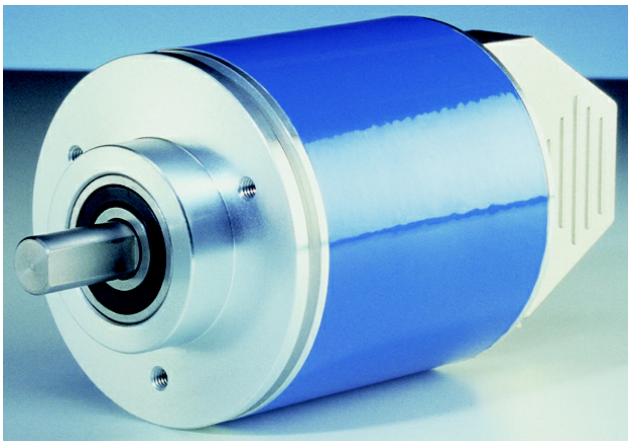
Deutschmann

your ticket to all buses

Instruction manual
Electronic cam control
ROTARNOCK 80
Display- and operating unit
TERM 6



Manual Art.-No. V3377E

Deutschmann Automation GmbH & Co. KG | Carl-Zeiss-Str. 8 | D-65520 Bad Camberg
Tel:+49 6434 9433-0 | Hotline: +49 6434 9433-33 | Fax: +49 6434 9433-40
www.deutschmann.com | wiki.deutschmann.de

Foreword

This operating manual provides users and OEM customers with all the information necessary for the installation and operation of the product described in this manual.

All details contained in this manual have been checked carefully, however, they do not represent an assurance of product characteristics. No liability can be accepted for errors. DEUTSCHMANN AUTOMATION reserves the right to carry out alterations to the described products in order to improve the reliability, function or design thereof. DEUTSCHMANN AUTOMATION only accepts liability to the extent as described in the terms and conditions of sale and delivery.

Bad Camberg, October 2014

Version 2.0 dated 13.10.14, Art.-No. V3377E

1 Introduction

1.1 On this manual

This manual documents installation, functions and operation of the Deutschmann unit specified on the cover sheet and in the header.

1.1.1 Symbols

Particularly **important text sections** can be seen from the adjacent pictogram.

You should **always** follow this information since, otherwise, this could result in malfunctions or operating errors.

1.1.2 Concepts

The expressions ‘ROTARNOCK’ and ’TERM’ are frequently used throughout this manual with no further model specifications. In such cases, the information applies to the entire model series.

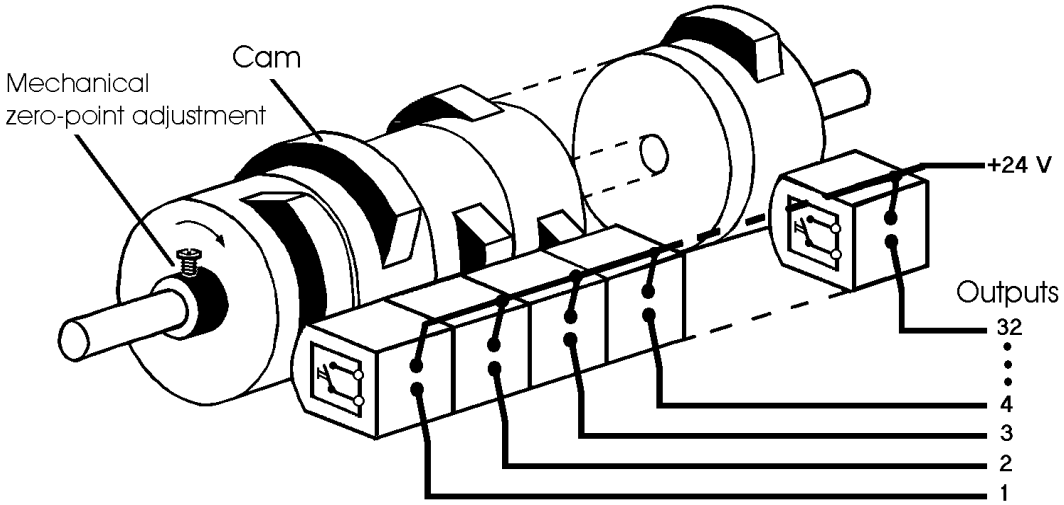
1.1.3 Suggestions

We are always pleased to receive suggestions and wishes etc. and endeavour to allow for these. It is also helpful if you bring our attention to any errors.

1.2 From the mechanical system to an electronic system

The purpose of electronic programming limit switches is not only to take the place of mechanical controllers but to render their function more precise and simpler, to provide a universal range of application and to reduce wear.

The mechanical cam control actuates a switch over sections of a circle, and this switch is closed over the length of this section. Such a section is defined as a "cam".
Each switch represents one output. Several circuits arranged in parallel produce the number of outputs.



Picture 1: Mechanical cam control

This basic principle has been adopted from the mechanical cam controls. A cam is programmed for an output by entering a switch-on point and a switch-off point. The output is switched on between these points.

Thanks to twenty years of experience, consistent further development and the use of ultra-modern technology, DEUTSCHMANN AUTOMATION has now become one of the leading suppliers of electronic cam controls.

1.3 Deutschmann Automation's range of products

See our homepage at http://www.deutschmann.de.

2 EMC Directives for products of Deutschmann Automation

The installation of our products has to be carried out considering the relevant EMC directives as well as our internal instructions.

For more information see ’EMC Directives’ on our homepage at http://www.deutschmann.de.

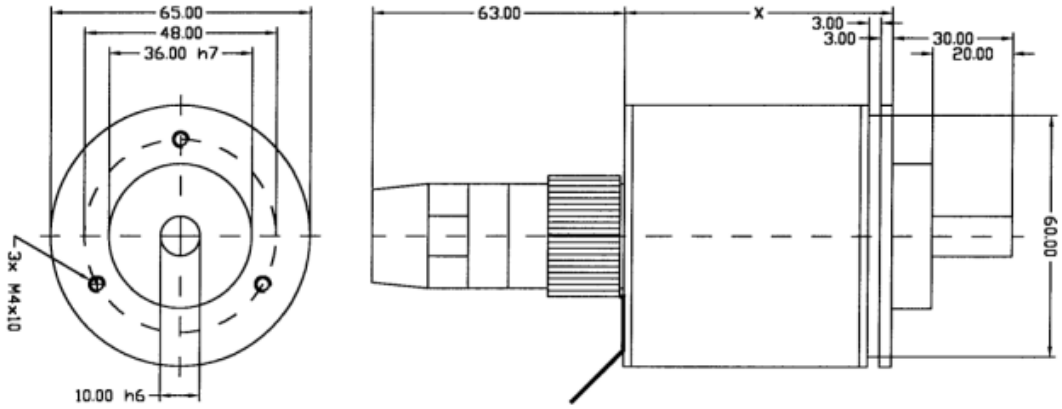
3 Basic device ROTARNOCK

3.1 ROTARNOCK 80 (singleturn)

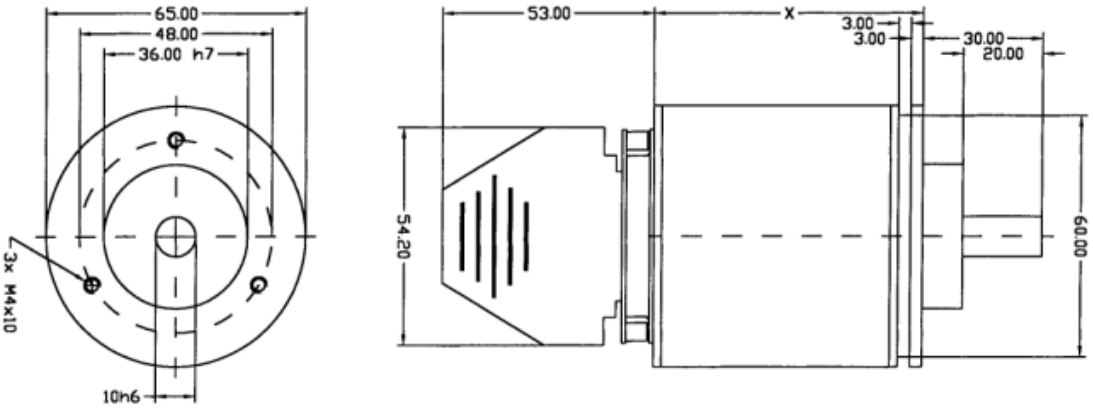
ROTARNOCK is a LOCON cam control, integrated in an encoder housing.
The technical data can be taken from the annex.

The programming is carried out a PC in connection with the software package "WINLOC32" or via an external operating unit, which, however, is not necessary for the operation. The connection between ROTARNOCK and a terminal or a PC is made via an RS232-interface according to the chapter "Networking terminals with cam controls and PCs".
The devices of the series ROTARNOCK are also available with Profibus-connection.
More information can be found in the instruction manual „Cam controls with Fieldbus connection“.

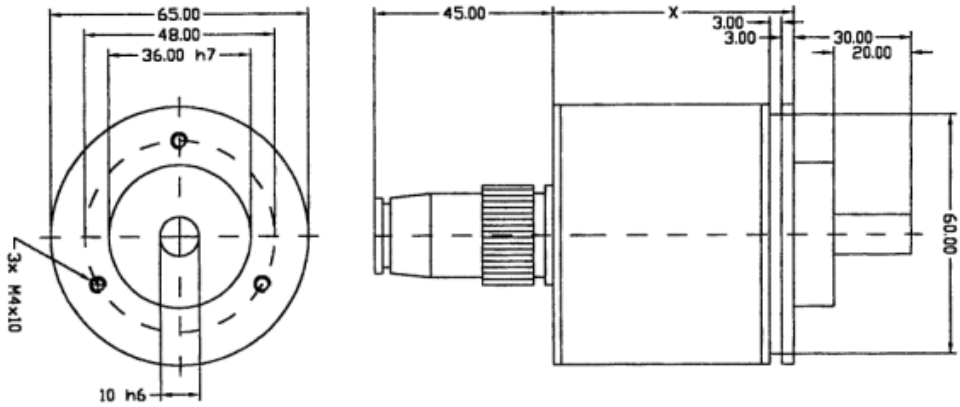
3.1.1 Dimensional drawing ROTARNOCK



Picture 2: Dimensional drawing ROTARNOCK RS232, option IF, version IP65



Picture 3: Dimensional drawing ROTARNOCK RS232 or Profibus, version IP54



Picture 4: Dimensional drawing ROTARNOCK with Profibus, version IP65

x = 69 mm at ROTARNOCK with RS-interface, version IP54 or IP65
x = 81 mm at ROTARNOCK with Profibus-interface, version IP54
x = 98 mm at ROTARNOCK with Profibus-interface, version IP65

3.2 Pin assignment ROTARNOCK

ROTARNOCK is delivered in the standard type (RS232) with a 25-pole D-SUB-plug (pin). Optionally ROTARNOCK is also available with Profibus-interface. The device is then equipped with an additional 9-pole D-SUB-plug (socket).
The device can also be equipped with a 28-pole round plug (option IF).

