

Deuschmann Automation

Cam Controls | Fieldbus Gateways | Industrial Ethernet Products

Instruction manual



Electronic cam control ROTARNOCK 1 / 2 / 3 / 4 Multiturn-ROTARNOCK Display and operating unit TERM 4 / TERM 5 / TERM 6

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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.

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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.

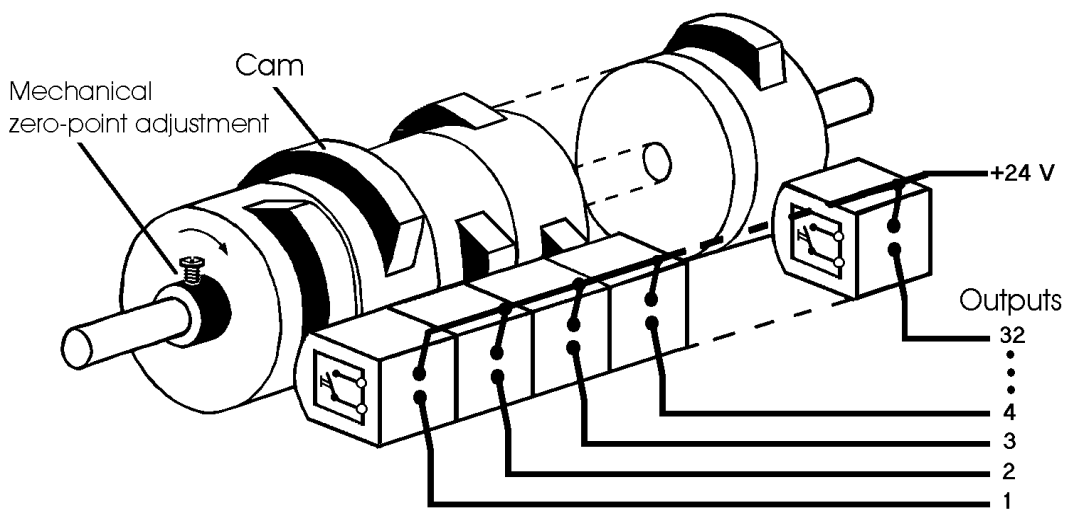
1.1.3 Suggestions

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

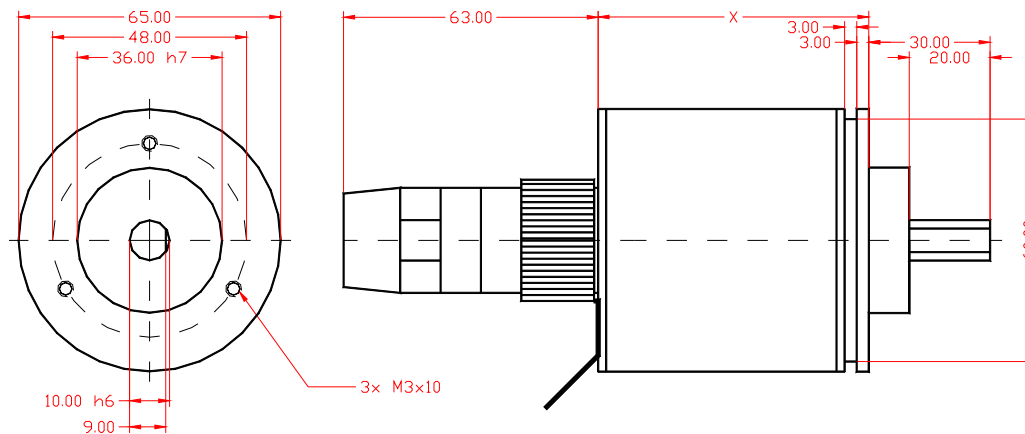
3.1 ROTARNOCK 1/2/3/4 (singleturn)

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

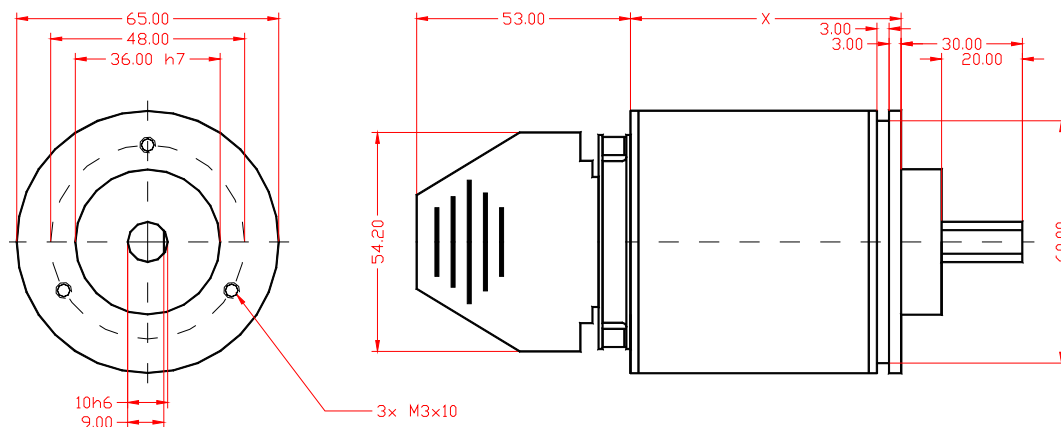
The programming is carried out a PC in connection with the software package "WINLOC" or via an external operating unit, which, however, is not necessary for the operation. The connection between ROTARNOCK and a terminal or a PC can be made at choice by an RS232-interface or by the DICNET[®]-bus (RS485) according to the chapter "Networking terminals with cam controls and PCs".

The devices of the series ROTARNOCK are also available with Profibus- and MPI-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 or RS485, version IP65



Picture 3: Dimensional drawing ROTARNOCK RS232 or RS485, version IP54

- x = 67 mm at ROTARNOCK 1, 2, 3
- x = 80 mm at ROTARNOCK with fieldbus connection
- x = 105 mm at ROTARNOCK Multiturn
- x = 113 mm at ROTARNOCK Multiturn with fieldbus connection

3.2 Multiturn-ROTARNOCK

The device Multiturn-ROTARNOCK is an electronic cam control, integrated in an encoder housing together with the Multiturn encoder.

The technical data can be taken from the annex.

The programming is carried out via an external operating unit TERM 32, which, however, is not necessary for the operation or with the software WINLOC. The connection between ROTARNOCK and a terminal can be made at choice by an RS232-interface or by the DICNET[®]-bus (RS485) according to the chapter "Networking terminals with cam controls and PCs".

The mechanical dimensions of a Multiturn ROTARNOCK are the same as those of a ROTARNOCK 1/2/3. However, the overall length amounts to 112 mm.

The Multiturn-ROTARNOCK is also available with Profibus- and MPI-connection.

More information can be found in the instruction manual „Cam controls with Fieldbus connection“.

3.3 Pin assignment ROTARNOCK

ROTARNOCK is delivered in the standard type (RS485-DICNET[®]) with 2 plugs, one 25-polar and another 9-polar D-SUB-plug (pin in each case).

The 9-polar-plug serves only for the installation of a configurator for the DICNET-bus, with which the participant-number in the network and, if necessary, a bus terminating resistor is configured. Ex works this plug has the configuration "Instrument number 0 with bus termination".

If the ROTARNOCK features a RS232-interface, this plug is dropped without being replaced.

Optionally ROTARNOCK is delivered with a PG-screwing and a 16-polar cable.

3.3.1 25-pol. 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
Output 9	White/green	9
Output 10	Brown/green	10
Output 11	White/yellow	11
Output 12	Yellow/brown	12
Output 13	White/grey	13
Output 14	Gray/brown	14
Output 15	White/pink	15
Output 16	Pink/brown	16
DICNET+/Tx-ROTARNOCK	Pink/red	17
DICNET-/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

For the color allocation see table in chapter 3.3.2 "40-pol. cable (optionally from s/n 942295 on)".

3.3.2 40-pol. cable (optionally from s/n 942295 on)

Pin-No.	Significance	Color
1	Output 1	White
2	Output 2	Brown
3	Output 3	Green
4	Output 4	Yellow
5	Output 5	Gray
6	Output 6	Pink
7	Output 7	Violet
8	Output 8	Gray/pink
9	Output 9	White/green
10	Output 10	Brown/green
11	Output 11	White/yellow
12	Output 12	Yellow/brown
13	Output 13	White/gray
14	Output 14	Gray/brown
15	Output 15	White/pink
16	Output 16	Pink/brown
17	DICNET+ /Tx-ROTARNOCK	Pink/red
18	R+	Gray/blue
19	DICNET- /Rx-ROTARNOCK	Gray/red
20	R-	Pink/blue
21	ProgSelect1	White/black
22	ProgSelect2	Brown/black
23	ProgSelect4	Gray/green
24	ProgSelect8	Yellow/gray
25	ProgSelectStart	Pink/green
26	DICNET-No1	Yellow/pink
27	DICNET-No2	Green/blue
28	DICNET-No4	Yellow/blue
29	DICNET-No8	Green/red
30	Zero point display	Yellow/red
31	NC	Green/black
32	NC	Red/blue
33	24V - DC	Yellow/black
34	24V - DC	Red
35	GND	Blue
36	GND	Black
37	NC	White/blue
38	NC	White/red
39	NC	Brown/blue
40	NC	Brown/red

3.3.3 Assignment of the configuration plug

The 9-polar D-SUB-plug or the respective signals within the 40-polar cable (see above) serve to adjust the device number in the DICNET and allows to activate an internal bus terminating resistor.

The device number is connected to the plug with a binary code, where a connection to GND is made at those pins that are marked with "0" in the list, the other pins remain not wired.

If for instance the device number 6 is to be set, the pins DICNET-No1 and DICNET-No8 must be connected to GND, the remaining connections are not wired.

For activating the bus terminating resistor the pins DICNET+ with R+ and DICNET- with R- must be linked, otherwise the pins remain not wired.

3.3.4 9-pol. D-SUB (only with DICNET®)

The pin assignment of the 9-pol. D-SUB-plug (pin) is as follows:

Pin No.	Significance
1	DICNET No. 1
2	DICNET No. 2
3	DICNET No. 4
4	DICNET No. 8
5	GND
6	DICNET-
7	R-
8	DICNET+
9	R+

3.3.4.1 Pin assignment 9-pol. 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	

3.3.4.2 Pin assignment 9-pol. D-SUB at the MPI-version

Pin-No.	Name	Function
1	not connected	
2	not connected	
3	B	not-inverted input-/output-signal from MPI-bus
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 MPI-bus
9	not connected	

3.3.4.3 Pin assignment 5-pol. at ROTARNOCK MPI and Profibus with IP65

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

3.3.4.4 Pin assignment 16-pol. at ROTARNOCK MPI and Profibus with IP65

Pin-No.	Name
1	output 1
...
12	output 12
13	Tx
14	Rx
15	24 VDC
16	GND



The use of integrated Gateway-technology might result in a signal delay on the fieldbuses of up to 10 ms.

