to be the same, since these also affect Axis 3.**

The device can operate with measuring systems whose supply voltage and signal level is 5V or 10-30V.

The measuring system supply voltage can be set using jumpers on the rear side.

When using 5V systems, always make sure that tracks A, B Z and their inversions are connected in order to prevent problems.

A B Z: Only tracks A, B and Z are evaluated.

AA BB ZZ: Tracks A, A/, B, B/ and Z, Z/ are processed.

**P49** *Encoder function [ - / Multiple Choice Parameter]*

Activates/deactivates the modulo function.

**P50** *Modulo value positive [ P91 / 0,100000]*

Describes to which value the actual counter is shown. By reaching this value, the displayed value is set to the value of the parameter P51 "Modulo value negative".

**P51** *Modulo value negative [ P91 / 0,-100000]*

Describes to which value the actual counter is shown. By reaching this value, the displayed value is set to the value of the parameter P50 "Modulo value positive".

**P56** *Actual value storage [ - / Multiple Choice Parameter]*

The storage for the actual value is by default active.

If the storage is deactivated, the user is requested to reference the axis after the start of the device.

**P60** *Offset [ P91 / -10000, 10000]*

Enter the offset dimension in units of length, such as xx.x mm or x.xx inches.

This value is subtracted from the display value when the offset measurement contact is activated.

When the input is deactivated the value is added again.

**P90** *Decimal point [ - / Multiple Choice Parameter]*

With this parameter you can select if and how the decimal point is displayed with the axis value.

**P91** *Unity [ - / Multiple Choice Parameter]*

General settings to select the axis unit.

**P92** *Unity length [ - / Multiple Choice Parameter]*

Which length unity shall be used.

Millimeter, Inch (meter, feet)

**P99** *Factory boot [ - / Multiple Choice Parameter]*

Selecting the factory boot will set all parameters to their default value.

## 4. Special features

### 4.1 Input functions

#### 4.1.1 Inputs 1-3

The inputs 1-3 of the MC530 can be occupied with different functions. Each of the 3 inputs refers to another axis:

Input 1 – Axis 1 – Device parameter P60

Input 2 – Axis 2 – Device parameter P61

Input 3 – Axis 3 – Device parameter P62

Function	Description
Static reset	Sets the actual value of the referred axis to “0” and holds the actual value at “0” as long as the input is active.
Edge triggered reset	Sets the actual value of the referred axis to “0” if a rising or falling edge of the input is recognized. (Depending on the settings of the device parameter P70, the input will trigger on a falling or rising edge)
Static set	Sets the actual value of the referred axis to the deposited reference value of the axis parameter P02 and holds the actual value at the reference value as long as the input is active.
Edge triggered set	Sets the actual value of the referred axis to the deposited reference value of the axis parameter P02 if a rising or falling edge of the input is recognized. (Depending on the settings of the device parameter P70, the input will trigger on a falling or rising edge)
Offset	The in the axis parameter P60 deposited offset value will be allocated with the actual value as long as the input is active.
Counter stop	As long as the input is active, the counter will be stopped. The actual value of the referred axis will stay on its last value until the input goes inactive. As long as the input is active, incoming pulses of the encoder will be ignored.

Counter freeze	If the input goes active, the actual value of the referred axis will be frozen until the input goes inactive. The counter will still run in the background.
----------------	---

#### 4.1.2 Input 4

This input will activate a transmission of the actual values via the RS232 interface, if the RS232 mode of the device parameter P85 is set to Mode 2.

#### 4.1.3 Inputs 5-6

These inputs are yet without any function and are reserved for special functions.

### 4.2 Tolerance window

#### 4.2.1 Parameter settings

Every tolerance window can be separately parameterized and activated/deactivated through the axis parameters

To activate/deactivate a tolerance window, the parameter P11 "Tolerance window" of the axis parameters has to be set to On/Off.

Through the parameter P12 "Tolerance unit" it is possible to indicate how the tolerance range should be calculated. The tolerance range can be specified as length or as a percentage. The length to calculate the tolerance range has to be deposited at the axis parameter P13 "Tolerance length". If the tolerance range should be calculated with the percentage, the wanted percentage has to be deposited at the axis parameter P14 "Tolerance percent".

The axis parameter P15 contains an additional choice of how the tolerance range has to be calculated. Depending on the selection, the tolerance range can be higher and lower than the demand value, can be equal and higher than the demand value or can be equal and lower than the demand value.

The demand value for the tolerance window has to be deposited at the axis parameter P01 demand value. The demand value can also be arranged through the front panel or be imported with a barcode reader (see 4.3.2 *Barcode reader*).



If a tolerance window is activated, the related output is always referred to the axis of the tolerance window.

Output 1 is related to the tolerance window of axis 1.

Output 2 is related to the tolerance window of axis 2.

Output 3 is related to the tolerance window of axis 3.

The device parameter of the particular outputs will be overwritten automatically. Inserted values and settings of the outputs can be lost.



The device parameter to configure the particular outputs are not allowed to be changed as long as the referred tolerance window is active. Changing these parameters can cause malfunctions of the outputs.

