BAUMÜLLER

Option Board IEI-02 for Ωmega Drive-Line II

E	5.00033.02

Technical Description
and Operating Instructions

Edition: July 2001

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Document no. 5.00033.02

This operation manual is intended as a complement to the technical description and the operation manual of the apparatus.

BEFORE CARRYING OUT COMMISSIONING, CAREFULLY READ AND OBSERVE THE OPERATING INSTRUCTIONS AND SAFETY INFORMATION

This document contains all the information necessary to correctly use the products it describes. It is intended for specially trained, technically qualified personnel who are well-versed in all warnings and commissioning activities.

The equipment is manufactured using state-of-the-art technology and is safe in operation. It can safely be installed and commissioned and functions without problems if the safety information is followed.

You may not carry out commissioning until it has been established that the machine into which this component is to be installed complies with the specifications of the EC machine guidelines.

This technical description/these operating instructions invalidate all previous descriptions of the corresponding product. Within the scope of further development of our products, Baumüller GmbH reserves the right to change their technical data and handling.

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Country of Origin: Germany

Date of Manufacture: Determined from the serial number on the equipment

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1 SAFETY INFORMATION

General Information

These operating instructions contain all the information necessary for correct operation of the products described. The document is intended for specially trained, technically qualified personnel who are well-versed in all warnings and commissioning activities.

The equipment is manufactured using state-of-the-art technology and is safe in operation. It can safely be installed and commissioned and functions without problems if the safety information in these operating instructions is followed.

Danger Information

On the one hand, the information below is for your own personal safety and on the other to prevent damage to the described products or to other connected equipment.

In the context of the operating instructions and the information on the products themselves, the terms used have the following meanings:

DANGER

This means that **death, severe personal injury**, or **damage to property will** occur unless appropriate safety measures are taken.

WARNING

This means that **death, severe personal injury**, or damage to property **may** occur unless appropriate safety measures are taken.

NOTE

This draws your attention to **important information** about the product, handling of the product or to a particular section of the documentation.

Qualified Personnel

In the context of the safety-specific information in this document or on the products themselves, qualified personnel are considered to be persons who are familiar with setting up, assembling, commissioning and operating the product and who have qualifications appropriate to their activities:

- Trained or instructed or authorized to commission, ground and mark circuits and equipment in acordance with recognized safety standards.
- Trained or instructed in accordance with recognized safety standards in the care and use of appropriate safety equipment.

Appropriate Use

WARNING

You may only use the equipment/system for the purposes specified in the operating instructions and in conjunction with the third-party equipment and components recommended or authorized by BAUMÜLLER NÜRNBERG GmbH.

For safety reasons, you must not change or add components on/to the equipment/system.

The machine minder must report immediately any changes that occur which adversely affect the safety of the equipment/system.

2 TECHNICAL DATA

2.1 General

2.1.1 Using the IEI-02 for Position Acquisition

You can use the IEI-02 (**I**ncremental **E**ncoder **I**nterface) as a counter module for position acquisition for positioning and synchronization tasks.

The IEI-02 is an option board of the Ωmega Drive-Line II system with two counter channels. For position acquisition, you can connect commercially available square-wave incremental encoders with different resolutions. The IEI-02 counts the signal edges with a 4-MHz counter, which allows it to evaluate high-resolution encoders too.

The IEI-02 is initialized and it carries out evaluation in a PROPROG wt II program under IEC 61131-3. A function block from library IEI_DLII_20bd00 (or above) is available for initialization. Library REGISTER_DLII_20bd00 (or above) is available as an option for further functions like referenceable absolute positions, angles with print mark positions and the functions of a register controller.

This results in the following areas of application for position acquisition:

- as a real leading axle for cam disks
- for position acquisition for positioning maneouvres
- for position acquisition for web-cylinder register controllers
- for position acquisition for web-web register controllers
- for position acquisition for infeed tasks
- for format measurement

2.1.2 Using the IEI-02 as a Rapid Counter

As an alternative to position acquisition, you can configure the IEI-02 as a rapid counter for tracer signals. The system can evaluate the 24 V tracer signal at up to 200 kHz. This means that you can carry out any counting procedures you like on 24 V industrial logic-based sensors. This yields the following area of application, for example:

- Copy counter

It is also possible to use the IEI-02 as a rapid counter in-parallel with application as position acquisition via the second counter.

Note that the system counts both edges of the tracer signal.

