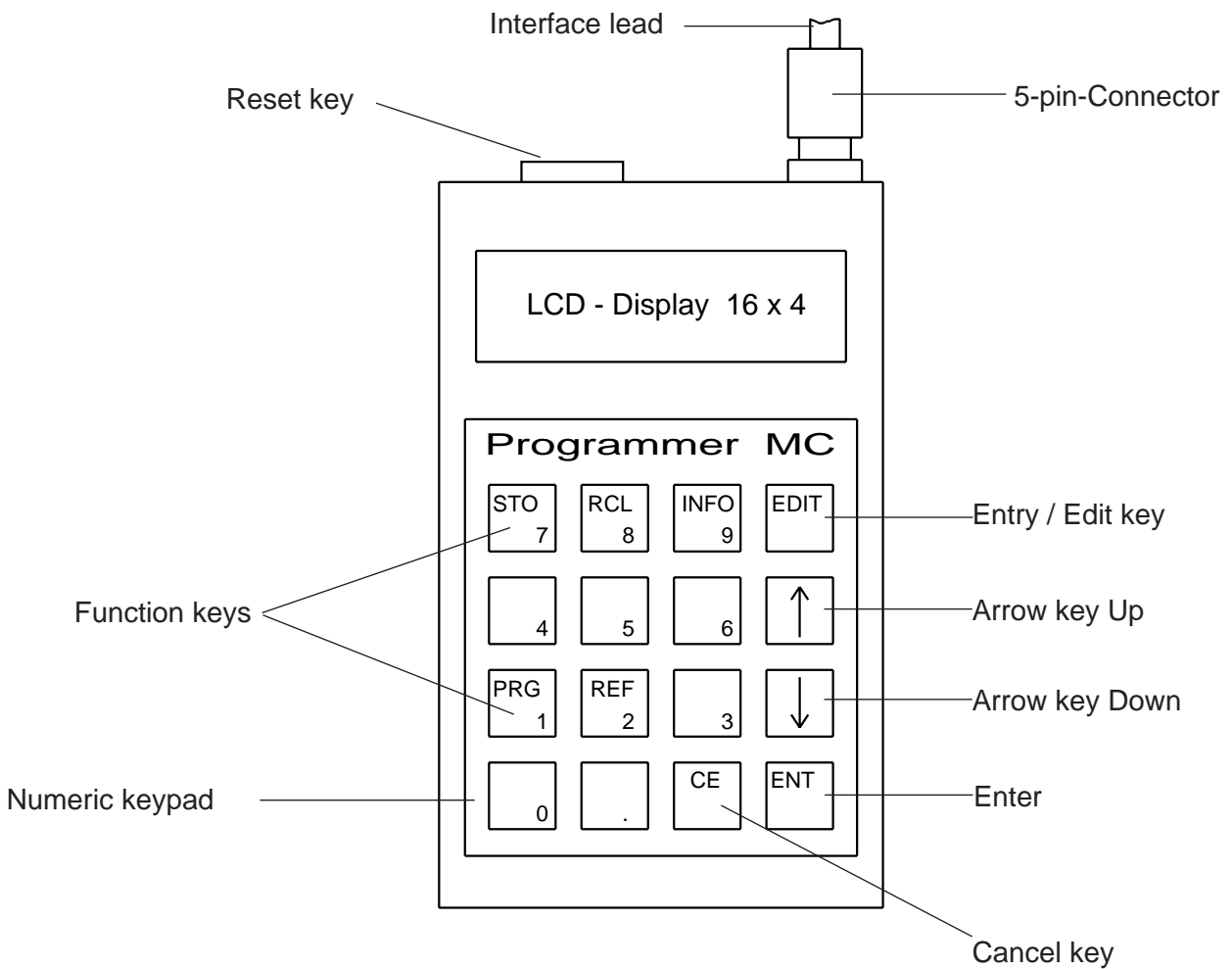


## Operation of the Programming Device Programmer MC

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## Overview of the Operator Elements



## Technical Data

Housing: ABS plastic-colour RAL 7038 (grey)  
 Dimensions: 200 x 100 x 40 mm  
 Weight: Approx. 0.4 kg

Display: LCD, 4 Lines, 16 Characters  
 Keyboard: Keybutton with protection film  
 Interface lead: 5 core, 1.5 m long with connectors

## Introduction

### General Information

The purpose of the programming device "Programmer MC" (PMC) in combination with the conformable encoder is to editing and programming the specific encoder parameters.

