

EXDUL-336E

EDP No.: A-385340

EXDUL-336S

EDP No.: A-385320

Firmware Version 4.05

10 optocoupler isolated digital inputs

8 relay outputs

2 16bit counters

LCD display (EXDUL-336E only)

wasco[®]

user's guide

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Important Information:

This manual was written for the modules EXDUL-336E and EXDUL-336S. EXDUL-336E additionally provides an LCD display, all other functions are identical. For EXDUL-336S all commands and functions concerning the LCD display are not applicable.

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1. Description

























Data acquisition modules EXDUL-336E and EXDUL-336S feature ten digital inputs and eight digital outputs each of which are galvanically isolated. Electrical isolation at inputs is made by top-quality optocouplers with integrated Schmitt trigger function. Electrical isolation at outputs is made by special high power relays managing a switching current of 2 A. Two of the ten optocoupler inputs are programmable and usable as digital counters if required. EXDUL-336E additionally provides an LCD display which can display I/O status information or user specific data.

Connecting to a computer is made quickly and conveniently Plug & Play via a USB interface. The required power supply can be provided via USB port or by an external voltage source

The module has a 24-pin screw terminal for connection of the input optocouplers and output relays and external power supply. The compact chassis enables the module to be used as a portable device with a notebook. For mechanical engineering control applications it can also easily be attached to a DIN mounting rail.

2. Connection Terminals

2.1 Terminal Assignment of CN1

| | | | |
|---------|--|--|------------------|
| OUT01A | 2  |  1 | OUT00A |
| OUT03A | 4  |  3 | OUT02A |
| OUT05A | 6  |  5 | OUT04A |
| OUT07A | 8  |  7 | OUT06A |
| NC | 10  |  9 | OUT00...07B |
| IN01+ | 12  |  11 | IN00+ / Counter1 |
| IN03+ | 14  |  13 | IN02+ |
| IN05+ | 16  |  15 | IN04+ / Counter2 |
| IN07+ | 18  |  17 | IN06+ |
| IN09+ | 20  |  19 | IN08+ |
| NC | 22  |  21 | IN00...09- |
| GND_EXT | 24  |  23 | Vcc_EXT |

Vcc_EXT:

Connector for external voltage source

GND_EXT:

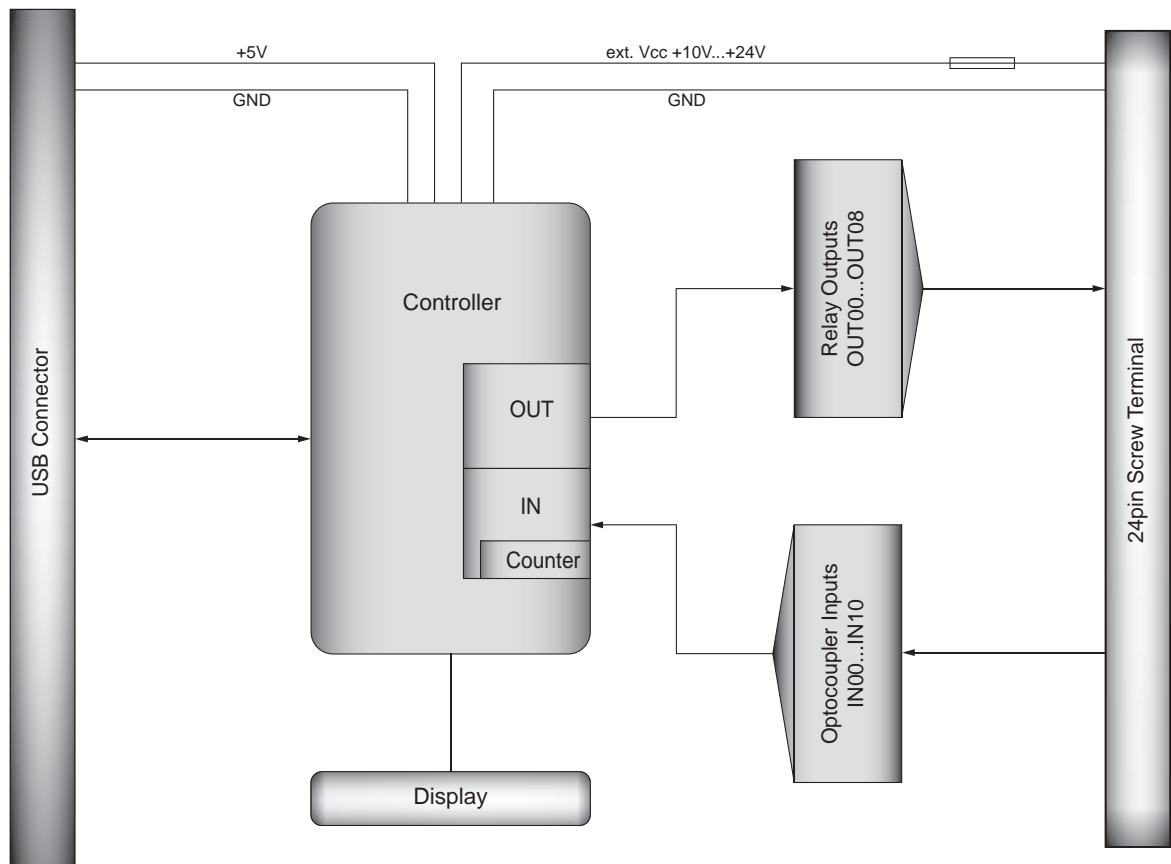
Ground connection when using external voltage source

NC:

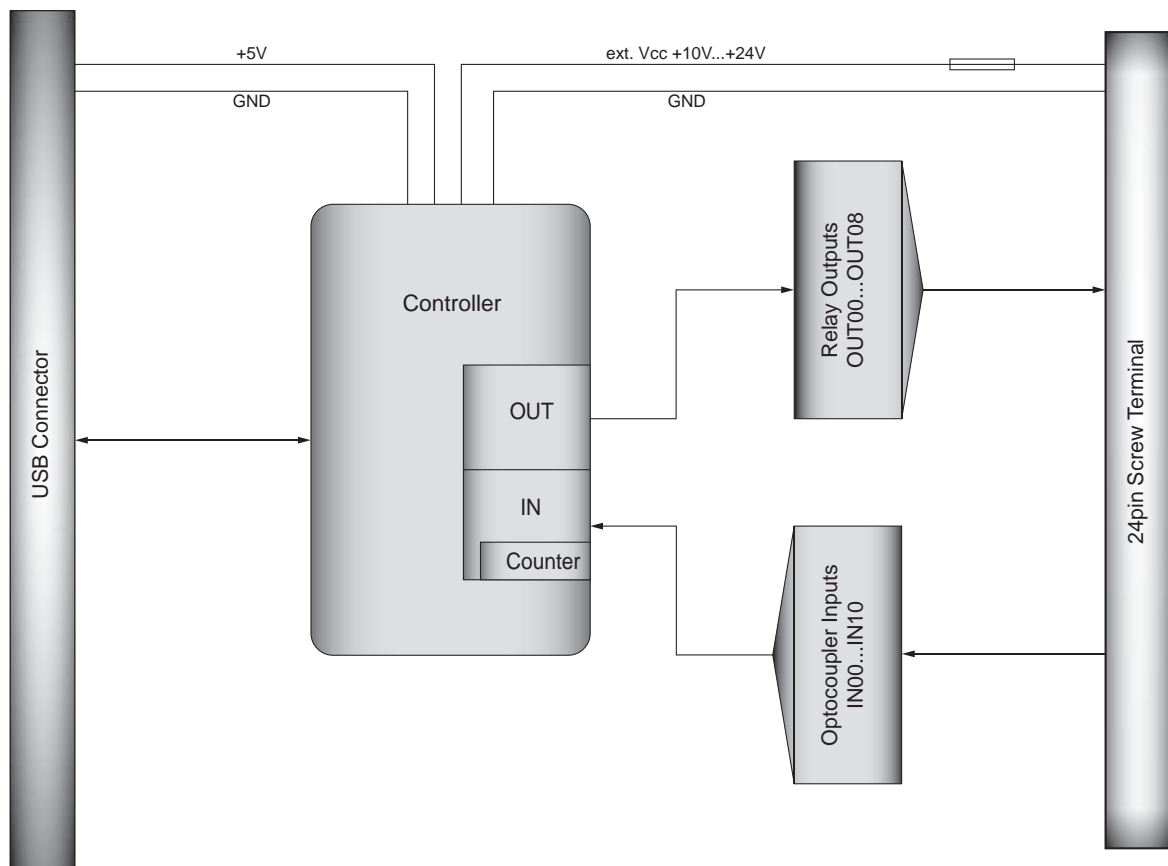
Not connected

3. System Components

3.1 Block Diagram EXDUL-336E



3.2 Block Diagram EXDUL-336S



3.3 Optocoupler Inputs

10 channels, galvanically isolated

Common ground connection (cathodes connected)

Two of the channels programmable to be digital counters

Optocouplers with integrated Schmitt trigger function

Overvoltage protection diodes

Input voltage range: low = 0....3 Volt high = 10.....30 Volt

Input frequency: max. 10 kHz

3.4 Relay Outputs

8 channels galvanically isolated

Relay contact A : one terminal connection each

Relay contact B: common terminal connection

Contact: 1 NO contact

Contact current rating: max. 2 A

Contact voltage rating: max. 240 VAC / 30 VDC

Contact power rating: max. 480 VA / 60 W

Isolation: coil/contact 500 V eff

Mechanical lifetime: max. $20 * 10^6$ operating cycles without load

Contact lifetime: 2 A, 250 VAC at NO contact, max. 10^5 switching cycles

Operating cycles under load: max. 10/min

Operating cycles without load: max. 1200/min

Circuit time: typ. 5 ms

Release time: typ. 2 ms

Bouncing time NO contact: < 1 ms

3.5 Digital Counters

2 programmable digital 16bit counters

(2 of the 10 optocoupler inputs are assigned)

Counting frequency: max. 5 kHz

3.6 LCD Display (EXDUL-336E only)

Matrix display with 2 lines and 16 columns performing 16 characters each line

Info display while booting

Display of I/O status or UserLCD while in operation

4. Initial Start-up

Connecting the EXDUL-336 to a computer is made quickly and conveniently Plug & Play via a USB interface. The required operating voltage for the module can be supplied via the USB port or by an external voltage source.

4.1 Connection via USB Port

EXDUL-336E / EXDUL-336S features a USB 2.0 interface and can be connected directly to the computer or via USB hub using the enclosed USB connecting cable. The module is hot pluggable, this means it is connectable even during running operations of your computer's system.

4.2 Power Supply via USB Port

If the USB port is used to power the device, then the operating voltage will be +5V. It may be necessary to configure your operating system software to obtain appropriate power requirements (see section Specifications).

4.3 Power Supply via an External Voltage Source

EXDUL-336E / EXDUL-336S firmware will automatically recognize when an external voltage source is used. Applying a voltage between +10V and +24 V across Vcc_EXT and GND_EXT (see fig. Terminal Configuration), will immediately cause the device to switch to „external“ source. The power supply via USB port will automatically be interrupted.

4.4 LCD Display while Booting (EXDUL-336E only)

When you boot the module the LCD display will show an info display with the module name in the first line. Once the booting process is completed, it will show I/O status display or UserLCD display depending upon your settings.