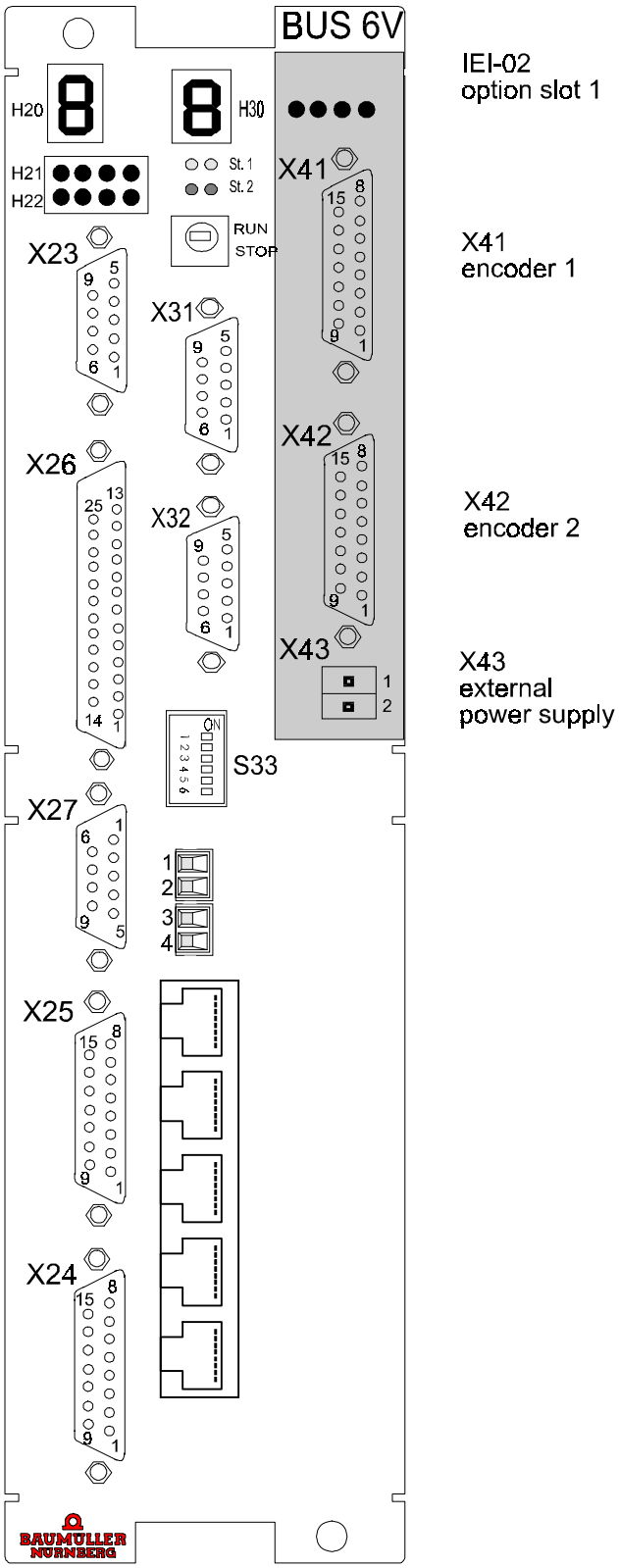
2.2 Technical Data of the Option Board

The IEI-02 has the following properties:

- Encoder signals are rated for 5 V and are optically isolated.
- The two sensors for print mark acquisition are rated for 24 V and are separated from the system via an optocoupler.
- For multiturn paths, reference cams are rated for 24 V and are separated from the system via an optocoupler. The reference cams zero the counters.
- LEDs indicate disturbances to the encoder or the encoder supply separately for each channel.
- The system also optically represents the latch signals of the two counters.
- For potential decoupling, you need an external power supply of 24 V.

