

IKD Series

Technical Manual | Digital Input Expansion Board



IKD-IN-16

Release 1.0

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Manual (original)

This is no translation but the original Technical Manual in English.

Designed in PRC and Germany; manufactured in PRC.

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Brief Overview

The IKD-IN-16 is an expansion module which has 16 digital input channels. The input port status of the IKD-IN-16 are transmitted to the upper level controller e.g. easYgen-3000XT for processing via CAN bus port.

Scope of delivery

The following parts are included in the scope of delivery. Please check prior to the installation that all parts are present.

- Device IKD-IN-16 module. All screwable terminal connectors are delivered with plug and jack.
- IPS (Installation Procedure Supplement) that contains a QR code and URL like below to access product literature.



The latest versions of the Technical Manual are available at the Woodward web site.

QR Code



To get access to the complete product documentation, scan this QR code or use the following link: \Rightarrow <http://wwdmanuals.com/ikd-in-16>.

Sample application setup

A typical application for the module is to extend the digital inputs of an easYgen-3000XT.

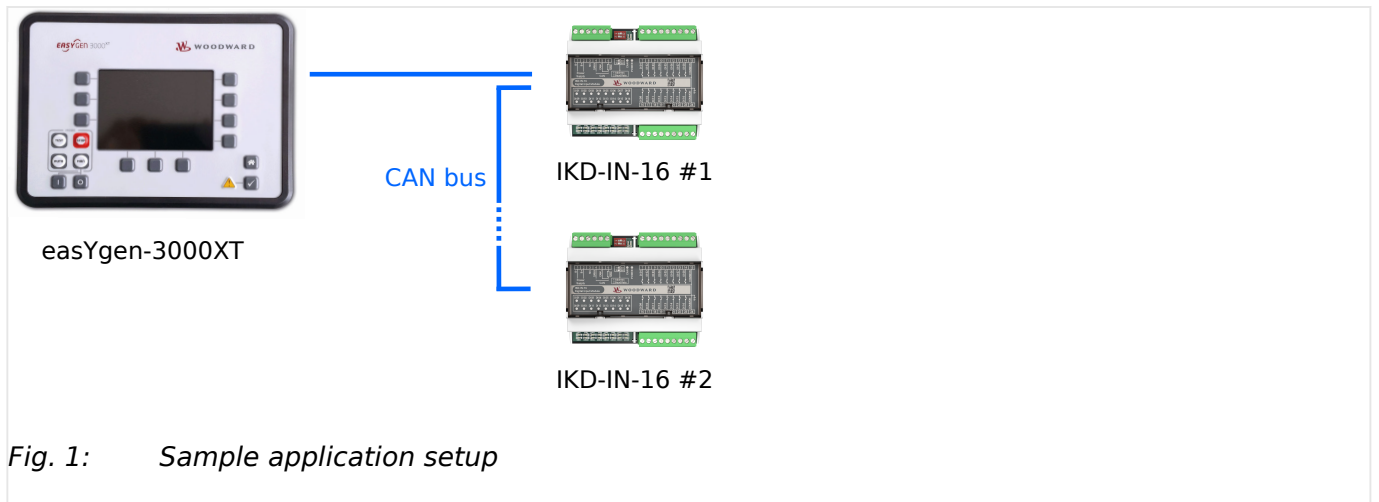


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1 General Information

1.1 Revision History

| Rev. | Date | Editor | Changes |
|------|---------|--------|--|
| A | 2022-10 | MK | Technical Manual - 1st release <ul style="list-style-type: none"> Describing device software release 1.0 |
| B | 2022-11 | MK | Manual changes <ul style="list-style-type: none"> corrected technical data of digital inputs |



Up to date documentation?

Please check Woodward web site for latest revision of this Technical Manual (search for: "37953") and if there is an Errata Sheet with latest information.

1.2 Depiction Of Notes And Instructions

Safety instructions

Safety instructions are marked with symbols in these instructions. The safety instructions are always introduced by signal words that express the extent of the danger.

DANGER!



This combination of symbol and signal word indicates an immediately-dangerous situation that could cause death or severe injuries if not avoided.

WARNING!



This combination of symbol and signal word indicates a possibly-dangerous situation that could cause death or severe injuries if it is not avoided.

CAUTION!



This combination of symbol and signal word indicates a possibly-dangerous situation that could cause slight injuries if it is not avoided.

NOTICE!



This combination of symbol and signal word indicates a possibly-dangerous situation that could cause property and environmental damage if it is not avoided.

Tips and recommendations



This symbol indicates useful tips and recommendations as well as information for efficient and trouble-free operation.

Dimensions



Dimensions in Figures

All dimensions shown are in **mm**, unless specified otherwise.

1.2.1 Copyright And Disclaimer

Disclaimer

All information and instructions in this manual have been provided under due consideration of applicable guidelines and regulations, the current and known state of the art, as well as our many years of in-house experience. Woodward assumes no liability for any damages due to:

- Failure to comply with the instructions in this manual
- Improper use / misuse
- Willful operation by non-authorized persons
- Unauthorized conversions or non-approved technical modifications
- Use of non-approved spare parts

The originator is solely liable for the full extent for damages caused by such conduct. The obligations agreed-upon in the delivery contract, the general terms and conditions, the manufacturer's delivery conditions, and the statutory regulations valid at the time the contract was concluded, apply.

Copyright

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Actions to the contrary will entitle us to claim compensation for damages. We expressly reserve the right to raise any further accessory claims.

1.2.2 Service And Warranty

Our Customer Service is available for technical information.

For regional support, please refer to: ⇒ http://www.woodward.com/Support_pgd.aspx.

In addition, our employees are constantly interested in new information and experiences that arise from usage and could be valuable for the improvement of our products.

Warranty terms



Please enquire about the terms of warranty from your nearest Woodward representative.

For our contact search webpage please go to: ⇒ <http://www.woodward.com/Directory.aspx>

1.3 Safety

NOTICE!



Damage due to improper use!

Improper use of the device may cause damage to the device as well as connected components.

Improper use includes, but is not limited to:

- Storage, transport, and operation outside the specified conditions.

1.3.1 Personnel

WARNING!



Hazards due to insufficiently qualified personnel!

If unqualified personnel perform work on or with the control unit hazards may arise which can cause serious injury and substantial damage to property.

- Therefore, all work must only be carried out by appropriately qualified personnel.

This manual specifies the personnel qualifications required for the different areas of work, listed below:

Personnel:

- **Qualified electrician**

The qualified electrician is able to execute tasks on electrical equipment and independently detect and avoid any possible dangers due to his training, expertise and experience, as well as knowledge of all applicable regulations.

The qualified electrician has been specially trained for the work environment in which he is active and is familiar with all relevant standards and regulations.

- **User**

The user operates the device within the limits of its intended use, without additional previous knowledge but according to the instructions and safety notes in this manual.

The workforce must only consist of persons who can be expected to carry out their work reliably. Persons with impaired reactions due to, for example, the consumption of drugs, alcohol, or medication are prohibited.

When selecting personnel, the age-related and occupation-related regulations governing the usage location must be observed.

1.3.2 General Safety Notes

Electrical hazards

DANGER!



Life-threatening hazard from electric shock!