4.5 LCD Display while in Operation (EXDUL-336E only)

Once the booting process is completed the module switches from info display to I/O status or UserLCD display depending upon your setting. If you selected I/O status display, the current input states are shown on line 1, the output states on line 2. If you activated the mode UserLCD display then instead of I/O status the display will show values from memory areas UserLCD1m and UserLCD2m. The data from UserLCD1m and UserLCD2m will be displayed as long as you not write out new user data to the UserLCD line1 or UserLCD line2.

To avoid a „screen-burn“ while in operation the display switches from I/O status display or UserLCD display respectively to extended info display (see table below) for about five seconds every minute.

| Display | Meaning |
|---------------|---|
| EXDUL-336 u c | u = Vcc via USB, c = USB connected |
| EXDUL-336 e c | e = Vcc external, c = USB connected |
| EXDUL-336 e n | e = Vcc external, n = USB not connected |

5. Installing Windows® Drivers

When you connect the USB-module EXDUL-336E / EXDUL-336S to your computer for the first time, Windows® will automatically detect a new hardware and search for a suitable driver.

To install the driver indicate the directory and the file „wascoxmfe.inf“ into the Windows Hardware Wizard.

After the driver database has been updated the Hardware Wizard will inform you about the successful installation of the driver.

The Windows® Device Manager will now show your USB module EXDUL-336E / EXDUL-336S as a Wasco USB Communication Port COMx in its directory connections (COM/LTP) tree. All Windows® software can access to the virtual interface as if it were a real COM port.

6. Programming in Windows[®]

6.1 Overview

After successful installation the USB module EXDUL-336E / EXDUL-336S is shown as a Wasco USB Communication Port COMx in your Windows[®] Device Manager. This is a CDC device (Communications Device Class), that is addressed via a virtual COM port.

The software access to this virtual COM port operates like a normal COM interface of default Windows[®] drivers, and it is not necessary to install any additional drivers.

6.2 Communication with EXDUL-336

Data is exchanged by transmitting and receiving zero-terminated strings via the virtual COM-interface.

Every transmitting or receiveing string consists of 3 elements in ANSI format (1 Byte per character).

Every valid transmission string will be replied by a defined result or confirmation string.

The last result or confirmation string has to be read before transmitting a new string.

6.3 Windows® Functions for Programming

You can program EXDUL-336E / EXDUL-336S either via WIN32 API functions or very easily via an already existing serial port object in a programming language. You can find examples in your installation directory on your computer after having installed the software.

Windows® functions for programming:

- Create file
- GetCommState
- SetCommState
- WriteFile
- ReadFile
- DCB structure (describes control parameters of the device)

6.4 Command and Data Format

Data is exchanged by transmitting and receiving zero-terminated strings. Every transmitting or receiving string consists of 3 elements in ANSI format (1 byte per character).

Configuration or output commands are confirmed by returning the relevant string. Reading commands are replied by a string with an operation code and the read value.

6.5 Register Config, HW Identification and Serial Number

| Byte | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|----------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Config | 00 | 00 | 01 | 11 | 00 | 0F | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF |
| HW Identifier | E | X | D | U | L | - | 3 | 3 | 6 | V | 4 | . | 0 | 5 | | |
| S/N | 1 | 0 | 4 | 4 | 0 | 2 | 6 | FF | FF | FF | FF | FF | FF | FF | FF | FF |

All settings are stored in the CONFIG registry and automatically restored when you restart your computer or when you connect to another PC.

The values arise from CONFIG commands (A2, A3 und A8), the data in CONFIG registry remains effective until it is overwritten by CONFIG commands or reset to factory settings (delivery status) by a default reset.

| Config Byte | Function |
|-------------|--|
| 0 | reserved |
| 1 | State of the outputs at switch on or restart |
| 2 | LCD Contrast value (High-Byte)* |
| 3 | LCD Contrast value (Low-Byte)* |
| 4 | Display mode |

The module name is stored in the HW identification registry. Here the user can determine the product identity. The hardware identifier ends with a blank (20_{hex}). Register SERIAL NUMBER serves for internal purposes and can only be read by the user.

*: EXDUL-336E only!

6.6 Memory Areas UserA, UserB, UserLCD1m* and UserLCD2m*

| Byte | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| UserA | | | | | | | | | | | | | | | | |
| | 20 _{hex} | 20 _{hex} | 20 _{hex} | 20 _{hex} | 20 _{hex} | 20 _{hex} | 20 _{hex} | 20 _{hex} | 20 _{hex} | 20 _{hex} | 20 _{hex} | 20 _{hex} | 20 _{hex} | 20 _{hex} | 20 _{hex} | 20 _{hex} |
| UserB | | | | | | | | | | | | | | | | |
| | 20 _{hex} | 20 _{hex} | 20 _{hex} | 20 _{hex} | 20 _{hex} | 20 _{hex} | 20 _{hex} | 20 _{hex} | 20 _{hex} | 20 _{hex} | 20 _{hex} | 20 _{hex} | 20 _{hex} | 20 _{hex} | 20 _{hex} | 20 _{hex} |
| UserLCD1m* | | | | | | | | | | | | | | | | |
| | 20 _{hex} | 20 _{hex} | 20 _{hex} | 20 _{hex} | 20 _{hex} | 20 _{hex} | 20 _{hex} | 20 _{hex} | 20 _{hex} | 20 _{hex} | 20 _{hex} | 20 _{hex} | 20 _{hex} | 20 _{hex} | 20 _{hex} | 20 _{hex} |
| UserLCD2m* | | | | | | | | | | | | | | | | |
| | 20 _{hex} | 20 _{hex} | 20 _{hex} | 20 _{hex} | 20 _{hex} | 20 _{hex} | 20 _{hex} | 20 _{hex} | 20 _{hex} | 20 _{hex} | 20 _{hex} | 20 _{hex} | 20 _{hex} | 20 _{hex} | 20 _{hex} | 20 _{hex} |

In each of the register UserA, UserB, UserLCD1m* and UserLCD2m* 16 digits (16 byte) are at your proposal for your own use. Data remains stored when you switch off, registries can be set back to factory settings (delivery status) by a default reset. In delivery status in all of the four user memory areas each digit is set to the Hex value 20 corresponding to a blank in ASCII code. The top illustration shows every Hex value and the respective ASCII character.

If UserLCD mode is activated the data from memory areas UserLCD1m* and UserLCD2m* will be displayed as long as you not write out new user data to the UserLCD line1 or UserLCD line2 of the LCD display.

6.7 Display Register UserLCD-Line1*, UserLCD-Line2* and LCD-Contrast* (EXDUL-336E only)

If UserLCD mode is activated you can write any 16 characters to both of the UserLCD-line1 and UserLCD-line2. Once the data is entered this will overwrite displayed data from UserLCD1m and UserLCD2m. Data from UserLCD-line1 and UserLCD-line2 will **not** be stored at switch off.

You can adjust LCD display contrast in register LCD contrast. This adjustment remains stored at switch off.

6.8 Index of Commands

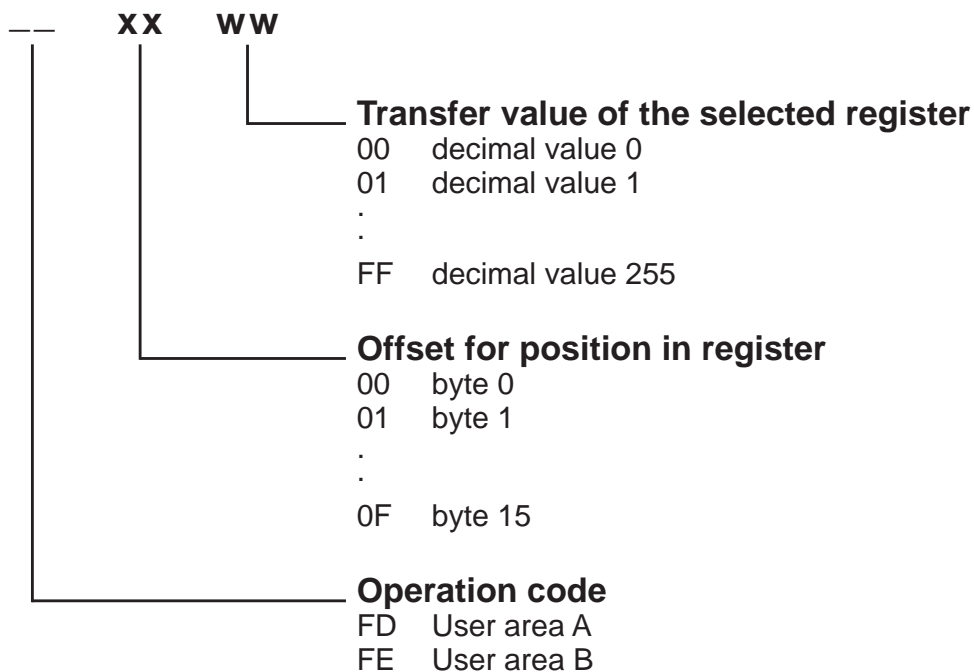
| Hexcode | Description |
|----------|---|
| D0 03 36 | EXDUL-336 Default Reset (restoring delivery settings) |
| FD xx ww | Writing user area A |
| FE xx ww | Writing user area B |
| E0 xx 00 | Reading configuration area |
| EC xx 00 | Reading HW identifier |
| ED xx 00 | Reading user area A |
| EE xx 00 | Reading user area B |
| EF xx 00 | Reading serial number |
| 01 03 00 | Reading optocoupler input port |
| 02 kk 0x | Reading of single optocoupler inputs |
| 01 13 00 | Reading counter1 |
| 01 23 00 | Reading counter2 |
| 81 03 ww | Writing relay output port |
| 82 kk 0x | Writing of single relay outputs |
| 83 kk 0x | Reading of single relay outputs |

| Hexcode | Description |
|----------------|-------------------------------------|
| 81 13 00 | Start counter1 |
| 81 13 FF | Stop counter1 |
| 81 23 00 | Start counter2 |
| 81 23 FF | Stop counter2 |
| | |
| A1 03 mm | Writing operation mode byte |
| A2 03 mm | Writing output port reset value |
| A3 03 mm | Writing display mode byte* |
| A8 ww ww | Writing LCD contrast setting value* |
| AF xy ww | Writing user LCD area* |

*: EXDUL-336E only!

6.9 Structure of Commands

6.9.1 Writing in User Area A and B

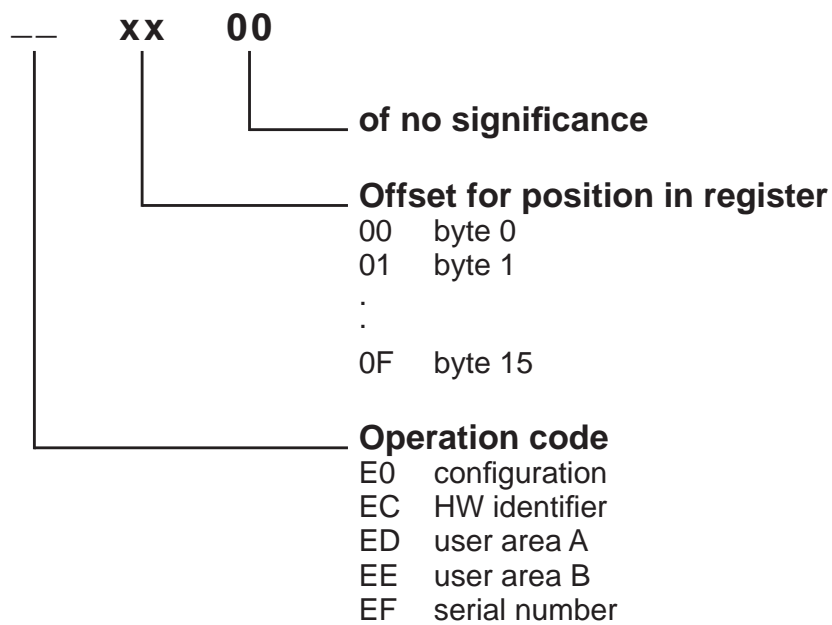


Areas User A and User B comprise of 16 digits each (16 bytes), into both of which is to write byte by byte.