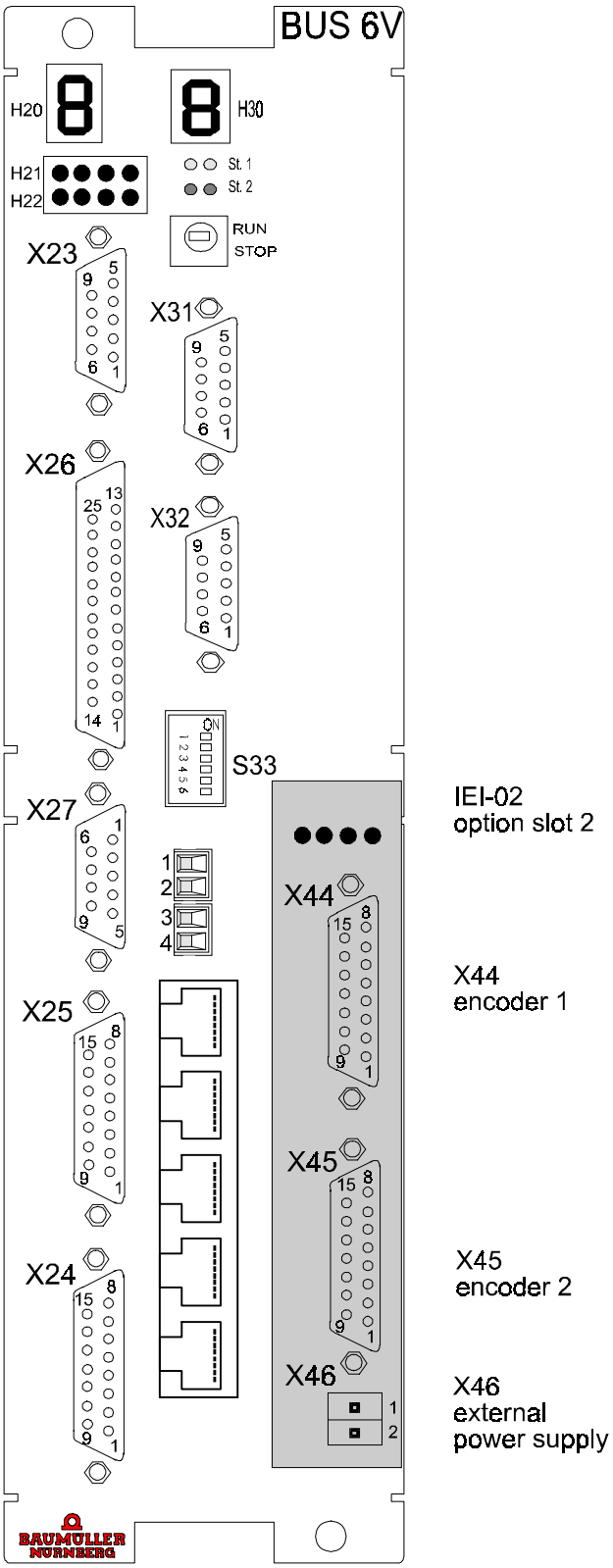
Supply Voltage	5 V, typ. 360 mA, 1.8 W (internal) 24 V, typ. 300 mA
Supply of encoder 1	5 V, max. 350 mA
Supply of encoder 2	5 V, max. 350 mA
Encoder inputs: Quantity Potential separation Signal level according to RS422 Input current Input frequency	 2 Optocoupler 15 mA 4 MHz
Sensor inputs Quantity Potential separation Nominal signal value Signal level 1 Signal 0 Signal Input current	 2 inputs per encoder Optocoupler +24 V 13 to 24 V 0 to 7.5 V 4 mA
Reference cam inputs Quantity Potential separation Nominal signal value Signal level 1 Signal 0 Signal Input current	 1 input per encoder Optocoupler +24 V 13 to 24 V 0 to 7.5 V 4 mA
Rapid counter via sensor 1	Sensor signal from 24 V to 200 kHz
Ambient conditions Operating temperature Storage temperature	 0 ... 55° C -30 ... 70° C

Sample configuration 1:



Ωmega Drive-Line II with IEI-02 in option slot 1

Sample configuration 2:



Ωmega Drive-Line II with IEI-02 in option slot 2

3 INSTALLATION

3.1 Pin Assignment

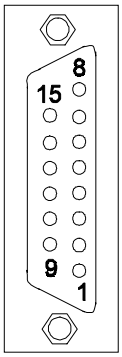
Encoder connection for two encoders

Option slot 1: (see sample configuration 1)

- Encoder 1: socket X 40
- Encoder 2: socket X 41

Option slot 2: (see sample configuration 2)

- Encoder 1: socket X 44
- Encoder 2: socket X 45



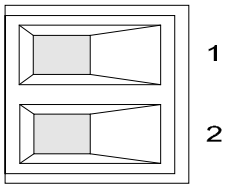
Pin No.	Assignment
1	Ground supply of encoder
2	Supply of encoder
3	Encoder zero track
4	Encoder zero track inverted
5	Encoder channel 2
6	Sensor 2+
7	Encoder channel 1 inverted
8	Encoder channel 1
9	Encoder channel 2 inverted
10	Reference
11	Reference inverted
12	Alarm
13	Sensor 1+
14	Sensor 1-
15	Sensor 2-

NOTE

You must use screened cables with the cable screening being connected to both connector housings. The associated encoder signals must be twisted pairs (e.g. encoder zero track and encoder zero track inverted).

Supply voltage

- **X 43 / X 46**

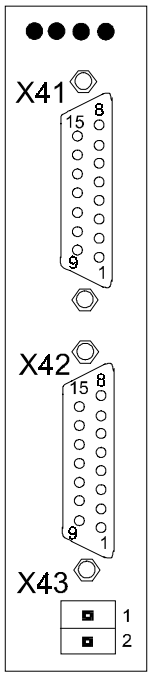


Pin No.	Assignment
1	+24 V supply voltage
2	24 V ground

3.2 LEDs

The green LEDs indicate correct power supply of the two counters and, with correct initialization, the sensor status conditions at the counters. Reading from the left, the meanings are as follows:

1. Latch display of tracer 1 (and/or 2) on counter 1
2. Power supply OK and no disturbance at counter 1
3. Latch display of tracer 1 (and/or 2) on counter 2
4. Power supply OK and no disturbance at counter 2



3.3 Accessories

2-pin connector for supply voltage.

4 USING THE IEI-02 IN THE PROPROG WT II PROJECT

To be able to read the counter readings and to control references in the PROPROG wt II project, the system must access from the program the IEI-02's registers. To make these accesses easier, data types are declared that mimic the IEI-02's register structure. See “Data Types for the IEI-02” on page 16.