3.2.1 25-pole D-SUB

The pin assignment of the 25-pol. D-SUB-plug (pin) is as follows:

Function	Cable color	Pin 25pol. socket
Output 1	White	1
Output 2	Brown	2
Output 3	Green	3
Output 4	Yellow	4
Output 5	Gray	5
Output 6	Pink	6
Output 7	Violet	7
Output 8	Gray/pink	8
nc	White/green	9
nc	Brown/green	10
nc	White/yellow	11
nc	Yellow/brown	12
nc	White/grey	13
nc	Gray/brown	14
nc	White/pink	15
nc	Pink/brown	16
Tx-ROTARNOCK	Pink/red	17
Rx-ROTARNOCK	Gray/red	18
ProgSelect1	White/black	19
ProgSelect2	Brown/black	20
ProgSelect4	Gray/green	21
ProgSelect8	Yellow/gray	22
ProgSelectStart	Pink/green	23
24 V-DC	Red + yellow/black	24
GND	Blue + black	25

3.2.2 Pin assignment 9-pole D-SUB at the Profibus-version

Pin-No.	Name	Function
1	not connected	
2	not connected	
3	B	not-inverted input-/output-signal from PROFIBUS
4	not connected	nc
5	M5	DGND-data reference potential
6	P5	5V supply voltage
7	not connected	
8	A	inverting input-/output-signal from PROFIBUS
9	not connected	

3.2.3 Pin assignment 5-pole at ROTARNOCK and Profibus with IP65

Pin-No.	Name
1	P5
2	A
3	M5
4	B
5	shield

3.2.4 Pin assignment 16-pole at ROTARNOCK and Profibus with IP65

Pin-No.	Name
1	output 1
...	....
8	output 8
13	Tx
14	Rx
15	24 VDC
16	GND

3.2.5 Pin assignment 28-pole round plug (option IF)

Function	Cable color	Pin 28-pole socket
Output 1	White	1
Output 2	Brown	2
Output 3	Green	3
Output 4	Yellow	4
Output 5	Gray	5
Output 6	Pink	6
Output 7	Violet	7
Output 8	Gray/pink	8
nc	White/green	9
nc	Brown/green	10
nc	White/yellow	11
nc	Yellow/brown	12
nc	White/grey	13
nc	Gray/brown	14
nc	White/pink	15
nc	Pink/brown	16
Tx ROTARNOCK	Pink/red	17
nc	Gray/blue	18
Rx-ROTARNOCK	Gray/red	19
nc	Pink/blue	20
ProgSelect1	White/black	21
ProgSelect2	Brown/black	22
ProgSelect4	Gray/green	23
ProgSelect8	Yellow/grey	24
ProgSelectStart	Pink/green	25
nc	-	26
24 V-DC	Red + yellow/black	27
GND	Blue + black	28

3.2.6 External zero point- and error-display

ROTARNOCK is supplied with an LED at the back of the device, which displays the real zero point (without considering the electronic zero-shift).
Because of that an exchange of the device is simplified in case of a default.
In case the ROTARNOCK detects an error, this LED flashes permanently.

3.3 Signal description ROTARNOCK, also Profibus

Function	Significance
Output 1 ... Output 8	Output block 1 Each output 24V / 0.3A plus-switching (PNP), short-circuit-proof Total current of the output block maximum 1A at 25°C and full load
Rx	Receive signal RS232
Tx	Transmission signal RS232
24 VDC	Supply voltage 24 volt DC
GND	Ground potential of the complete cam control
ProgNo 1 ... ProgNo 8*	in case of external program selection the program number is set at these pins. The coding takes place in a binary way referring to the chapter "Coding device numbers".
ProgStart*	If this pin is connected with 24V, the program number is taken over at the pins ProgNo1 to ProgNo8 (see above).
nc	Not connected
Shield	
A	Inverted input/output signal
B	Not-inverted input/output signal
P5	5V supply voltage
M5	Data reference potential

(* not valid for ROTARNOCK Profibus.)

4 Basic device TERM 6 (external operating unit)

4.1 Assembly of the instrument

This external control- and display unit consists of a metal housing with overall dimension W72xH96xD18 mm for front sheet installation and W72xH96xT28 mm for DIN-rail mounting.

It is adjusted for programming cam controls (LOCON, ROTARNOCK).
On the 16 LEDs below the seven-segment-display the first 16 outputs of the connected cam controls are displayed with a delay of maximum 500ms.

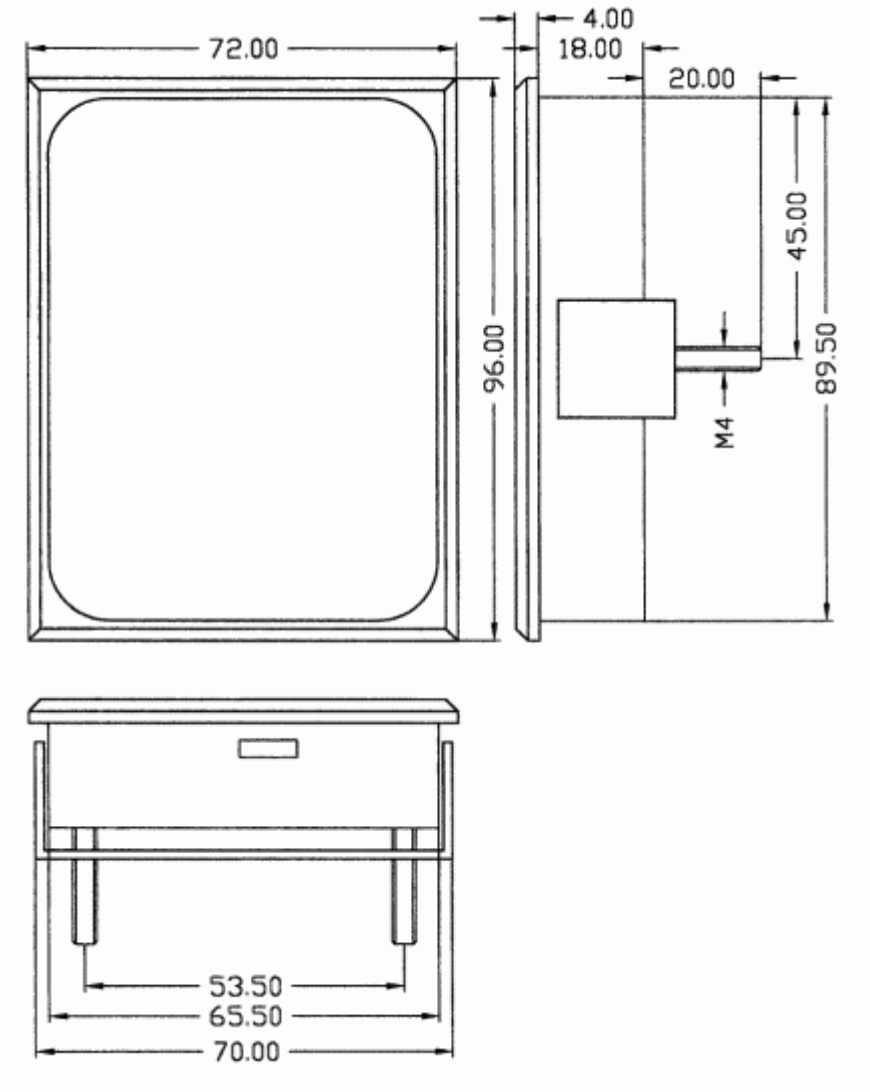
The connection to the cam control takes place via a serial wire. According to the standard type an RS485-connection (DICNET) and an RS232 (switchable) are available.
The correct wiring of the instruments among themselves is described in the chapter "Networking terminals with cam controls and PCs".