The programmer PMC has a LCD-Display, a keyboard with 16 function keys and a microcontroller with a seriell interface. This seriell interface is specifically designed for the encoder in the series CRP.

The power supply for the PMC is provided by the encoder via the interface lead (for details see pin assignment of the interface lead).

### Connection Programmer MC - Encoder

The interface lead is connected to the 5-pin socket of the encoder as well as to the 5-pin connector of the PMC. By requirement the connectors are protected by screwing on. The connector of the PMC should be generally screwed together.

The power supply for the PMC will be provided by the connection of an operationally ready CRP encoder (the power supply must be applied to the CRP) or the power supply for the encoder must be switched on by existing connection.

When power supply for the PMC is applied, the programmer will be started the intialization with the self-test.

**Note:** The **encoder** reswitches in the **operation** mode again after the **disconnection** of the PMC.

The disconnection of the PMC should be made only out of the selection function mode or out of error messages.

### Initialization

The initialization divided into:

1. ROM Checksum Error (Error output)
2. Check Interface-Status (Error output)
3. Presetting Controller
4. Presetting LCD-Display
5. Begin of the Encoder Polling

After a correct initialization the PMC is ready for operations and is going into the selection function mode (→ Function Select Mode).

Errors are indicated by conformable messages (→ Error Messages).

## Selection Function Mode

The selection function mode is the operating interface after correct initialization and the highest level of operation.

During the initialization the encoder parameters will be read in the PMC and will be displayed as topic parameter set. This topic parameter set can be edited. The encoder parameters are unchangeable until programming with the topic parameter set of the PMC.

The selection function mode displays the topic parameter set as following (Example):

4096.0000 x 4096  
 Gry Evn pos  
 REF: 00000000  
 -select function-

### The displayed parameters mean in detail:

4096.0000x4096	Resolution x Measuring range Resolution: The resolution indicates the number of steps per full turn. Measuring range: Indication of the maximum number of turns to be given as a power of 2.
Gry	Output code (Gray, Binary, BCD)
Evn	Parity bit (Even, Odd)
pos	Logic polarity (Positive, Negative)
REF:00000000	Reference value

In the following the functions for editing of the topic parameter set and the programming of the encoder with this parameter set will be described.

**Note:** The reference value is its value, which is displayed in the reference point. Further documentation for setting of the reference point will be described in the data sheet CRP.

## Overview of Functions

The following functions can be called in the selection function mode by pressing of the corresponding key.

Function	Key	Description
LANGUAGE SELECTION	6	Sets the language for the display
ENTRY/EDIT	EDIT	Selection of parameters and entry / editing of values
STORE SET OF	STO	Storage of a set of parameters in a non-volatile register; 10 parameter registers are available.
RECALL SET OF PARAMETERS	RCL	Recalls a set of parameters from a register
INFORMATION	INFO	Displays additional information about connected encoder and about current set of parameters.
PROGRAMMING SETTING OF PARAMETERS	PRG	Programs the encoder with the current set of parameters and sets the reference value.
PROGRAMMING REFERENCE VALUE	REF	Programs the encoder only with the reference value and sets the reference point

By pressing of the key the corresponding function will be called and the menu item will be displayed (→ Functions). The further operating is menu controlled.

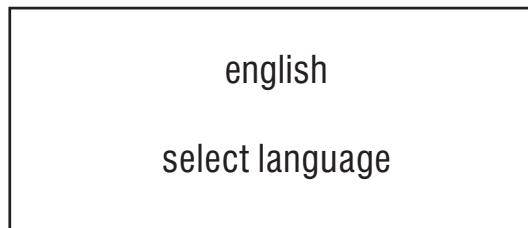
Select via keys UP/DOWN  
Confirmation via key ENT  
Abort and delete via key CE

Select the option  
Confirm a selection or a value and close a menu point  
Abort a menu point or delete value input

For exact meaning of the keys see description of functions.

## Function LANGUAGE SELECTION

By means of the function LANGUAGE SELECTION (6), the following message is displayed:



The temporary topic language will be displayed. It may be scrolled by means of the up and down arrow keys. The menu guidance can be selected in the languages German, English or French.

via keys	UP/DOWN	Select language (German, English or French)
via key	ENT	Accept and return to the selection function mode
via key	CE	Return to the selection function mode without acception of the selected language.

The selected language will be stored in the programmer and will be set to the next alteration.