3.3.5 Pin assignment 28pol. round plug (option IF)

Function	Cable color	Pin 28pol. 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
Output 9	White/green	9
Output 10	Brown/green	10
Output 11	White/yellow	11
Output 12	Yellow/brown	12
Output 13	White/grey	13
Output 14	Gray/brown	14
Output 15	White/pink	15
Output 16	Pink/brown	16
DICNET+/Tx ROTARNOCK	Pink/red	17
R+	Gray/blue	18
DICNET-/Rx-ROTARNOCK	Gray/red	19
R-	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

The DICNET-ID is set through the DIP switch at the back of the unit. The switch is accessible after removing the protecting cover (screw top). Please take the meaning from the below table

DIP switch position	DICNET-ID
0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
A	10
B	11
C	12
D	13
E	14
F	15

3.4 Options ROTARNOCK

3.4.1 RS232-interface

Alternatively to the RS485-bus-interface (DICNET[®]) the instrument can be made to order with a RS232-interface.

3.4.2 External zero point- and error-display

Optionally the 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.

3.4.3 Lockable outputs at ROTARNOCK

An option "V" is supported. Thereby it is possible to lock any desired number of the 16 outputs. Generally the above outputs are locked. If for instance the option "V06" (6 outputs are locked) is ordered, the outputs 1 to 10 are freely programmable; the outputs 11 to 16 are locked.

Since no programming-release-pin exists by hardware, the locking at ROTARNOCK takes place by a password.

For this purpose at those places where a locking is necessary, the word „PASS“ is displayed on the TERM 5, with that the ROTARNOCK is programmed. At this place the password (see chapter "Password" on page 69) has to be entered with the keys of TERM 5. In case only the open out-

puts are to be programmed, just press the key  to confirm.

By ordering this option the whole program can only be dialled in connection with the password. Also an external select of the program 0 is not possible without release.

ROTARNOCK automatically copies the cams, that are set in the program 0, to all remaining programs. Therefore it is achieved that a manufacturer of machines determines important machine parameter in the program 0, which must not be changed by the operator. The programs 1 to 15 are available to the operator. He can program them freely except for the locked outputs. Those cams, defined in the program 0, automatically exist in the programs 1 to 15.



ATTENTION:

The data records installed in the program 0 are copied physically to all other programs; i. e. in this case a cam does not only cover one data record in the EEROM, but 16 data records !

A special use of this function is, that no output can be locked by the external input; therefore V=0.


3.4.4 Output change dependent on rotational direction (direction cam)

It is possible to make the change (set and reset) of the outputs dependent on the rotational direction of the encoder, e. g. to avoid that, in case of a machine's downtime, at a switch-point of an output, this output switches permanently by encoder-vibrations for some increments.

If for example an output-change is only adjusted in a positive direction of rotation, the outputs are only changed, if the encoder moves to higher position-values.

It must be considered, that after a reversal of rotation an update of the outputs only takes place, if this position is reached again; e. g. while having a positive direction at position 100 the machine comes to a standstill and then swings back to position 90, first an output-change happens at position 100, even if different program changes are programmed between 90 and 100.


This parameter is programmed as follows:


From the display of the end-point of the partial ITC (see chapter "Programming ROTARNOCK with TERM 5/6" the parameter is displayed encoded by pressing the key  (long). This parameter determines the rotational direction for the output-change.

The following coding applies:



- 0 = always output-change (default)
- 1 = only output-change when having a negative direction of rotation
- 2 = only output-change when having a positive direction of rotation



In this state the LEDs "Function", "On" and "Off" light.

By pressing the key  you can return to the menu-point display of the end point of the ITC.

If the parameter should be changed, you can switch to the programming-mode by pressing the key  (long), provided that the programming release by hardware took place.

Then the LEDs "Function", "On", "Off" and "Prg.Mode" flash.

With the keys  and  the desired value can be adjusted.

Subsequent the programming is either broken off by pressing the key  and the set value is rejected or by pressing  the new value is stored permanently in the EEROM.

Anyway a return to the display menu of this parameter takes place.

3.4.5 Run-control

It is possible to use the output 16 of LOCON as a run-control-signal. This option has to be mentioned on the order and it causes, that the output 16 can no longer be connected with cams. Instead this output issues a signal with a frequency, which can vary from 0.8Hz to 1.7Hz; i. e. this output changes its state after 300ms at the earliest or after 625ms at the latest if the cam control works correctly. Every error leading to an error-display or an uncontrolled system crash of the cam control does not cause a signal change.

3.4.6 ROTARNOCK 1/2/3-232 with option X024 (9-pol. D-SUB at RS232)

3.4.6.1 Pin assignment of the additional 9-pol. D-SUB-plug

Pin No.	Assignment
1	Reserve (do not wire)
2	Reserve (do not wire)
3	Reserve (do not wire)
4	Reserve (do not wire)
5	GND
6	RxD-ROTARNOCK
7	Reserve (do not wire)
8	TxD-ROTARNOCK
9	Reserve (do not wire)

3.4.7 ROTARNOCK 2 with option X026 (fault message stores encoder position)

The device acts like a "regular" ROTARNOCK 2 except for the following differences:

- The connection "ProgNo.8" is used as input "fault message" and it is scanned every 1 ms.
- Only 8 of the 16 programs can be selected externally.

- If at the input "fault message" a positive edge (transition 0V -> 24V) is identified, the cam control stores the current encoder value and reports an "error 45". After confirming that error, the stored encoder value is displayed on a connected operation panel until the fault message signal at the input "fault message" falls back to 0V again.
- The stored encoder information is deleted immediately when the fault message signal is switched off again and is replaced by the current encoder information!

3.4.8 ROTARNOCK with option X034 (program release-input)

The device acts like a "regular" ROTARNOCK except for the following differences:

The input „DICNET®-No.8“ is used as „ProgEnable“.

Only the device numbers 0..7 can be set.

Function ProgEnable: GND =programming allowed
 Open =programming locked

3.4.9 Multiturn-ROTARNOCK with option X90

The Multiturn-ROTARNOCK with option X90 acts like a Singleturn-ROTARNOCK. Contrary to the operating instruction only 8 programs can be selected externally. The Prog8-input is used as Clear in this case (external zero offset).

In order to activate the external zero offset the Prog8-input has to be wired with 24 Volt for at least 100 ms. Then the internal cam tables are calculated again, at which the outputs are frozen for a short period.

3.5 Signal description ROTARNOCK, also Profibus and MPI

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 1 A
Output 9 ... Output 16*	Output block 2 Each output 24V / 0.3A plus-switching (PNP), short-circuit-proof Total current of the output block maximum 1 A
DICNET+, DICNET-*	Data line for networking via the DEUTSCHMANN-bus system DICNET® (see chapter "DICNET®").
Rx	Receive signal RS232
Tx	Transmission signal RS232
R+, R-	Terminating resistor connections for DICNET®. Required, if LOCON 32 is operated as first or last device in DICNET® (see also chapter "DICNET®").
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 ProgNo64 (see above).
ProgEnable (only at X034)*	If this pin is connected with 24V, all parameter changes (incl. change of configuration) are allowed in ROTARNOCK.
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 and MPI.)

4 ROTARNOCK 4 with Profibus

ROTARNOCK 4-Profibus is a device optimized for fieldbus connections with a high-end performance range. 16 hardware outputs are complemented with 48 software outputs that are made available via Profibus. Angle-time cams, 16 software inputs with logic function and numerous further performance characteristics distinguish this device from others.

The customer can configure ROTARNOCK 4 via WINLOC completely, which means that the functions of ROTARNOCK 4, such as logic, angle-time-cams, direction cams can be configured via PC-tool WINLOC.

The number of outputs is adjustable between 24, 32, 48 and 64. In the state of delivery the number is preset to 64. The first 16 outputs or 12 outputs of the IP65-version respectively are hardware outputs, all outputs can also be transferred via the fieldbus.

The encoder resolution can be selected from the range 2 .. 4096. Moreover, the values 360, 720 and 1000 are available. The fictitious encoder value is not required since the encoder resolution can be set any way. The values for „counting area“ and „fictitious encoder“ have to be identical to „encoder resolution“, as otherwise a „plausibility error“ is the result.

For the configuration (via WINLOC) please note the following:

- As encoder type only encoder_abs can be selected.
- The blocking outputs is adjustable in any way from 0 .. number of outputs. Please note that after a change of the „number of outputs“ the „number of blocking outputs“ is set to the same value.
- The following idle time compensations are possible: bitwise, blockwise and blockwise I/O. The ex-works condition of the idle time compensation is bitwise. At present, however, the data component generator supports bitwise idle time compensation only.
- The logic inputs are transferred via the bus only.
The speed display scaling can be adjusted as desired, the default value is 60 rev./min.
- In the status of delivery the number of angle-time outputs is 0, however 16 and 32 is also possible. The number of analog outputs is always 0. A presentation via WINLOC is not required.
- The direction cams are always released, the bits are always set in the flags. A presentation via WINLOC is not required.
- The number of high dynamic outputs is always 0. A presentation via WINLOC is not required.

The device is programmed via the Profibus (with the data component generator) - exactly as ROTARNOCK 2-Profibus. For further information, see instruction manual for „cam controls with fieldbus connection“.

4.1 Option H08 - highspeed-idle time compensation

At this option the outputs 1 - 8 are determined according to the direct ITC-calculation method. All other outputs are treated according to the path-dependent ITC-calculation method. Further details on the idle time compensation can be found in chapter "Idle time compensation (ITC)" on page 45.

5 Basic device TERM 5/6 (external operating unit)

5.1 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.

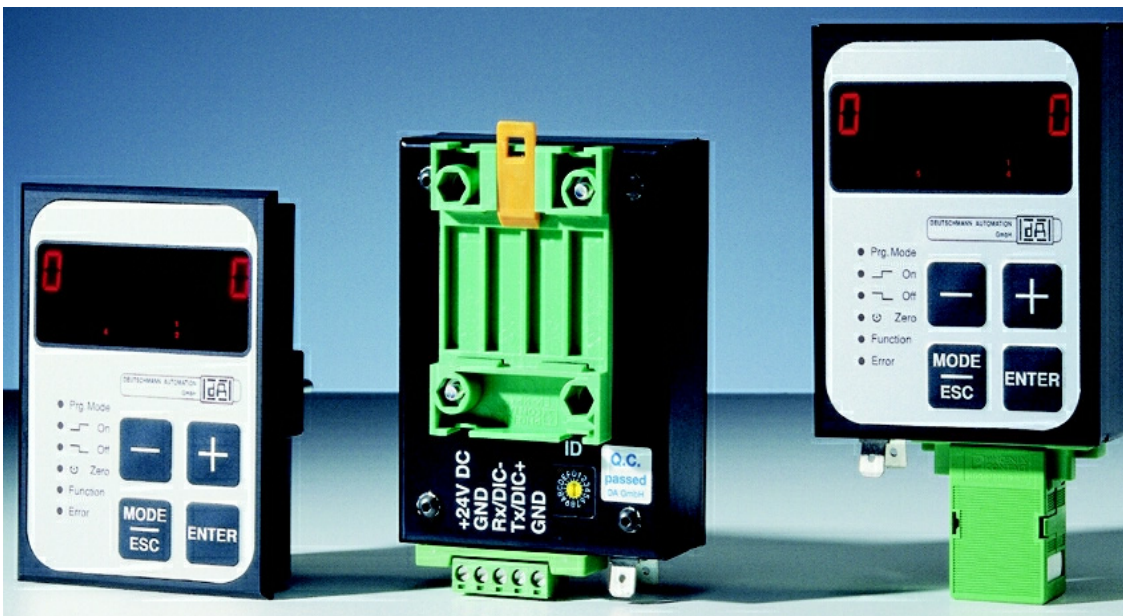
It is adjusted for programming cam controls (LOCON, ROTARNOCK).