4.2 View TERM 6

Picture 5: TERM 6

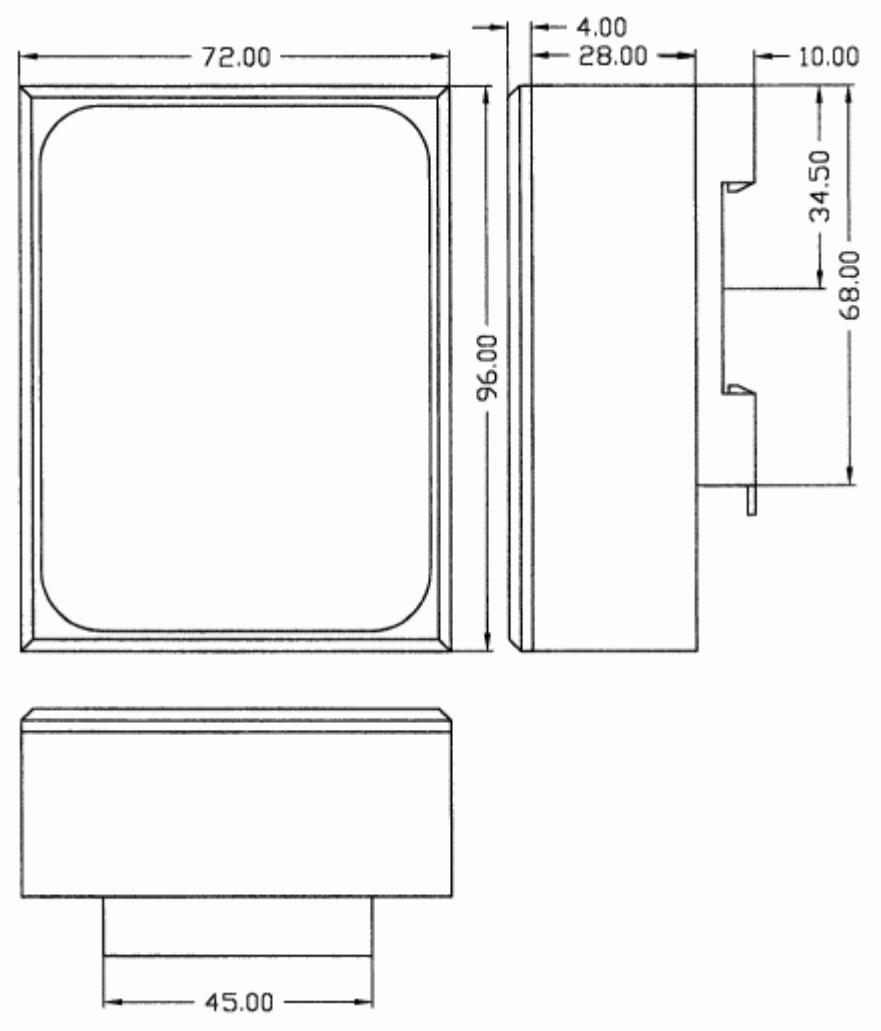
4.3 Technical dimensional drawings

4.3.1 TERM 6



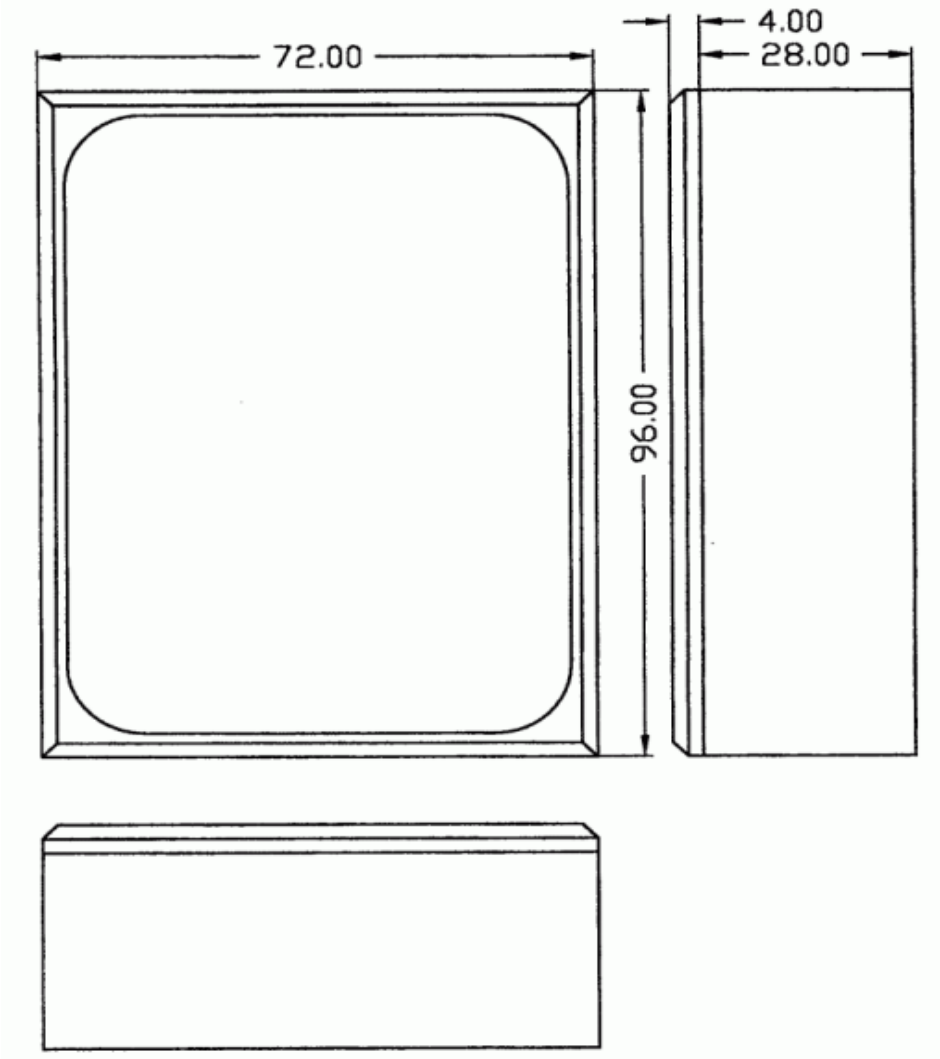
Picture 6: Technical dimensional drawing TERM 6

4.3.2 TERM 6-H



Picture 7: Technical dimensional drawing TERM 6-H

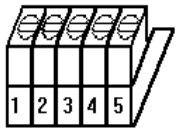
4.3.3 TERM 6-T



Picture 8: Technical dimensional drawing TERM 6-T

4.4 Pin assignment TERM 6

The external control unit is suitable for connection through a 5-pin-screw-plug-connection with the following assignment:

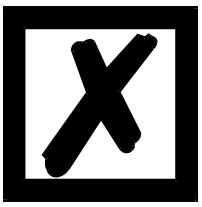


Picture 9: 5-pin-screw-plug-connector

Pin No.	Significance
1	24 Volt DC
2	GND
3	Rx-TERM (DICNET-)
4	Tx-TERM (DICNET+)
5	GND

4.4.1 Interface switch-over

The interface switch is to be found under the sticker with the imprint RS232/RS485. In the state of delivery it is set as indicated on the marking of the sticker.The position of the desired interface can be taken from the sticker at the back of the device. Please use an appropriate tool to change the position of the microswitch to the left or to the right.



Please note the signal description on the following pages!

4.5 Programming of several devices with TERM 6

TERM 6 is network-capable in the version with DICNET-connection, i. e. up to 16 cam controls (LOCON, ROTARNOCK ...) can be connected with TERM 6 **at the same time** and they can be programmed by it.
The device number of the device TERM 5/6 is communicating with at the moment appears at the 1. place on the display.

4.5.1 Selecting the device number on TERM 6

TERM 5 always communicates with that ROTARNOCK whose device number is indicated at the 1. place of the display in hexadecimal spelling (0 to F, see also table in the annex).

After switching on the unit the device number, which is tuned by the rotary switch (0 to F) at the back, is displayed there.
During service this device number can be changed by the keyboard at any time. In standard mode (see chapter "Definitions") for this purpose the key Enter has to be pressed for at least 3 seconds.

Then the displayed ID begins to flash and can be changed with the help of the keys + and −. After adjusting the right value, it is confirmed with Enter and from this time on TERM 6 communicates with the new selected ROTARNOCK, if an instrument with this coding exists in the network.
Should the adjusted value be dismissed and the old ID be restored, this takes place with the key Esc. In case there is no control system with the chosen ID in DICNET, it appears the display

"- - - - -"

If the TERM 6 is switched to the RS232-interface, the first place shows the actual program of the connected cam control.

4.6 Display of the executed program via TERM 6

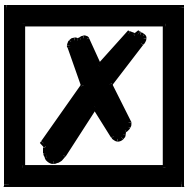
When connecting a ROTARNOCK with the operating and display unit TERM 6 via the RS232-interface, the first place on the left side permanently displays the program that is executed that moment.
This only applies to a RS232-TERM 6, as the DICNET-version displays the device number at this place.

4.7 Reading and changing cam control parameters via TERM 6

All cam control parameters that can be reached via the communication profile with GET/SET-PARAMETER can be read and changed via a “menu point“ that is integrated in TERM 6.

Starting from the main menu the keys + and − are pressed for the same time period. Thereupon the function LED shines and a 1 (current parameter number) appears on the display.

Now this number can be changed with + and −. (see parameter table in chapter 4.9)
If, for instance, the virtual encoder value is to be read / changed, please select (see parameter table in the manual communication profile) the number 19 (corresponds to 13H = PNR_SCALED_ENCODER_RES). Confirm with Enter and the encoder resolution of the connected cam control is displayed (e. g. 1000). To change this value, please press Enter again (long). Then the Prog-LED and the Function LED start to flash. Now the value can be changed with + or −. Then by pressing Enter the new value is loaded into the cam control, the value is rejected with Esc.
Special parameters in X-options can also be handled as described in this chapter.



Important:
Before the configuration the device should not contain programmed data. After the configuration the device has to be restartet so that the changes will be applied. Restarting the device may take a while.

4.8 Possible error messages on the configuration

In case of a wrong application during the configuration might result in error messages:
E34 -> Changing the parameter invalid
E36 -> Parameter not present
E37 -> When programming an angle-time-cam greater than output 8

4.9 Parameter table

This Parameter table is used by the commands GET_PARAMETER and SET_PARAMETER.

Command's name	Command's value	Parameter number in config-menu of TERM 6	Meaning	Explanation
PNR_SOFT_REV	0x0001	1	s. PNR_HARD_REV	
PNR_HARD_REV	0x0002	2	ASCII z. B: '3''1''2' 't' = V3.12t - gives back the soft- or hardware version	
PNR_UNIT_NAME	0x0003	3	ASCII i. e. 'L' '4' '8 '' ' = L48	
PNR_UNIT_TYP	0x0004	4	Device type	
PNR_VNUMBER	0x0005	5	Article number	
PNR_SN	0x0006	6	Serial number	
PNR_OPTION X	0x0007	7	Option X	
PNR_ENCODER_TYP	0x0010	16	Encoder type	
PNR_RESOLUTION_PER_TURN	0x0011	17	Real-resolution per revolution	
PNR_NUMBER_OF_TURNS	0x0012	18	Real-number revolution	
PNR_SCALED_ENCODER_RES	0x0013	19	Virtual encoder value	
PNR_ENCODER_INVERT	0x0014	20	Reversal of rotational direction	
PNR_SCALED_COUNT_RANGE	0x0017	23	Virtual count range	
PNR_COUNT_RANGE	0x0018	24	Counting area at incremental encoders	
PNR_COUNT_RESTORE_VALUE	0x0019	25	At X 16: = brake point	
PNR_TIMEBASE	0x001C	28	Time basis at Timer	
PNR_DEADTIME_BASE_US	0x001D	29	Time unit for idle time compensation in µs (if not defined -> 1000µs)	
PNR_NUMBER_OUTPUTS	0x0020	32	Number of outputs	
PNR_NUMBER_LOCK_OUTPUTS	0x0021	33	Number of locked outputs	
PNR_NUMBER_DATA_RECORDS	0x0022	34	Number of data records	
PNR_NUMBER_LOGIC_INPUTS	0x0023	35	Number of Logic inputs	
PNR_NUMBER_ANGLE_TIME	0x0024	36	Number of angle/time outputs from output 1	
PNR_NUMBER_OUTNAME_CHAR	0x0025	37	Output names	
PNR_NUMBER_PROGRAMS	0x0026	38	Number of programs	
PNR_NUMBER_AXIS	0x0027	39	Number of axes	
PNR_NUMBER_ANALOGOUTPUT	0x0028	40	Number of analog outputs	
PNR_NUMBER_COUNTERCAM	0x0029	41	Number of counter cams	
PNR_FIRST_OUTPUT_NR	0x002A	42	Counting starts at 1	
PNR_SPEED_SCALE	0x0030	48	With reference to rev./ms =>60000 = rev./min 0...9999 (rev./s)	
PNR_LANGUAGE	0x0031	49	Language	
PNR_DEADTIME_TYP	0x0032	50	ITC-type	
PNR_ZEROPOINT_OFFSET	0x0033	51	Scaled preset value at inc.	
PNR_ACTIV_PROGNR	0x0034	52	Active program	0..max program -1
PNR_ACTIV_AXIS	0x0035	53	Active axis	1..max AxisNo.
PNR_CALC_SPEED_START	0x0036	54	IdleStart scaled	
PNR_CALC_SPEED_STOP	0x0037	55	IdleStop scaled	
PNR_DICNET_ID	0x0038	56	Actual value (PLS = 80..95), RS232 = 232	
PNR_CLEAR_LENGTH	0x0039	57	Length clear pulse	
PNR_BREAK_PARA	0x003A	58	(BrakeA*0x10000) + BrakeB	
PNR_OUTPUT_OFF_SPEED	0x003B	59	Speed-threshold value below which the outputs are switched off	
PNR_WZ_MAXTIME	0x003C	60	Time in ms	
PNR_WZ_TIMEBASE	0x003D	61	Time in µs	
PNR_V_LIMIT	0x003E	62	M13 = 1, if V_LIMIT is exceeded	
PNR_DREHSCHALTER	0x003F	63	Read switch position	
PNR_RESTART	0x004E	78	Warmstart with value 1:0x1234 -> 2:0xEDCB	
PNR_CLEAR_EEROM	0x004F	79	General deletion: 1: 0x1234 -> 2:0xEDCB	
PNR_STATUS_FLAGS	0x0050	80		
PNR_PROC_OUT_MAPPING	0x0051	81	Mapping of the process data in the Fieldbus	
PNR_PROC_IN_MAPPING	0x0052	82	Mapping of the process data in the Fieldbus	
PNR_USED_EEROM_LEN	0x0053	83	Actual used EEROM length	
PNR_S7_MODE	0x0054	84	1 = S7 do not copy data into the EEROM	
PNR_RESET_EEROM	0x0055	85	Set to set in factory 1:0x1234 ->2:0xEDCB	
PNR_CYCLETIME	0x0056	86	Read cycle time	
PNR_AKTIV_STATUS	0x0057	87		
PNR_PROC_LOAD	0x0058	88	Processor utilization	
PNR_ENABLE_OPTION	0x0059	89	Release of options	
PNR_TEACH_IN_ZEROPOINT	0x0060	90	Teach-in zero offset	
PNR_ENABLE_TESTMODE	0x005B	91	With 0x1234 -> Switch to testmode	