There is an imminent life-threatening hazard from electric shocks from live parts. Damage to insulation or to specific components can pose a life-threatening hazard.

- Only a qualified electrician should perform work on the electrical equipment.
- Immediately switch off the power supply and have it repaired if there is damage to the insulation.
- Before beginning work at live parts of electrical systems and resources, cut the electricity and ensure it remains off for the duration of the work. Comply with the five safety rules in the process:
 - cut electricity;
 - safeguard against restart;
 - ensure electricity is not flowing;
 - earth and short-circuit; and
 - cover or shield neighboring live parts.
- Never bypass a fuse or render it inoperable. Always use the correct amperage when changing a fuse.
- For critical functions we recommend the usage of the on board digital inputs (e.g. of the easYgen-3000XT).
- Keep moisture away from live parts. Moisture can cause short circuits.

Prime mover safety

WARNING!



Hazards due to insufficient prime mover protection

The engine, turbine, or other type of prime mover should be equipped with an overspeed (over-temperature, or over-pressure, where applicable) shutdown device(s), that operates totally independently of the prime mover control device(s) to protect against runaway or damage to the engine, turbine, or other type of prime mover with possible personal injury or loss of life should the mechanical-hydraulic governor(s) or electric control(s), the actuator(s), fuel control(s), the driving mechanism(s), the linkage(s), or the controlled device(s) fail.

Modifications

WARNING!



Hazards due to unauthorized modifications

Any unauthorized modifications to or use of this equipment outside its specified mechanical, electrical, or other operating limits may cause personal injury and/or property damage, including damage to the equipment.

Any unauthorized modifications:

- constitute "misuse" and/or "negligence" within the meaning of the product warranty thereby excluding warranty coverage for any resulting damage
- invalidate product certifications or listings.

Use of batteries/alternators

NOTICE!



Damage to the control system due to improper handling

Disconnecting a battery from a control system that uses an alternator or battery-charging device whilst the charging device is still connected causes damage to the control system.

- Make sure the charging device is turned off before disconnecting the battery from the system.

Electrostatic discharge



- Protective equipment: ESD wrist band



NOTICE!



Damage from electrostatic discharge

All electronic equipment sensitive to damage from electrostatic discharge, which can cause the control unit to malfunction or fail.

- To protect electronic components from static damage, take the precautions listed below.

1. ▷ Avoid build-up of static electricity on your body by not wearing clothing made of synthetic materials. Wear cotton or cotton-blend materials as much as possible because these do not store static electric charges as easily as synthetics.
2. ▷  Before working on terminals on the control unit, ground yourself by touching and holding a grounded metal object (pipes, cabinets, equipment, etc.) to discharge any static electricity.
Alternatively wear an ESD wrist band connected to ground.
3. ▷  Before any maintenance work on the control unit, ground yourself by touching and holding a grounded metal object (pipes, cabinets, equipment, etc.) to discharge any static electricity.
Alternatively wear an ESD wrist band connected to ground.
4. ▷ Keep plastic, vinyl, and Styrofoam materials (such as plastic or Styrofoam cups, cigarette packages, cellophane wrappers, vinyl books or folders, plastic bottles, etc.) away from the control unit, modules and work area.
5. ▷ Opening the control cover may void the unit warranty. Do not remove the printed circuit board (PCB) from the control cabinet unless instructed by this manual.



If instructed by this manual to remove the PCB from the control cabinet, follow these precautions:

- Ensure that the device is completely voltage-free (all connectors have to be disconnected).
- Do not touch any part of the PCB except the edges.
- Do not touch the electrical conductors, connectors, or components with conductive devices or with bare hands.
- When replacing a PCB, keep the new PCB in the plastic antistatic protective bag it comes in until you are ready to install it. Immediately after removing the old PCB from the control cabinet, place it in the antistatic protective bag.



For additional information on how to prevent damage to electronic components caused by improper handling, read and observe the precautions in:

- "Woodward manual 82715, Guide for Handling and Protection of Electronic Controls, Printed Circuit Boards, and Modules".

1.3.3 Protective Equipment And Tools

Protective gear

Personal protective equipment serves to protect risks to the safety and health of persons as well as to protect delicate components during work.

Certain tasks presented in this manual require the personnel to wear protective equipment. Specific required equipment is listed in each individual set of instructions.

The cumulative required personal protective equipment is detailed below:

Protective equipment: ESD wrist band

The ESD (**e**lectro**s**tatic **d**ischarge) wrist band keeps the user's body set to ground potential. This measure protects sensitive electronic components from damage due to electrostatic discharge.

Tools

Use of the proper tools ensures successful and safe execution of tasks presented in this manual.

Specific required tools are listed in each individual set of instructions.

The cumulative required tools are detailed below:

1.3.4 Intended Use

This control unit has been designed and constructed solely for the intended use described in this manual.

The IKD-IN-16 devices are designed to be installed on the back panel of a switch gear cabinet. The terminals are always located on the inner side of the housing.

This control unit must be used exclusively as extension of upper level control units.

- Intended use requires operation of the control unit within the specifications listed in [↪ “7.1 Technical Data”](#).
- Intended use also includes compliance with all instructions and safety notes presented in this manual.
- Any use which exceeds or differs from the intended use shall be considered improper use!
- No claims of any kind for damage will be entertained if such claims result from improper use.

2 System Overview

2.1 LEDs Indicate State

The IKD-IN-16 indicates the state of the device and the digital inputs via LEDs.

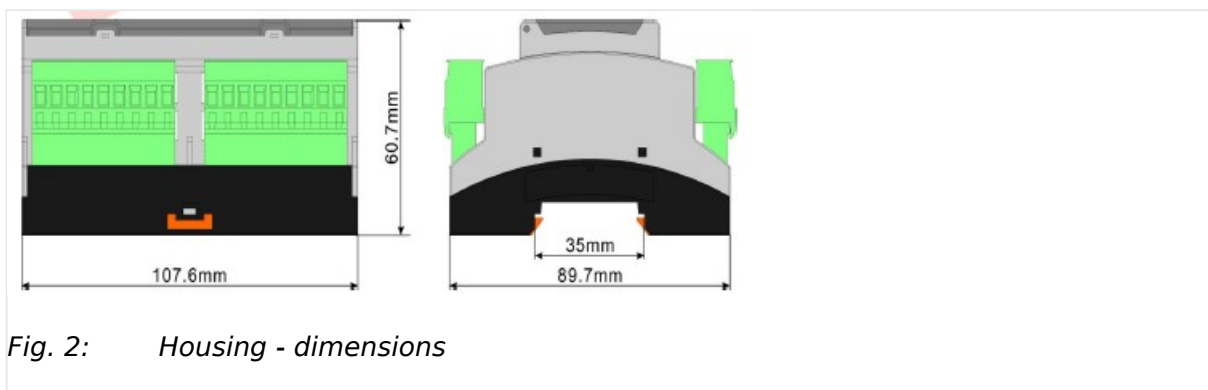
| LED | Function |
|-----------------------|--|
| CAN | Off: no CAN communication Flash: Communication normal, data transmission |
| POWER | Device operation (CPU ok) |
| Status DI 01 .. DI 16 | When DI 01 .. DI 16 input are active (connected to common), corresponding DI 01 .. DI 16 LEDs are illuminated. |

3 Installation

3.1 Mount Unit

The IKD-IN-16 is a unit for DIN-rail/rear panel mounting.