The system uses these data types to declare variables that are assigned to the address of the option interface that is used. (See “Declaring Variables” on page 18.) In this way, the variables mimic the IEI-02's register structure (see structure elements in "Structure Assignment and Register Addresses"). For more details about the option slots and option interfaces, refer to the Ωmega Drive-Line II technical description.

After this, it is possible to use the structure elements of the declared variables to access the IEI-02's register structure and to initialize the Incremental Encoder Interface in this way. Apart from this, the system uses structure elements to enable references and to poll them (see "IEI-02 COMMAND register" and "IEI-02 STATUS register").

To correctly evaluate the option board, you must also configure a trigger signal (see "IEI-02 trigger signal").

4.1 Libraries Under PROPROG wt II

You can set the functions of the IEI-02 using the function blocks (FBs) and register structures of the PROPROG wt II library from the following versions on.

- IEI_DLII_20bd00 (or above): Function block IEI02_INIT for setting the counter
- SYSTEM_DLII_20bd00 (or above): Function block OPT_INIT for interconnecting Trigger 1
- BM_TYPES_20bd00 (or above): Data type IEI_WRITE_BMSTRUCT for reading IEI-02 data type IEI_READ_BMSTRUCT for writing to the IEI-02

You must insert the libraries in the project tree under libraries into the project.

The optional library of the register controller offers enhanced functions

- REGISTER_DLII_20bd00 (or above): Function blocks of the register controller

4.2 Data Types for the IEI-02

From library "BM_TYPES_20bd00" onwards, two structures are defined for communication between the Ωmega Drive-Line II and the Incremental Encoder Interface. Once you have integrated library "BM_TYPES_20bd00" (or above) in the project, you have available data types IEI_READ_BMSTRUCT and IEI_WRITE_BMSTRUCT:

- IEI_READ_BMSTRUCT: structure for reading from the IEI-02
- IEI_WRITE_BMSTRUCT: structure for writing to the IEI-02

(see also "Structure Assignment and Register Addresses").

The IEI_READ_BMSTRUCT structure is defined as follows:

```
IEI_READ_BMSTRUCT
      STRUCT
                  dw_LATCH1_CNT1      : DWORD;
                  dw_LATCH2_CNT1      : DWORD;
                  w_RESERVED1         : WORD;
                  w_MODE_CNT1         : WORD;
                  w_RESERVED2         : WORD;
                  w_STATUS1           : WORD;
                  dw_LATCH1_CNT2      : DWORD;
                  dw_LATCH2_CNT2      : DWORD;
                  w_RESERVED3         : WORD;
                  w_MODE_CNT2         : WORD;
                  w_RESERVED4         : WORD;
                  w_FIRMWARE          : WORD;
                  dw_LATCH3_CNT1      : DWORD;
                  w_COMMAND_BIT       : WORD;
                  w_RESERVED5         : WORD;
                  w_RESERVED6         : WORD;
                  w_RESERVED7         : WORD;
                  w_RESERVED8         : WORD;
                  w_RESERVED9         : WORD;
                  dw_LATCH3_CNT2      : DWORD;
      END_STRUCT;
```

Structure IEI_WRITE_BMSTRUCT is defined as follows:

```
IEI_WRITE_BMSTRUCT :
      STRUCT
                  dw_COUNT_CNT1       : DWORD;
                  w_COMMAND2          : WORD;
                  w_COMMAND1          : WORD;
                  w_RESERVED1         : WORD;
                  w_MODE_CNT1         : WORD;
                  w_RESERVED2         : WORD;
                  w_RESERVED3         : WORD;
                  dw_COUNT_CNT2       : DWORD;
                  dw_RESERVED4        : DWORD;
                  w_RESERVED5         : WORD;
                  w_MODE_CNT2         : WORD;
                  w_RESERVED6         : WORD;
                  w_RESERVED7         : WORD;
                  dw_RESERVED8        : DWORD;
                  w_COMMAND_BIT       : WORD;
      END_STRUCT;
```

4.3 Declaring Variables

You declare two global variables of types global IEI_READ_BMSTRUCT and IEI_WRITE_BMSTRUCT. Using these variables and their structure elements (See “Structure Assignment and Register Addresses” on page 20.), you can access the Incremental Encoder Interface.

NOTE

Apart from the marked registers of the IEI-02, it is only possible in the case of data types WORD and DWORD to access the registers word-by-word or doubleword-by-doubleword. Control accesses via the command register can only be made in one cycle, successively and word-by-word. DWORD must convert polled counter readings to the arithmetic data type DINT.

In the PROPROG wt II project, you create a global variable of data type

```
IEI_READ_BMSTRUCT
```

and assign it to the base address of option interface 1

```
%MB3.1000000
```

Example

```
_IEI_READ AT %MB3.1000000 : IEI_READ_BMSTRUCT;
```

Where:

`_IEI_READ`	is the variable name with the data type short designation "_" for STRUCT
`IEI_READ_BMSTRUCT`	is the variable's data type
`%MB3.1000000`	is the base address of option interface 1

Example of accessing an element of the structure:

```
_IEI_READ.dw_LATCH1_CNT1
```

Where:

`_IEI_READ`	is the variable name
`dw_LATCH1_CNT1`	is the element of the structure with the data type short designation "dw" for DWORD

When writing to the IEI-02 via data type `IEI_WRITE_BMSTRUCT`, proceed in a similar way using the address `%MB3.1000000` in this case too.