5 Networking terminals with cam controls and PCs

The chapter below illustrates certain connection examples between the units both via the DICNET bus and via the RS232 interface.
All DEUTSCHMANN controls (LOCON, ROTARNOCK ...) with a DICNET bus can be included in this network. The following principles apply in general:

5.1 RS232 link

An RS232 link is always a **point-to-point link for 2 users**.
Here, it must be borne in mind that, on connection, the Tx end of one user is connected to the Rx end of the other user and vice versa. Moreover, the device ground potentials must be interconnected.

5.2 RS485 link (DICNET®)

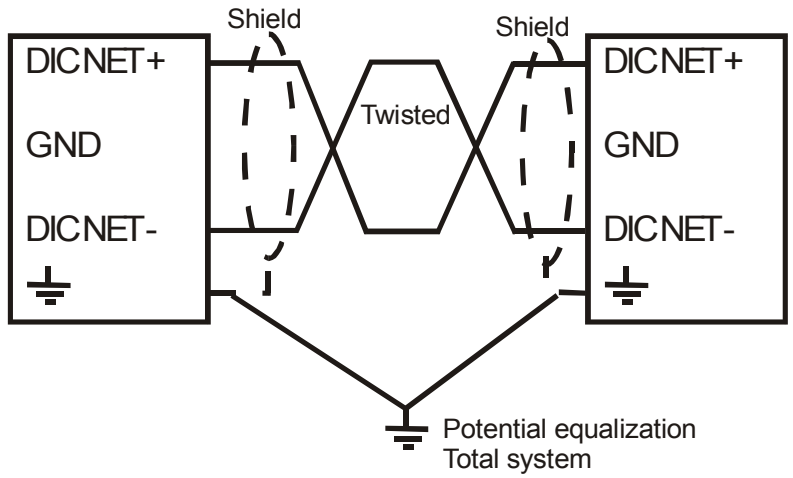
A DICNET® link is a bus system to which at maximum configuration level 16 cam controls (LOCON 32, LOCON 24 ...), 16 display units (TERM 4), 16 operator terminals (TERM 6, TERM 24 ...) and 1 PC can be connected **simultaneously** via a **twisted two-wire line** which should be shielded.
All "DICNET+" terminals are interconnected and all "DICNET-" terminals are interconnected. The terminals do not need to be reversed as on the RS232 interface.
Likewise, not necessarily there is a connection of the individual device ground potentials as on the RS232 interface; **however, you must ensure that the potential difference between the individual devices does not exceed 7 V.**
Consequently, equipotential bonding is generally carried out in practice at a central point (for example, in the switch cabinet).
Moreover, please ensure that the two bus users feature bus termination resistors at the start and end of the bus by connecting DICNET+ to R+ and DICNET- to R-, since, otherwise, serious transmission problems could occur.
If the devices are connected to the bus with a stub-end feeder, the length of the stub-end feeder may not exceed 1 m, so as to guarantee trouble-free operation.

5.2.1 Cable type for DICNET®

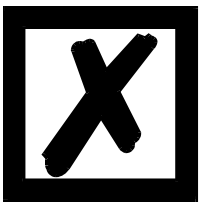
A shielded, twisted, 2-core cable (twisted pair) is recommended as bus cable. The shield serves to enhance electromagnetic compatibility (EMC). However, an unshielded cable may also be used if ambient conditions permit it, i. e. if no electromagnetic interference (EMI) is to be expected.
The characteristic impedance of the cable should be between 100 and 130 *Ω at f > 100 kHz; the cable capacitance should be < 60 pF/m wherever possible and the wire cross-section should be minimum 0.22 mm^2 (24 AWG).

A cable that fully complies with these specifications and that has been developed specifically for use in field bus systems is the UNITRONIC®-BUS LD cable 2 x 2 x 0.22, available on a drum from LAPP KABEL in Stuttgart, or by the metre from DEUTSCHMANN AUTOMATION.

The minimum wiring with shielding between two bus users is shown in the following illustration:



Picture 10: DICNET-wiring



The two signal wires may not be reversed!
<u>GND of the two devices do not necessarily have to be connected.</u>
The potential difference between the data reference potentials GND of all interface connections may not exceed ± 7 V.

5.2.1.1 Earthing, shielding

If using a shielded bus cable, we recommend that the shield is connected at both ends and with low inductance to PE in order to achieve optimum EMC wherever possible.

5.2.1.2 Line termination at DICNET®

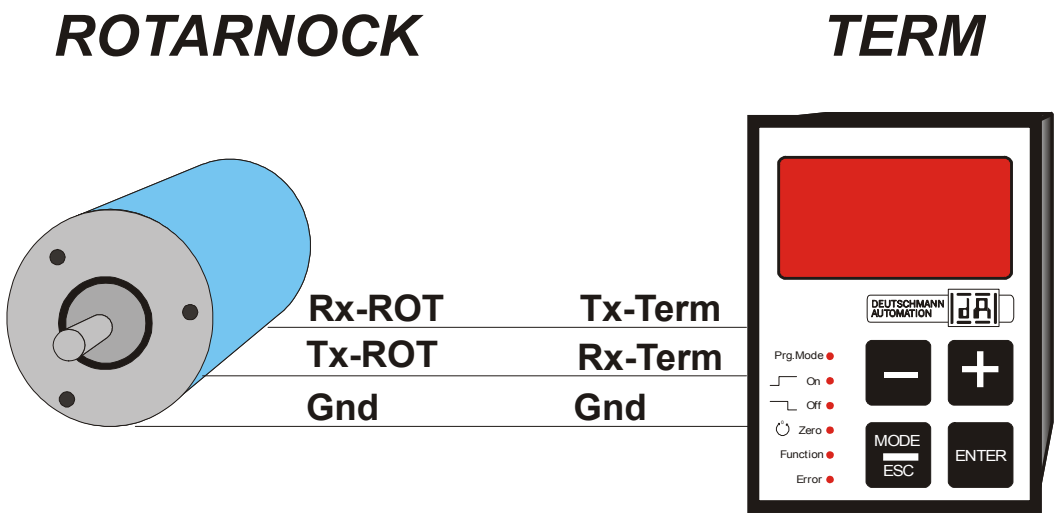
The two ends of the entire bus cable must each be fitted with a line termination. This avoids signal reflections on the line and ensures a defined open-circuit potential if no user is transmitting (state of rest between the telegrams, so-called idle state).
In this case, please ensure that the line termination is made at the physical ends of the bus cable, i. e. the integrated bus termination resistor must be activated at both devices located at the start and end of the bus.

5.3 Comparison DICNET® - RS232

If you intend to set up a permanent link between terminal and one or more cam controls, preference should be given to connection via the DICNET® bus and not the RS232 interface since the bus features a higher level of data integrity, i. e. transmission errors which may occur, for instance, as the result of noise pulses are automatically detected and corrected by DICNET® up to a certain extent.
Wherever possible, the RS232 interface should be used only for temporary connections (e. g. for connecting a PC).

5.4 RS232 link ROTARNOCK - TERM

On the RS232 version, only a point-to-point connection between ROTARNOCK and the external operator control panel is possible.
In this case, the Tx ROTARNOCK line must be connected to the Rx TERM line of the operator control unit and vice versa, as can be seen from the illustration below.
The two ground potentials **must** be connected.



Picture 11: RS232 link Terminal - ROTARNOCK

The presented devices exemplary stand for Deutschmann terminals and cam controls of the series LOCON / ROTARNOCK respectively.

6 Programming ROTARNOCK with TERM 6

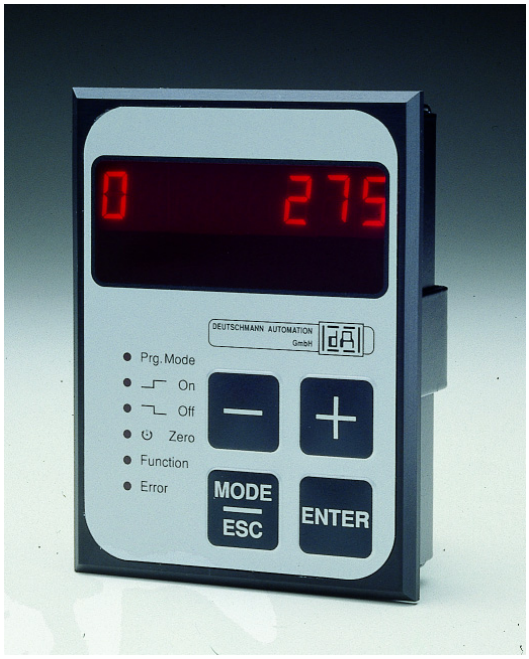
6.1 Basics

3 ways to program ROTARNOCK:

- Input of the switch-on- and switch-off points of the cams through the operation front
- Input of the cams in the TEACH-IN process
- Programming of ROTARNOCK offline on a PC with a subsequent download of the program via a serial interface

At this point the offline-programming is not described more detailed because it can be taken from the separate program-description "WINLOC32".

The other two programming-possibilities are dealt with more detailed in the following chapters. Generally a complete programming of ROTARNOCK is possible with the 4 keys, the 7-segment-display and the 6 status LEDs according to the following picture.



Picture 12: TERM 6

6.2 Program structure

The graphs shown on the following two pages should serve the operators, who have experience in programming cams, as a survey how to program ROTARNOCK.
The different states of ROTARNOCK are represented by the big boxes; the smaller boxes reflect actions which are caused by pressing a key (represented by arrows).