Dimensions



3.2 Setup Connections

NOTICE!



Avoid electrostatic discharge!

Before working with terminals please read and follow the instructions of chapter [“Electrostatic discharge”](#).

For CAN shielded cabling, no more than 25 mm wiring exposed without shield coverage are allowed at terminal plug side.

General notes

NOTICE!



Malfunctions due to literal use of example values

All technical data and ratings indicated in this chapter are merely listed as examples. Literal use of these values does not take into account all actual specifications of the control unit as delivered.

- For definite values please refer to chapter [“7.1 Technical Data”](#).

Wire sizes



Field wiring shall be made with use of cables which have temperature rating not less than 90 °C.

| AWG | mm ² | AWG | mm ² | AWG | mm ² | AWG | mm ² | AWG | mm ² | AWG | mm ² |
|-----|-----------------|-----|-----------------|-----|-----------------|-----|-----------------|--------|-----------------|---------|-----------------|
| 30 | 0.05 | 21 | 0.38 | 14 | 2.5 | 4 | 25 | 3/0 | 95 | 600MCM | 300 |
| 28 | 0.08 | 20 | 0.5 | 12 | 4 | 2 | 35 | 4/0 | 120 | 750MCM | 400 |
| 26 | 0.14 | 18 | 0.75 | 10 | 6 | 1 | 50 | 300MCM | 150 | 1000MCM | 500 |
| 24 | 0.25 | 17 | 1.0 | 8 | 10 | 1/0 | 55 | 350MCM | 185 | | |
| 22 | 0.34 | 16 | 1.5 | 6 | 16 | 2/0 | 70 | 500MCM | 240 | | |

Table 1: Conversion chart - wire sizes

3.2.1 Wiring Diagram



General recommendations

Ensure appropriate cable cross sections following the local standards and restrictions.

The maximum cable cross section of the terminal blocks is 2.5 mm².

For every type of signal lines like power supply, DI:

- Return line has to be close to forward signal line.
- Use cables instead of single wires.
 - In case of using single wires please do at least one twist per meter to keep wires together closely.

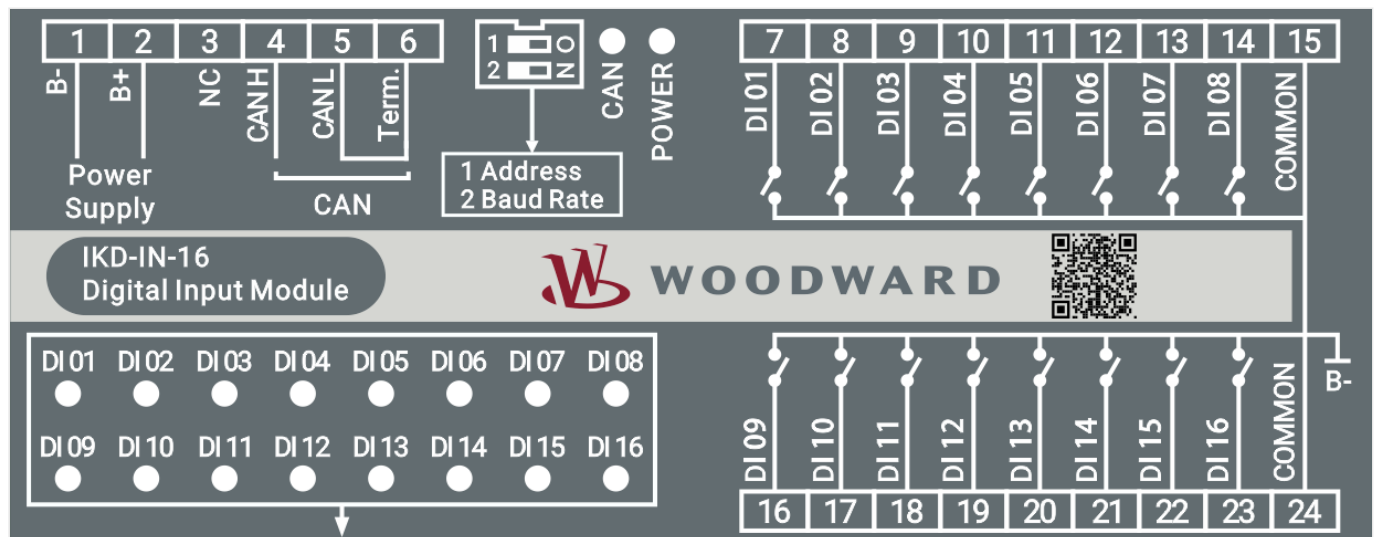


Fig. 3: Label/print IKD-IN-16 wiring

3.2.2 CAN Bus Interfaces

NOTICE!



Avoid electrostatic discharge!

Before working with terminals please read and follow the instructions of chapter [“Electrostatic discharge”](#).

For CAN shielded cabling, no more than 25 mm wiring exposed without shield coverage are allowed at terminal plug side.



Avoid electrostatic discharge!

Avoid electrostatic discharge during cable connection to the unit.

Pin assignment

| Terminal | Description | A _{max} |
|----------|-------------|---------------------|
| 4 | CAN-H | 1.5 mm ² |
| 5 | CAN-L | 1.5 mm ² |
| 6 | Termination | 1.5 mm ² |

Topology



There is a 120Ω terminal resistance inside already; if needed, make terminal 5, 6 short circuits.

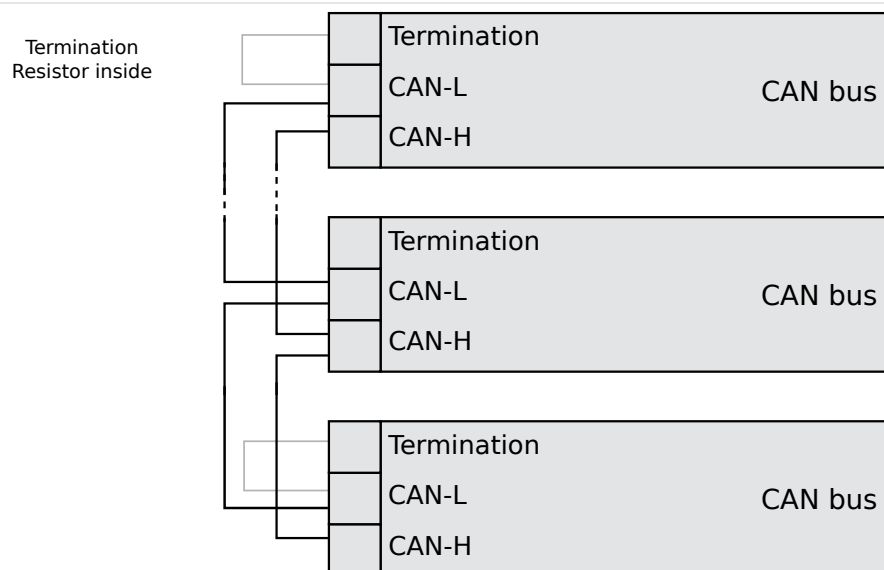


Fig. 4: CAN bus - termination

Maximum CAN bus length

The maximum length of the communication bus wiring is dependent on the configured baud rate. Observe the maximum bus length.