For example: Type STEUERUNG in User area A

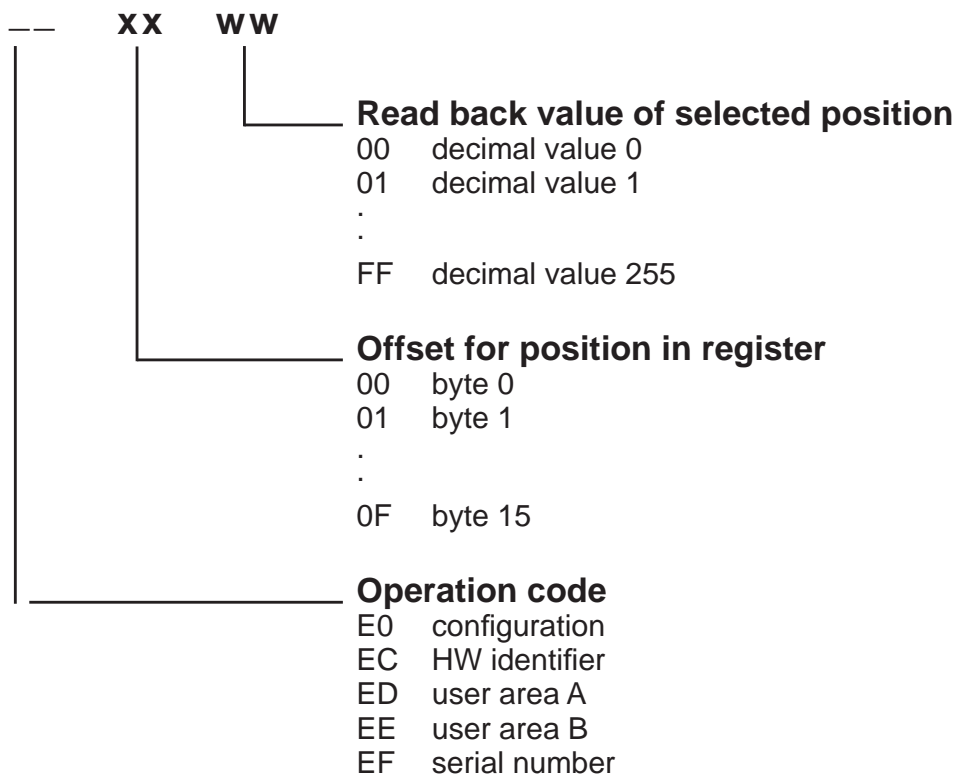
| Write | Response |
|---|---|
| FD _{hex} 00 _{hex} 53 _{hex} | FD _{hex} 00 _{hex} 53 _{hex} |
| FD _{hex} 01 _{hex} 54 _{hex} | FD _{hex} 01 _{hex} 54 _{hex} |
| FD _{hex} 02 _{hex} 45 _{hex} | FD _{hex} 02 _{hex} 45 _{hex} |
| FD _{hex} 03 _{hex} 55 _{hex} | FD _{hex} 03 _{hex} 55 _{hex} |
| FD _{hex} 04 _{hex} 45 _{hex} | FD _{hex} 04 _{hex} 45 _{hex} |
| FD _{hex} 05 _{hex} 52 _{hex} | FD _{hex} 05 _{hex} 52 _{hex} |
| FD _{hex} 06 _{hex} 55 _{hex} | FD _{hex} 06 _{hex} 55 _{hex} |
| FD _{hex} 07 _{hex} 4E _{hex} | FD _{hex} 07 _{hex} 4E _{hex} |
| FD _{hex} 08 _{hex} 47 _{hex} | FD _{hex} 08 _{hex} 47 _{hex} |

6.9.2 Reading Data from Area User A and User B, Serial Number, config and HW Identifier



All above mentioned areas comprise of 16 digits each (16 bytes) and are read byte by byte. Hardware identifier ends with a blank (20_{hex}).

Adapter Response

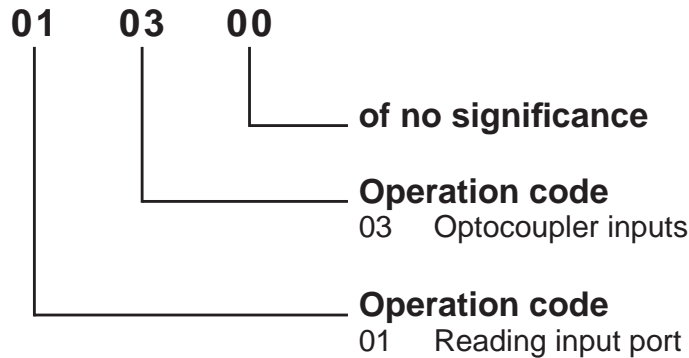


For Example:

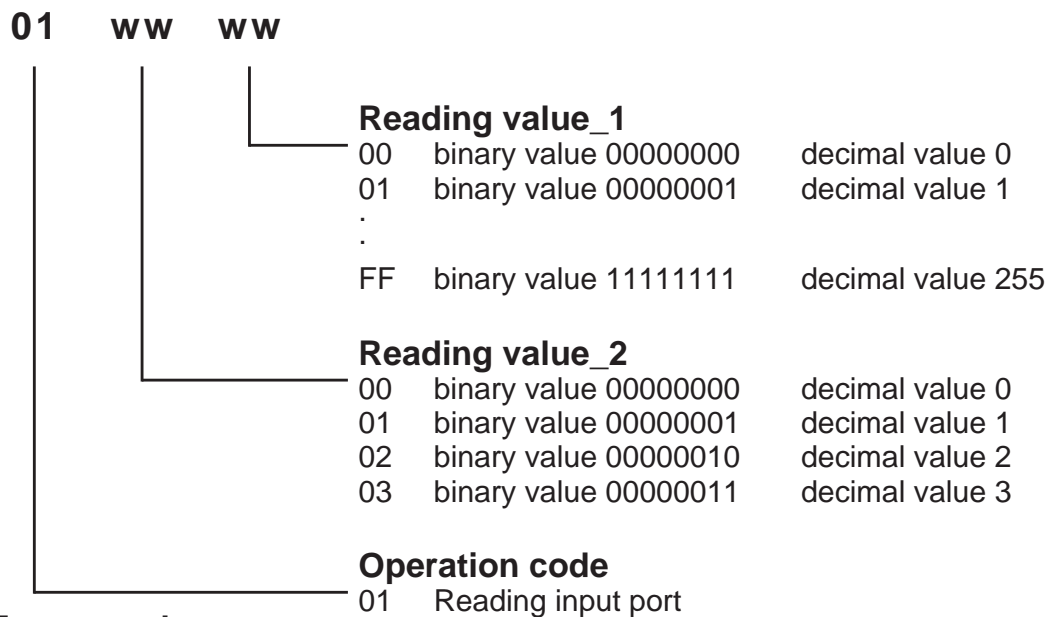
Reading the first 9 digits of register user area A. The stated response is valid for the word STEUERUNG (see example in section 6.9.1 Writing in User Area A)

| Read | Response |
|---|---|
| ED _{hex} 00 _{hex} 00 _{hex} | ED _{hex} 00 _{hex} 53 _{hex} |
| ED _{hex} 01 _{hex} 00 _{hex} | ED _{hex} 01 _{hex} 54 _{hex} |
| ED _{hex} 02 _{hex} 00 _{hex} | ED _{hex} 02 _{hex} 45 _{hex} |
| ED _{hex} 03 _{hex} 00 _{hex} | ED _{hex} 03 _{hex} 55 _{hex} |
| ED _{hex} 04 _{hex} 00 _{hex} | ED _{hex} 04 _{hex} 45 _{hex} |
| ED _{hex} 05 _{hex} 00 _{hex} | ED _{hex} 05 _{hex} 52 _{hex} |
| ED _{hex} 06 _{hex} 00 _{hex} | ED _{hex} 06 _{hex} 55 _{hex} |
| ED _{hex} 07 _{hex} 00 _{hex} | ED _{hex} 07 _{hex} 4E _{hex} |
| ED _{hex} 08 _{hex} 00 _{hex} | ED _{hex} 08 _{hex} 47 _{hex} |

6.9.3 Reading of the Optocoupler Inputs



Adapter response



For example:

Reading inputs from optocoupler input port. The voltage thresholds for an input to be considered a logic low and logic high are shown below. This example assumes that the correct voltages have been applied to each input optocoupler pin (0 = Low = 0...3 V; 1 = High = 10...30 V)

| Input channel | IN09 | IN08 | IN07 | IN06 | IN05 | IN04 | IN03 | IN02 | IN01 | IN00 |
|----------------|------|------|------|------|------|------|------|------|------|------|
| Terminal screw | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 |
| Input level | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 |
| Display* | E | A | E | E | E | E | A | A | E | E |