**Function ENTRY/EDIT**

When the function ENTRY/EDIT (EDIT) is selected, the following message (Example: Resolution) is displayed:

Counts/turn  
 4096.0000  
 -select parameter -

The PMC expects the selection of one parameter of the topic parameter set. The following parameter can be selected by means of the arrow keys UP/DOWN.

Resolution	Numerical value / record (List of options) parameter
Measuring range	Record parameter (List of options)
Output code	Record parameter (List of options)
Parity bit	Record parameter (List of options)
Logic polarity	Record parameter (List of options)
Reference value	Numerical value parameter

Every parameter will be displayed with the parameter name and his topic value (see example).

via keys	UP/DOWN	Selection parameter
via key	ENT	Accept of the selected parameter and editing by entering numerical values or editing by selecting from a list of options
via key	CE	Abort the selection of parameters and return to the selection function mode

Depending on the parameter will be distinguished according to entering a numerical value or by selecting from a list of options.

Note: The parameter measuring range (number of turns) is not editable by all encoders. See function INFORMATION.



## Numerical value input

The editing of parameter will be directly defined by entering numerical values.

Counts/turn

4096.0000

- enter value

via keys 0 - 9 and	Enter the numerical value (general decimal, independent of output code)
via key ENT	Accept value and return to select parameter or display "invalid entry" (see below)
via key CE	Delete input value (Cursor in start position)
via key CE	Return to select parameter without alteration

for incorrect or faulty input the following error message will be displayed:

Counts/turn

invalid

entry!

-continue w. CE-

via key CE	Return to enter the numerical value
------------	-------------------------------------

The input is not plausible (E. g. The reference value is higher than the total number of steps), if the parameter value is not inside of the scope. The limits will be defined through the encoder hardware (E. g. Maximum resolution) and the values of the parameter set.

Informations about the hardware and the total number of steps see function INFO.

### Record parameter (List of options)

The parameter will be edited by selecting from a list of options.

Code	Gry
- select parameter -	

via keys UP/DOWN

Editing of the selected parameter (Example: List of parameter for parameter Output code: Gray, Binary, BCD)

via key ENT

Accept parameter and return to select parameter

via key CE

Editing of the selected parameter is cancelled, the original value is restored. The function is left without any action.

The described example is also analog for all record parameters.

**Function STORE SET OF**

The function STORE SET OF (STO) allows a permanently loading of the topic parameter set in one of ten registers. The following message is displayed (Example):

4096.0000 x 4096  
 Gry Evn pos  
 REF: 00000000  
 - storage no. ?\_ -

via keys 0 - 9

Editing the register number.

via key CE  
 restored.

Editing of the register number is cancelled, the original value is

via key ENT

The function is left without any action.

Accept the register number and further with following conditions

when Register not occupied

storage no. 7  
 confirm?  
 -Yes=ENT NO=CE -

when Register occupied

storage occupied  
 overwrite?  
 -Yes=ENT NO=CE -

when the register number not edited

no storage no.  
 entered!  
 - back thru CE -

via key ENT

The parameter set is stored under the indicated register number.

via key CE

Abort. The function is left without any action and return to the function STORE SET OF.

**Function RECALL SET OF PARAMETERS**

The function RECALL SET OF PARAMETERS (RCL) reads the stored parameter set out of a register. This parameter set is the topic parameter set.

when not register occupied

no storage no.  
occupied!  
  
- back thru CE -

when one or more register occupied, then the first occupied register will be displayed (Example: Register 4)

800.0000 x 4096  
BCD Odd pos  
REF: 00000000  
- recall from 4 -

via keys UP/DOWN

Parameter sets of the occupied register will be displayed consecutive

via key CE

Abort and return to the selection function mode

via keys 0 - 9

Direct editing of the register number

when not register occupied

storage no.  
not occupied!  
  
- back thru CE -

via key ENT

Take over the parameter set of the register and return to the selection function mode

when the parameter set is incompatible to the hardware, then will be displayed

parameter  
incompatible!  
  