We recommend to use shielded cables.

(Source: CANopen; Holger Zeltwanger (Hrsg.); 2001 VDE VERLAG GMBH, Berlin und Offenbach; ISBN 3-8007-2448-0).

| Baud rate | Max. length |
|-----------|-------------|
| 250 kB | 250 m |
| 125 kB | 500 m |



When the cable is too long, impedance 120 Ohm matching is required at the CAN transceiver to meet the communication quality, and the shielding layer of the shielded wire needs to be grounded.

Troubleshooting



If there is no data transmission on the CAN bus, check for the following common CAN bus communication problems:

- A T-structure bus is utilized
- CAN-L and CAN-H are switched
- Not all devices on the bus are using identical baud rates
- Termination resistor(s) are not activated
- The configured baud rate is too high for wiring length
- The CAN bus cable is routed in close proximity with power cables



Woodward recommends the use of shielded, twisted-pair cables for the CAN bus (see examples).

- Lappkabel Unitronic Bus CAN UL/CSA
- UNITRONIC-Bus LD 2×2×0.22

3.2.3 Digital Inputs



Activate digital input

To activate a digital input the terminal must be connected to Common / B-.

CAUTION!



Be aware that the common terminal is internally connected to battery minus (B-). There is no galvanic isolation between the inputs and the supply voltage.

If galvanic isolation is required we recommend the usage of coupling relays.

| Terminal | Description | Common / B- |
|----------|-------------|-------------|
| 7 | DI 01 | 1, 15, 24 |
| 8 | DI 02 | 1, 15, 24 |
| 9 | DI 03 | 1, 15, 24 |
| 10 | DI 04 | 1, 15, 24 |
| 11 | DI 05 | 1, 15, 24 |
| 12 | DI 06 | 1, 15, 24 |
| 13 | DI 07 | 1, 15, 24 |
| 14 | DI 08 | 1, 15, 24 |
| 16 | DI 09 | 1, 15, 24 |
| 17 | DI 10 | 1, 15, 24 |
| 18 | DI 11 | 1, 15, 24 |
| 19 | DI 12 | 1, 15, 24 |
| 20 | DI 13 | 1, 15, 24 |
| 21 | DI 14 | 1, 15, 24 |
| 22 | DI 15 | 1, 15, 24 |
| 23 | DI 16 | 1, 15, 24 |

Avoid electrostatic discharge during cable connection to the unit.

3.2.4 Terminal Allocation

NOTICE!



Avoid electrostatic discharge!

Before working with terminals please read and follow the instructions of chapter ["Electrostatic discharge"](#).

For CAN shielded cabling, no more than 25 mm wiring exposed without shield coverage are allowed at terminal plug side.

The device terminals are allocated as follows:

The max. possible conductor cross-section of the terminals used is $A_{\max} = 2.5 \text{ mm}^2$!

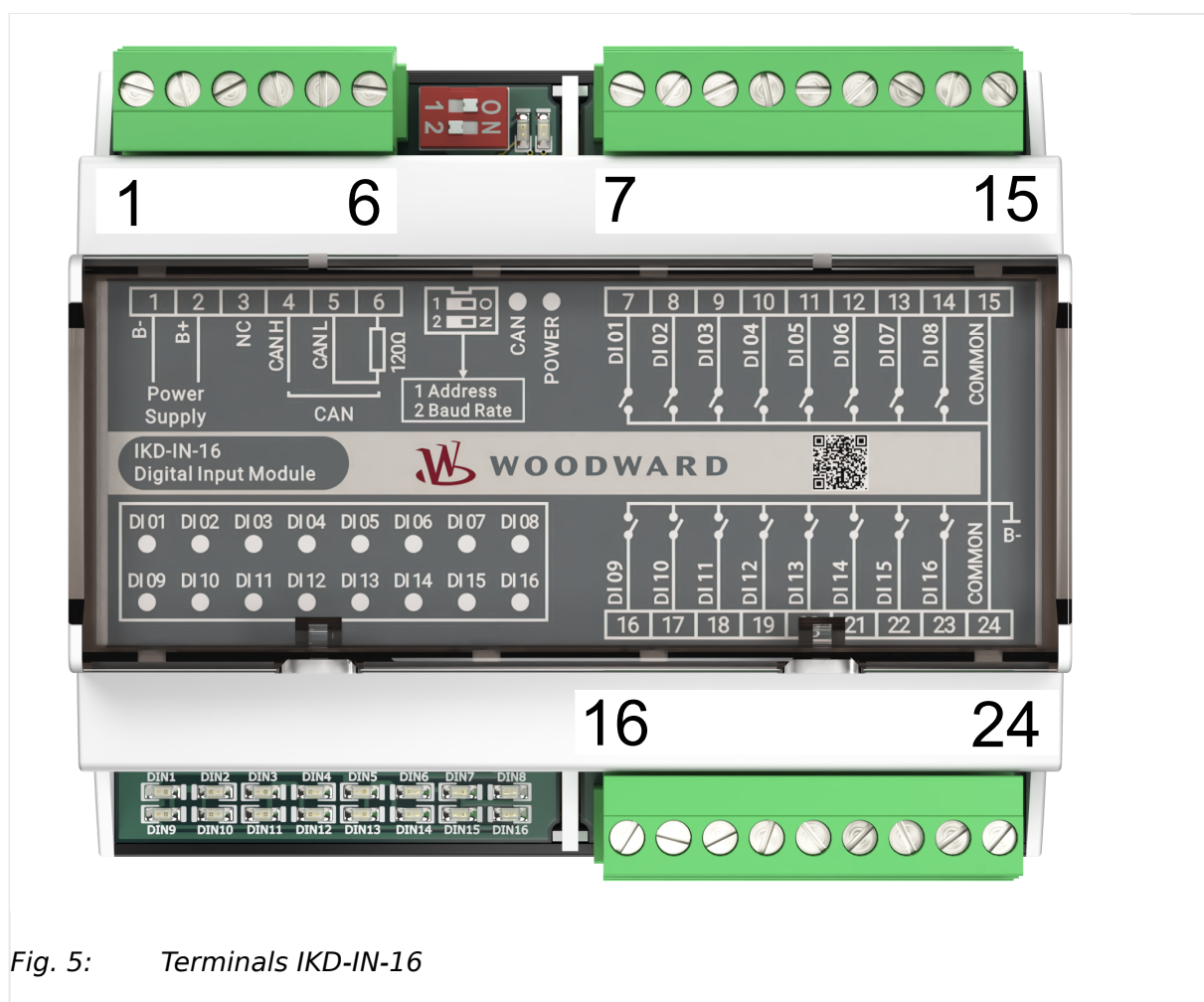


Fig. 5: Terminals IKD-IN-16

3.2.5 Power Supply

General notes

WARNING!



Risk of electric shock - plastic housing

- The conductor providing the connection must have a wire larger than or equal to 2.5 mm² (14 AWG). The connection must be performed properly.

WARNING!