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 a RS485-connection (DICNET) and optionally a RS232-connection is supported.

The correct wiring of the instruments among themselves is described in the chapter "Networking terminals with cam controls and PCs".

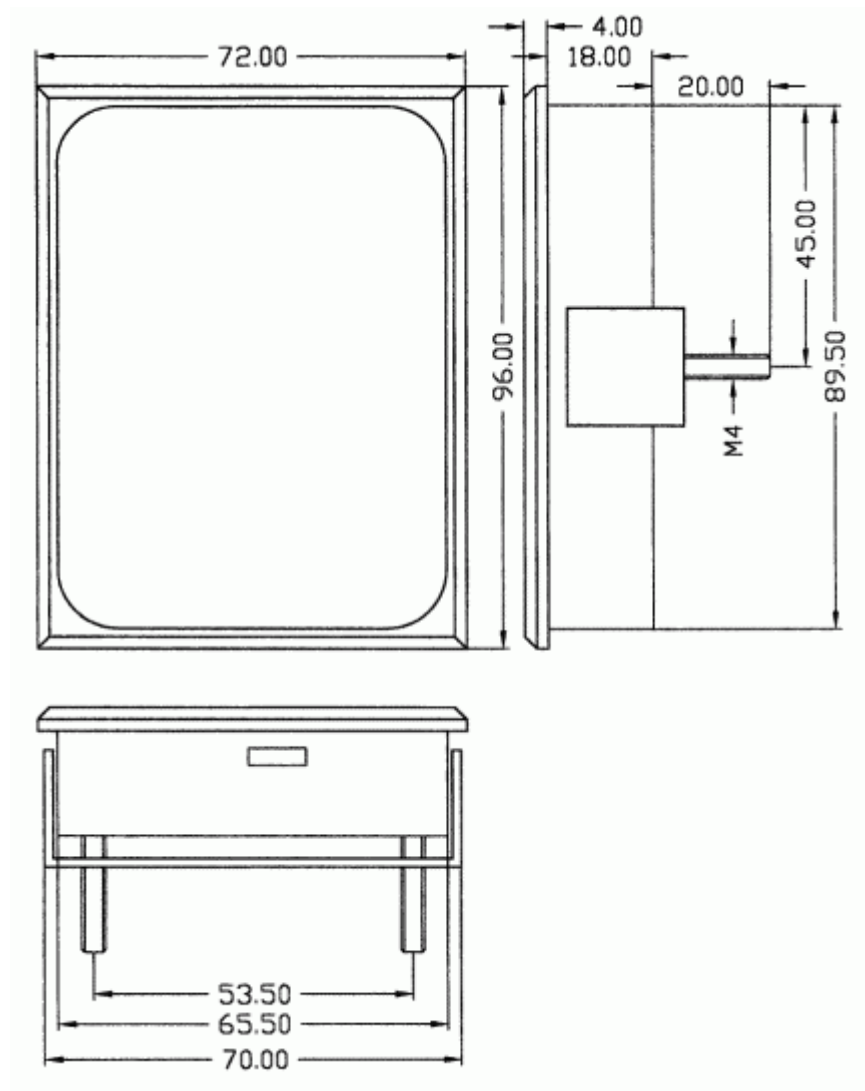
5.2 View TERM 5/6



Picture 4: TERM 5 / TERM 6

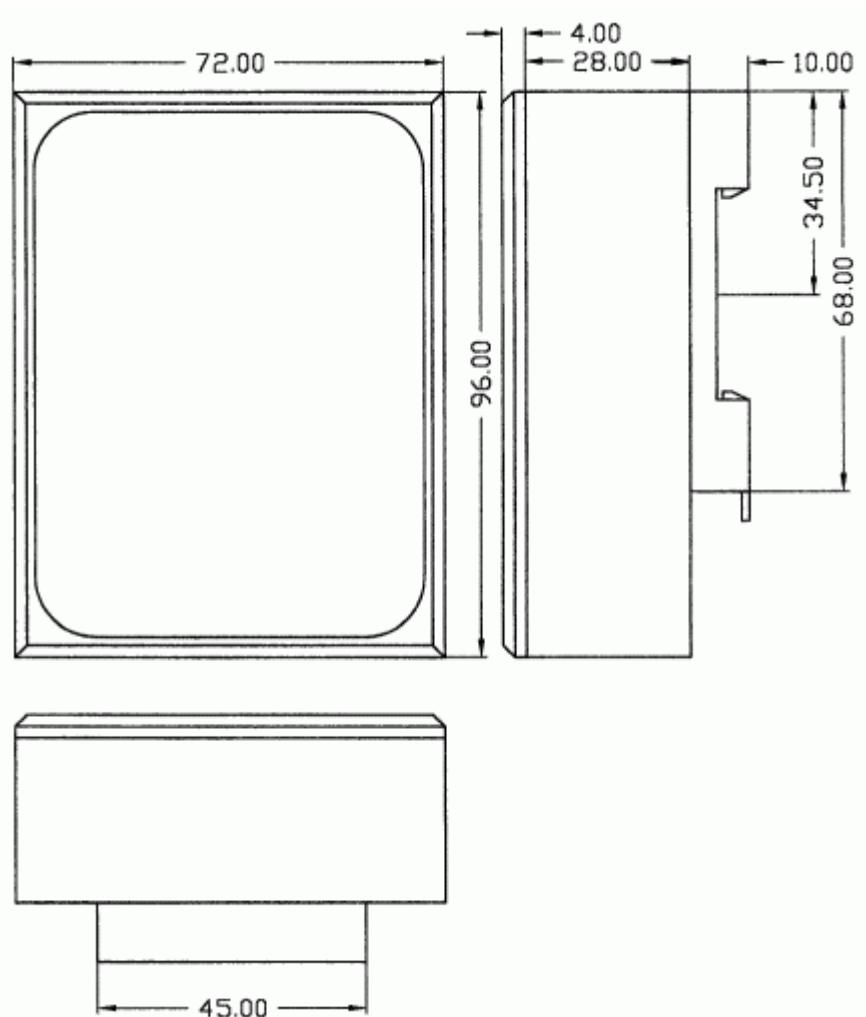
5.3 Technical dimensional drawings

5.3.1 TERM 5 / TERM 6



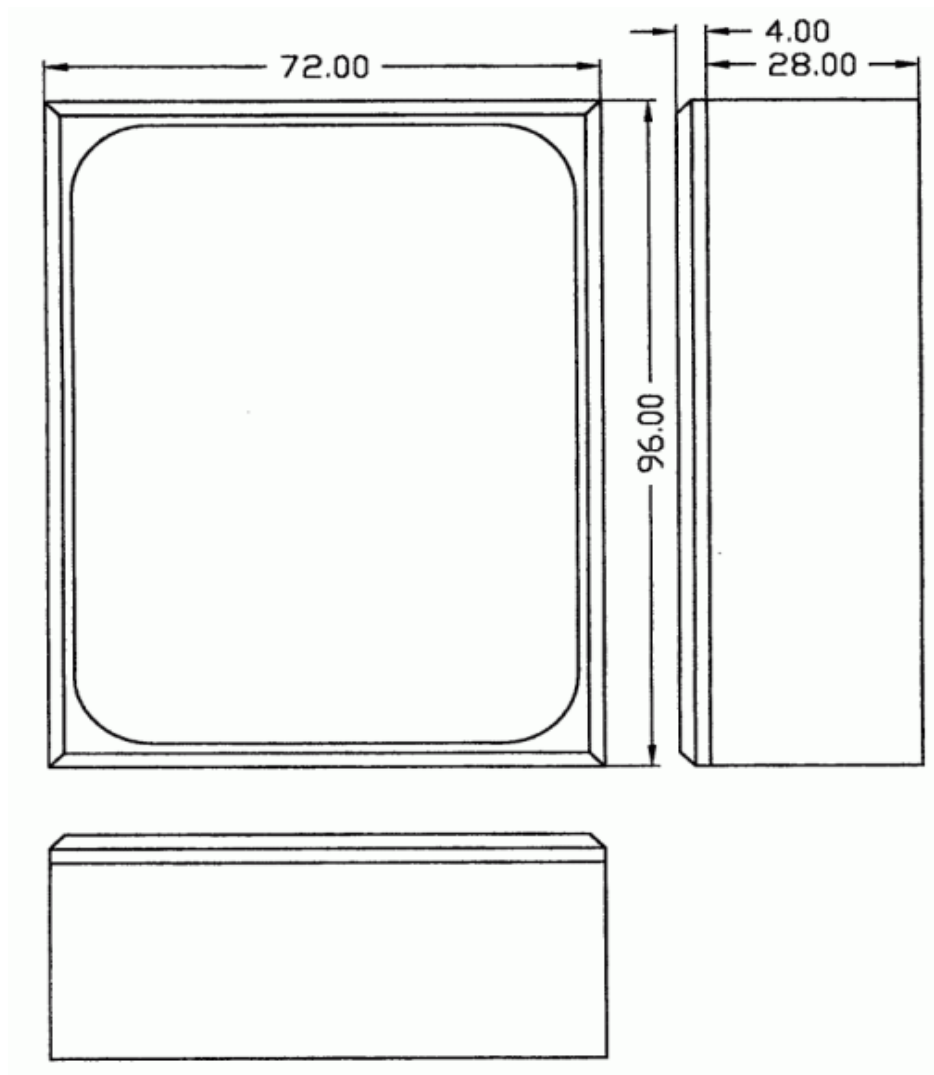
Picture 5: Technical dimensional drawing TERM 5 / TERM 6

5.3.2 TERM 5-H / TERM 6-H



Picture 6: Technical dimensional drawing TERM 5-H / TERM 6-H

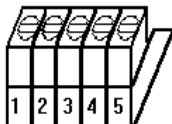
5.3.3 TERM 5-T / TERM 6-T



Picture 7: Technical dimensional drawing TERM 5-T / TERM 6-T

5.4 Pin assignment TERM 5/6

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

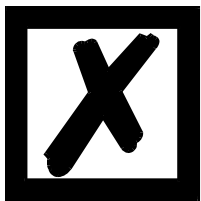


Picture 8: 5-pin-screw-plug-connector

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

5.4.1 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!

5.5 Programming of several devices with TERM 5/6

TERM 5/6 is network-capable in the version with DICNET-connection, i. e. up to 16 cam controls (LOCON, ROTARNOCK ...) can be connected with TERM 5/6 **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.