Write

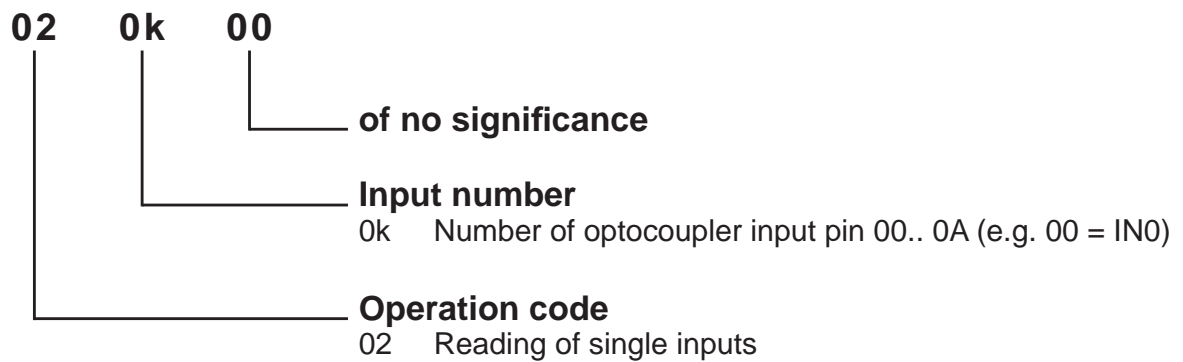
01_{hex} 03_{hex} 00_{hex}

Response

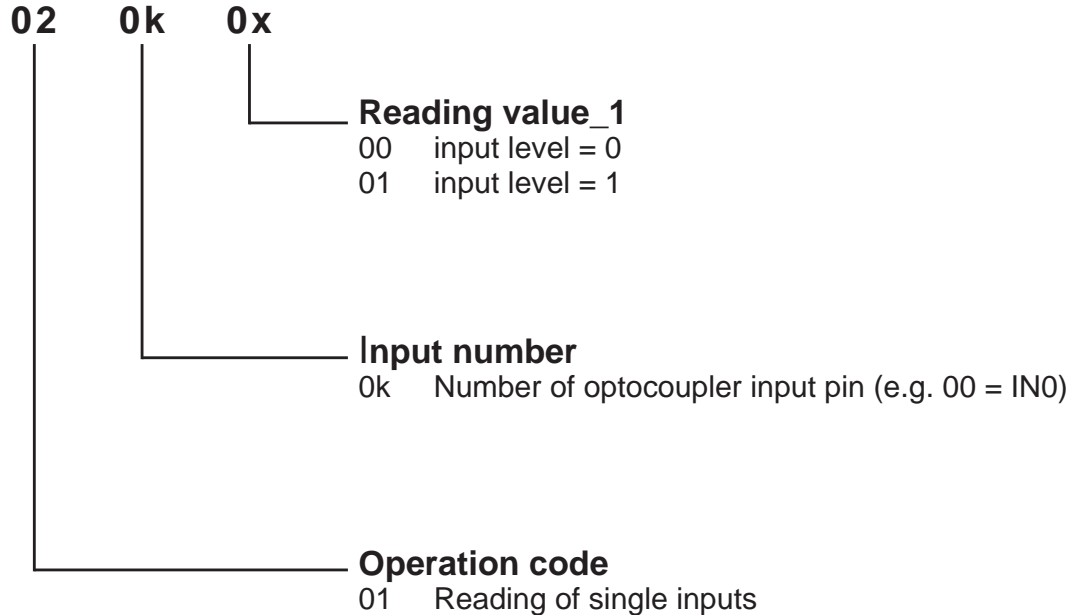
01_{hex} 02_{hex} F3_{hex}

*: EXDUL-336E only

6.9.4 Reading of Single Optocoupler Inputs

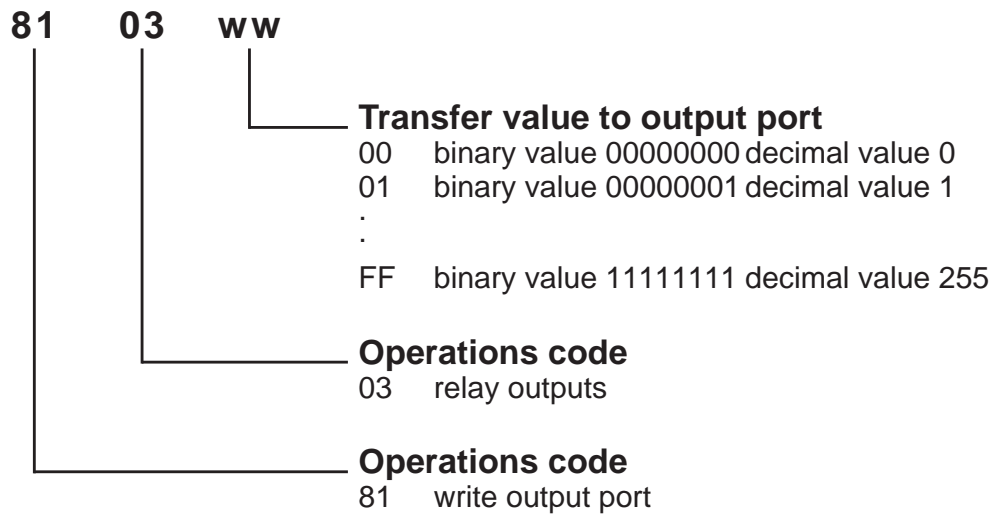


Adapter Response



*: EXDUL-336E only!

6.9.5 Writing Relay Output Port



For example:

Enable relay OUT02, OUT03, OUT04 und OUT06, relay contacts of the other channels remain made (relay contact made = 1; relay contact broken = 0)

| Output channel | OUT07 | OUT06 | OUT05 | OUT04 | OUT03 | OUT02 | OUT01 | OUT00 |
|------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Terminal screw | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Switching status | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 |
| Display* | A | E | A | E | E | E | A | A |

Write

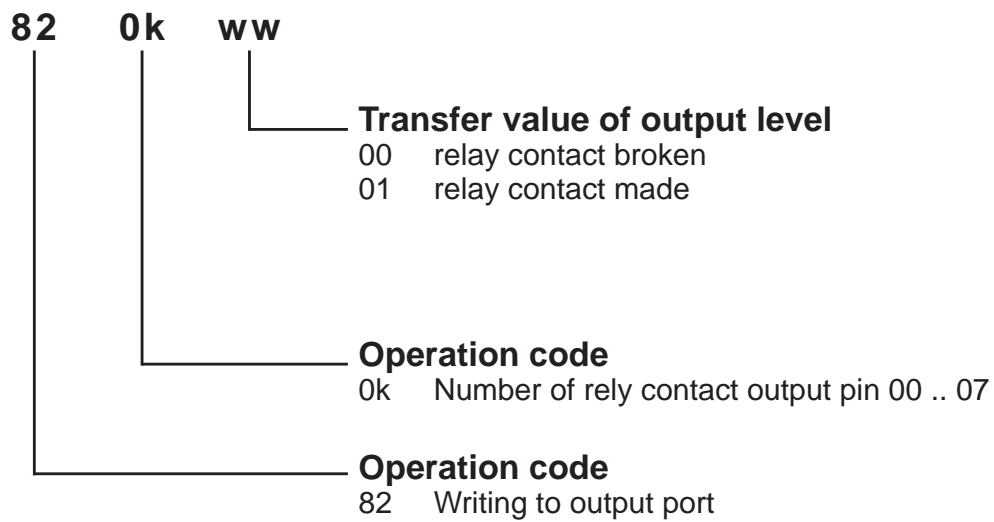
81_{hex} 03_{hex} 5C_{hex}

Response

81_{hex} 03_{hex} 5C_{hex}

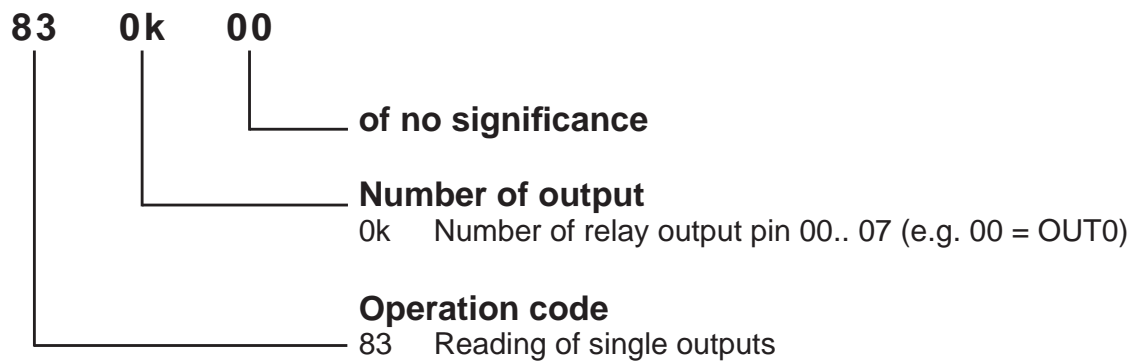
*: EXDUL-336E only!

6.9.6 Writing of Single Relay Outputs

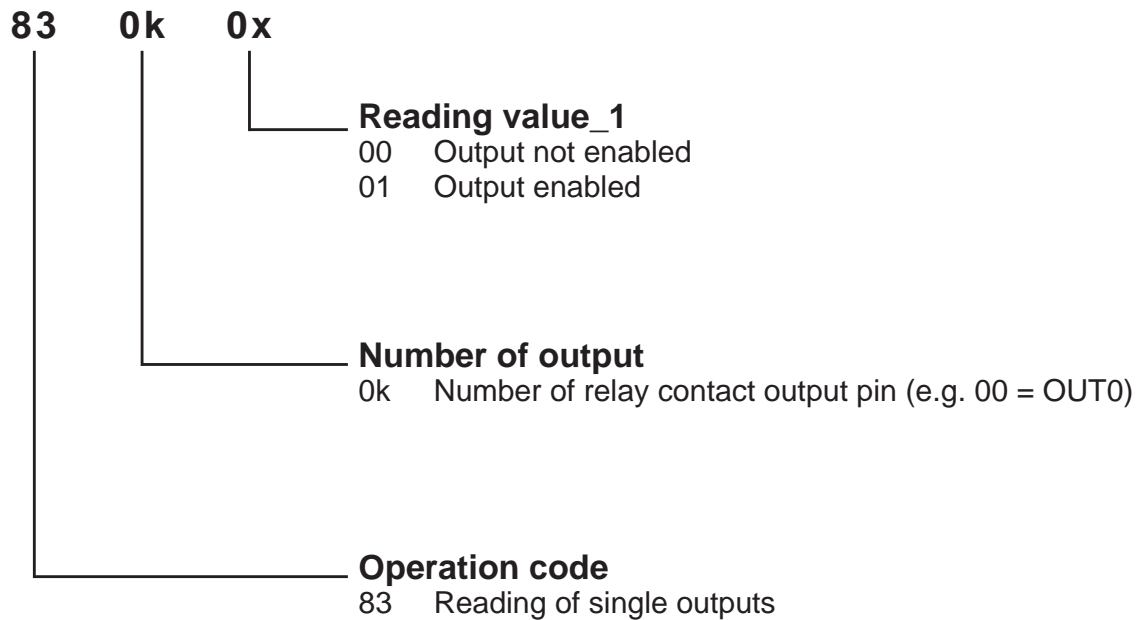


*: EXDUL-336E only!

6.9.7 Reading of Single Relay Outputs

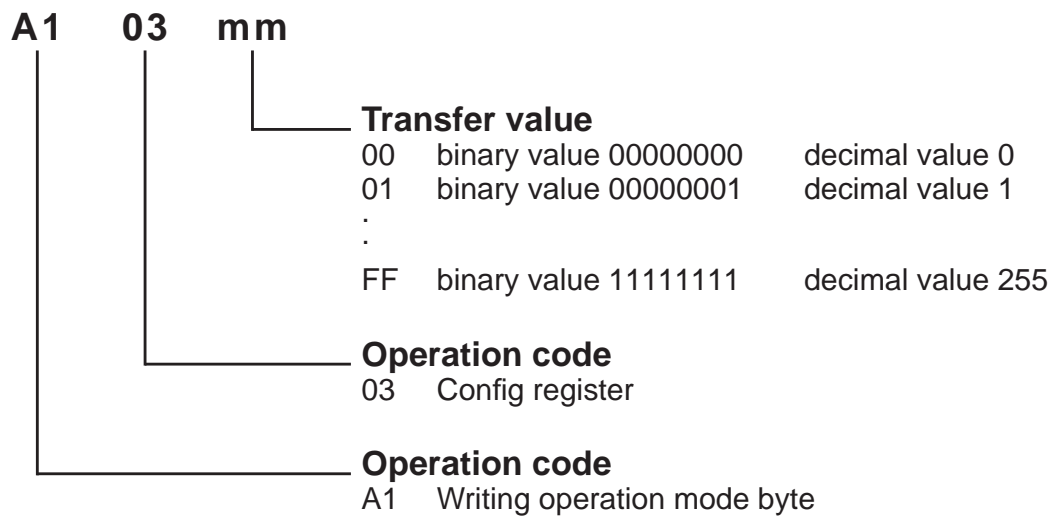


Adapter Response



*: EXDUL-336E only!