You must assign both variables to the address of the option interface that is being used. The address of the option interface results from the option slot that you are using.

- Option slot 1 → option interface 1 → address AT **%MB 3.1000000**
- Option slot 2 → option interface 2 → address AT **%MB 3.2000000**

NOTE

In the following description, the variable name is replaced by an asterisk (*).

4.4 Structure Assignment and Register Addresses

You can carry out both symbolic evaluation of the communications registers using the structure elements as well as absolute evaluation. In the case of absolute evaluation, you must use the addresses of the registers that are listed in the tables below. Base address n results in dependence on the option slot that you are using:

Option interface 1: **n = %MB 3.1000000**

Option interface 2: **n = %MB 3.2000000**

4.4.1 Structure Elements of IEI_READ_BMSTRUCT

Address	Data type	Meaning	Structure element in IEI_READ_BMSTRUCT
n + 0	DWORD	Counter 1 - Count register	*.dw_LATCH1_CNT1
n + 4	DWORD	Counter 1 - Latch register (positive edge)	*.dw_LATCH2_CNT1
n + 10	WORD	Counter 1 - MODE register	*.w_MODE_CNT1
n + 14	WORD	STATUS register (word access)	*.w_STATUS1
n + 16	DWORD	Counter 2 - Count register	*.dw_LATCH1_CNT2
n + 20	DWORD	Counter 2 - Latch register (positive edge)	*.dw_LATCH2_CNT2
n + 26	WORD	Counter 2 - MODE register	*.w_MODE_CNT2
n + 30	WORD	Reserved for firmware	*.w_FIRMWARE
n + 32	DWORD	Counter 1 - Latch register (negative edge)	*.dw_LATCH3_CNT1
n + 36	WORD	Command register (bit accesses)	*.w_COMMAND_BIT
n + 48	DWORD	Counter 2 - Latch register (negative edge)	*.dw_LATCH3_CNT2

The registers have the following meanings:

Counter 1 - count register (*.dw_LATCH1_CNT1):

This value is updated due to triggering of the option board via Trigger 1. Depending on the setting of the MODE register, the system can read the position value of encoder 1 or the number of positive and negative edges from tracer 1 of encoder 1.

Counter 1 - latch register (positive edge) (*.dw_LATCH2_CNT1):

When a transfer condition occurs, the system represents the current value of counter 1 in this register. You can use as the transfer condition the positive edges of tracer 1 or 2 and the zero track of encoder 1. The transfer condition results from the setting of the COMMAND register.

Counter 2 - count register (*.dw_LATCH1_CNT2):

This value is updated due to triggering of the option board via Trigger 1. Depending on the setting of the MODE register, the system can read the position value of encoder 2 or the number of positive and negative edges from tracer 1 of encoder 2.

Counter 2 - latch register (positive edge) (*.dw_LATCH2_CNT2):

When a transfer condition occurs, the system represents the current value of counter 2 in this register. You can use as the transfer condition the positive edges of tracer 1 or 2 and the zero track of encoder 2. The transfer condition results from the setting of the COMMAND register.

Counter 1 - latch register (negative edge) (*.dw_LATCH3_CNT1):

When a transfer condition occurs, the system represents the current value of counter 1 in this register. You can use as the transfer condition the negative edges of tracer 1 or 2 of encoder 1. The transfer condition results from the setting of the COMMAND register.

Counter 2 - latch register (negative edge) (*.dw_LATCH3_CNT2):

When a transfer condition occurs, the system represents the current value of counter 2 in this register. You can use as the transfer condition the negative edges of tracer 1 or 2 of encoder 2. The transfer condition results from the setting of the COMMAND register.

Counter 1 - MODE register (*.w_MODE_CNT1):

Read the configuration of the signal evaluation (see "IEI-02 MODE register").

Counter 2 - MODE register (*.w_MODE_CNT2):

Read the configuration of the signal evaluation (see "IEI-02 MODE register").

Status register (*.w_STATUS1):

Representation of the IEI-02's status conditions (see "IEI-02 STATUS register").

COMMAND register (*.w_COMMAND_BIT):

Read out the current settings of the transfer conditions and the direction of rotation (see "IEI-02 COMMAND register").

4.4.2 Structure Elements of IEI_WRITE_BMSTRUCT

Address	Data type	Meaning	Structure element in IEI_WRITE_BMSTRUCT
n + 0	DWORD	Counter 1 - Count register	*.dw_COUNT_CNT1
n + 4	WORD	Command register (word access)	*.w_COMMAND2
n + 10	WORD	Counter 1 - MODE register	*.w_MODE_CNT1
n + 16	DWORD	Counter 2 - Count register	*.dw_COUNT_CNT2
n + 26	WORD	Counter 2 - MODE register	*.w_MODE_CNT2
n + 36	WORD	Command register (bit accesses)	*.w_COMMAND_BIT

The registers have the following meanings:

Counter 1 - count register (*.dw_COUNT_CNT1):

If bit 14 of the command register = TRUE and a preload value is entered in counter 1 - count register, the system sets the internal counter to this value. If bit 14 = FALSE, counting is reenabled.