5.5.1 Selecting the device number on TERM 5/6

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 5/6 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 5/6 features the RS232-interface (option), the first place shows the actual program of the connected cam control.

5.6 Display of the executed program via TERM 5/6

When connecting a ROTARNOCK with the operating and display unit TERM 5/6 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 5/6, as the DICNET-version displays the device number at this place.

5.7 Reading and changing cam control parameters

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 **-**.

If, for instance, the encoder resolution is to be read / changed, please select (see parameter table in the manual communication profile) the number 17 (corresponds to 11H = PNR_RESOLUTION_PER_TURN). Confirm with **Enter** and the encoder resolution of the connected cam control is displayed (e. g. 1000). If you want to change this value, please press **Enter** again (long) and then the Prog-LED starts 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**. An error message appears if the cam control does not allow a change of this parameter. An error message also appears (Error 36), if a not existing parameter is supposed to be read. Special parameters in X-options can also be handled as described in this chapter.

5.8 Different and common characteristics of TERM 5 and TERM 6

In the previous chapters the devices TERM 5 and TERM 6 were always jointly looked at, even though these are two independent devices that differ in some points.

The main difference is the self-intelligence of the TERM 6, that means it carries out the communication with the user independently and it always exchanges complete data records with the connected cam control. TERM 5, on the other hand, is not active on its own and it forwards information to the cam control, which key is pressed that moment or it receives the information that is to be presented at present from the cam control (LED and display).

Some devices do not support TERM 5 any more, whereas TERM 6 is supported by all cam controls (also old ones).

6 Basic instrument TERM 4 (external display unit)

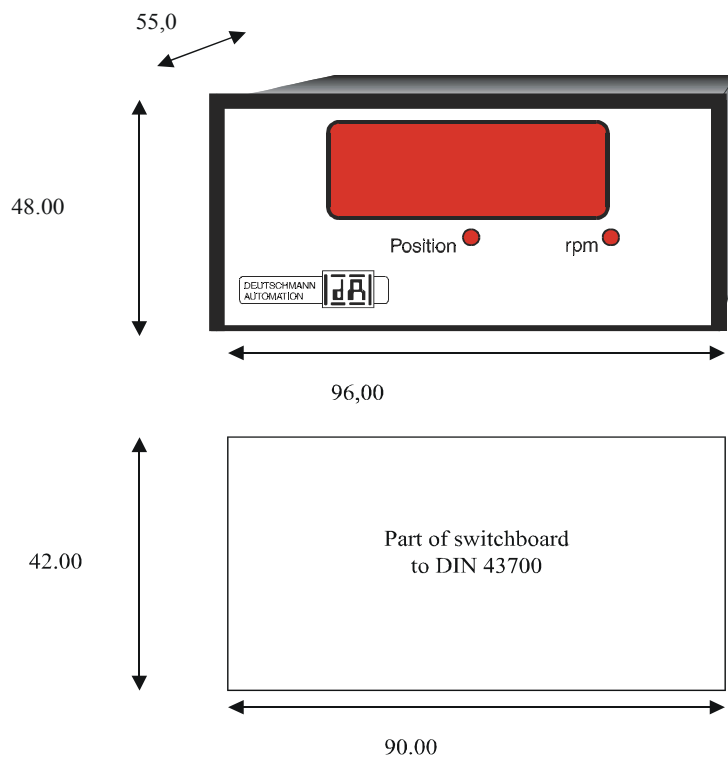
6.1 Assembly of the unit

As an additional position and speed-display TERM 4 is available in the housing W96xH48xD55 mm for front panel installation.

The unit has 4 seven-segment-displays and 2 status LEDs which characterize the position- and speed-display.

At the back next to the plug a rotary switch is located comparable to TERM 5/6, which is necessary in the DICNET-version to adjust the device number of the control system, that data should be displayed by TERM 4. Therefore 16 TERM 4 can be operated in a DICNET at the same time. The rotary switch of the RS232-variation is without any function.

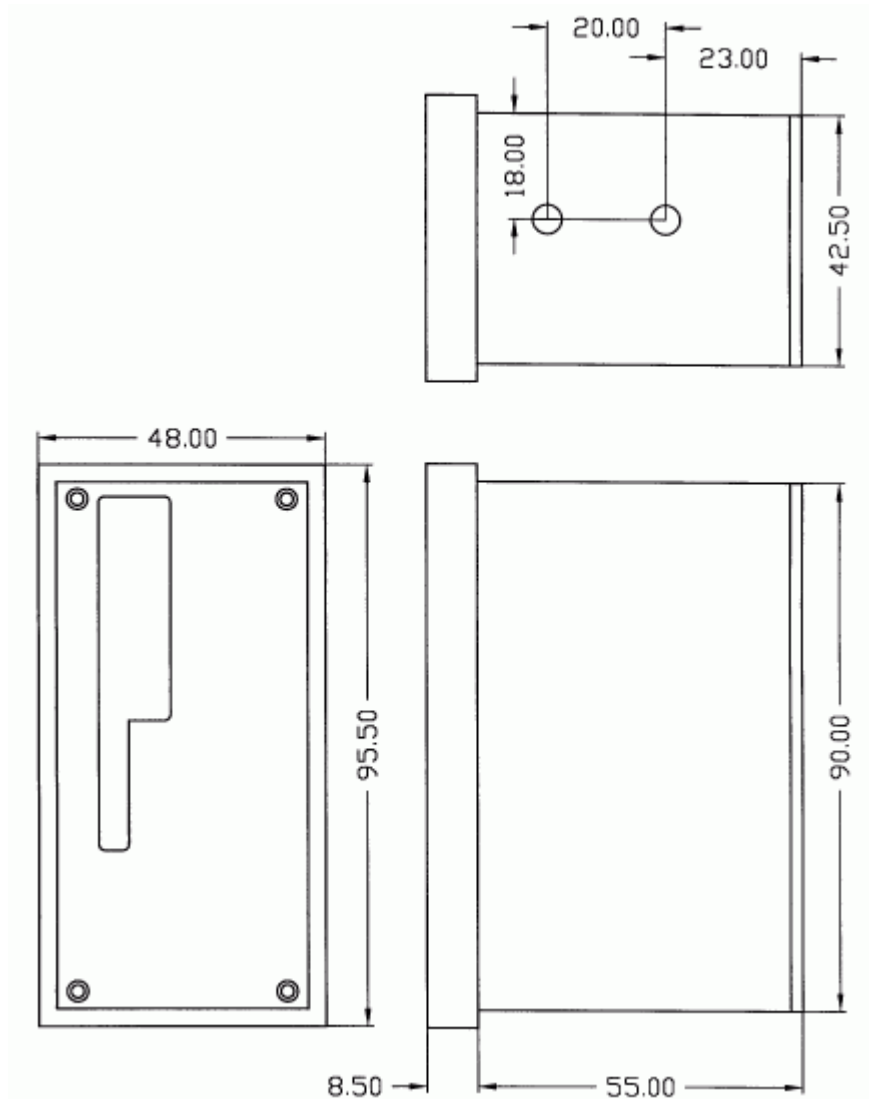
6.2 Dimensional drawing TERM 4



Picture 9: TERM 4

6.3 Technical dimensional drawing

6.3.1 TERM 4



Picture 10: Technical dimensional drawing TERM 4

6.4 Pin assignment TERM 4

The connection is carried out through the 5-pin-plug, identical to the pin assignment of TERM 5 (see chapter 5.4 "Pin assignment TERM 5/6" on page 25).

6.5 Interface switch-over

For more details see chapter "Interface switch-over" on page 26.

7 Networking terminals with cam controls and PCs

The chapter below illustrates certain connection examples between the units both via the DIC-NET 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:

7.1 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.

7.2 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.

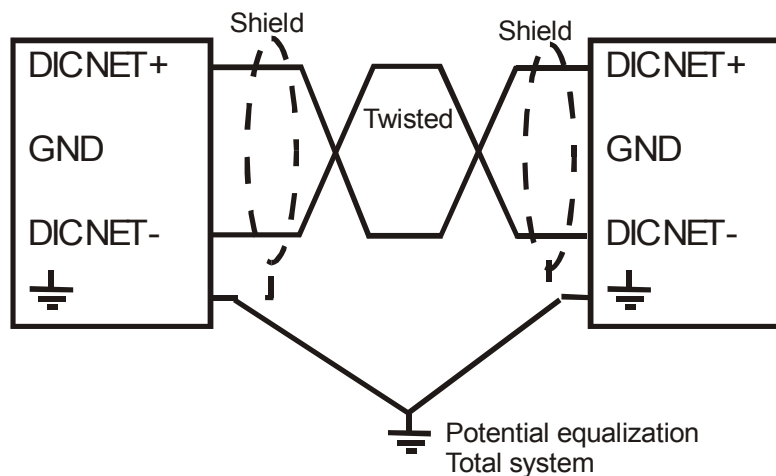
7.2.1 Cable type for DICNET[®]

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 mm² (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 11: DICNET-wiring



The two signal wires may not be reversed!

GND of the two devices do not necessarily have to be connected.

The potential difference between the data reference potentials GND of all interface connections may not exceed ± 7 V.

7.2.1.1 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.

7.2.1.2 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.

7.3 Comparison DICNET® - RS232

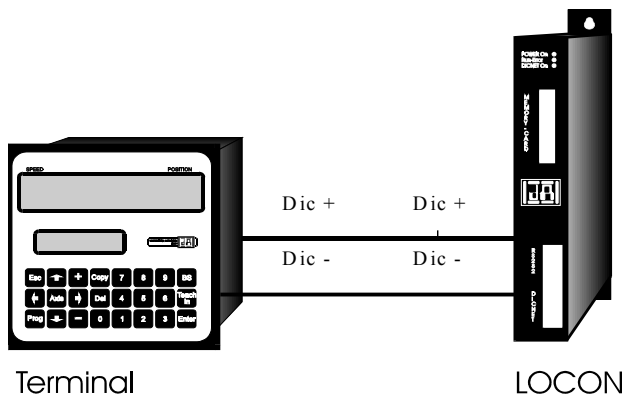
If you intend to set up a permanent link between terminal and one or more cam controls, preference should be given to connection via the DICNET® bus and not the RS232 interface since the bus features a higher level of data integrity, i. e. transmission errors which may occur, for instance, as the result 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).

7.4 Connection examples

7.4.1 DICNET[®] link ROTARNOCK - TERM

ROTARNOCK and TERM are connected as follows via DICNET[®]:



Picture 12: DICNET[®] link terminal - ROTARNOCK



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

The two ground potentials do not have to be interconnected. However, you must ensure that the GND potential between the individual DICNET[®] bus users does not differ by more than 7 V. Otherwise, equipotential bonding must be used.

The bus termination resistor must be activated on both units.