6.9.8 Writing Operation Mode Byte

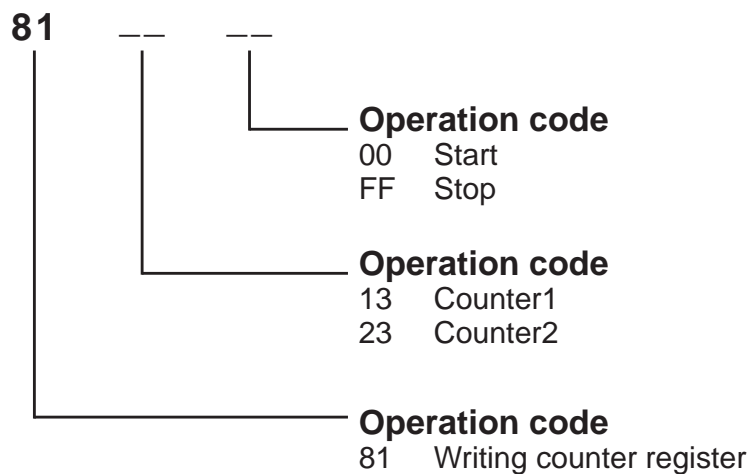


Structure of transfer value:

| Bit | | | | | | | | Function |
|-----|---|---|---|---|---|---|---|----------------------------|
| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | |
| x | x | 1 | | x | x | x | x | counter2 start at reset |
| x | x | 0 | | x | x | x | x | counter2 no start at reset |
| x | x | | 1 | x | x | x | x | counter1 start at reset |
| x | x | | 0 | x | x | x | x | counter1 no start at reset |

Bit 0 to 3 as well as Bit 6-7 are reserved.

6.9.9 Start and Stop Counters



For example:

Start counter1

Write

81_{hex} 13_{hex} 00_{hex}

Response

81_{hex} 13_{hex} 00_{hex}

Stop counter2

Write

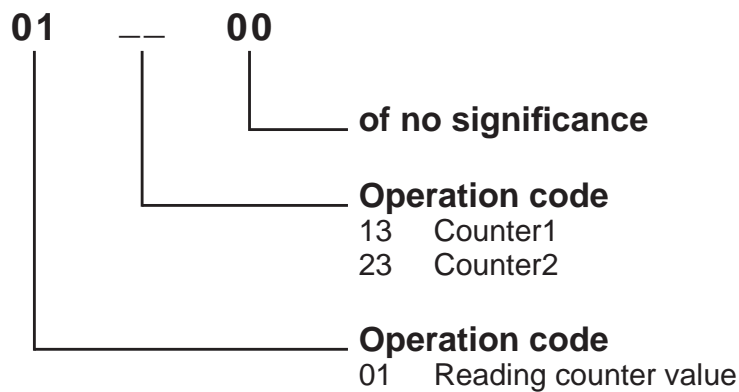
81_{hex} 23_{hex} FF_{hex}

Response

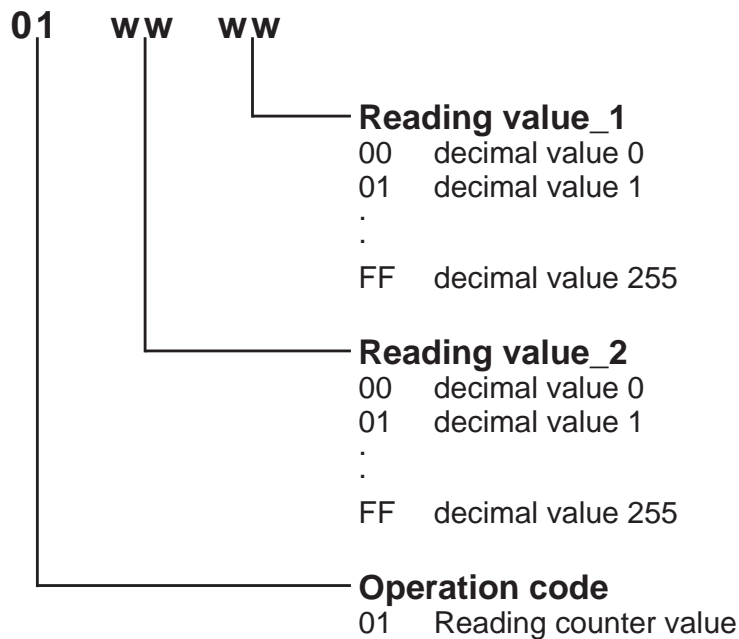
81_{hex} 23_{hex} FF_{hex}

Counter1 and counter2 are 16bit counters ranging from 0 65535. Every start command will reset the selected counter to 0 and then it will start to count upwards.

6.9.10 Reading Counter Value on Counter1 and Counter2



Adapter Response



counter value = reading value_2 x 256 + reading value_1

For example:

Reading counter value 2047 on counter1:

Write

01_{hex} 13_{hex} 00_{hex}

Response

01_{hex} 07_{hex} FF_{hex}

Display*

L1: 2047

*: EXDUL-336E only

Reading counter value 24319 on counter2

| Write | Response | Display* |
|---|---|-----------------|
| 01 _{hex} 23 _{hex} 00 _{hex} | 01 _{hex} 5E _{hex} FF _{hex} | L2: 24319 |

You can read out the current counter value calling a read command at any time and as often as you want to without interrupting the counting operation. If the counting range (0 ... 65535) is exceeded, the operation code will response in a modified way(11_{hex} instead of 01_{hex}). The Display* will show an „F“ before the counted value („Fehlerüberlauf“ - counting range exceeded).

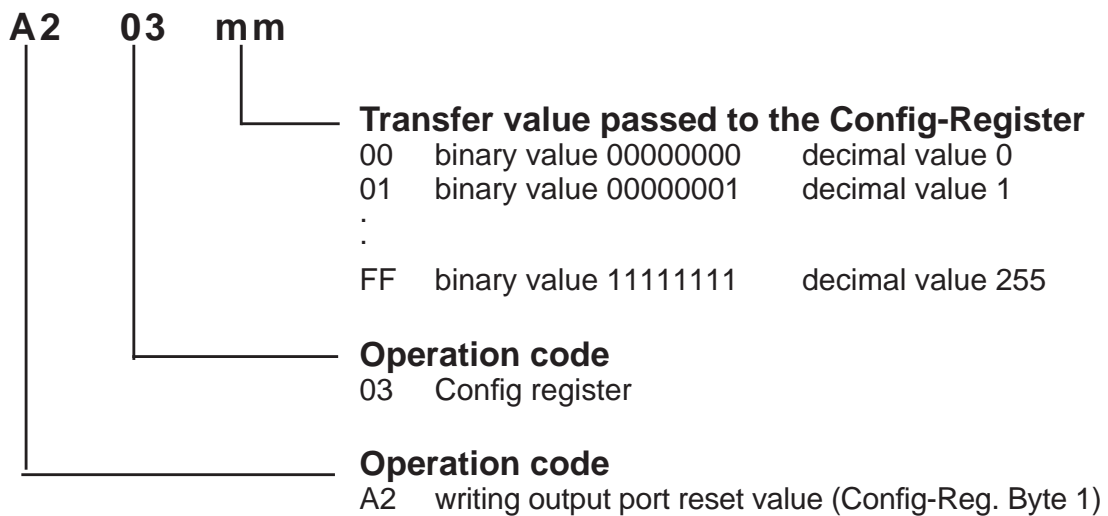
For example:

Read counter value 2047 on counter2 after counting range being exceeded

| Write | Response | Display* |
|---|---|-----------------|
| 01 _{hex} 23 _{hex} 00 _{hex} | 11 _{hex} 07 _{hex} FF _{hex} | L1: F 2047 |

*: EXDUL-336E only!

6.9.11 Writing Output Port Reset Value



For example:

Enable the relay contacts at channel OUT02, OUT03, OUT04 and OUT06 at next start or reset of the module, the relay contacts of all other channels remain broken (relay contact made = 1; relay contact broken = 0)

| Output channel | OUT07 | OUT06 | OUT05 | OUT04 | OUT03 | OUT02 | OUT01 | OUT00 |
|------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Terminal screw | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Switching status | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 |
| Display* | A | E | A | E | E | E | A | A |

Write

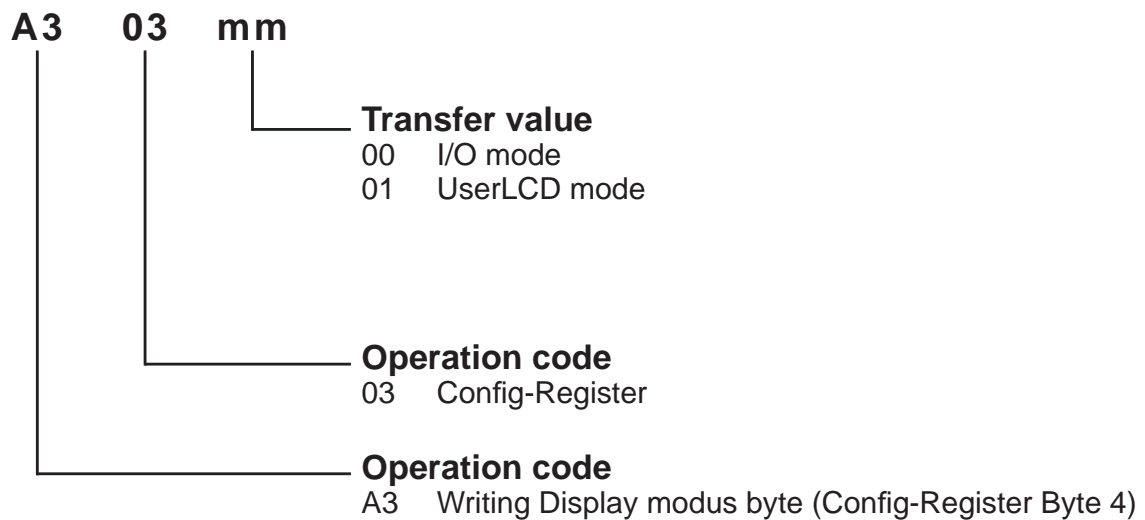
A2_{hex} 03_{hex} 5C_{hex}

Response

A2_{hex} 03_{hex} 5C_{hex}

*: EXDUL-336E only!