#### 4.2.2 Display and functions

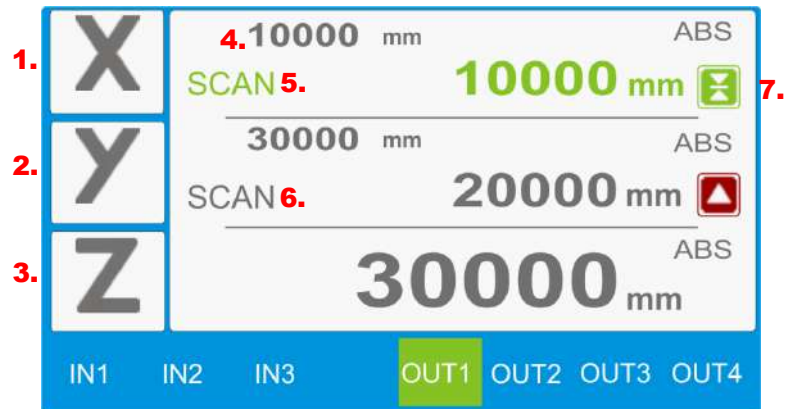


Fig. 27 Display functions

1. Tolerance window for axis 1 active
2. Tolerance window for axis 2 active
3. Tolerance window for axis 3 inactive
4. Display of the demand value
5. Scanner for axis 1 active
6. Scanner for axis 2 inactive
7. Tolerance state symbol

The symbol beside/under the actual value can change between three different symbols, according to the actual value and the demand value:


- means that the demand value has a more negative value than the actual value.
- means that the demand value has a more positive value than the actual value.
- means that the demand value equals the actual value.

Additional to the symbols, the actual value will be colored green if the actual value is inside the range of the tolerance. Also the related

output will be activated as long as the actual value is inside the tolerance range.

#### 4.2.3 Additional function: Arrangement via front panel

This function is only with the tolerance window active.

To modify the demand value through the front panel, the value can be chosen with the cursor. By pressing the -key, an input window opens up and the demand value can be modified.

The input of the value works the same way as the input at the parameter menu.

### 4.3 RS232 interface

The device comes with an RS232 interface.

Through the device parameter P85 “RS232 mode”, one of four different modes can be selected for the RS232 interface.

Information about the modes and technical data can be found in the manual “Serial protocol MC530” and at the device parameter list.

#### 4.3.1 Important parameters

P00	Actual value	Axis 1-3, read only
P01	Demand value	Axis1-3, read and write
P60	Offset	Axis 1-3, read and write
P66	Sum/Difference	Axis 1, read only.  This parameter contains, according to the settings of device parameter P56 “Counter mode”, the sum or difference between the actual values of axis 1 and axis 2.

#### 4.3.2 Barcode scanner

The scanner function of the device is only active as long as at least one tolerance window is active. The barcode scanner mode is used to modify the demand values of the axis without leaving the display.

The barcode has to match the Code 128 and the scanned value is not allowed to have more than 6 numerical figures (including decimal places). In addition to these 6 figures, the barcode is allowed to include one leading sign and one comma.

The comma can also be written as a dot.



**Fig. 28 Barcode example**

According to the settings of the decimal point of the related axis (axis parameter P90), 0-3 decimal places can be read.



It is important to ensure that the scanned value does not exceed the maximum value or fall below the minimum value of the demand value (axis parameter P01).

**Example 1:**

Settings decimal point, axis parameter P90: Two decimal places (0,00)



Because the decimal point is set to two decimal places, only the first two of the three decimal places of the barcode are processed. The third decimal place is ignored.

Therefore, only the value “-1,66” is read instead of the original value “-1,665” because the last figure of the decimal places is ignored.

**Example 2:**

Settings decimal point, axis parameter P90: Three decimal places (0,000)



The decimal point is set to three decimal places, but only one decimal place is transmitted by scanning the barcode. The absentee decimal places will be filled automatically with “0”.

Therefore, the original value “97,3” is extended with two “0” and is stored as “97,300”.

#### **4.4 Z-trace reference**

The Z-trace reference is individually activated/deactivated for every axis through the axis parameter P07 "Reference mode".

If the Z-trace reference mode is active, the actual value of the depending axis is set to the reference value, deposited at the axis parameter P02 "Reference value", if an impulse of the Z-trace is recognized.

#### **4.5 Actual value storage**

The actual value storage is individually activated/deactivated for every axis through the axis parameter P56 "Actual value storage". The actual value storage is active by default, therefore it has not to be considered.

If the actual value storage is deactivated, a small reference symbol is blinking near the referred axis value. This symbol indicates that the actual value storage is deactivated and the referred axis should be referenced before further operations.

#### **4.6 USB-Update**

The device MC530 comes with an USB interface.

With this interface updates, bitmaps and other data can be transferred to the device.

The USB menu will open as soon as the device detects a plugged in USB-stick.

Information to the execution of an update and the transmission of the other data can be found in the manual "Device update via USB-Interface".

## 5. Illustration list

Fig. 1 Dimensions.....	6
Fig. 2 Connection diagram.....	8
Fig. 3 Measuring system supply voltage.....	12
Fig. 4 Front Panel MC530.....	13
Fig. 5 ESC.....	13
Fig. 6 Up.. ..	13
Fig. 7 Down .....	13
Fig. 8 Right .....	14
Fig. 9 Enter .....	14
Fig. 10 Standard configuration.....	15
Fig. 11 1-/2-/3-axis configurations.....	16
Fig. 12 Difference-/Sum-mode .....	16
Fig. 13 Difference.....	17
Fig. 14 Sum .....	17
Fig. 15 User parameter .....	17
Fig. 16 Reference.....	17
Fig. 17 Parameter level.....	17
Fig. 18 Information .....	17
Fig. 19 Axis 1.....	18
Fig. 20 Axis 2.....	18
Fig. 21 Axis 3.....	18
Fig. 22 Device parameter .....	18
Fig. 23 Parameter selection .....	19
Fig. 24 Standard parameter .....	19
Fig. 25 Multiple choice parameter .....	19
Fig. 26 Parameter input.....	20
Fig. 27 Display functions .....	35
Fig. 28 Barcode example.....	37