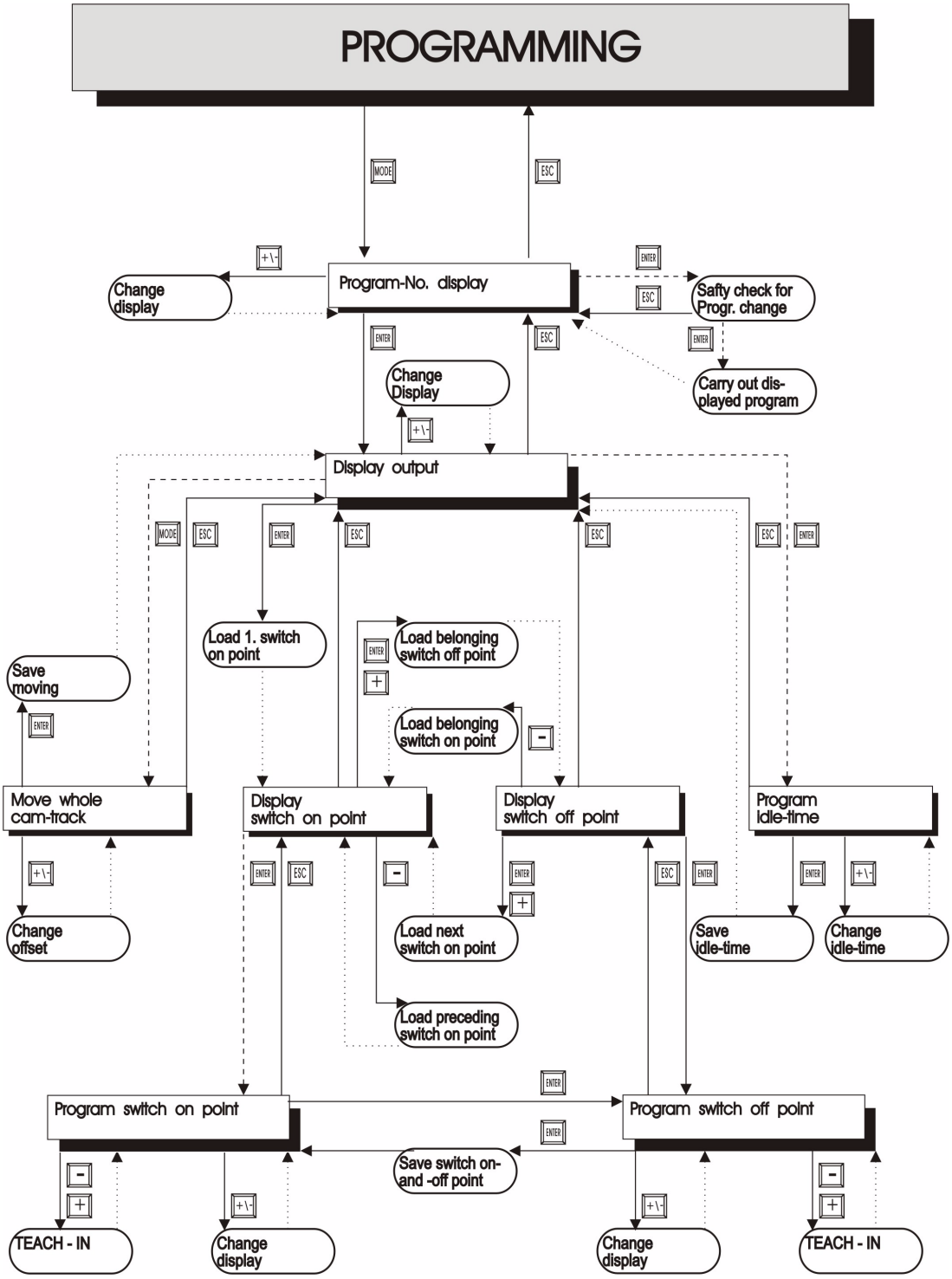
Generally the following rules apply:

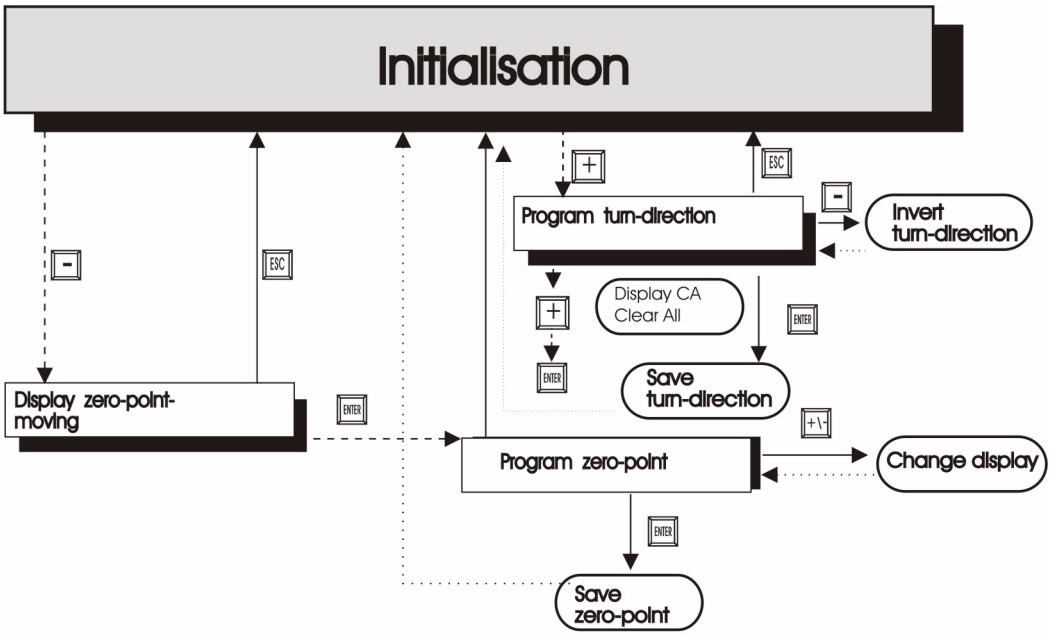
1) With the help of the Enter-key it can be switched to the next menu-point.

2) With the help of the Esc-key the program process is broken off or is returned to the previous menu point.

3) By pressing the Enter-key for a longer time it can be switched from a display-mode to the corresponding programming mode.

4) With + and − the displayed value in the program mode can be changed. With it a three-stage autorepeat-function is supported, i. e. one key is pressed steadily, the change of the display follows for a while in one step, then in five steps and in the end in twenty steps. Therefore a fast change of the display in the whole field is guaranteed.


PROGRAMMING
MODE
ESC
+\-
ENTER
Change display
Program-No. display
Safty check for Progr. change
Change Display
Carry out dis-played program
Display output
Load 1. switch on point
Load belonging switch off point
Load belonging switch on point
Save moving
Move whole cam-track
Display switch on point
Display switch off point
Program idle-time
Change offset
Load next switch on point
Load preceding switch on point
Save idle-time
Change idle-time
Program switch on point
Program switch off point
Save switch on- and -off point
TEACH - IN
Change display
Change display
TEACH - IN



LEGEND

At the graph are only standardfunctions considered.
All functionkeys are arranged on the right or above.

———— Keypush normal
- - - - - - - - Keypush long
..... Remove automatically

A more detailed description on how the device is programmed via TERM 6 can be found in the instruction manual for ”LOCON 16 / 17”. The described ways of proceeding for LOCON 16 / 17 also apply for TERM 6.

A more detailed description on how the device is programmed via TERM 24 can be found in the instruction manual for ”LOCON 24 / 48 / 64”. The described ways of proceeding for LOCON 24 / 48 / 64 also apply for TERM 24.

6.2.1 Definitions

Active program — The program that is finished by ROTARNOCK, i. e. this program determines how the outputs in dependence on the encoder position are set. After switching on the active program is the one that was processed as active program when switching off the last time.

Normal mode — ROTARNOCK is directly in that mode when switching on. Either the encoder position or the speed is displayed. The active program is carried out.

Display mode — Either the switch-on- or the switch-off-point of the programmed cams is displayed. The active program is carried out.

Programming mode — The switch-on- or the switch-off-point, which is just to be programmed, is displayed. At the same time the LED "Prg.Mode" flashes. The active program is carried out. Either the active program or any other program can be programmed.

Blank-cam — A "blank-cam" is displayed by three horizontal dashes (“---“). It always appears, when no cam is programmed at the desired output or if a new cam can be added in the programming-activity.

6.3 Automatic shifting to the speed display

Instead of the encoder position the speed can be displayed in the normal mode. Ordering without any particulars the display takes place in rpm.
The shifting between position- and speed-display is carried out automatically. The position is displayed if the speed falls below 1 rpm; otherwise the speed is displayed.

The speed display indicates an “n“ in the second place from the left for the differentiation from position display.

6.4 Zero offset and clear-shift

The zero offset or zero-point-correction is used to synchronize the mechanical zero-point of a machine with the zero-point of an absolute encoder. It makes it possible that the encoder can be installed in every position; the mechanical zero-point of the machine does not have to correspond with the zero-point of the encoder.
The exact procedure of the zero-point-correction can be taken from the chapters "Reading out the actual zero offset" and "Programming the zero offset".

6.4.1 Reading out the actual zero offset

The programmed zero offset can be read out in normal mode by pressing the key − (long).
Then the LED "Zero" lights and the difference (zero offset) between the real encoder value and the desired encoder value (position of machine) is displayed.
This zero offset is normally programmed once on the installation of the absolute encoder. It is necessary to compensate the difference between the 0°-position of the machine and the 0°-position of the encoder with the help of software.

The procedure of this correction is described more precisely in the following chapter.

6.4.2 Programming the zero offset

In the normal mode the programming begins by pressing the key − (long) and then Enter (long).
Please note that for an easier operation in this mode the zero offset is not displayed, but the desired encoder-position.
The LEDs "Prg.Mode" and "Zero" flash.

In most cases the adjustment is made at the mechanical zero-point of the machine, i. e. the machine runs up to 0°, ROTARNOCK is set to "000" with the keys + and − and confirmed with Enter.
If the adjustment at the 0°-point of a machine is not possible, it can be carried out at any other known position. Only the desired position must be input into ROTARNOCK.

Leaving this mode is possible either by Enter, then the programmed value is stored, or by Esc, if the value should be rejected.

6.5 Displaying the active program

Pressing the key MODE/ESC in the normal mode causes that the active program appears on the display in form of "Pxx". "xx" represents the corresponding program number.

The program number on the display can be changed with the keys + and −.
If there are cams on the outputs in the displayed program, the LEDs "On" and "Off" light at the same time. Therefore it can be examined very fast, on which program values are programmed. If the displayed program is the active one (it is always at the beginning of the display mode), the middle of the three decimal points lights on the display.

The normal mode can be reached by pressing the key Esc.

6.6 Changing the active program

Based on the display of the program number (see chapter before) the active program can be changed.
Therefore that program appears on the display, that should be carried out as a new active program.

By pressing the key Enter (long) a security query takes place (from V 3.33 on) at which point the text „PG_CHG“ for „Program change“ appears on the seven-segment display.

If this query is also confirmed with Enter (long) the program change takes place and the new, active program appears on the display.