Risk of electric shock - sheet metal housing

- The conductor providing the connection must have a wire larger than or equal to 2.5 mm² (14 AWG). The cable length should be as short as possible.
- The connection must be performed properly.



Woodward strictly recommends to use a power supply that is fulfilling the SELV restrictions (SELV = separated or safety extra-low voltage, see IEC)



Woodward recommends to use one of the following slow-acting protective devices in the supply line to terminal 2:

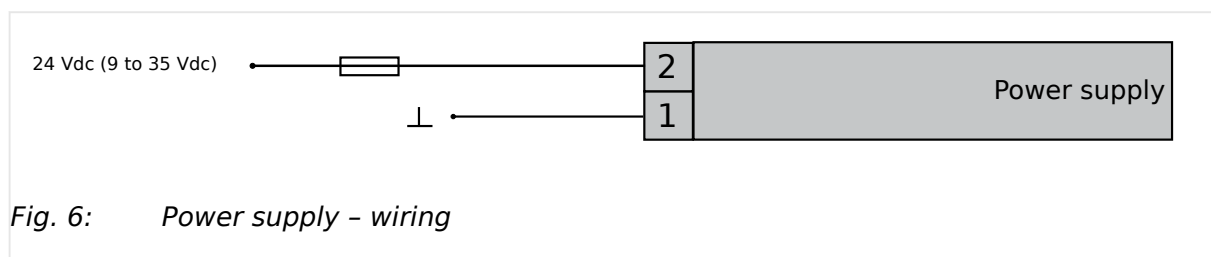
- Fuse NEOZED D01 6A or equivalent **or**
 - Miniature Circuit Breaker 6A / Type C
- (for example: ABB type: S271C6 or equivalent)



Power ON

With power ON the IKD-IN-16 device LED 'POWER' shows the device is working.

Schematic and terminals



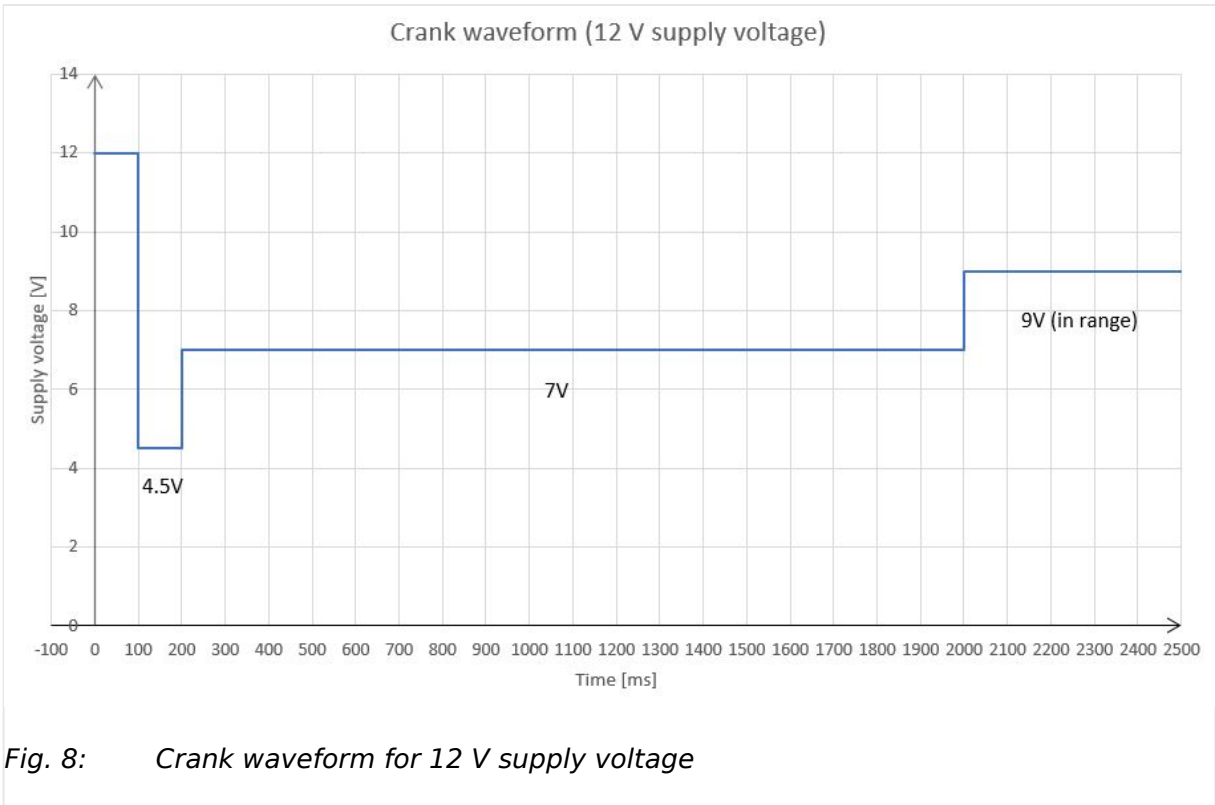
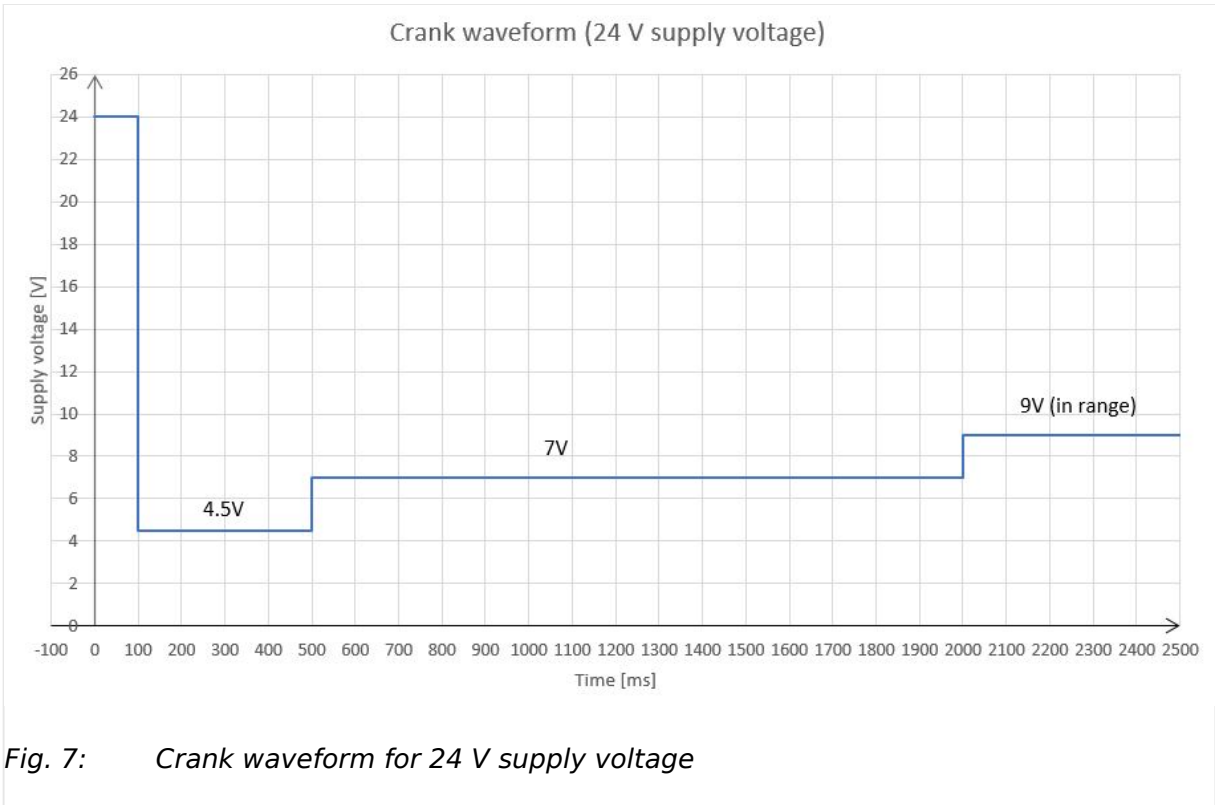
| Terminal | Description |
|----------|----------------------------|
| 1 | B- / 0 Vdc |
| 2 | B+ / 24Vdc (9 to 35.0 Vdc) |