COMMAND register (word access) (*.w_COMMAND2):

Write the settings of the transfer conditions and the direction of rotation (see "IEI-02 COMMAND register").

Counter 1 - MODE register (*.w_MODE_CNT1):

Write the configuration of the signal evaluation (see "IEI-02 MODE register").

Counter 2 - count register (*.dw_COUNT_CNT2):

If bit 15 of the command register = TRUE and a preload value is entered in counter 2 - count register, the system sets the internal counter to this value. If bit 15 = FALSE, counting is reenabled.

COMMAND register (bit accesses) (*.w_COMMAND_BIT):

Write the settings of the transfer conditions and the direction of rotation (see "IEI-02 COMMAND register"). With address programming, the system can write to the COMMAND register bit-by-bit; with the structure access, no difference results to *.w_COMMAND2.

Counter 2 - MODE register (*.w_MODE_CNT2):

Write the configuration of the signal evaluation (see "IEI-02 MODE register").

NOTE

The IEI-02 registers that are used for IEI_WRITE_BMSTRUCT allow write access only. Read accesses to these addresses or structure elements are not possible. In online mode too, it is not possible to display the values or these registers or structure elements.

4.5 Configuring and Operating the IEI-02

4.5.1 The IEI-02 Trigger Signal

The IEI-02 needs a trigger signal, i.e. **Trigger 1.** You must interconnect Trigger signal Trigger 1 via function block (FB) OPT_INIT (see FB OPT_INIT in the Ωmega Drive-Line II technical description).

The IEI-02's count registers are updated via Trigger 1 of the option interface. If the counter readings are triggered by a clock signal that triggers an event at the same time, it is possible to synchronize the accesses to the registers to the event task. This procedure is absolutely necessary for many applications to guarantee real-time response, e.g. for encoder signals as a real leading axle.

4.5.2 IEI-02 COMMAND Register

Using the COMMAND register, you set the transfer condition (referencing) of the current counter reading to the latch register (positive and negative), enabling or blocking of the transfer conditions, setting of the direction of rotation and of a preload value.

Structure elements for COMMAND register: ***.w_COMMAND2**

***.w_COMMAND_BIT**

There are two COMMAND registers. With absolute address programming, there is one register each for word accesses only and bit accesses only. With the structure access, no difference results between *.w_COMMAND2 and *.w_COMMAND_BIT.

Bit	Meaning	Channel
0	TRUE: Enable sensor MT 1	Counter 1
1	TRUE: Enable sensor MT 2	
2	TRUE: Enable reference cams	
3	TRUE: Enable zero track	
4	TRUE: Enable sensor MT 1	Counter 2
5	TRUE: Enable sensor MT 2	
6	TRUE: Enable reference cams	
7	TRUE: Enable zero track	
8	TRUE: STATUS register Reset bit 12 (“referenced”)	Counter 1
9	TRUE: STATUS register Reset bit 13 (“referenced”)	Counter 2
10	TRUE: STATUS register Reset bit 10 (“zero track reached”)	Counter 1
11	TRUE: STATUS register Reset bit 10 (“zero track reached”)	Counter 2
12	TRUE: Positive encoder direction of rotation FALSE: Negative encoder direction of rotation	Counter 1
13	TRUE: Positive encoder direction of rotation FALSE: Negative encoder direction of rotation	Counter 2
14	TRUE: Take preload value from count register	Counter 1
15	TRUE: Take preload value from count register	Counter 2

You must choose either

Tracer 1

or

Tracer 2

or

Zero track and tracer 1

or

Reference cam.

Reference cam: on a change from FALSE ⇒ TRUE, the system resets the hardware counter.

4.5.3 IEI-02 STATUS register

The STATUS register shows the status conditions of the tracer, reference cams and acceptance of the new values in the latch register. For the latch register to be accepted in the event task of the PROPROG wt II program, the system must poll the corresponding „counter has referenced“ bit (see "Procedure at Acquisition of Print Marks and Zero Tracks").

Structure element for STATUS register: ***.w_STATUS1**

Bit	Meaning if 1	Channel
0	Current status of sensor MT 1	Counter 1
1	Current status of sensor MT 2	
2	Current status of sensor MT 1	Counter 2
3	Current status of sensor MT 2	
4	Current status of reference cams	Counter 1
5	Current status of reference cams	Counter 2
6	TRUE: Error „voltage monitoring“ channel 1 (sense line)	
7	TRUE: Error „voltage monitoring“ channel 2 (sense line)	
8	Reserved	
9	Reserved	
10	TRUE: zero track reached [a)]	Counter 1
11	TRUE: zero track reached [a)]	Counter 2
12	TRUE: Counter has referenced LATCH positive [a)]	Counter 1
13	TRUE: Counter has referenced LATCH positive [a)]	Counter 2
14	TRUE: Counter has referenced LATCH negative [a)]	Counter 1
15	TRUE: Counter has referenced LATCH negative [a)]	Counter 2

[a)] Display (bit = TRUE) continues until it is reset via the command register.