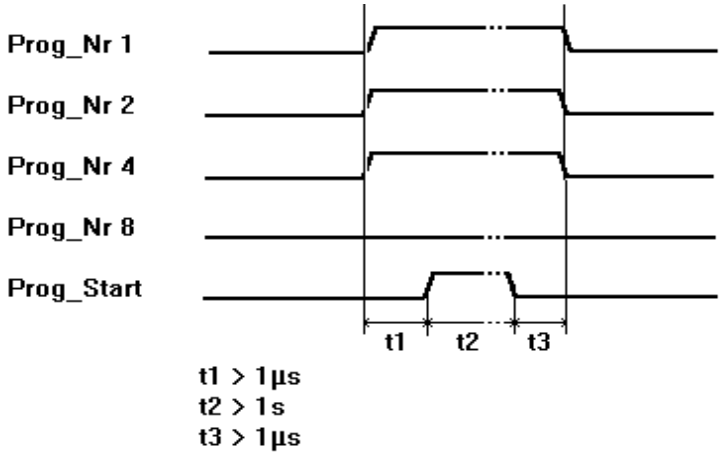
A break-off of the security query is carried out by pressing the key Esc. From that point on the outputs of the ROTARNOCK are determined by the new, active program.

A change of the active program (without security query) is also possible via THE 25pol. D-SUB-plug. A program number as a binary code must be put on the plug and afterwards a leading edge be produced at the pin "PROG_START". The high-level (24 V) must be kept at minimum 200 ms.

Should for example program 7 be activated, the following steps are necessary:
- Program 7 corresponds with the binary code 0111.

- Applying the adequate voltages: PROG_NR8 = 0V0
  PROG_NR4 = 24V 1
  PROG_NR2 = 24V 1
  PROG_NR1 = 24V 1

- Production of the takeover edge: PROG_START = 24V
  Wait 200 ms
  PROG_START = 0V



Picture 13: Program change

From software revision V5.4 in the devices ROTARNOCK 1/2/3 a faster program-changeover routine is used.
This faster routine is always active, when
1.) no partial idle time compensation is activated
2.) not more than 127 cams exist in any program.
Otherwise the “old“ method is used.
The typical changeover time at the “old“ method is 750 ms (max. 1 second), at the new method the changeover takes place in max. 280 ms (typical 100 ms).
This time period is extended by max. 200 ms at this new method, when a cam change is carried out before the propram is changed.

At both methods during an up- or download NO program changeover takes place, as otherwise inconsistent data might possibly develop in the EEROM.

6.7 Selecting the output number

Should cams be displayed, added or deleted, always the same procedure is carried out:

1) Select the desired program
2) Select the desired output
3) Carry out the manipulations of the cams

The selection of the program occurs according to chapter "Displaying the active program".

From this point on the desired output is selected by pressing the key Enter.

The selected output in form of "Axx" appears on the display. At first the output 1 ("AO1) is always shown {default}.

With the keys + or − the desired output can be adjusted.
Analogous to the program adjustment the LEDs "On" and "Off" also flash in that mode at the same time, if cams already exist on the displayed output, or rather the LED "Function", if an idle time is programmed at this output. So the outputs, to which cams are programmed, can be determined very fast within a program.

By renewed pressing the key Enter it is switched to the cam display mode, which is described more detailed in the following chapters.

6.8 Displaying existing cams

With the help of the described procedure in the previous chapters the operator reaches the mode "Display of existing cams".

At first the starting point of the first cam is displayed, that is signaled by a flashing of the LED "On". Is none of the cams programmed, a blank-cam appears instead ("- - -").

By repeatedly pressing the key − counterclockwise, the operator gets all programmed cams displayed, or he can move forward by a repeated pressing of Enter or + and the display changes between the switch-on- or the switch-off-point, that is displayed by the LEDs "On" and "Off".
After displaying the cam with the highest encoder value, the first cam follows again or vice versa, but a blank cam is added in between, because it is necessary for programming new cams, that is described later on.

6.9 Changing existing cams

Should an existing cam be changed, the cam which is to change must be displayed, as it is described in the previous chapters.

After that it is changed in the programming mode by pressing the key Enter (long) and it is important that the programming release follows by hardware.
Then the LEDs "Prg.Mode" and "On" or "Off" flash depending if the switch-on- or the switch-off-point of a cam is programmed.

With the keys + and − the desired value can be adjusted. The keys have a graduated auto-repeat-function; i. e. the longer the key is pressed, the faster the value of the display increases or decreases.

If the right value is adjusted, it can be taken over with Enter or rejected again with Esc. This automatically leads back to the display mode.

If the value is taken over, the display changes to the next value. That is either the switch-on point of the next cam, if an switch-off point has been programmed, or the switch-off point of the same cam, if an switch-on point has been programmed.
If the change was carried out in the active program, it immediately affects the other outputs.

If no other cams should be changed, you can return to the display mode with Esc.

6.10 Deleting existing cams

Deleting a cam is the same procedure as changing it, only that the switch-on point is programmed like the switch-off point or vice versa.
If ROTARNOCK recognizes that the switch-on- or the switch-off-point are identical, the cam is removed from the program.

6.11 New programming of cams

At first the new programming of a cam is the same procedure as changing it. Always when a blank cam appears on the display, the possibility of a new programming is given by changing with Enter (long) into the programming mode. Now as many cams as desired can be completed in the selected program and output. The program expects the switch-on point at first and then the switch-off point, that is marked by the flashing LEDs "On" or "Off".
The input of the values is carried out analogous to the procedure of changing the cams.
If no more cams are to be completed, it is possible to return to the display mode by pressing the Esc-key.

6.12 Teach-in programming

Instead of a manual programming of the switch-on- and switch-off values it is also possible to use the teach-in-procedure.

Teach-in-procedure means that the machine is run at the switch-on point at first, the adequate encoder value is taken over from ROTARNOCK, and then the same procedure is carried out at the switch-off point, but the operator does not have to or input the real encoder value.

Whenever a value must be input, that is obvious if the LEDs "Prg.Mode" and "On" or "Off" are flashing, the actual encoder value can be taken over instead by pressing the keys + and − **at the same time**.

The actual encoder value is displayed, which can be corrected however, if required.
The further procedure is the same as programming or changing cams.

6.13 Shifting all cams on one output

If **all** cams of one output are to be shifted by a certain number of increments, at first the desired output has to be brought on the display, as described in chapter "Selecting the output number".

After that by pressing the key MODE ESC (long) it is changed into the "shift mode". Here it has to be considered that the programming release by hardware took place.
Only the LED "Zero" flashes and "000" appears on the display.

Now the increments, by which all cams are to be shifted, can be set with the keys + and −.
If the cam switching points should be changed to a lower value it is necessary to add the encoder resolution to the value which is to be shifted, because a negative input is not possible. This value has to be input.
If for instance the switching points should be set earlier with 10 increments and if a 360-inc.-encoder is connected, this is achieved by entering 350 (360 - 10).

The autorepeat-function is supported as usual.

If the right value is adjusted, the real shift of the cams can be started with Enter or it can be rejected with Esc, that automatically leads back to the display mode in any case.

6.14 Clear all

A complete deletion of all custom-built data (cams, idle time,...) can be carried out through the external operating front or an external TERM 5 as follows:

based on the programming of the rotational direction (see corresponding chapter) by pressing the key + (long) the letters **CA** (for Clear All) appear on the display.

By pressing Enter subsequently the complete deletion is initiated, at which point "---" is visible on the display during the deletion. After the complete deletion the device is automatically restarted.

6.15 Idle time compensation (ITC)

Idle time is defined as the time that passes from putting a cam control-output to the real reaction of the connected instrument (e. g. opening a valve).
This idle time is normally fixed.

To compensate this idle time dynamically, a cam control must shift a programmed cam in dependence on the real encoder speed; i. e. a valve that should open at the position 100, must be opened for example at 1m/s at position 95, at 2m/s already at position 90.
This function is called dynamic cam shift or idle time compensation (ITC).

6.15.1 Program-dependent idle times

It is possible to program different idle times for different programs. To decrease the effort of programming, an idle time which is programmed in the program 0, is interpreted as a default idle time, that is valid for all other programs, provided that it is not programmed explicitly in this program with another value.
If for instance an idle time of 10ms is programmed in the program 0 at the output 1 and one of 20ms is programmed in the program 1 at the output 1, then the idle time of program 0 is valid as a default for all programs. Only in program 1 an idle time of 20ms is executed at the output 1.

ATTENTION: If an idle time was programmed in program 0, this idle time can be changed in other programs but it can not be deleted.

6.15.2 Programming or changing idle times

For programming idle times first of all a program and an output have to be selected (as already described in the previous chapters).
If the desired output appears on the display ("Axx"), the idle time programming is activated by pressing the key Enter (long), provided that the programming release by hardware took place.
Now the LEDs "Function" and "Prg.Mode" flash and the programmed idle time appears on the display.

With the help of the keys + and − this time can now be changed. It must be considered that this change also has a direct effect on the outputs.

This state can be left with the keys Enter or Esc, whereas Esc rejects the adjusted value and restores the old value, Enter on the other hand stores the new value.

6.16 Inverting the rotational direction of the absolute encoder

The rotational direction of the ROTARNOCK can be programmed by software. In the device's state of delivery the rotational direction is not inverted.
The display and the programming of the inversion of the rotational direction takes place as follows:

After pressing the key + (long) in the normal mode the state of the rotational direction is displayed, provided that a program release by hardware is available.

The following categorization applies:

0 = rotational direction not inverted (state of delivery)
1 = rotational direction inverted

In this state the LEDs "Zero" and "Function" flash together with the LED "Prg.Mode".

Now the state of inversion of the rotational speed can be changed by pressing the key −.

If the desired value is adjusted, the displayed value is programmed with the key Enter and a return to the normal mode takes place.

If the programming should be broken off, the old value can be restored with the key Esc and a return to the normal mode can take place.

7 Commissioning and self-test

7.1 Commissioning of the terminal

Please follow the procedure below when commissioning the terminal:

1) Connect the terminal to the required cam control
2) Connect the 24 V supply voltage

The terminal now conducts the self-test described in the following chapter, checks whether a user with the No. in accordance with the DIP switch setting is connected and then establishes the connection (provided this user is present).
The duration of the power-up phase, until the unit is ready for operation, depends on the number of network users and may take up to 10 seconds.

You will see message "not present" if no user is found with the set No.

7.1.1 Self-test of the terminal

After power-up of the terminal, the terminal conducts a self-test which takes a few seconds. The unit is then ready for operation.

The following tests are conducted during the self-test:

- Test of the entire RAM area or defective memory addresses
- Checksum test of the EPROM
- Display test; all output indicators light

Should errors occur during the self-test, these are displayed on the display if possible (see chapter "Error messages").

7.2 Commissioning of the cam control

The commissioning procedure for the ROTARNOCK is as follows:
1) Connection of the external program selection if required
2) Connection of the outputs used
3) Connection of the serial interface, if required
4) Connection of the 24 V supply voltage

The ROTARNOCK now conducts the self-test described in the following chapter, then generates the cam tables, after which it is ready for operation, i. e. the program last active (the last time the system was powered down) is executed.
The duration of the power-up phase until the unit is ready for operation depends on the number of programmed cams and may take up to 10 seconds.
A status message together with the software version information is displayed on any optionally connected PC.
If any error conditions which ROTARNOCK can detect itself have occurred, a corresponding error number is displayed. Please refer to chapter ""Error messages" for the significance of this number and the actions required.
Moreover, the optional Run-Control relay remains in dropped-out condition and the corresponding status LED "Run Error" lights.