Table 2: Power supply - terminal assignment

Characteristics

The figures below describe the permissible voltage drop (e.g. during cranking) at which the IKD-IN-16 still works properly for 24 V supply and 12 V supply voltage.

The voltage supply must always be above the graph!



4 Configuration

Module address

The module address is configured via DIP switch 1.

| DIP Switch 1 position | Module number |
|-----------------------|----------------------------------|
| OFF | 1 (easYgen-3000XT channel 1-16) |
| ON | 2 (easYgen-3000XT channel 17-32) |

Baudrate

The CAN bus baudrate of the IKD-IN-16 is configured via DIP switch 2.

| DIP Switch 2 position | Baudrate |
|-----------------------|----------|
| OFF | 250 kB |
| ON | 125 kB |



Refer to upper level controller manual eg. easYgen-3200XT (#37574) for configuration related to each DI.

5 Operation

5.1 Function of LEDs

The LEDs indicate the status of the module.

LED POWER

The LED is activated if the device is in operation (the CPU is ok).

LED CAN

The LED flashes if the CAN bus communication is working correctly.

LEDs DI 01 - DI 16

One IKD-IN-16 has 16 digital inputs. The status of each digital input is represented by one LED. If the contact of the digital input is connected to common, the corresponding LED is activated.



LEDs are located on the PCBA and according description on the face plate.

6 Application Field

The IKD-IN-16 is an expansion module that provides 16 digital inputs that can be processed by

- a higher level control unit (eg. easYgen-3000XT) **or**
- a PLC

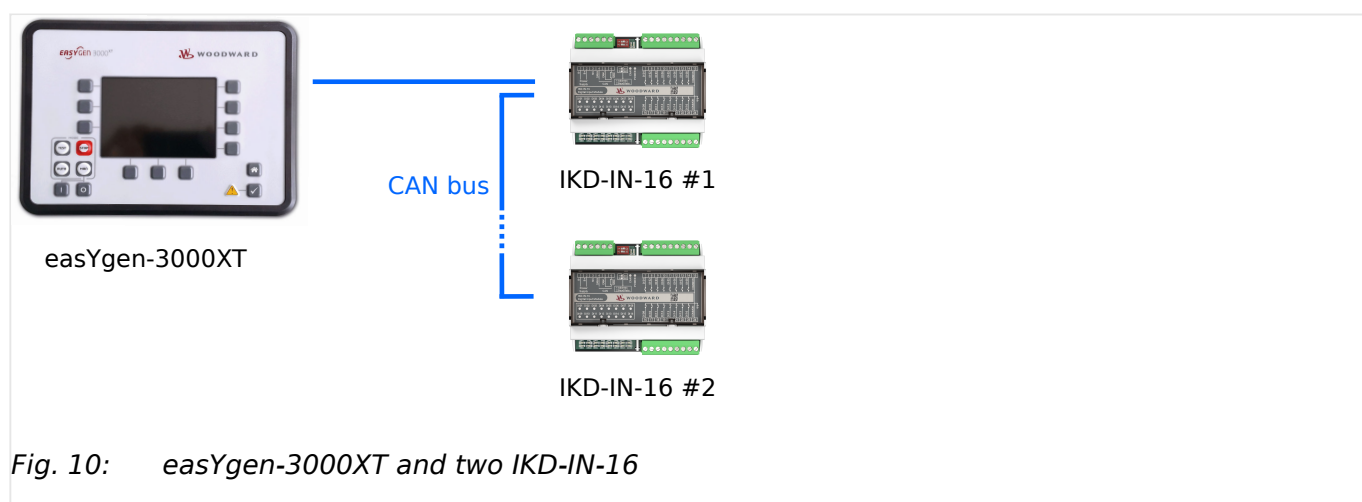
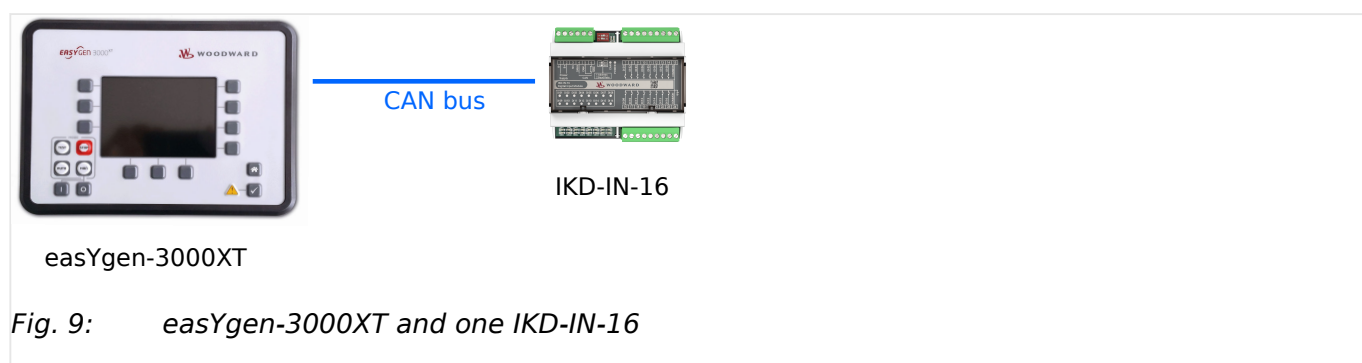
Coupling to a Higher Level Control Unit (e.g. easYgen-3000XT)

Recognition of status transferred via external sensors to the discrete inputs and transfer via the engine CAN bus to the higher level control unit that is coupled with the IKD 1. Evaluation is proceeded according to the configured action and additional steps are initiated.