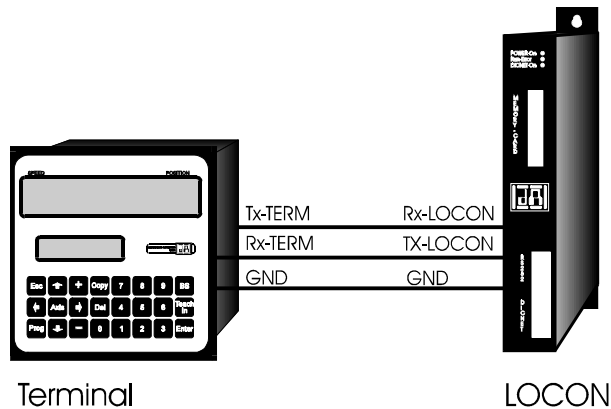
Consequently, in the case of simple wiring with a ROTARNOCK and an external operator control panel, it is the obvious choice to use the same 24 V supply for both units.

7.4.2 RS232 link ROTARNOCK - TERM

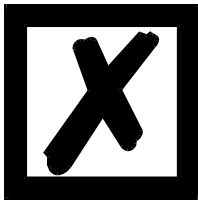
On the RS232 version, only a point-to-point connection between ROTARNOCK and the external operator control panel is possible.

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.



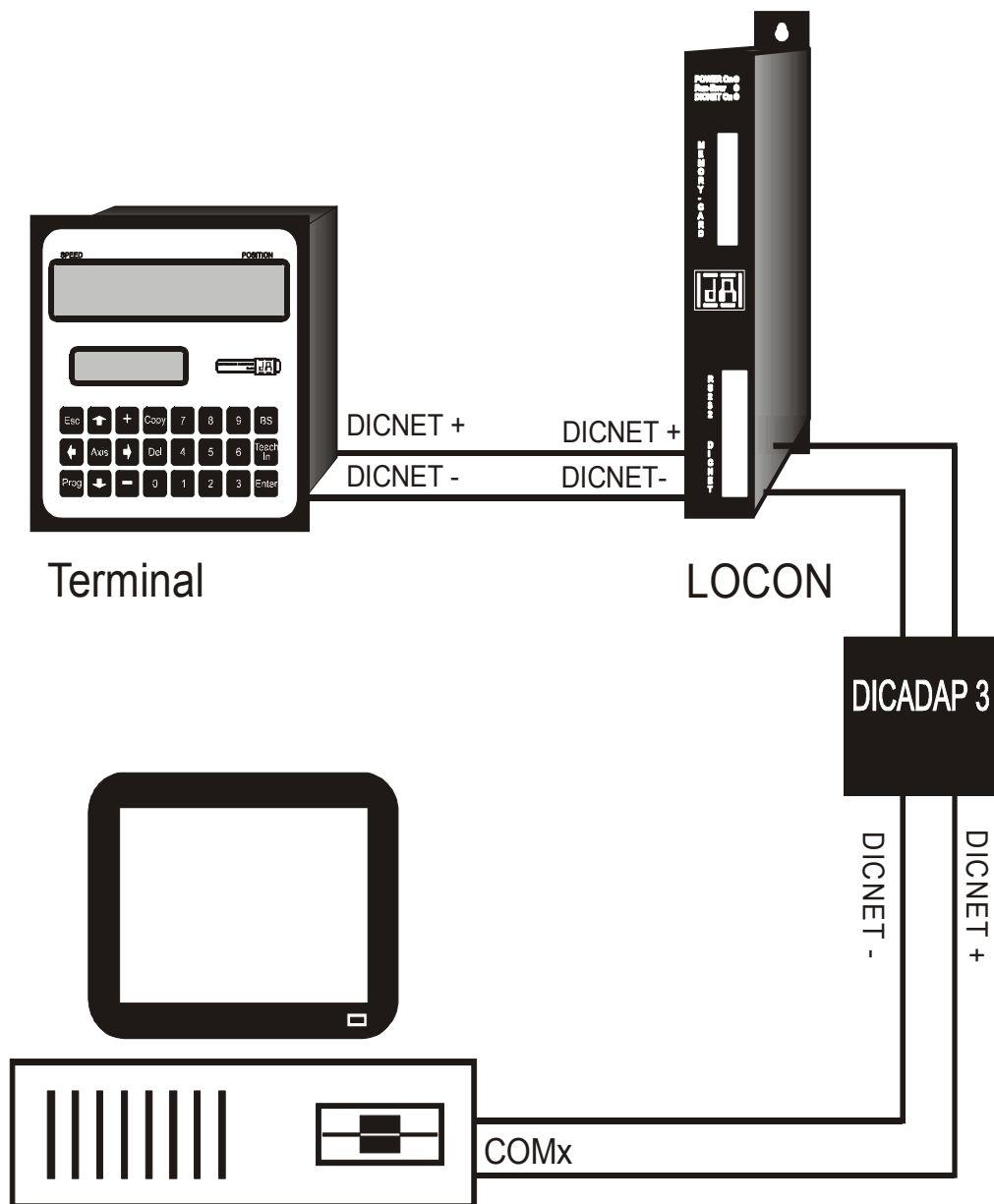
Picture 13: RS232 link Terminal - ROTARNOCK



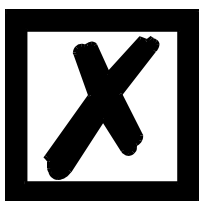
The presented devices exemplary stand for Deutschmann terminals and cam controls of the series LOCON / ROTARNOCK respectively.

7.4.3 DICNET link ROTARNOCK - TERM - PC

A PC can be integrated in a DICNET® bus system using a DICNET adapter. The connection to the PC is made at a serial port COMx - see the illustration below.



Picture 14: Link DICNET bus to PC

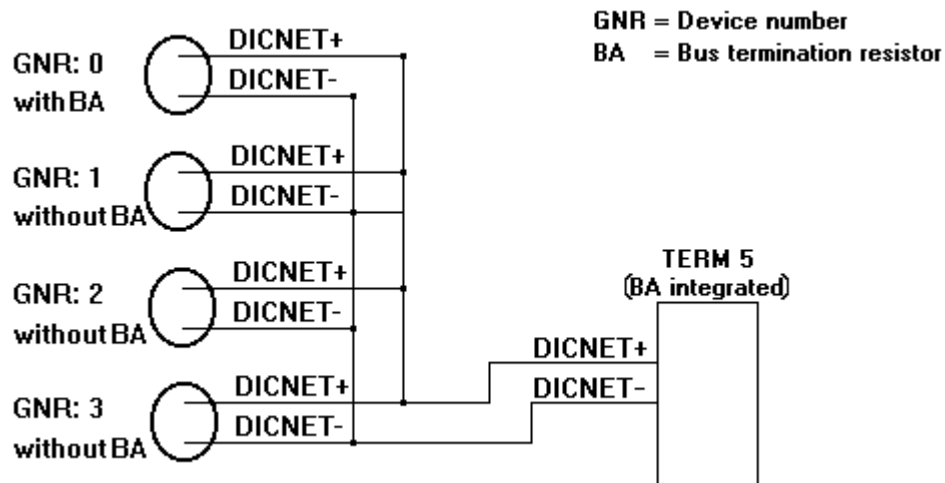


The presented devices exemplary stand for Deutschmann terminals and cam controls of the series LOCON / ROTARNOCK respectively.

7.4.4 Networking of 4 ROTARNOCKs and TERM 5/6

If more than 2 DICNET®-participants are interconnected, only the first and the last are to be supplied with a bus termination resistor, as shown below.

The device numbers can be selected as desired, however, numbers must not be used twice in one network.



Picture 15: Networking of 4 ROTARNOCKs and TERM 5

8 Programming ROTARNOCK with TERM 5/6

8.1 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 "WINLOC".