With absolute address programming, the system can only read the STATUS register word-by-word.

4.5.4 IEI-02 MODE Register

You must set the MODE register in accordance with the counter that is to be configured.

In rapid counter setting, the system counts on the count register both edges of the sensor connected to tracer 1.

There are two MODE registers. One register each per counter channel.

Structure elements for the MODE register:

***.w_MODE_CNT1**:	For counter channel 1
***.w_MODE_CNT2**:	For counter channel 2

Value	Meaning
16#0000	Four-fold multiplexing of encoder signal evaluation
16#0001	Two-fold multiplexing of encoder signal evaluation
16#0004	Single multiplexing of encoder signal evaluation
16#0085	Rapid counter for tracer 1, positive and negative edges

Four-fold multiplexing of signal evaluation sets the maximum encoder resolution.

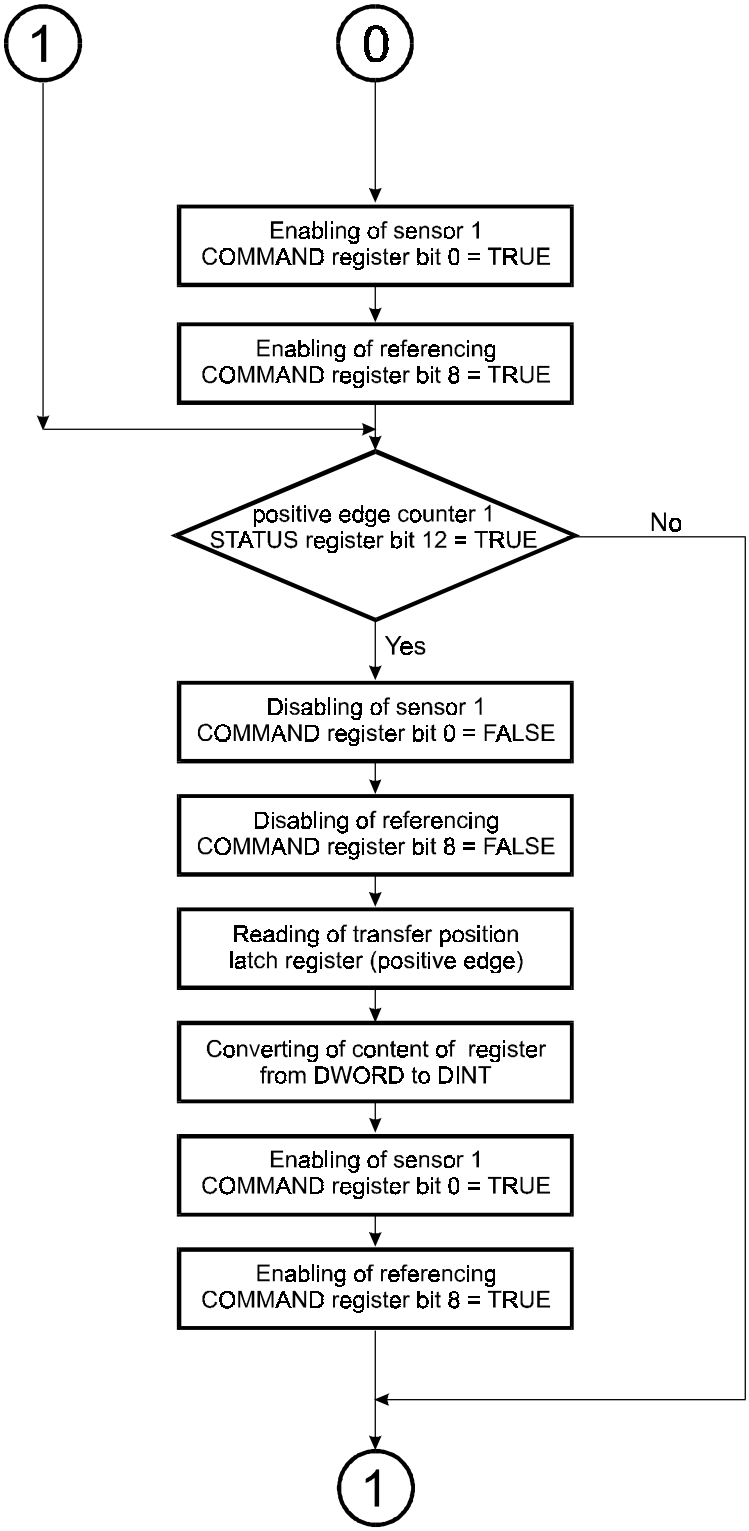
With absolute address programming, the system can only write to the MODE register word-by-word.