7.2.1 Self-test of the cam control

After power-up of the ROTARNOCK, it conducts a self-test which takes a few seconds.

The unit is ready for operation then.

The following tests are conducted during this self-test:

- Test the entire RAM area for defective memory addresses
- Checksum test of the EPROM
- Checksum and plausibility test of the EEROM
- Plausibility test of the cam program

Should errors occur during the self-test, these are represented on the display if possible (see chapter "Error messages").

8 ROTARNOCK with Profibus

See instruction manual „Cam controls with Fieldbus connection“ (art.-no. V3058E).

9 Technical data

9.1 Technical data ROTARNOCK 80

Characters	Basic equipment
Operating voltage	24V ± 20%, max 150mA (no load)
Data protection	EEPROM (at least 100 years no battery required) or with WINLOC32 at the PC
Programs	16
Number of cams	2000 cams, optionally distributable to channels and programs; cams are interchangeable line wise
Zero-point offset	Programmable over the entire range with optical zero point display
Position recording	360 inc.-absolute encoder (resolution 1°)
Outputs	8, Each output 24 /, 3A, positive switching (PNP), short circuit proof. Total power output of the block max. 1A at 25 ° C and full load.
Idle time compensation (ITC)	0 ... 999ms bit wise, to be configured as desired
Cycle time	500µs
Rotational speed of the encoder shaft	360 inc.-encoder: error: 1 inc. 2 inc. 3 inc. 4 inc... rev./min.: 333 666 1000 1333..
Programming	Via external operating panel or offline with the PC
Display (on external front)	Encoder position / rotation speed
Interface	RS232 (V.24)
Optoelectronic lifetime	At least 1,000,000 hours
Shaft	Diameter 10 mm
Shaft load	Axial 40 N, radial 110 N
Max. permissible rotational speed	6000 rev./min.
Initial torque at 120 °	1 Ncm (typ)
Moment of inertia	≤ 30 gcm
Lifetime of the ball bearings	At least 400 x 10^6 rev.
Weight	Appr. 400 g

9.2 Technical data TERM 6

Characters	TERM 6
Device type	**Display- and operating unit**
Connection to	LOCON 1/2 LOCON 7 LOCON 9 LOCON 16/17 LOCON 24 LOCON 32/32PM LOCON 32-HC-4X-INK/32PM-4X-INK LOCON 32-HC-4X-ABS/32PM-4X-ABS LOCON 48 LOCON 64 ROTARNOCK 1/2/80/100 MULTITURN-ROTARNOCK
Display	8 digit 7-segment display for encoder position/rotational speed
Interface	RS485 DICNET®-and RS232 (V.24) (switchable) up to 3 terminals in one network possible for DICNET-operation
Connections	With screw-plug-connector
Installation	Front panel installation DIN-rail mounting portable version
Type of protection	IP54
Dimensions	72 x 96 x 18 mm (BxHxT) 72 x 96 x 28 mm (BxHxT) DIN-rail version
Weight	Appr. 200 g
Switchgear opening	66 x 90 mm
Operating voltage	10 - 30 VDC

Recommendation for new customers:
For new projects please directly use the more intelligent TERM 6!

10 Technical details

10.1 Specification of the input levels

Logical High:> 16 Volt < 10mA (typ. 5mA)
Logical Low: < 4 Volt < 1mA

10.2 Specification of the RS232-transmission protocol

On request ROTARNOCK is in the position to supply information on

- speed
- encoder position
- state of the outputs

via the RS232-interface (9600 Baud, 8 data bit, 1 start bit and 1 stop bit, no parity bit).

For this purpose the following 4-byte-command sequence has to be sent to ROTARNOCK via the RS232-interface (all values in binary form):

Here the first 3 bytes serve to start a cyclical sending out of the above mentioned information, where the 4. byte (cycle-time) gives the time pattern in 10 ms-steps. If, for instance, the sequence 24 04 04 100 is transmitted, ROTARNOCK sends its information via the serial interface every 1 second.

ROTARNOCK cyclically sends a data record with 8 bytes, that is coded as follows:

1. byte: Identification (always 26)
2. byte: If >127, then speed follows, otherwise position
3. byte: Speed/position (Low Byte)
4. byte: Speed/position (High Byte)
5. byte: Status (without meaning)
6. byte: State of the output 9..16
7. byte: State of the output 1..8
8. byte: Current program

The information, that is indicated on the integrated operation front that moment is always sent as 3. and 4. byte (see also chapter "Automatic shifting to the speed display").

10.3 Specification of the output drivers

The used outputs in ROTARNOCK are positive switching, short circuit proof and can drive maximum 300mA per output with a normal ambient temperature. 8 outputs of a driver (1..8 9..16, 17..24, 25..32, 33..40, 41..48, 49..56, 57..64) that belong together can operate with maximum 1A at 25°C and full load.
If more than 300mA per output should be required, it is possible to switch more outputs together (up to 3 outputs per driver). In this case up to 900mA can be driven.
If several outputs are switched together, the switch-on- and switch-off points in ROTARNOCK must be programmed absolute identically. Otherwise the short circuit control reacts.

In case of a durable short-circuit or an overload the necessary outputs are switched off, and a corresponding error message is indicated on the display.

When switching inductances (coils, valves) free-wheeling diodes have to be put directly at the inductances (see chapter "EMC Directives for products of Deutschmann Automation").

10.4 Switching accuracy of Deutschmann cam controls

The accuracy of cam controls is influenced by four parameters:

1) Switch delay (SD)

This time is constant and results from the calculating time the cam control requires from reading-in the encoder value up to setting the output driver.

2) Repeat precision (RP)

This tolerance range results from the asynchronous scanning of the encoder. Ideally the encoder is directly scanned after a change, in the worst case the encoder value changes directly after reading-out the cam control.

3) Resolution

This value indicates the length of the shortest cam, which is definitely evaluated by the cam control.

4) Idle time resolution (ITR)

This error appears only, if an idle time is programmed for the adequate output. It's given in ms and represents the scanning time of the encoder speed, which serves as a basis of the ITR.

Generally the SD and the RP are lower than the cycle time of the cam control. That means, the real switch point is between the moment "switch-on point + SD" and "switch-on point + SD + RP", as it is explained in the following graph.
Without idle time compensation (ITC) the resolution is one increment, as long as the maximum encoder speed is not exceeded; i. e. also a 1-increment-long cam is perfectly recognized and set.
By exceeding the encoder speed ($V_{encoder}$) n-times, the resolution increases appropriate to n increments.
By working with idle time compensation the error increases only by one increment, because the correction of ITC, which is caused by the implemented "dynamic brake" at LOCON, comes to maximum $\pm$ 1 increment at each change of the encoder position.

In summary the following formula can be set up:

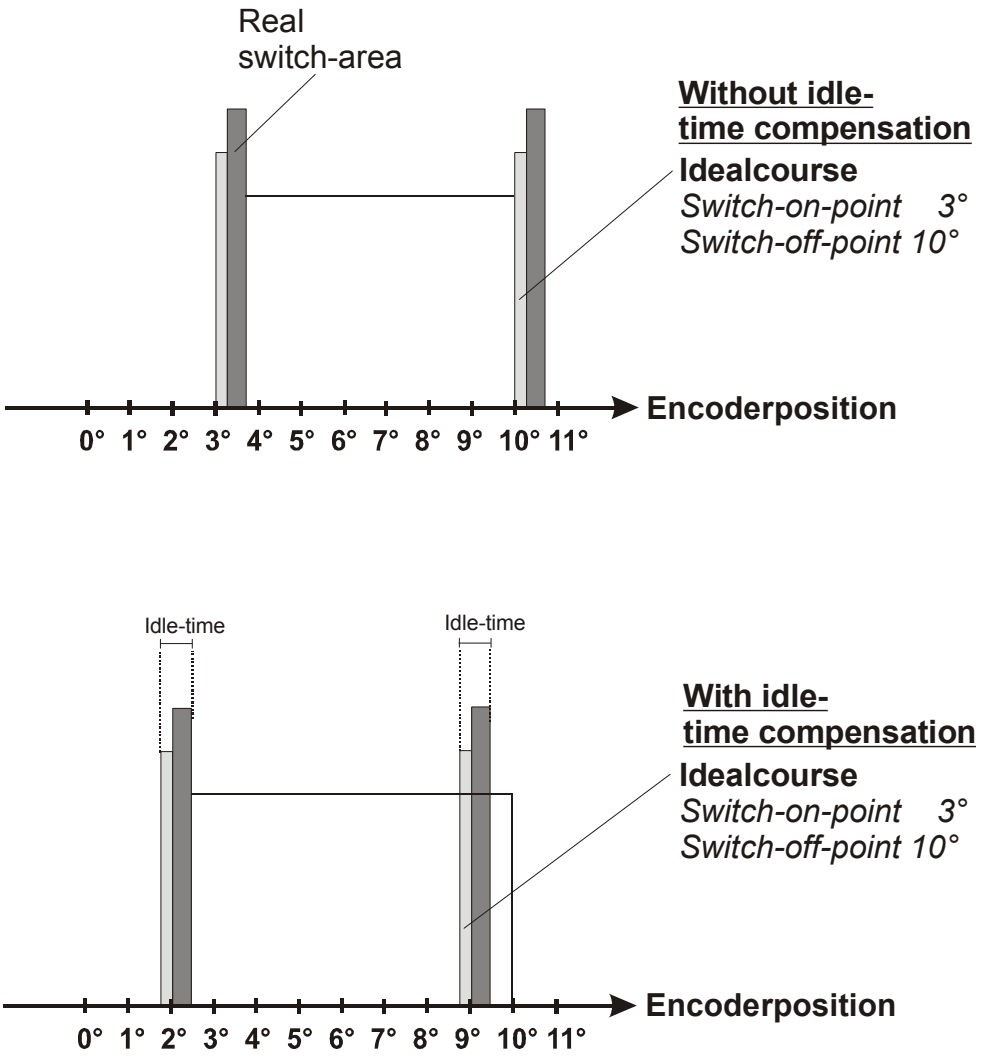
Without idle time compensation:

Real switch-point = ideal switch-point + SD (const.) + RP
SD < Cycle time (const. typical cycle time/2)
RP < Cycle time (varying between 0..cycle time)
Resolution = n increments, when $V_{encoder} < n * V_{encoder\ Max}$

With idle time compensation:

Real switch-point = ideal switch-point + SD (const.) + RP + ITR
SD < Cycle time (const. typical cycle time/2)
RP < Cycle time (varying between 0.. cycle time)
ITR = Resolution of the ITC (typical 1ms)
Resolution = n increments, when $V_{encoder} < n * V_{encoder\ max}$, with $V_{encoder}$ const.
Resolution = n + 1 increments, when $V_{encoder} < n * V_{encoder\ max}$, with $V_{encoder}$ variable

10.4.1 Time diagram



Picture 14: Time diagram - Idle time compensation

10.5 Environmental specifications of cam controls of the ROTARNOCK series

Storage temperature:	-25°C.. + 70°C
Operating temperature:	0°C .. 45°C (without forced convection) 0°C .. 65°C (with forced convection)
Relative humidity:	Max. 80% no condensation, no corrosive atmosphere
Enclosure:	IP54 (optionally IP65)
Shock:	15 G/11 ms
Vibration:	0.15 mm/10..50 Hz, 1G/50..150 Hz
Weight:	Appr. 400 g

10.6 DICNET®

DICNET® (**D**EUTSCHMANN **I**ndustrial **C**ontroller **Net**) is a multi-master fieldbus whose physical layer complies with the ISO-OSI Layer Model of DIN 19245, part 1, i. e. a connection is established between all users in the network with one RS485 two-wire line.
The physical arrangement is thus a bus system on which the users can be connected and disconnected as required.