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 16: TERM 5

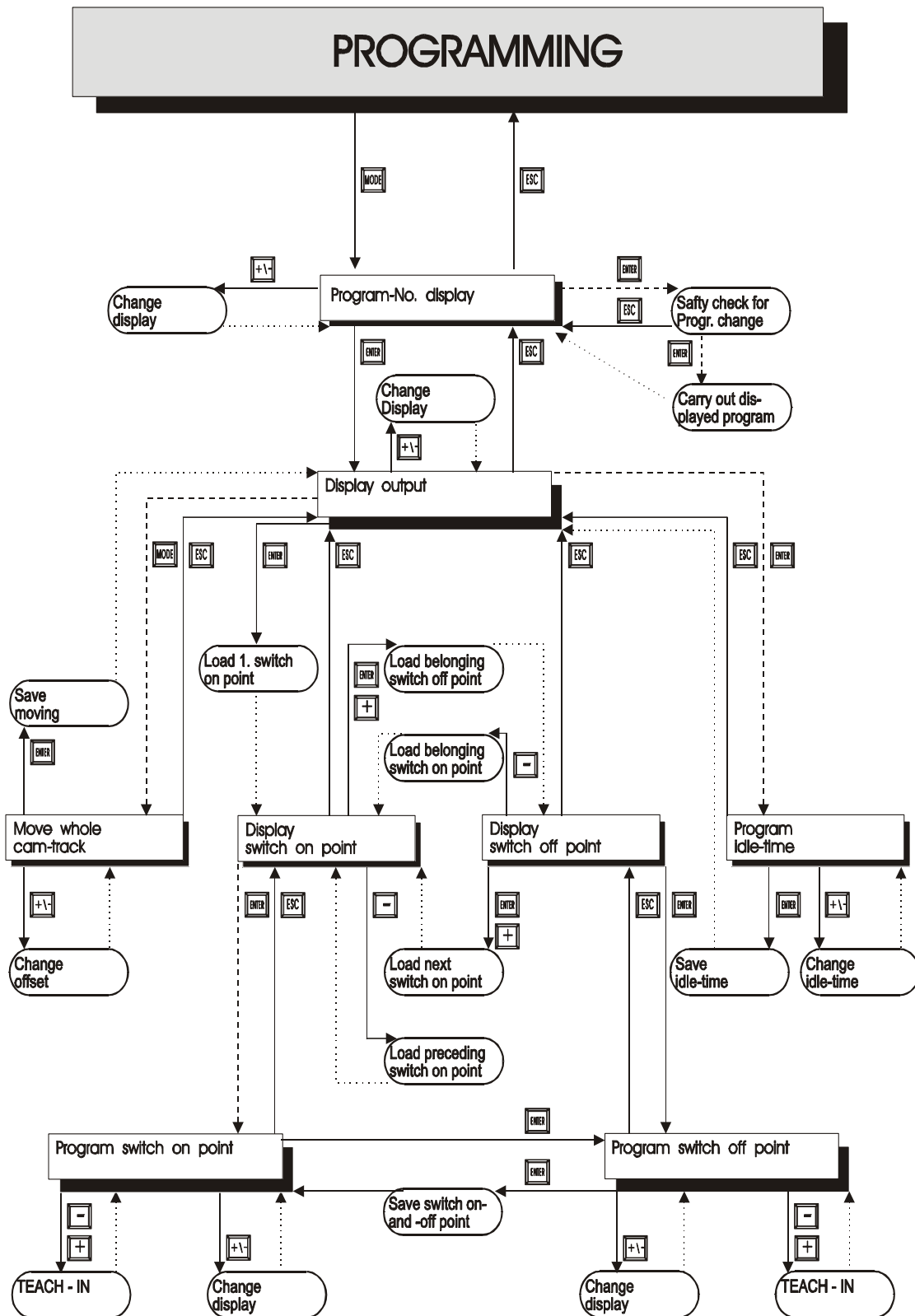
8.2 Program structure

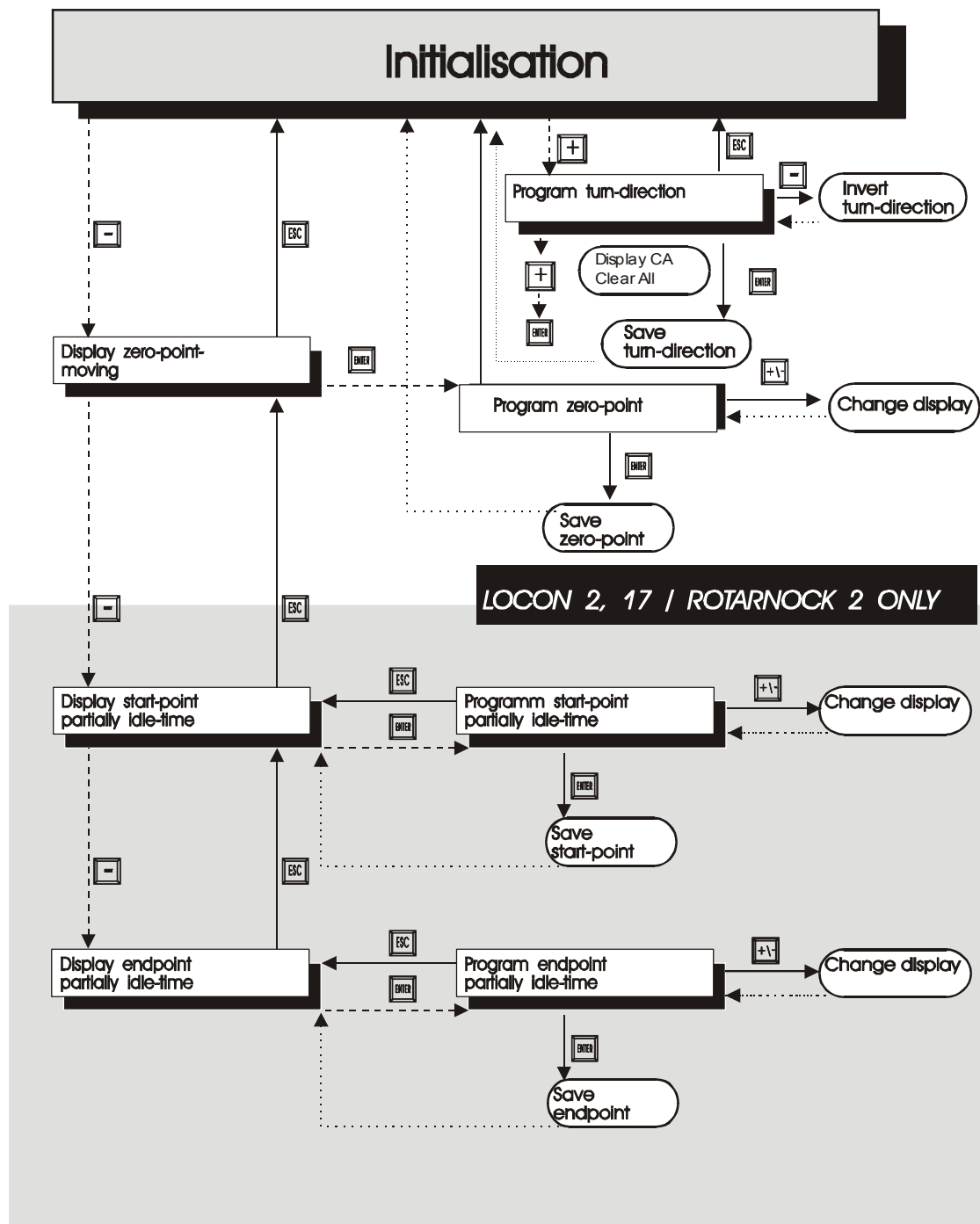
The graphs shown on the following two pages should serve the operators, who have experience in programming cams, as a survey how to program ROTARNOCK.

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 -key it can be switched to the next menu-point.
- 2) With the help of the -key the program process is broken off or is returned to the previous menu point.
- 3) By pressing the -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.





LEGEND

At the graph are only standard functions considered.

All function keys are arranged on the right or above.

———— Keypush normal

----- Keypush long

..... Remove automatically

8.2.1 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.
Programming release	A change of the program is only possible if a programming release is carried out. For that the pin "PROG_ENABLE" must also have 24V (only X034).
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.

8.3 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.

8.4 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".

8.4.1 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.

8.4.2 Programming the zero offset



In the normal mode the programming begins by pressing the key  (long) and then  (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 .

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 , then the programmed value is stored, or by , if the value should be rejected.

8.5 Displaying the active program

Pressing the key  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 .


8.6 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  (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.

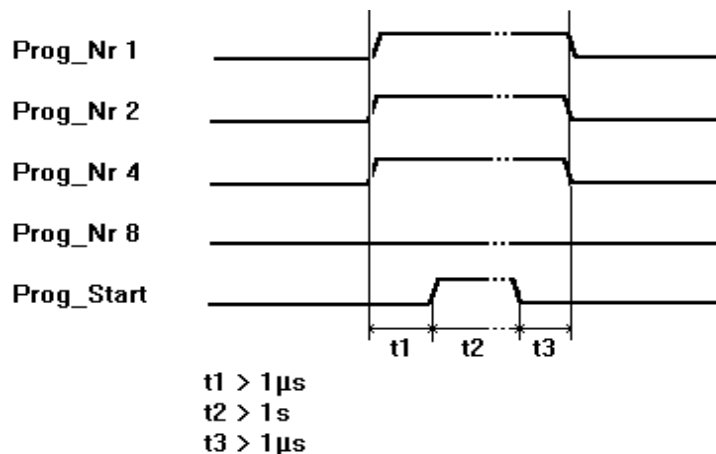
If this query is also confirmed with  (long) the program change takes place and the new, active program appears on the display.

A break-off of the security query is carried out by pressing the key . 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 = 0V 0
 - 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 17: 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 program 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.

8.7 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 .

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  it is switched to the cam display mode, which is described more detailed in the following chapters.

8.8 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  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.



8.9 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  (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  or rejected again with . 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 .

8.10 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.

8.11 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  (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 -key.

8.12 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.

8.13 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  (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.

8.14 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.

8.15 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.

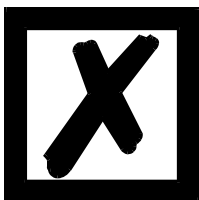
To compensate this idle time dynamically, a cam control must shift a programmed cam in dependence on the real encoder speed; i. e. a valve that should open at the position 100, must be opened for example at 1m/s at position 95, at 2m/s already at position 90.

This function is called dynamic cam shift or idle time compensation (ITC).

8.15.1 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.

8.15.2 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.

8.15.3 Programming the off-switch idle time

If rOTARNOCK was ordered with the option "Separate switch-on- and switch-off idle time" the switch-on time lag has also been input, as it is described in the previous chapter. It can also be recognized by the flashing status-LED "On" additionally to the described LEDs.

After pressing the key **Enter** the LED "On" goes out, and the LED "Off" flashes together with "Prg.Mode" and "Function".

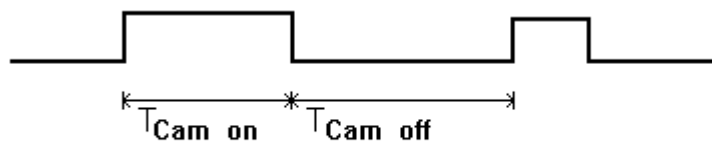
The switch-off idle time is programmed with the keys **+** and **-** in the same way now.

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.



ATTENTION: It is very important that the difference between switch-on idle time and switch-off idle time never exceed one of the times T_{Cam_On} or T_{Cam_off} (see below), as otherwise this may result in an unforeseeable output behaviour!

The cycle time is lower than having a common switch-on- and switch-off idle time (see chapter "Should errors occur during the self-test, these are represented on the display if possible (see chapter "Error messages").").




$$|ITC_{on} - ITC_{off}| < I_{cam_off}; |ITC_{on} - ITC_{off}| < I_{cam_on}$$

Picture 18: Switch on- and switch of idle time

8.16 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  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  and a return to the normal mode can take place.

9 Commissioning and self-test

9.1 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.

9.1.1 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").

9.2 Commissioning of the cam control

The commissioning procedure for the ROTARNOCK is as follows:

- 1) Connection of the encoder
- 2) Connection of the "ProgEnable" input if programming is to be allowed
- 3) Connection of the external program selection if required
- 4) Connection of the status signals if an incremental encoder is used
- 5) Connection of the outputs used
- 6) Connection of the serial interface, if required
- 7) Connection of the 24 V power supply

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.

9.2.1 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").

10 ROTARNOCK with Profibus and MPI

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

11 Technical data

11.1 Technical data ROTARNOCK 1

Characters	Basic equipment	Option
Operating voltage	24V ± 20%, max 150mA (no load)	
Data protection	EEPROM (at least 100 years no battery required)	Via WINLOC on 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	Optical zero point indication
Position recording	360 inc.-absolute encoder (resolution 1°)	1000 inc.-absolute encoder (resolution 0.36°)
Outputs	16, short-circuit proof, plus-switching, 24 Volt/0.3A (max. 1A/8 outputs),	Lockable
Idle time compensation (ITC)	0 ... 999ms (block wise)	
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..	1000 inc.-encoder: error: 1 inc. 2 inc. 3 inc. 4 inc... rev./min.: 120 240 360 480.. 4096 inc.-encoder: error: 1 inc. 2 inc. 3 inc. 4 inc... rev./min.: 29.3 58.6 87.9 117.2..
Programming	Via external operating panel	Offline via PC
Display (on external front)	Encoder position	Rotation speed
Interface	RS 485 (DICNET®)	RS232 (V.24)
Optoelectronic lifetime	At least 1,000,000 hours	
Shaft	Diameter 10	Others on request
Shaft load	Max. 200 N	
Max. permissible rotational speed	6000 rev./min.	
Initial torque at 120 °	1 Ncm (typ)	
Moment of inertia	Appr. 50 gcm	
Lifetime of the ball bearings	At least 400 x 10 ⁶ rev.	
Weight	Appr. 400 g	