Coupling to a PLC

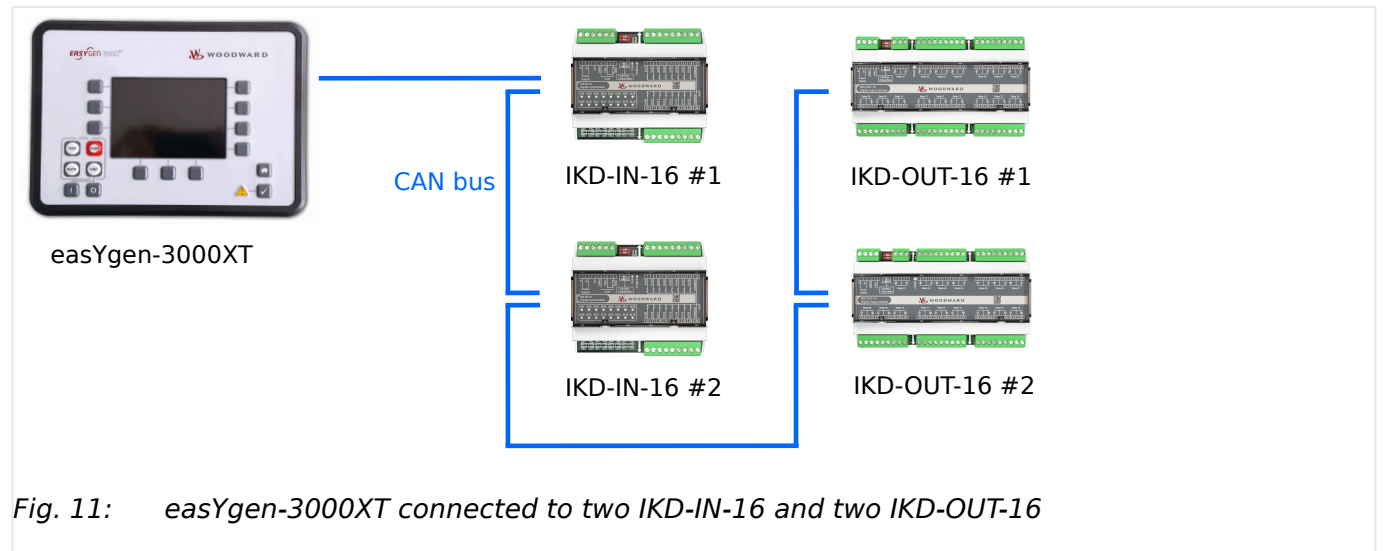
Recognition of status transferred via external sensors to the discrete inputs and transfer via the engine CAN bus to the PLC that is coupled with the IKD 1. Evaluation is proceeded according to the program in the PLC. See Appendix ([↗](#) “8.1 CAN Messages”) for according CAN Telegrams.

6.1 Overview of applications with easYgen-3000XT



6 Application Field

6.1 Overview of applications with easYgen-3000XT



7 Technical Specifications

7.1 Technical Data

Product label

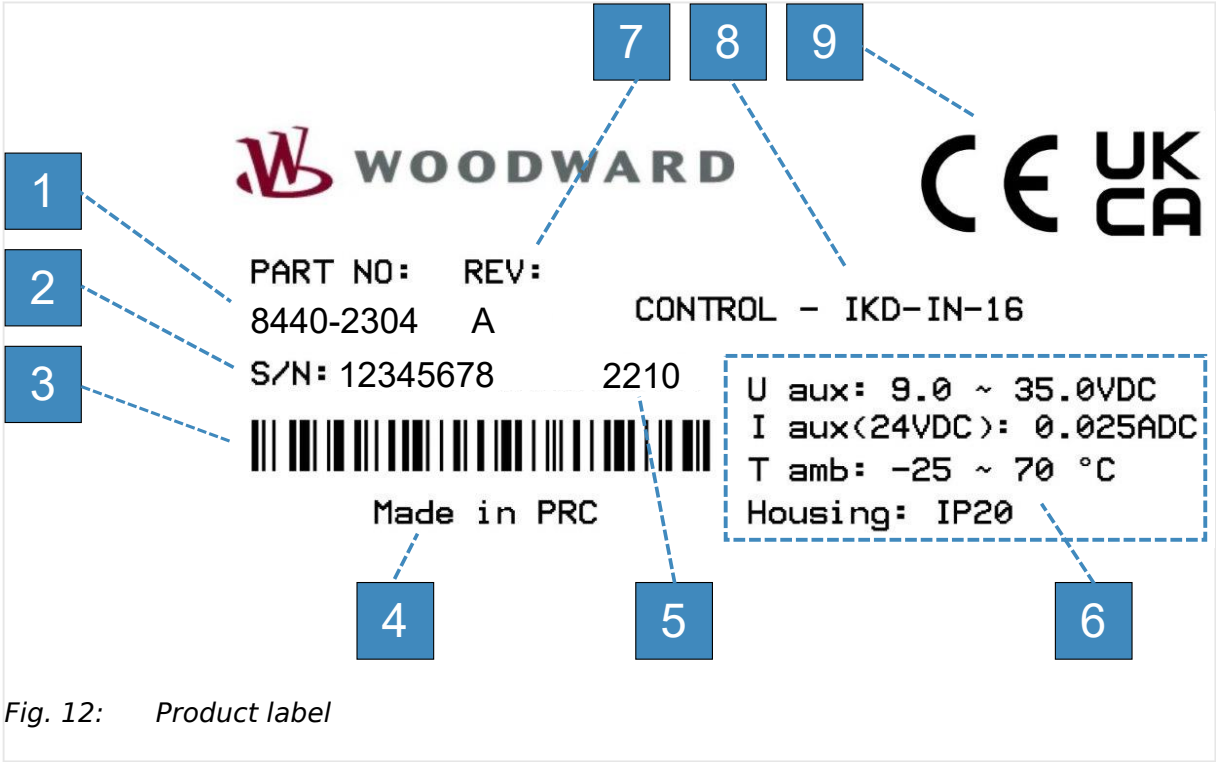



Fig. 12: Product label

| Number | Name | Description |
|--------|------------------|---------------------------------|
| 1 | P/N | Item number |
| 2 | S/N | Serial number (numerical) |
| 3 | S/N | Serial number (barcode) |
| 4 | Address | Manufacturer |
| 5 | S/N | Date of production (year-month) |
| 6 | Details | Technical data |
| 7 | REV | Item revision number |
| 8 | Type Description | Description (product name) |
| 9 | Approval | Approvals |

7.1.1 Ambient Variables

CAUTION!

**Device Operating Voltage**

Connect the unit only to a DC power source that complies with the safety extra-low voltage (SELV) requirements.

| | |
|--|---|
| Power supply | 24 V _{DC} (9 to 35.0 V _{DC}), SELV |
| Current consumption | I min : 17.86 mA (24V) I max : 23.94 mA (24V) |
| Intrinsic consumption | max. 2 W |
| Degree of pollution | 2 |
| Maximum elevation | 3000 m |
| Reverse voltage protection (of power supply) | Yes |

7.1.2 Inputs

Discrete inputs 'DI xx'



Be aware that the common terminal is internally connected to battery minus (B-). There is no galvanic isolation between the inputs and the supply voltage.