4.5.5 Procedure at Acquisition of Print Marks and Zero Tracks

Below, we will show you on the basis of an example the procedure for implementing print mark acquisition on a positive edge of tracer 1 on encoder 1.

Set the MODE register to the appropriate multiplexing of the signal evaluation and direction of rotation for encoder 1 (FB IEI02_INIT).

Follow the sequence of control and evaluation to print mark acquisition via the **COMMAND** and **STATUS** registers that is shown in the following diagram:



The procedure that is shown there represents a unique time reference between the latch register and the status displays during code processing.

Since evaluation of the position acquisition is carried out in an event task, you must ensure that the system cannot evaluate two successive print marks in the same call of the event task.

For implementing: **zero track acquisition,** additionally note the following

- If tracer 1 is irrelevant to position acquisition, the signal must be permanently connected to 24 V.
- Enable the zero track in addition to tracer 1
- The transfer condition for the latch register is „enable zero track“ = TRUE and „enable tracer 1“ = TRUE
- Display of „zero track reached“ in the STATUS register is only an additional piece of information. Evaluation of the latch register (positive edge) must always be carried out with „Counter has referenced LATCH positive“. In any one direction of rotation, the distance of two „Counter has referenced LATCH positives“ is the zero track distance and, with this, the encoder resolution is one revolution.

4.6 Function Initialization of the IEI-02 via FB IEI02_INIT

Function block IEI02_INIT initializes the IEI-02 option board. The system writes the IEI-02 registers of the specified option interface with the configuration that was created at the input.

FB IEI02_INIT needs BM_TYPES_20bd00 (or above).

Parameter input	Data type	Description
_BASE_WRITE	IEI_WRITE_BMSTRUCT	Option interface with register structure
u_CFG_CNT1_EVA	UINT (1, 2, 4)	Multiplexing of evaluation counter 1
u_CFG_CNT1_GRO	UINT (0, 1)	Direction of rotation of counter 1 clockwise or anti-clockwise
u_CFG_CNT2_EVA	UINT (1, 2, 4)	Multiplexing of evaluation counter 2
u_CFG_CNT2_GRO	UINT (0, 1)	Direction of rotation of counter 2 clockwise or anti-clockwise
x_CFG_MTMODE_CNT1	BOOL	Rapid counter on sensor 1 counter 1
x_CFG_MTMODE_CNT2	BOOL	Rapid counter on sensor 1 counter 2
x_EN	BOOL	Enable

Parameter output	Data type	Description
_BASE_WRITE	IEI_WRITE_BMSTRUCT	Option interface with register structure

Description

Input/output _BASE_WRITE:

At _BASE_WRITE, you must connect a global variable of data type IEI_WRITE_BMSTRUCT.

You must assign this variable via declaration of global variables to the base address of option board IEI-02.

Example:

Option board IEI-02 for Ωmega Drive-Line II

```
_IeiBaseWrite AT %MB3.1000000 : IEI_WRITE_BMSTRUCT;
```

Where:

`_IeiBaseWrite`	is the variable name with the data type short designation "_" for STRUCT
`IEI_WRITE_BMSTRUCT`	is the data type
`%MB3.1000000`	is the base address on the IEI-02 in option slot 1

Input u_CFG_CNT1_EVA:

For counter 1 encoder resolution with factor 1.
For counter 1 encoder resolution with factor 2.
For counter 1 encoder resolution with factor 4 (highest resolution).

Input u_CFG_CNT1_GRO:

For counter 1 direction of rotation 1 = clockwise, 0 = anti-clockwise.

Input u_CFG_CNT2_EVA:

For counter 2 encoder resolution with factor 1.
For counter 2 encoder resolution with factor 2.
For counter 2 encoder resolution with factor 4 (highest resolution).

Input u_CFG_CNT2_GRO:

For counter 2 direction of rotation 1 = clockwise, 0 = anti-clockwise.

Input x_CFG_MTMODE_CNT1:

For counter 1 operating mode rapid counter on tracer 1.
TRUE = activated (both edges are counted).
FALSE = deactivated (tracer 1 or 2 takes the position).

Input x_CFG_MTMODE_CNT2:

For counter 2 operating mode rapid counter on tracer 1.
TRUE = activated (both edges are counted).
FALSE = deactivated (tracer 1 or 2 takes the position).

Input x_EN:

TRUE = The IEI-02 is initialized.
FALSE = No initialization enable.

The FB IEI02_INIT initializes the specified IEI-02 counter module with regard to multiplexing of evaluation, the direction of rotation and operating mode (position acquisition or counting the latches of tracer 1, rapid counter).

Instead of counting a position via a square-wave incremental encoder signal, the system can count a tracer detection (operating mode rapid counter to both edges of tracer 1).

The counter group is not initialized until after a general enable x_EN=TRUE.

NOTE

To configure functions of the IEI-02 for a register controller, you must use function block REG_CONTROL_INIT from library REGISTER_DLII_20bd00 (or above). FB IEI02_INIT is a component of FB REG_CONTROL_INIT.

Error evaluation: None.

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