Logically, the system comprises a token ring, i. e. only the user granted bus access authorization (token) may send on the bus. If this user has no data for another user, it forwards the token to its neighbor which was determined in a configuration phase.
This principle achieves a deterministic bus cycle time, i.e. the time (worst-case) until a data packet can be sent can be computed precisely.
Automatic reconfiguration occurs when a user is connected or disconnected.

The transmission baud rate is 312.5 kilobaud with a length of 11 bits/byte. A maximum of 127 users may be operated on one bus, whereby data packets of maximum 14 bytes per cycle can be sent.
An automatic check of the received information is conducted and an error message is issued should a transmission error occur twice.

The maximum extent of the network may not exceed 500 m.
In order to avoid transmission errors, it must be ensured that both ends of the bus are terminated correctly.

10.7 Communication interface

DEUTSCHMANN AUTOMATION encourages the use of cam controls with remote control and display unit in order to meet market requirements.

Since different combinations of cam control and terminal have been required repeatedly, specific to the particular application, it has been necessary to define a standard interface (communication profile) supported by all terminals and cam controls from the DEUTSCHMANN AUTOMATION range.
This makes it possible for each user to select the most suitable combination for his application.

By making the communication profile an open profile, this means that the user also has the option of communicating with DEUTSCHMANN cam controls and thus using existing information (encoder position, speed, ...) for his own applications or operating the cam control via his own terminal.
Moreover, with Deutschmann UNIGATEs it is possible to make the LOCON-family capable for fieldbuses (Profibus, Interbus, CANopen, Ethernet, ...).

On request, we are able to supply information on this interface in the form of the manual "Communication profile for DEUTSCHMANN AUTOMATION cam controls".

10.8 Coding device numbers

The device number is set in hexadecimal code on the rotary switch.
The following assignment applies:

Display	Device number	Binary coding			
		8	4	2	1
0	0	0	0	0	0
1	1	0	0	0	1
2	2	0	0	1	0
3	3	0	0	1	1
4	4	0	1	0	0
5	5	0	1	0	1
6	6	0	1	1	0
7	7	0	1	1	1
8	8	1	0	0	0
9	9	1	0	0	1
A	10	1	0	1	0
B	11	1	0	1	1
C	12	1	1	0	0
D	13	1	1	0	1
E	14	1	1	1	0
F	15	1	1	1	1

11 Error messages

A ROTARNOCK error message can be seen from the fact that the error LED flashes and an error code is shown on the connected TERM.

For ROTARNOCK 80 all errors must be acknowledged with Esc.

A distinction can be made between the following error types:

11.1 Error number 1..19 (irrecoverable error)

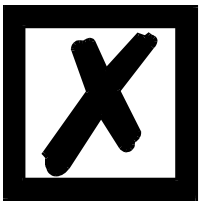
These errors are errors occurring during the self-test routine. If one of the errors 1 to 19 occurs, the unit must be returned to the manufacturer. When returning the unit, please provide the information specified in chapter "Returning a unit".

11.2 Error number 20..99 (warning)

The cam control continues running in the background in the case of all errors of this chapter, i.e. the outputs are still updated as a function of the encoder value in the specified cycle time.

Error No.	Significance	Remarks
20	Error writing to EEPROM	
21	Error saving zero-point offset	
22	Error saving a cam value	
23	Error deleting a data record	
24	Error deleting a program parameter	Parameters can be deleted only in program 0
25	Error copying a program Error shifting a cam track	
26	Time-out accessing LCD	Acknowledge error. If the error occurs again, the unit must be returned specifying the information described in chapter ‘Returning a unit’.
26	Error saving an idle time	
27	Error saving a pattern value	
27	Record number not available	At S7 data component
30	No programming enable	The program can be modified only if signal ”Prog Enable“ is at 24 V on the connector or if parameter ”Lockable outputs” is set appropriately
31	Overload switch-off of the output driver	The output drivers are short-circuit-proof. If LOCON or ROTARNOCK senses an overcurrent for a long period (under certain circumstances, also in the case of incandescent lamps with high power rating), this error message is issued. The corresponding output load must then be reduced and after that the error then be acknowledged. Only the overloaded output is switched off. The other outputs continue to operate.

32	EEPROM full	All data records in the EEPROM are used. Either you must remove cams no longer required or the unit must be equipped with a higher-capacity memory card (LOCON 32 only).
33	Duplicate switch-on point	An attempt has been made to program two cams with the same switch-on point at an output (cam track).
33	Too many angle-time-cams have been set	
34	Error programming a partial idle time compensation	Unit does not feature the 'Y' partial idle time compensation option
34	Error setting a parameter	
35	Error at logic programming	
36	An attempt has been made to activate the protocol function but no 16k memory card is fitted (LOCON 32 only)	Insert 16k memory card
36	Parameter not available	
37	Error programming a prohibited angle-time-cam	
39	No ITC or direction cam possible	For configuration without ITC or direction cams
40	DICNET® - transmit error Duplicate error on transmit	Duplicate error on transmit
41	DICNET® - receive error	Duplicate error on receive
42	DICNET® - ID error	There is already a user with the same device number (GNR) in the network or the network line is faulty (missing bus termination, line discontinuity or non-twisted lines).
43	DICNET® bus error	E. g. missing or wrong bus termination
43	No connection to the Profibus-master	Only for devices with Profibus-interface
44	Overflow of the serial receive buffer	
45	Overflow of the serial transmit buffer	
46	Error saving a blank cam	Data record incomplete
47	Error programming a direction cam	No direction cams permitted
48	DICNET® - transmit error	Addressed ID not in the net
49	Checksum error of the serial receive buffer	
50	Outputs switched-off	Only option brake cam
51	Area of the forwarded parameters wrong	



All outputs are switched briefly to 0 V when error 31 is acknowledged.

11.3 Error number 100..199 (serious error)

All outputs are switched to 0 V until the error has been remedied in the case of errors from this chapter since it is no longer feasible to set the outputs.

Error No.	Significance	Remarks
100	Error in Gray code	The (excess) Gray code read in by the encoder is chekked for plausibility in each cycle. If an illegal code is detected, this error message is issued. If the error occurs only occasionally, this probably involves a fault on the encoder line, and this fault can be remedied by improved cable shielding or different cable routing. Should the error be repeated frequently or be pending constantly, the encoder and the encoder line must be checked and exchanged if necessary. If the error still persists, the unit must be returned (see chapter 'Returning a unit').
101	Checksum error on the memory card or in EEPROM	If a checksum error on the memory card or in the EEPROM is detected on power-up, you will see the corresponding error message. After acknowledgement by the user, the memory is written with the default configuration data and all user data is deleted. You then have the option of reprogramming or, if the old data has been backed up on a PC, of reloading this data.
102	Error initializing the cam array	Illegal cams detected. Carry out a general deletion
104	Plausibility error (illegal device configuration)	A device configuration which is illegal has been saved (e. g. absolute encoder with 127 increments resolution). Carry out a general reset
106	Error configuring a fieldbus	

11.4 Error number 200-299 (terminal errors)

The following errors occur only on terminals (or if using cam controls of the LOCON 24, 48, 64 series as a terminal).
Errors 201 - 209 cannot be

Error No.	Significance	Remarks
210	RX overflow error / receive buffer overflow	
211	TX overflow error / transmit buffer overflow	
212	TX change ID error / error changing the ID	
213	Time-out accessing LCD-display	Acknowledge the error. If the error occurs again, the unit must be returned, specifying the information described in chapter ‘Returning a unit’
220	Time-out connecting to cam control	
221	Incorrect data record on transmission to cam control	
222	Checksum error on reception from cam control	
223	Checksum error on transmission to cam control	
224	Unknown command on transmission to cam control	
230	Incorrect configuration data record or not possible to configure the cam control	
231	Initialization data record not correct	
240	DICNET® transmit error	
241	DICNET® receive error	
242	Duplicate device number in DICNET® or connection problems	Assign a different device number. Check for cable discontinuity, short circuit, non-twisted cable....
243	Too many terminals in network (max. 3 allowed)	Reduce to 3 terminals
244	Max. 1 external terminal in the case of multiple-axis version of the LOCON 32	
245	DICNET® initialization error	
251	Internal error	
252	Unknown command	Internal error
253	Checksum error detected by the cam control	Internal error

12 Servicing

Should questions arise that are not covered in this manual you can find further information in our

- FAQ/Wiki area on our homepage www.deutschmann.com or directly in our Wiki on www.wiki.deutschmann.de
- Corresponding Manual of the used Cam Control

If your questions are still unanswered please contact the responsible sales partner (see www.deutschmann.com) or contact us directly.

Please note down the following information before calling:

- Device designation
- Serial number (S/N)
- Article number
- Error number and error description

You can reach us during hotline hours which are as follows:

Monday to Thursday from 8 am to midday and from 1 pm to 4 pm, Friday from 8 am to midday (CET).

Deutschmann Automation GmbH & Co. KG
Carl-Zeiss-Straße 8
D-65520 Bad Camberg
Germany

Central office and sales department	+49 6434 9433-0
Technical hotline	+49 6434 9433-33
Fax sales department	+49 6434 9433-40
Fax technical hotline	+49 6434 9433-44
E-mail technical Hotline	hotline@deutschmann.de

12.1 Returning a unit

If you return a unit to us, we require as comprehensive a description of the error as possible. We require the following information in particular:

- What error number was displayed?
- How is the unit externally wired (encoders, outputs, ..)? Please state all connections of the unit.
- What is the magnitude of the 24V supply voltage (± 0.5V) with connected LOCON?
- What were you last doing on the unit (programming, error on power-up, ...)?

The more precise your information and error description, the more precisely we can check the possible causes.

Devices, that are sent in without an error description undergo a standard test. You have to bear the costs for that test even though no defect was found.

12.2 Internet

The current software WINLOC32 is available for download from our Internet-homepage www.deutschmann.com. There you can also find topical information on Deutschmann products, instruction manuals and a list of our distribution partners.