11.2 Technical data ROTARNOCK 2

Characters	Basic equipment	Option																																																
Operating voltage	24V ± 20%, max 150mA (no load)																																																	
Data protection	EEPROM (at least 100 years no battery required)	Via WINLOC on PC																																																
Programs	16																																																	
Number of cams	2000 cams, optionally distributable to channels and programs; cams are interchangeable linewise																																																	
Zero-point offset	Programmable over the entire range	Optical zero point indication																																																
Position recording	360 inc.-absolute encoder (resolution 1°)	1000 inc.-absolute encoder (resolution 0.36°) 3600, 2..12 Bit																																																
Outputs	16, short-circuit proof, plus-switching, 24 Volt/0.3A (max. 1A/8 outputs),	Lockable																																																
Idle time compensation (ITC)	0 ... 999ms (blockwise)	Separate switch on- and switch off-delay at blockwise idle time compensation																																																
Cycle time	< 150 µs (without ITC) < 200 µs (blockwise ITC) < 550 µs (bitwise ITC)	High speed: 60 100 µs 250																																																
Rotational speed of the encoder shaft	360 inc.-encoder <table><tr><td><u>error</u></td><td><u>1 inc.</u></td><td><u>2 inc.</u></td><td><u>3 inc...</u></td></tr><tr><td>without ITC</td><td>1111</td><td>2222</td><td>3333..</td></tr><tr><td>blockwise ITC</td><td>833</td><td>1666</td><td>2500..</td></tr><tr><td>bitwise ITC</td><td>303</td><td>606</td><td>909..</td></tr></table>	<u>error</u>	<u>1 inc.</u>	<u>2 inc.</u>	<u>3 inc...</u>	without ITC	1111	2222	3333..	blockwise ITC	833	1666	2500..	bitwise ITC	303	606	909..	1000 inc.-encoder: <table><tr><td><u>error</u></td><td><u>1 inc.</u></td><td><u>2 inc.</u></td><td><u>3 inc...</u></td></tr><tr><td>without ITC</td><td>400</td><td>800</td><td>1200..</td></tr><tr><td>blockwise ITC</td><td>300</td><td>600</td><td>900..</td></tr><tr><td>bitwise ITC</td><td>110</td><td>220</td><td>330..</td></tr></table> 4096 inc.-encoder: <table><tr><td><u>error</u></td><td><u>1 inc.</u></td><td><u>2 inc.</u></td><td><u>3 inc...</u></td></tr><tr><td>without ITC</td><td>98</td><td>195</td><td>294..</td></tr><tr><td>blockwise ITC</td><td>73</td><td>146</td><td>219..</td></tr><tr><td>bitwise ITC</td><td>26</td><td>53</td><td>80..</td></tr></table>	<u>error</u>	<u>1 inc.</u>	<u>2 inc.</u>	<u>3 inc...</u>	without ITC	400	800	1200..	blockwise ITC	300	600	900..	bitwise ITC	110	220	330..	<u>error</u>	<u>1 inc.</u>	<u>2 inc.</u>	<u>3 inc...</u>	without ITC	98	195	294..	blockwise ITC	73	146	219..	bitwise ITC	26	53	80..
<u>error</u>	<u>1 inc.</u>	<u>2 inc.</u>	<u>3 inc...</u>																																															
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<u>error</u>	<u>1 inc.</u>	<u>2 inc.</u>	<u>3 inc...</u>																																															
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<u>error</u>	<u>1 inc.</u>	<u>2 inc.</u>	<u>3 inc...</u>																																															
without ITC	98	195	294..																																															
blockwise ITC	73	146	219..																																															
bitwise ITC	26	53	80..																																															
Programming	Via external operating panel	Offline via PC																																																
Display (on external front)	Encoder position / rotation speed																																																	
Interface	RS 485 (DICNET®)	RS232 (V.24)																																																
Optoelectronic lifetime	At least 1,000,000 hours																																																	
Shaft	Diameter 10	Others on request																																																
Shaft load	Max. 200 N																																																	
Max. permissible rotational speed	6000 rev./min.																																																	
Initial torque at 120 °	1 Ncm (typ)																																																	
Moment of inertia	Appr. 50 gcm																																																	
Lifetime of the ball bearings	At least 400 x 10 ⁶ rev.																																																	
Weight	Appr. 400 g																																																	

11.3 Technical data ROTARNOCK 3

Characters	Basic equipment	Option
Operating voltage	24V ± 20%, max 100mA (no load)	
Data protection	EEPROM (at least 150 years no battery required)	Via WINLOC on PC
Programs	4	
Number of cams	120 cams	
Position recording	360 inc.-absolute encoder (resolution 1°)	
Outputs	8	16
Idle time compensation (ITC)	-	
Cycle time	1 ms	
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	Offline via PC	
Display (on external front)	Encoder position	
Interface	RS232	
Optoelectronic lifetime	At least 1,000,000 hours	
Shaft	Diameter 10	Others on request
Shaft load	Max. 200 N	
Max. permissible rotational speed	6000 rev./min.	
Initial torque at 120 °	1 Ncm (typ)	
Moment of inertia	Appr. 50 gcm	
Lifetime of the ball bearings	At least 400 x 10 ⁶ rev.	
Weight	Appr. 400 g	

11.4 Technical data ROTARNOCK 4

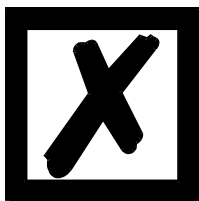
Characters	Basic equipment	Further features																																																
Operating voltage	24V ± 20%, max 150mA (no load)																																																	
Data protection	EEPROM (at least 100 years no battery required)	Via WINLOC on PC																																																
Programs	16																																																	
Number of cams	2000 cams, optionally distributable to channels and programs; cams are interchangeable linewise																																																	
Zero-point offset	Programmable over the entire range	Optical zero point indication																																																
Position recording	Programmable from 2 .. 12 bit and 360, 720, 1000																																																	
Outputs	Programmable as desired, short-circuit proof, plus-switching, 24V / 0.3A (max. 1A / 8 outputs) 24 - 64 outputs, 16 of them hardware outputs	Lockable, IP65-version features 12 hardware outputs only																																																
Idle time compensation (ITC)	0 ... 999ms (blockwise) bitwise configurable as desired	Separate switch on- and switch off-delay at blockwise idle time compensation																																																
Cycle time	< 150 µs (without ITC) < 200 µs (blockwise ITC) < 550 µs (bitwise ITC)	High speed: 60 100 µs 250																																																
Rotational speed of the encoder shaft	360 inc.-encoder <table><tr><td><u>error</u></td><td><u>1 inc.</u></td><td><u>2 inc.</u></td><td><u>3 inc...</u></td></tr><tr><td>without ITC</td><td>1111</td><td>2222</td><td>3333..</td></tr><tr><td>blockwise ITC</td><td>833</td><td>1666</td><td>2500..</td></tr><tr><td>bitwise ITC</td><td>303</td><td>606</td><td>909..</td></tr></table>	<u>error</u>	<u>1 inc.</u>	<u>2 inc.</u>	<u>3 inc...</u>	without ITC	1111	2222	3333..	blockwise ITC	833	1666	2500..	bitwise ITC	303	606	909..	1000 inc.-encoder: <table><tr><td><u>error</u></td><td><u>1 inc.</u></td><td><u>2 inc.</u></td><td><u>3 inc...</u></td></tr><tr><td>without ITC</td><td>400</td><td>800</td><td>1200..</td></tr><tr><td>blockwise ITC</td><td>300</td><td>600</td><td>900..</td></tr><tr><td>bitwise ITC</td><td>110</td><td>220</td><td>330..</td></tr></table> 4096 inc.-encoder: <table><tr><td><u>error</u></td><td><u>1 inc.</u></td><td><u>2 inc.</u></td><td><u>3 inc...</u></td></tr><tr><td>without ITC</td><td>98</td><td>195</td><td>294..</td></tr><tr><td>blockwise ITC</td><td>73</td><td>146</td><td>219..</td></tr><tr><td>bitwise ITC</td><td>26</td><td>53</td><td>80..</td></tr></table>	<u>error</u>	<u>1 inc.</u>	<u>2 inc.</u>	<u>3 inc...</u>	without ITC	400	800	1200..	blockwise ITC	300	600	900..	bitwise ITC	110	220	330..	<u>error</u>	<u>1 inc.</u>	<u>2 inc.</u>	<u>3 inc...</u>	without ITC	98	195	294..	blockwise ITC	73	146	219..	bitwise ITC	26	53	80..
<u>error</u>	<u>1 inc.</u>	<u>2 inc.</u>	<u>3 inc...</u>																																															
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without ITC	98	195	294..																																															
blockwise ITC	73	146	219..																																															
bitwise ITC	26	53	80..																																															
Programming	Profibus	Configuration via PC																																																
Display (on external front)	Encoder position / rotation speed																																																	
Interface	Profibus	RS232 (V.24)																																																
Optoelectronic lifetime	At least 1,000,000 hours																																																	
Shaft	Diameter 10																																																	
Shaft load	Max. 200 N																																																	
Max. permissible rotational speed	6000 rev./min.																																																	
Initial torque at 120 °	1 Ncm (typ)																																																	
Moment of inertia	Appr. 50 gcm																																																	
Lifetime of the ball bearings	At least 400 x 10 ⁶ rev.																																																	
Weight	Appr. 400 g																																																	

11.5 Technical data Multiturn-ROTARNOCK

Characters	Basic equipment	Option
Operating voltage	24V \pm 20%, max 150mA (no load)	
Data protection	EEPROM (at least 100 years no battery required)	Via WINLOC on PC
Programs	16	
Number of cams	936 cams, optionally distributable to channels and programs; cams are interchangeable linewise	
Zero-point offset	Programmable over the entire range	Optical zero point indication
Position recording	Max. 4096 inf./rev. x 4096 rev. (16777216 inf.), resolution/revolution configurable in steps from 2 ⁰ to 2 ¹² (1, 2, 4 ...4096)	
Outputs	16, short-circuit proof, 24 Volt/0.3A (max. 1A/8 outputs), plus-switching	Lockable
Idle time compensation (ITC)	0 ... 999ms, bitwise	
Cycle time	1 ms + (number of cams x 50)	
Programming	Via external operation panel TERM 32, teach-in	WINLOC
Display	Encoder position / rotation speed on external operation unit	Run-Control
Interface	RS 485 DICNET®	RS232 (V.24)
Optoelectronic lifetime	At least 100,000 hours	
Shaft diameter	10 mm	Others on request
Shaft load	Max. 50 N axial max. 200 N radial	
Max. permissible rotational speed	6000 rev./min.	
Lifetime of the ball bearings	At least 10 ⁹ rev. (at max. 20 N)	
Type of protection	IP54	
Connections	25pol. D-SUB and 9pol. D-SUB at RS485 25pol. D-SUB at RS232	
Weight	Appr. 600 g	
Dimensions	Diameter 65 mm, length 112 mm	

11.6 Technical data TERM 5/6

Characters	TERM 5	TERM 6
Device type	Display unit	Display- and operating unit
Connection to	LOCON 1/2 LOCON 7 LOCON 9 LOCON 16/17 LOCON 32/32PM ROTARNOCK 1/2	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 MULTITURN-ROTARNOCK
Display	6 digit 7-segment display, thereof 4 digits for encoder position/rotational speed 1 digit for device no. (at DICNET®) 1 digit for displaying the executed program (at RS232)	8 digit 7-segment display for encoder position/rotational speed
Interface	RS485 DICNET®-and RS232 (V.24) (switchable)	RS485 DICNET®-and RS232 (V.24) (switchable) up to 3 terminals in one network possible for DICNET-operation
Connections	With screw-plug-connector	With screw-plug-connector
Installation	Front panel installation DIN-rail mounting portable version	Front panel installation DIN-rail mounting portable version
Type of protection	IP54	IP54
Dimensions	72 x 96 x 18 mm (BxHxT) 72 x 96 x 28 mm (BxHxT) DIN-rail version	72 x 96 x 18 mm (BxHxT) 72 x 96 x 28 mm (BxHxT) DIN-rail version
Weight	Appr. 200 g	Appr. 200 g
Switchgear opening	66 x 90 mm	66 x 90 mm
Operating voltage	10 - 30 VDC	10 - 30 VDC



Recommendation for new customers:

For new projects please directly use the more intelligent TERM 6!