- back thru CE -

## Function INFORMATION

The function INFORMATION (INFO) indicates additional informations about the encoder, the PMC and the topic parameter set. Following message will be displayed:

```
INFO REV 1.2/5.0
4096-12 M=P A=N
Tot:16777216(24)
- back thru CE -
```

via key CE	Return to the selection function mode
REV 2.1/5.0	Software revision number 2.1 - PMC software 5.0 - Encoder software
4096-12 M=P A=I	Hardware parameter encoder 4096 - Position per turns (360°) 12 - Multiturn bit value (Note: Number of turns in steps of power of 2) M=P/N - Multiturn section/turns P = programable N = not programable A=I/N - Property of output circuits
Tot: 16777216(24)	Information about the topic parameter set Total number of steps (always decimal) and the required number of significant bits in dependence of the output code

The total number of steps and the conformity number of bits will be always specified for the topic parameter set. The total number of steps is the result from number by steps/turn x turns.

The number of bit declares, how many data bits will be required for the output of the total steps.

## Function PROGRAMMING SETTING OF PARAMETERS

This function (PRG) programs the encoder with the topic parameter set. The parameter set and the confirmation request will be displayed:

4096.0000 x 4096  
Gry Evn pos  
REF: 00000000  
- progr? ENT/CE -

via key CE

Abort and return to the selection function mode

via key ENT

Accept. The Programmer PMC programs the encoder with the topic parameter set.

During the programming will be displayed:

- please wait! -

After the following programming a hardware reset will be resolved and the program checks the acceptance of the parameter. In dependence of the result will be displayed:

programming  
ok!  
-continue w. CE-

via key

Return to the selection function mode

programming  
NOT  
ok!  
- continue w. CE -

via key CE

Continue to the mode of the detected error (→ Error Messages)

## Function PROGRAMMING REFERENCE VALUE

This function (REF) programs only the reference point of the topic parameter set of the encoder. All other parameters are unchangeable.

The topic reference value and enquiry for programming is displayed:

REF: 00000000  
- progr?      ENT/CE -

via key CE

Abort and return to the selection function mode

via key ENT  
value

Accept, the PMC programs the encoder with the topic reference

The further program flow is identical with the function PROGRAMMING SETTING OF PARAMETERS.

This function PROGRAMMING REFERENCE VALUE will be used for programming the topic reference values and setting of the reference point (For example: Setting up of the machine).

If the parameter resolution and number of turns were also changed additional to the parameter reference value, the following menu will be displayed:

function REF  
not reasonable!  
use PRG  
- continue w. CE -

via key CE

Abort and return to the selection function mode

## Error Messages

If errors occur upon the initialization, then an error message will be displayed. In case of fatal error all operations are no more possible.

The debugging will be tried by switching on of the power supply for the encoder and/or by reset of the PMC.

## Error Status Encoder

By setting the error bit and displaying the error message, the encoder signalizes the following error states.

The error messages during the initialization of the encoder will be characterized by the PMC and will be displayed.

## Reference Point Error

Error into the reference point memory.

The following message will be displayed:

Ref-point-error  
PMC programs  
with REF = 0  
- please wait! -

The PMC tries to set the reference point (REF = 0) all over again, makes a hardware reset and checks the topic message after the initialization.

If not any error will be detected, the PMC returns to the selection function mode.

If the reference point error will be detected again, the following message is displayed:

again  
Ref-point-error  
FATAL  
ERROR

All operations are no more possible.

In case of other errors, the PMC branches in the conformable error mode.



## Parameter Error

Error in the parameter storage

The following error message is displayed:

The following error message will be displayed:

```
Parameter-Error  
  
F A T A L  
E R R O R
```

All operations are no more possible, not respond to any command.

## ROM-Code-Error

Error in the program storage.

The following error message will be displayed:

```
ROM-Code-Error  
  
F A T A L  
E R R O R
```

All operations are no more possible, not respond to any command.

## **Error Status Programmer MC**

### **ROM-Code-Error**

When the Programmer PMC during the self test recognizes an internal memory error, then the following error message will be attempt to displayed:

ROM-Code-Error  
during  
self-testing  
FATAL ERROR

All operations are no more possible, not respond to any command.

In the next following errors it is possible, that the interface lead and/or the interface hardware are defective.

In case of errors, check the Programming unit PMC and the interface lead. So the encoder respectively the PMC as error reason will be bounded and excluded.

### **Interface Error**

When the PMC during the self test recognizes a interface error, then the following error message will be displayed:

Interface-Error  
during  
self-testing  
FATAL ERROR

All operations are no more possible, not respond to any command.

### **Transmission Error**

When the PMC during the self test recognizes a transmission error, then the following error message will be displayed:

Encoder - Error  
  
F A T A L  
E R O R R

All operations are no more possible, not respond to any command.