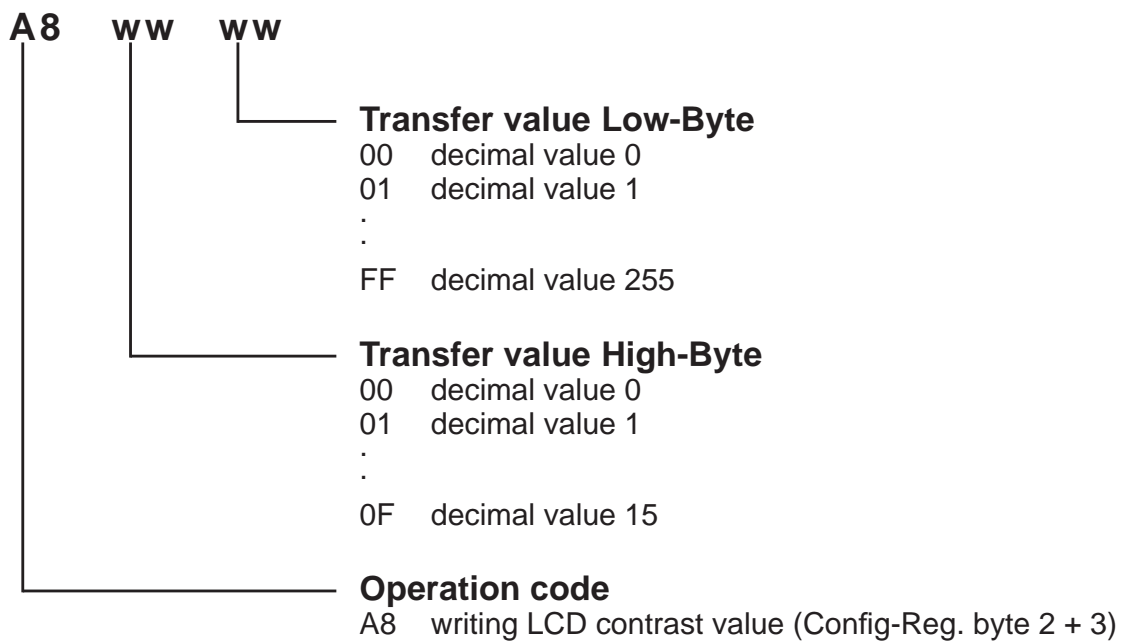
6.9.12 Writing Display Mode Byte*



The display mode byte determines, which data is displayed in a flashing or rotational mode, respectively, alternating with communication or refresh display.

*: EXDUL-336E only!

6.9.13 Writing LCD Contrast Value*



Contrast value = transfer value high-byte x 256 + transfer value low-byte (0F FF = 4095)

For example:

Display contrast peak value (maximum brightness)

Write

A8_{hex} 0F_{hex} FF_{hex}

Response

A8_{hex} 0F_{hex} FF_{hex}

Display contrast average value

Write

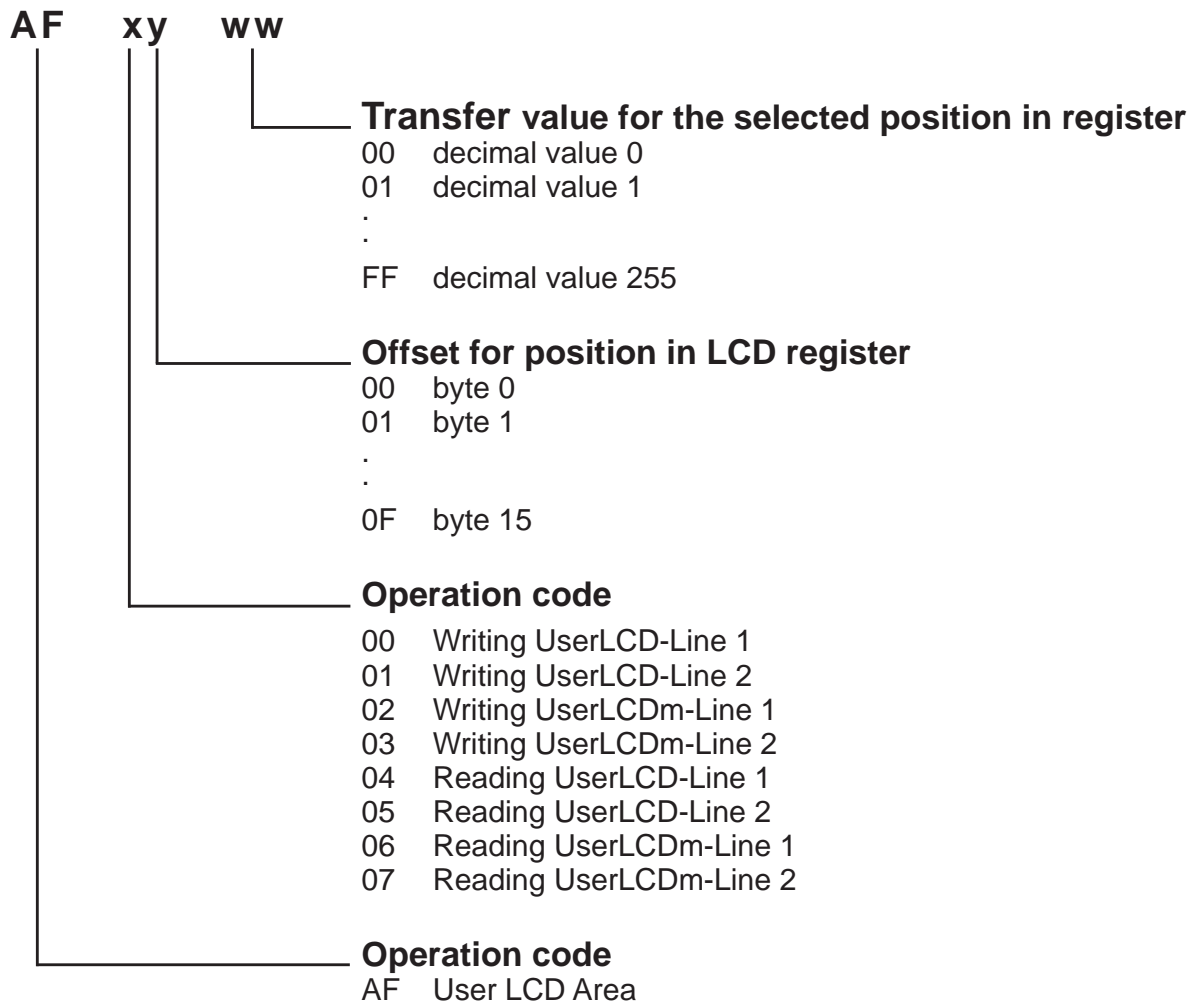
C2_{hex} 07_{hex} FF_{hex}

Response

C2_{hex} 07_{hex} FF_{hex}

*: EXDUL-336E only!

6.9.14 Writing in User LCD Area*



*: EXDUL-336E only!

For example:

Type STEUERUNG into UserLCD-Line 1

Write

AF_{hex} 00_{hex} 53_{hex}

AF_{hex} 01_{hex} 54_{hex}

AF_{hex} 02_{hex} 45_{hex}

AF_{hex} 03_{hex} 55_{hex}

AF_{hex} 04_{hex} 45_{hex}

AF_{hex} 05_{hex} 52_{hex}

AF_{hex} 06_{hex} 55_{hex}

AF_{hex} 07_{hex} 4E_{hex}

AF_{hex} 08_{hex} 47_{hex}

Response

AF_{hex} 00_{hex} 53_{hex}

AF_{hex} 01_{hex} 54_{hex}

AF_{hex} 02_{hex} 45_{hex}

AF_{hex} 03_{hex} 55_{hex}

AF_{hex} 04_{hex} 45_{hex}

AF_{hex} 05_{hex} 52_{hex}

AF_{hex} 06_{hex} 55_{hex}

AF_{hex} 07_{hex} 4E_{hex}

AF_{hex} 08_{hex} 47_{hex}

Calling the command A3_{hex} 03_{hex} 01_{hex} induces the display to show the UserLCD area

*: EXDUL-336E only!

7. Specifications

Digital optocoupler inputs

| | |
|------------------------|---|
| Channels | 10 inputs with galvanic isolation common ground connection (cathodes connected) 2 of the channels programmable as counting inputs |
| Galvanic isolation | optocoupler with integrated Schmitt-Trigger function |
| Overvoltage protection | diodes |
| Input voltage range | high = 10 30 V low = 0 3 V |
| Input frequency | max. 10 kHz |

Digital relay outputs

| | |
|--------------------------------|--|
| Channels: | 8 channels galvanically isolated Relay contact A with one terminal connection each Relay contact B with common terminal connection |
| Contact: | 1 NO contact |
| Contact current rating: | max. 2 A |
| Contact voltage rating: | max. 50 V AC / 30 V DC |
| Contact power rating: | max. 100 VA / 60 W |
| Isolation: | coil/contact 500 V eff |
| Mechanical lifetime: | max. 20 * 10 ⁶ switching cycles without load |
| Contact lifetime: | 2 A, 250 VAC at NO contact, max. 10 ⁵ switching cycles |
| Operating cycles under load: | max. 10/min |
| Operating cycles without load: | max. 1200/min |
| Switching time:: | typ. 5 ms |
| Release time:: | typ. 2 ms |
| Bouncing time NO contact: | < 1 ms |

Counter

| | |
|---------------------|--|
| Channels: | 2 programmable digital 16bit counters (2 of the 10 input optocouplers are assigned) |
| Counting frequency: | max. 5 kHz |

LCD Display (EXDUL-336E only)

| | |
|------------------|--|
| Display: | Matrix display with 2 lines and 16 columns performing 16 characters each line |
| Programmable as. | I/O status display UserLCD display |

Power Supply

Internal via USB Port:

+5V. (It may be necessary to configure your operating system software to obtain appropriate power requirements).

External power supply:

+10 V...+24 V (using an external power supply will automatically interrupt the power supply via USB port)

USB interface

USB 2.0 compatible

USB connection Plug-and-Play
(hot pluggable)

Module connections

1 * 24pin screw terminal

1 * USB port type B

USB connecting cable

1 * USB plug type A

1 * USB plug type B

Product dimensions

105 mm x 89 mm x 59 mm (l x b x h)