If galvanic isolation is required we recommend the usage of coupling relays.

| | |
|-----------------------|-------|
| Low level threshold | 0.6 V |
| Maximum input voltage | 60 V |
| Minimum input voltage | 0 V |
| High level threshold | 2.5 V |

7.1.3 Interfaces

CAN bus interface

| | |
|-----------------------------------|--------------------------------|
| CAN bus interface | Galvanically isolated 3.048 mm |
| Insulation voltage (continuously) | 2500 V _{DC} |
| Version | CAN bus |
| Internal line termination | Yes (terminals 5,6) |

7.1.4 Housing

Housing type

| | |
|---------------------------|---|
| Type | Plastic |
| Dimensions (W × H × D) | 107.6 × 89.7 × 60.7 mm |
| Weight | approx. 250 g |
| Wiring | Screw-plug-terminals 2.5 mm ² |
| Recommended locked torque | 4 inch pounds / 0.5 Nm. |

| | |
|--|--------------------------------------|
| | Use 90 °C copper wire or better. |
| | Use class 1 wire only or equivalent. |

Protection

| | |
|-------------------|------|
| Protection system | IP20 |
|-------------------|------|

7.1.5 Approvals

| | |
|----------|----------------|
| Listings | CE |
| | UKCA |
| | UL/cUL pending |

7.2 Environmental Data**Vibration**

| | |
|----------------|--|
| Vibration test | 5 Hz~8 Hz, amplitude ± 7.5 mm, fixed displacement, 3 cycles of vibration respectively for 14 min. 8 Hz~500 Hz, 2g fixed acceleration, three axial vibration respectively for 120 min. Number of sweep cycles: 10 |
| Standards | GB/T2423.10 |

Shock

| | |
|-----------|--|
| Shock | Half sine pulse, peak acceleration 20 g _n , pulse duration 16 ms, Number of impacts in three directions: 1000 \pm 10 |
| Standards | GB/T2423.5 |

Temperature

| | |
|----------------------------|-----------------------------------|
| Cold, Dry Heat (storage) | -30 °C (-22 °F) to 80 °C (176 °F) |
| Cold, Dry Heat (operating) | -25 °C (-13 °F) to 70 °C (158 °F) |
| Standards | GB/T 2423.1 |
| | GB/T 2423.2 |

Humidity

| | |
|----------|-----------------------|
| Humidity | 40 °C, 93% RH, 4 days |
|----------|-----------------------|

8 Appendix

8.1 CAN Messages

8.1.1 DI module 1 (Dip switch 1 off)

DI 1-8 Send message

| ID | Byte 0 | Byte 1 | Byte 2 | Byte 3 | Byte 4 | Byte 5 | Byte 6 | Byte 7 |
|------|--------|-------------|--------|--------|--------|--------|--------|--------|
| 201h | MUX | State DIs | | | | | | |
| | 1 | see details | 0 | 0 | 0 | 0 | 0 | 0 |

Details to Byte 1:

| | meaning |
|-----------|----------------------|
| Bit 0 = 1 | input 1 is triggered |
| Bit 1 = 1 | input 2 is triggered |
| Bit 2 = 1 | input 3 is triggered |
| Bit 3 = 1 | input 4 is triggered |
| Bit 4 = 1 | input 5 is triggered |
| Bit 5 = 1 | input 6 is triggered |
| Bit 6 = 1 | input 7 is triggered |
| Bit 7 = 1 | input 8 is triggered |

DI 9-16 Send message

| ID | Byte 0 | Byte 1 | Byte 2 | Byte 3 | Byte 4 | Byte 5 | Byte 6 | Byte 7 |
|------|--------|-------------|--------|--------|--------|--------|--------|--------|
| 202h | MUX | State DIs | | | | | | |
| | 1 | see details | 0 | 0 | 0 | 0 | 0 | 0 |

Details to Byte 1:

| | meaning |
|-----------|-----------------------|
| Bit 0 = 1 | input 9 is triggered |
| Bit 1 = 1 | input 10 is triggered |
| Bit 2 = 1 | input 11 is triggered |
| Bit 3 = 1 | input 12 is triggered |
| Bit 4 = 1 | input 13 is triggered |
| Bit 5 = 1 | input 14 is triggered |
| Bit 6 = 1 | input 15 is triggered |
| Bit 7 = 1 | input 16 is triggered |

8.1.2 DI module 2 (Dip switch 1 on)

DI 1-8 Send message (easYgen-3000XT channel 17-24)

| ID | Byte 0 | Byte 1 | Byte 2 | Byte 3 | Byte 4 | Byte 5 | Byte 6 | Byte 7 |
|------|--------|-------------|--------|--------|--------|--------|--------|--------|
| 203h | MUX | State DIs | | | | | | |
| | 1 | see details | 0 | 0 | 0 | 0 | 0 | 0 |

Details to Byte 1:

| | meaning |
|-----------|----------------------|
| Bit 0 = 1 | input 1 is triggered |
| Bit 1 = 1 | input 2 is triggered |
| Bit 2 = 1 | input 3 is triggered |
| Bit 3 = 1 | input 4 is triggered |
| Bit 4 = 1 | input 5 is triggered |
| Bit 5 = 1 | input 6 is triggered |
| Bit 6 = 1 | input 7 is triggered |
| Bit 7 = 1 | input 8 is triggered |

DI 9-16 Send message (easYgen-3000XT channel 25-32)

| ID | Byte 0 | Byte 1 | Byte 2 | Byte 3 | Byte 4 | Byte 5 | Byte 6 | Byte 7 |
|------|--------|-------------|--------|--------|--------|--------|--------|--------|
| 204h | MUX | State DIs | | | | | | |
| | 1 | see details | 0 | 0 | 0 | 0 | 0 | 0 |

Details to Byte 1:

| | meaning |
|-----------|-----------------------|
| Bit 0 = 1 | input 9 is triggered |
| Bit 1 = 1 | input 10 is triggered |
| Bit 2 = 1 | input 11 is triggered |
| Bit 3 = 1 | input 12 is triggered |
| Bit 4 = 1 | input 13 is triggered |
| Bit 5 = 1 | input 14 is triggered |
| Bit 6 = 1 | input 15 is triggered |
| Bit 7 = 1 | input 16 is triggered |

9 List Of Abbreviations

| | |
|---------------|--|
| AC | Alternating current |
| AI | Analog input |
| AM | AnalogManager |
| AO | Analog output |
| BDEW | German community of 1,800 companies represented by the German Association of Energy and Water Industries (Bundesverband der Energie- und Wasserwirtschaft) |
| BMS | Battery management system |
| CL | Code Level |
| COB-ID | Communication Object Identifier (CAN) |
| CT | Current Transformer |
| DI | Discrete Input |
| DO | Discrete (Relay) Output |
| EG | Name of device 'easYgen' |
| HMI | Human Machine Interface e.g., a front panel with display and buttons for interaction |
| I | Current |
| LM | LogicsManager© |
| LSx | Name of a device LS-5 or LS-6XT |
| NW | Network |
| P | Active power |
| P/N | Part Number |
| PDO | Process Data Object (CAN) |
| PLC | Programmable Logic Control |
| PT | Potential (Voltage) Transformer |
| PV | Photovoltaic |
| SAE | Society of Automotive Engineers (defines J1939 CAN protocol standard) |
| SDO | Service Data Object (CAN) |
| S/N | Serial Number |
| SNTP | Simple Network Time Protocol |
| V | Voltage |
| W | Unit of active power (P). Often also as kW |
| Wb | Wire break |

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