11.7 Technical data TERM 4

Characters	TERM 4
Device type	Display unit
Connection to	LOCON 1/2 LOCON 7 LOCON 9 LOCON 16/17 LOCON 24 LOCON 32/32PM LOCON 32-HC-4X-INK/32 PM-4X-INK LOCON 32-HC-4X-ABS/32-PM-4X-ABS LOCON 32PM-Matte LOCON 48 LOCON 64 ROTARNOCK 1/2 MULTITURN-ROTARNOCK
Display	4 digit 7-segment display for encoder position/rotational speed LED for encoder position LED for rotational speed
Interface	RS485 DICNET®-1 display to each participant possible RS232 (V.24)
Connections	With screw-plug-connector
Installation	Front panel installation
Type of protection	IP54
Dimensions	48 x 96 x 55 mm (BxHxT)
Switchgear opening	42 x 90 mm
Operating voltage	10 - 30 VDC

12 Technical details

12.1 Specification of the input levels

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

Logical Low: < 4 Volt < 1mA

12.2 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").

12.3 Specification of the output drivers

The used outputs in ROTARNOCK are 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 be loaded with maximum 1A.

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").

12.4 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 ± 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 $V_{\text{encoder}} < n * V_{\text{encoder Max}}$

With idle time compensation:

Real switch-point = ideal switch-point + SD (const.) + RP + ITR

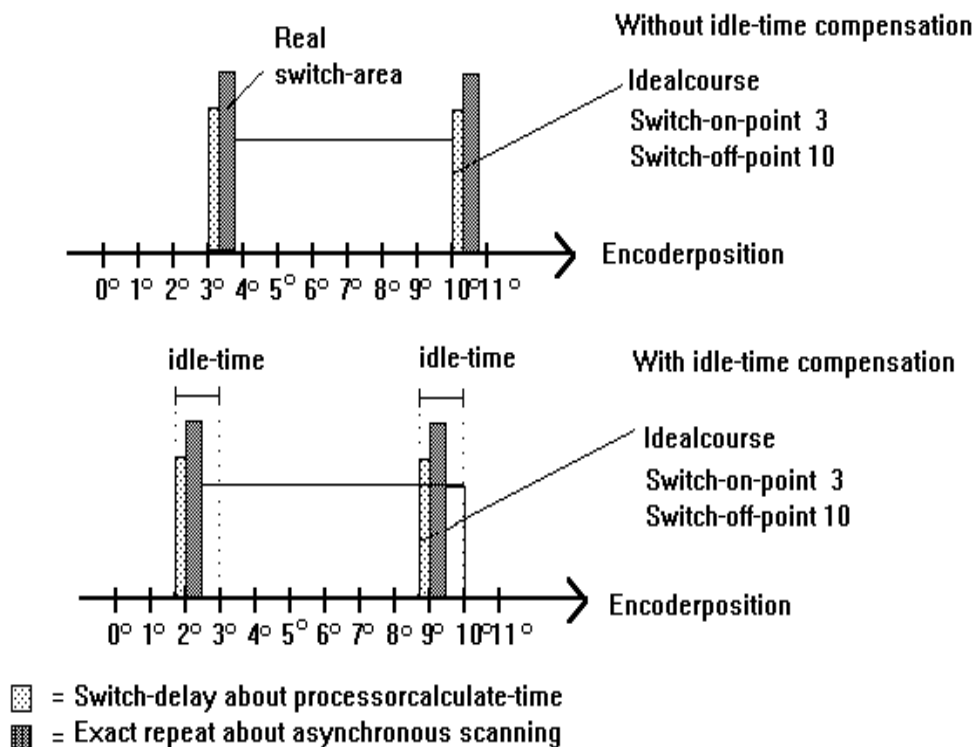
SD < Cycle time (const. typical cycle time/2)

RP < Cycle time (varying between 0.. cycle time)

ITR = Resolution of the ITC (typical 1ms)

Resolution = n increments, when $V_{\text{encoder}} < n * V_{\text{encoder max}}$, with V_{encoder} const.

Resolution = n + 1 increments, when $V_{\text{encoder}} < n * V_{\text{encoder max}}$, with V_{encoder} variable

12.4.1 Time diagram

Picture 19: Time diagram - Idle time compensation

12.5 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:	IP 54
Shock:	15 G/11 ms
Vibration:	0.15 mm/10..50 Hz, 1G/50..150 Hz
Weight:	Appr. 400 g

12.6 DICNET®

DICNET® (DEUTSCHMANN Industrial Controller 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.

12.7 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".

12.8 Coding device numbers

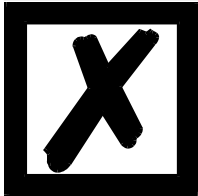
The device number is set in hexadecimal code on the rotary switch.

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

13 Error messages

A ROTARNOCK error message can be seen from the fact that an error code is shown on the display.



For ROTARNOCK 1 and 2 all errors must be acknowledged with **Esc**. Since ROTARNOCK 3 can be programmed via WINLOC only, "Enter" or "Return" respectively has to be pressed in case of an error.

A distinction can be made between the following error types:

13.1 Error number 1..19 (irrecoverable error)

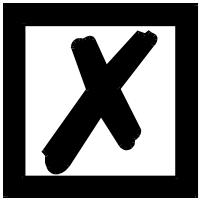
These errors are errors occurring during the self-test routine. If one of the errors 1 to 19 occurs, the unit must be returned to the manufacturer. When returning the unit, please provide the information specified in chapter "Returning a unit".

13.2 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'.
27	Error saving a pattern value	
28	Error programming an idle time	Only in the case of pattern units
29	Error in function CLEAR_CAM	X97 only
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	<p>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.</p> <p>Only the overloaded output is switched off. The other outputs continue to operate.</p>

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).
34	Error programming a partial idle time compensation	Unit does not feature the 'Y' partial idle time compensation option
35	Illegal encoder resolution, no power of 2	Program a valid value
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
37	Reserved	
38	Error programming an idle time	On LOCON 17 only - idle times are permitted only for outputs 1 to 8
39	ERROR No ITC No ITC possible	e.g. LOCON 7
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	
44	Overflow of the serial receive buffer	
45		External fault signal (X26 only)
46	Save blank cam	Data record incomplete
47		Direction-dependent output update illegal
50		Outputs deactivated (brake cam option only)



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

13.3 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 checked 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 reset
103	New memory card	
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
105	Encoder error (only in the case of "Special configuration" LOCON 32 option or LOCON 24, 48, 64 units with encoder monitoring option)	An encoder error has been detected. The current encoder value and the last encoder value read in are shown at the top right on the LCD (LOCON 32). LOCON 24, 48, 64, see chapter Options: Encoder monitoring.
108	SSI Time-out error	
111	SSI Gray code error	

13.4 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)

Error No.	Significance	Remarks
201	Self-test error	
202	Internal error	
206	Error initializing the RS485 interface	
207	RS232 error	
210	RX overflow error	
211	TX overflow error	
212	TX change ID error	
213	Time-out accessing LCD	Acknowledge the error. If the error occurs again, the unit must be returned, specifying the information described in chapter 'Returning a unit'
214	Undefined field error	
215	Get key error	
216	LCD XY error	
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	Incorrect initialisation data record	
240	DICNET® transmit error	
241	DICNET® receive error	
242	Duplicate device number in DIC-NET® 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	
251	Internal error	
252	CMD UNKNOWN ERROR	
253	CMD CHECKSUM ERROR	

14 Servicing

Should an error message occur, please first take all measures described in chapter Error messages.

Should questions occur that are not covered by this manual, please contact the responsible sales partner (see internet: <http://www.deutschmann.de>) or contact us directly.

Please keep the following information ready at hand when you call:

Device designation
Serial number (S/N)
Item No.
Error number and error description (see also following chapter 'Returning a unit')

You can reach us on the following Hotline number. Lines are open from

Monday to Thursday from 8 am to 12 pm and from 1 pm to 4 pm, Friday from 8 am to 12 pm

Central office & sales department: +49-(0)6434-9433-0
Technical hotline: +49-(0)6434-9433-33

Fax Central office & sales department: +49-(0)6434-9433-40
Fax technical hotline: +49-(0)6434-9433-44

14.1 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 24 V supply voltage (± 0.5 V) with connected ROTARNOCK?
- 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.

14.2 Internet

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

URL: www.deutschmann.de

15 Appendix

15.1 Description and connection of the DICNET[®]-Adapter

15.1.1 DICNET[®]-Adapter DICADAP 3

The DICNET-Adapter serves to connect a PC to a DICNET-network of the company DEUTSCHMANN AUTOMATION.

It converts both the network protocol as well as the physical RS485-signals, so that a PC with the WINDOWS-software "WINLOC" will be in the position to communicate with those control units from DEUTSCHMANN AUTOMATION, existing in the net through a serial interface (COMx).

"WINLOC" is able to run under WIN 3.1x, WIN95/98 and WIN NT. The basic version is available free of charge.

The DICNET-Adapter is directly connected to a serial interface of the PC through the 9-pin D-SUB plug.

On the other side of the adapter (25-pin D-SUB plug) the DICNET-Bus and the supply voltage, which is allowed to range between 10V and 30V, is fed according to the below pin-assignment.

In case the DICNET-Adapter is connected as the last subscriber in the bus, the internal bus-terminating resistor has to be activated by means of bridges of the PIN's DICNET+ with R+ and DICNET- with R-. (More detailed information to the bus-termination and to the connection to the DICNET can be found in the instruction manual of the used control unit.)

Pin assignment 25-pin:

Pin No.	Name
1-15	Reserved (do not wire)
16	R+
17	DICNET +
18	DICNET -
19	R-
20-23	Reserved (do not wire)
24	+24 V
25	GND

Pin assignment 9-pin:

Pin No.	Name
2	Rx
3	Tx
5	GND
Others	nc

16 Password

16.1 Programming of a ROTARNOCK with option "V"

After the prompting to enter the password via TERM 5 by indication of „PASS“ the following key sequence has to be entered:

"+" "+" "-" "+" "-" "ENTER".

The order has to be kept exactly, as otherwise the password is not accepted.