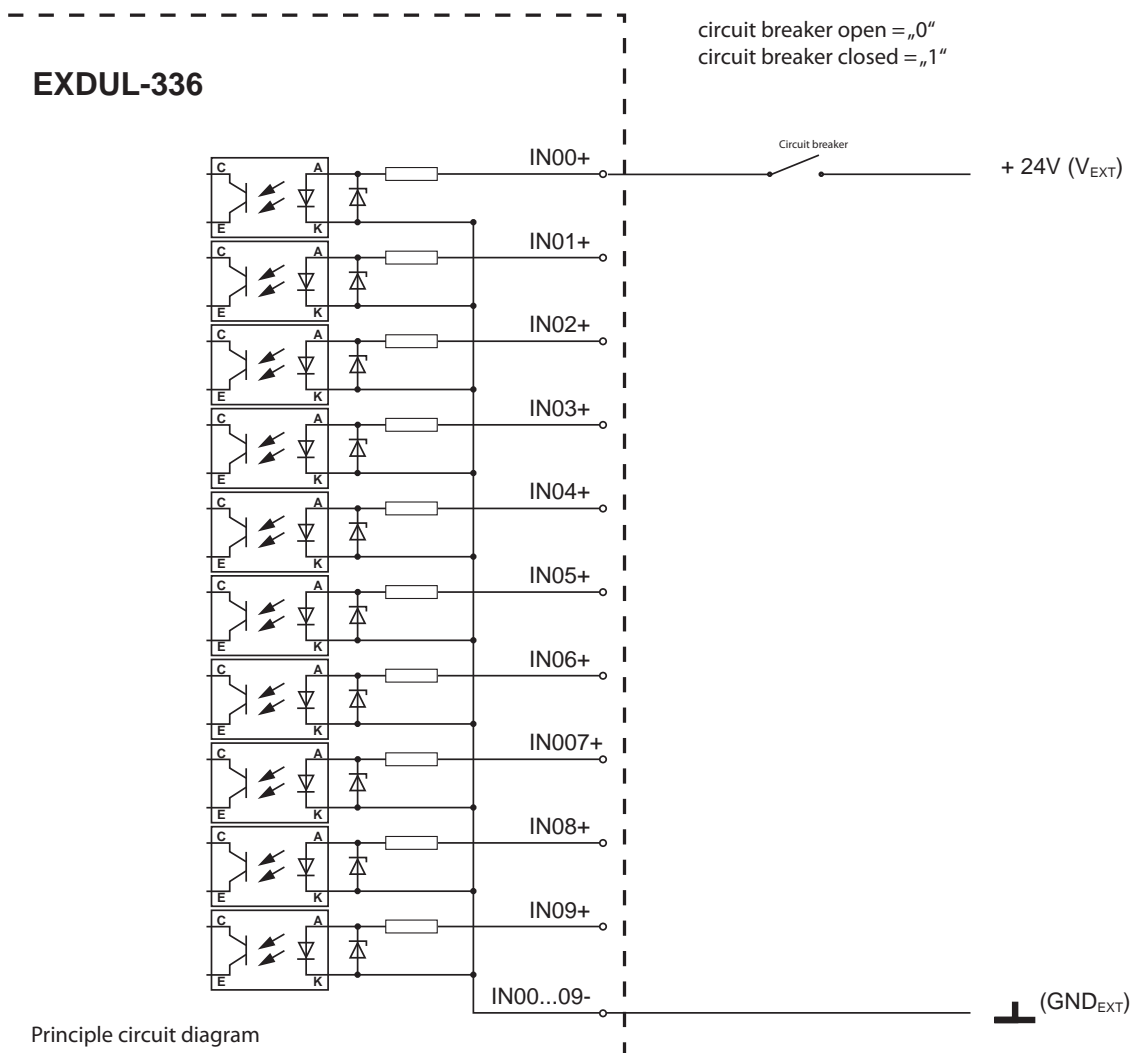
Casing

Plastic casing with integrated snap-on technology for top-hat rail mounting to DIN EN

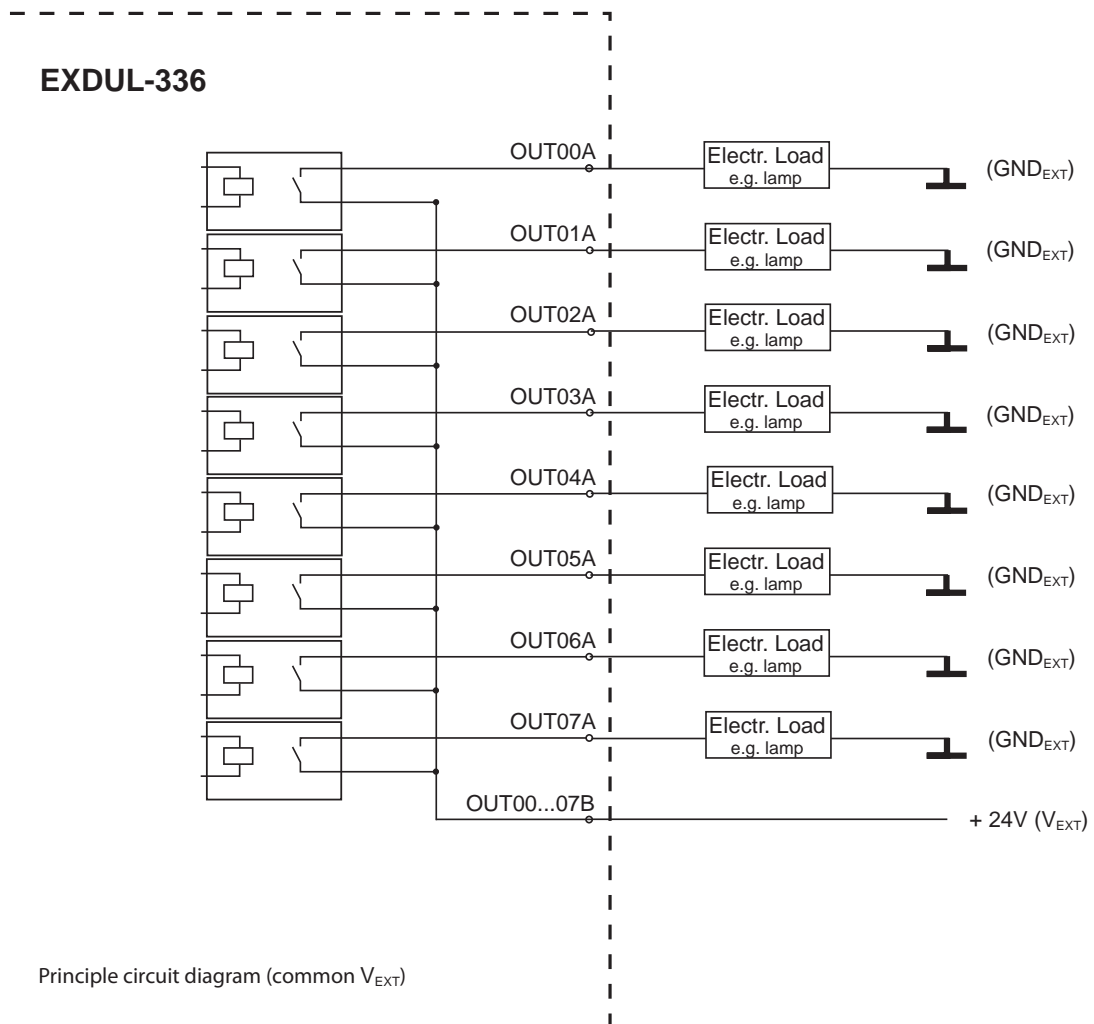
Suitable for control and engineering technology mounted to control and distribution boxes, surface mounting or mobile use on a desk.

8. Examples for circuitry

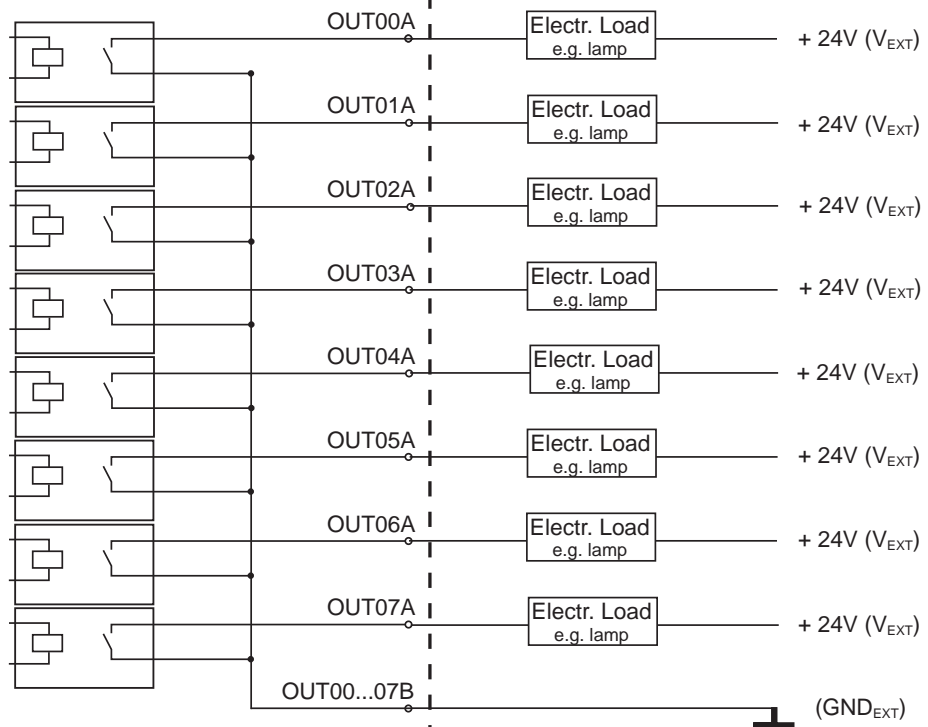
8.1 Input Circuit



8.2 Output Circuit



EXDUL-336



Principle circuit diagram (common GND)

9. ASCII Table

| Hex | Dec | Binary | sign |
|-----|-----|----------|---------|
| 00 | 0 | 00000000 | |
| 01 | 1 | 00000001 | |
| 02 | 2 | 00000010 | |
| 03 | 3 | 00000011 | |
| 04 | 4 | 00000100 | |
| 05 | 5 | 00000101 | |
| 06 | 6 | 00000110 | |
| 07 | 7 | 00000111 | |
| 08 | 8 | 00001000 | |
| 09 | 9 | 00001001 | |
| 0A | 10 | 00001010 | |
| 0B | 11 | 00001011 | |
| 0C | 12 | 00001100 | |
| 0D | 13 | 00001101 | |
| 0E | 14 | 00001110 | |
| 0F | 15 | 00001111 | |
| 10 | 16 | 00010000 | |
| 11 | 17 | 00010001 | |
| 12 | 18 | 00010010 | |
| 13 | 19 | 00010011 | |
| 14 | 20 | 00010100 | |
| 15 | 21 | 00010101 | |
| 16 | 22 | 00010110 | |
| 17 | 23 | 00010111 | |
| 18 | 24 | 00011000 | |
| 19 | 25 | 00011001 | |
| 1A | 26 | 00011010 | |
| 1B | 27 | 00011011 | |
| 1C | 28 | 00011100 | |
| 1D | 29 | 00011101 | |
| 1E | 30 | 00011110 | |
| 1F | 31 | 00011111 | |
| 20 | 32 | 00100000 | [Blank] |
| 21 | 33 | 00100001 | ! |
| 22 | 34 | 00100010 | " |
| 23 | 35 | 00100011 | # |
| 24 | 36 | 00100100 | \$ |
| 25 | 37 | 00100101 | % |
| 26 | 38 | 00100110 | & |
| 27 | 39 | 00100111 | ' |

| Hex | Dec | Binary | sign |
|-----|-----|----------|------|
| 28 | 40 | 00101000 | (|
| 29 | 41 | 00101001 |) |
| 2A | 42 | 00101010 | * |
| 2B | 43 | 00101011 | + |
| 2C | 44 | 00101100 | , |
| 2D | 45 | 00101101 | - |
| 2E | 46 | 00101110 | . |
| 2F | 47 | 00101111 | / |
| 30 | 48 | 00110000 | 0 |
| 31 | 49 | 00110001 | 1 |
| 32 | 50 | 00110010 | 2 |
| 33 | 51 | 00110011 | 3 |
| 34 | 52 | 00110100 | 4 |
| 35 | 53 | 00110101 | 5 |
| 36 | 54 | 00110110 | 6 |
| 37 | 55 | 00110111 | 7 |
| 38 | 56 | 00111000 | 8 |
| 39 | 57 | 00111001 | 9 |
| 3A | 58 | 00111010 | : |
| 3B | 59 | 00111011 | ; |
| 3C | 60 | 00111100 | < |
| 3D | 61 | 00111101 | = |
| 3E | 62 | 00111110 | > |
| 3F | 63 | 00111111 | ? |
| 40 | 64 | 01000000 | @ |
| 41 | 65 | 01000001 | A |
| 42 | 66 | 01000010 | B |
| 43 | 67 | 01000011 | C |
| 44 | 68 | 01000100 | D |
| 45 | 69 | 01000101 | E |
| 46 | 70 | 01000110 | F |
| 47 | 71 | 01000111 | G |
| 48 | 72 | 01001000 | H |
| 49 | 73 | 01001001 | I |
| 4A | 74 | 01001010 | J |
| 4B | 75 | 01001011 | K |
| 4C | 76 | 01001100 | L |
| 4D | 77 | 01001101 | M |
| 4E | 78 | 01001110 | N |
| 4F | 79 | 01001111 | O |

| Hex | Dec | Binary | sign |
|-----|-----|----------|------|
| 50 | 80 | 01010000 | P |
| 51 | 81 | 01010001 | Q |
| 52 | 82 | 01010010 | R |
| 53 | 83 | 01010011 | S |
| 54 | 84 | 01010100 | T |
| 55 | 85 | 01010101 | U |
| 56 | 86 | 01010110 | V |
| 57 | 87 | 01010111 | W |
| 58 | 88 | 01011000 | X |
| 59 | 89 | 01011001 | Y |
| 5A | 90 | 01011010 | Z |
| 5B | 91 | 01011011 | [|
| 5C | 92 | 01011100 | |
| 5D | 93 | 01011101 |] |
| 5E | 94 | 01011110 | ^ |
| 5F | 95 | 01011111 | _ |
| 60 | 96 | 01100000 | ` |
| 61 | 97 | 01100001 | a |
| 62 | 98 | 01100010 | b |
| 63 | 99 | 01100011 | c |
| 64 | 100 | 01100100 | d |
| 65 | 101 | 01100101 | e |
| 66 | 102 | 01100110 | f |
| 67 | 103 | 01100111 | g |
| 68 | 104 | 01101000 | h |
| 69 | 105 | 01101001 | i |
| 6A | 106 | 01101010 | j |
| 6B | 107 | 01101011 | k |
| 6C | 108 | 01101100 | l |
| 6D | 109 | 01101101 | m |
| 6E | 110 | 01101110 | n |
| 6F | 111 | 01101111 | o |
| 70 | 112 | 01110000 | p |
| 71 | 113 | 01110001 | q |
| 72 | 114 | 01110010 | r |
| 73 | 115 | 01110011 | s |
| 74 | 116 | 01110100 | t |
| 75 | 117 | 01110101 | u |
| 76 | 118 | 01110110 | v |
| 77 | 119 | 01110111 | w |
| 78 | 120 | 01111000 | x |
| 79 | 121 | 01111001 | y |
| 7A | 122 | 01111010 | z |
| 7B | 123 | 01111011 | { |

| Hex | Dec | Binary | sign |
|-----|-----|----------|------|
| 7C | 124 | 01111100 | |
| 7D | 125 | 01111101 | } |
| 7E | 126 | 01111110 | |
| 7F | 127 | 01111111 | |
| 80 | 128 | 10000000 | |
| 81 | 129 | 10000001 | |
| 82 | 130 | 10000010 | |
| 83 | 131 | 10000011 | |
| 84 | 132 | 10000100 | |
| 85 | 133 | 10000101 | |
| 86 | 134 | 10000110 | |
| 87 | 135 | 10000111 | |
| 88 | 136 | 10001000 | |
| 89 | 137 | 10001001 | |
| 8A | 138 | 10001010 | |
| 8B | 139 | 10001011 | |
| 8C | 140 | 10001100 | |
| 8D | 141 | 10001101 | |
| 8E | 142 | 10001110 | |
| 8F | 143 | 10001111 | |
| 90 | 144 | 10010000 | |
| 91 | 145 | 10010001 | |
| 92 | 146 | 10010010 | |
| 93 | 147 | 10010011 | |
| 94 | 148 | 10010100 | |
| 95 | 149 | 10010101 | |
| 96 | 150 | 10010110 | |
| 97 | 151 | 10010111 | |
| 98 | 152 | 10011000 | |
| 99 | 153 | 10011001 | |
| 9A | 154 | 10011010 | |
| 9B | 155 | 10011011 | |
| 9C | 156 | 10011100 | |
| 9D | 157 | 10011101 | |
| 9E | 158 | 10011110 | |
| 9F | 159 | 10011111 | |
| A0 | 160 | 10100000 | |
| A1 | 161 | 10100001 | |
| A2 | 162 | 10100010 | |
| A3 | 163 | 10100011 | |
| A4 | 164 | 10100100 | |
| A5 | 165 | 10100101 | |
| A6 | 166 | 10100110 | |
| A7 | 167 | 10100111 | |

| Hex | Dec | Binary | sign |
|-----|-----|----------|------|
| A8 | 168 | 10101000 | |
| A9 | 169 | 10101001 | |
| AA | 170 | 10101010 | |
| AB | 171 | 10101011 | |
| AC | 172 | 10101100 | |
| AD | 173 | 10101101 | |
| AE | 174 | 10101110 | |
| AF | 175 | 10101111 | |
| B0 | 176 | 10110000 | |
| B1 | 177 | 10110001 | |
| B2 | 178 | 10110010 | |
| B3 | 179 | 10110011 | |
| B4 | 180 | 10110100 | |
| B5 | 181 | 10110101 | |
| B6 | 182 | 10110110 | |
| B7 | 183 | 10110111 | |
| B8 | 184 | 10111000 | |
| B9 | 185 | 10111001 | |
| BA | 186 | 10111010 | |
| BB | 187 | 10111011 | |
| BC | 188 | 10111100 | |
| BD | 189 | 10111101 | |
| BE | 190 | 10111110 | |
| BF | 191 | 10111111 | |
| C0 | 192 | 11000000 | |
| C1 | 193 | 11000001 | |
| C2 | 194 | 11000010 | |
| C3 | 195 | 11000011 | |
| C4 | 196 | 11000100 | |
| C5 | 197 | 11000101 | |
| C6 | 198 | 11000110 | |
| C7 | 199 | 11000111 | |
| C8 | 200 | 11001000 | |
| C9 | 201 | 11001001 | |
| CA | 202 | 11001010 | |
| CB | 203 | 11001011 | |
| CC | 204 | 11001100 | |
| CD | 205 | 11001101 | |
| CE | 206 | 11001110 | |
| CF | 207 | 11001111 | |
| D0 | 208 | 11010000 | |
| D1 | 209 | 11010001 | |
| D2 | 210 | 11010010 | |
| D3 | 211 | 11010011 | |

| Hex | Dec | Binary | sign |
|-----|-----|----------|------|
| D4 | 212 | 11010100 | |
| D5 | 213 | 11010101 | |
| D6 | 214 | 11010110 | |
| D7 | 215 | 11010111 | |
| D8 | 216 | 11011000 | |
| D9 | 217 | 11011001 | |
| DA | 218 | 11011010 | |
| DB | 219 | 11011011 | |
| DC | 220 | 11011100 | |
| DD | 221 | 11011101 | |
| DE | 222 | 11011110 | |
| DF | 223 | 11011111 | |
| E0 | 224 | 11100000 | |
| E1 | 225 | 11100001 | |
| E2 | 226 | 11100010 | |
| E3 | 227 | 11100011 | |
| E4 | 228 | 11100100 | |
| E5 | 229 | 11100101 | |
| E6 | 230 | 11100110 | |
| E7 | 231 | 11100111 | |
| E8 | 232 | 11101000 | |
| E9 | 233 | 11101001 | |
| EA | 234 | 11101010 | |
| EB | 235 | 11101011 | |
| EC | 236 | 11101100 | |
| ED | 237 | 11101101 | |
| EE | 238 | 11101110 | |
| EF | 239 | 11101111 | |
| F0 | 240 | 11110000 | |
| F1 | 241 | 11110001 | |
| F2 | 242 | 11110010 | |
| F3 | 243 | 11110011 | |
| F4 | 244 | 11110100 | |
| F5 | 245 | 11110101 | |
| F6 | 246 | 11110110 | |
| F7 | 247 | 11110111 | |
| F8 | 248 | 11111000 | |
| F9 | 249 | 11111001 | |
| FA | 250 | 11111010 | |
| FB | 251 | 11111011 | |
| FC | 252 | 11111100 | |
| FD | 253 | 11111101 | |
| FE | 254 | 11111110 | |
| FF | 255 | 11111111 | |

10. Release Notes

Firmware Version 4.05

- Speed optimization
- Deletion of reset command
- Modifications upon accessing to LCD display
- New commands for accessing to single relay channels and for reading of the relay output port

11. Product Liability Act

Information for Product Liability

The Product Liability Act (Act on Liability for Defective Products - Prod-HaftG) in Germany regulates the manufacturer's liability for damages caused by defective products.

The obligation to pay compensation can be given, if the product's presentation could cause a misconception of safety to a non-commercial end-user and also if the end-user is expected not to observe the necessary safety instructions handling this product.

It therefore always must be verifiable, that the not-commercial end-user was made familiar with the safety rules.

In the interest of safety, please always advise your non-commercial customer of the following safety instructions:

Safety instructions

The valid VDE-instructions must be observed, when handling products that come in contact with electrical voltage.

Especially the following instructions must be observed:
VDE100; VDE0550/0551; VDE0700; VDE0711; VDE0860.

The instructions are available from:

Vde-Verlag GmbH
Bismarckstr. 33
10625 Berlin

- * unplug the power cord before you open the unit or make sure, there is no current to/in the unit.
- * You only may start up any components, boards or equipment, if they are installed inside a secure touch-protected casing before. During installation there must be no current to the equipment.
- * Make sure that the device is disconnected from the power supply before you use any tools on any components, boards or equipment. Any electric charges stored in any components in the device are to be discharged prior.
- * Voltaged cables or wires, which are connected with the unit, the components or the boards, must be tested for insulation defects or breaks. In case of any defect the device must be immediately taken out of operation until the defective cables are replaced.
- * When using components or boards you must strictly comply with the characteristic data for electrical sizes shown in the corresponding description
- * As a non-commercial end-user, if it is not clear whether the electrical characteristic data given in the provided description is valid for a component you must consult a specialist.

The compliance with building and safety instructions of every kind (VDE, TÜV, industrial injuries corporation, etc.) are entirely subject to the user/customer.

12. CE Declaration of Conformity

This is to certify, that the products

EXDUL-336E EDV-Nummer A-385340
EXDUL-336S EDV-Nummer A-385320

comply with the requirements laid down by the EC directives. This declaration will lose its validity, if the instructions given in this manual for the intended use of the products are not fully complied with.

EN 5502 Class B
IEC 801-2
IEC 801-3
IEC 801-4
EN 50082-1
EN 60555-2
EN 60555-3

The following manufacturer is responsible for this declaration:

Messcomp Datentechnik GmbH
Neudecker Str. 11
83512 Wasserburg

given by

Dipl.Ing.(FH) Hans Schnellhammer

Wasserburg, 29.10.2008



Reference System for Intended Use

The multi functional modules EXDUL-336E and EXDUL-336S are not stand-alone devices. The CE-conformity only can be assessed when using additional computer components simultaneously. Thus the CE conformity only can be confirmed when using the following reference system for the intended use of the multi functional modules:

| | | |
|--------------------|--------------------------|---|
| Control Cabinet: | Vero IMRAK 3400 | 804-530061C 802-563424J 802-561589J |
| 19" Casing: | Vero PC Casing | 145-010108L |
| 19" Casing: | Additional Electronic | 519-112111C |
| Motherboard: | GA-586HX | PIV 1.55 |
| Floppy-Controller: | on Motherboard | |
| Floppy: | TEAC | FD-235HF |
| Grafic Card: | Advantech | PCA-6443 |
| Interfaces: | EXDUL-336E EXDUL-336S | A-385340 A-385320 |