

ifm electronic



Device manual  
AS-i / RS-485 gateway

**ecomat300**<sup>®</sup>

**AC1155**

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## 1 Preliminary note

This document applies to the device AC1155.

This document is intended for specialists. These specialists are people who are qualified by their appropriate training and their experience to see risks and to avoid possible hazards that may be caused during operation or maintenance of the device. The document contains information about the correct handling of the device.

Read this document before use to familiarise yourself with operating conditions, installation and operation. Keep this document during the entire duration of use of the device.

Adhere to the safety instructions.

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## 2 Safety instructions

These instructions contain texts and figures concerning the correct handling of the device and must be read before installation or use.

Observe the operating instructions. Non-observance of the instructions, operation which is not in accordance with use as prescribed below, wrong installation or incorrect handling can seriously affect the safety of operators and machinery.

## 3 Documentation

This documentation relates to the hardware and firmware status at the time of editing this manual.

## 4 Functions and features

The devices have been designed for use in applications described in this manual and the data sheet.

Adhere to the data indicated in the data sheets and in the manual. If the handling specifications and safety instructions for configuration, installation and operation indicated in the documentation are adhered to, the devices normally do not lead to any danger for persons and objects.

The AS-i / RS-485 gateway is a slave for the AS-Interface fieldbus system. It corresponds to the V3.0 specification and can be operated in the extended addressing mode.

- AS-i profile S-B.A.5, the CTT2 communication protocol is implemented.

The AS-i / RS485 gateway is used to connect devices with an RS485 interface (text displays, code readers, measurement devices....) to AS-Interface.



Parameter data is stored permanently in the slave memory. Since the process of storing takes several 100 ms, the CTT2 communication will stop and resume after a reset of the device only.

#### **4.1 Receiving data via the RS-485 gateway**

The slave cyclically transmits the number of bytes that have been received and that are available for reception via AS-Interface. The receive buffer in the slave has a size of 64 bytes.

The master should then send "18, 3, xx" (acyclic read service request to index 3 with a usable length of xx bytes) to collect the information.

If more than 32 bytes are in the buffer, the command may be issued several times with a maximum length of 32 bytes until the buffer is empty. If there are fewer bytes in the buffer than required, the response contains all available bytes. If an acyclic read service request to index 3 is issued while the buffer is empty, the response is an error "illegal length".

If single bit transmission errors occur, AS-Interface will repeat faulty telegrams and recover lost information. If byte transmission errors occur, the data may be lost.

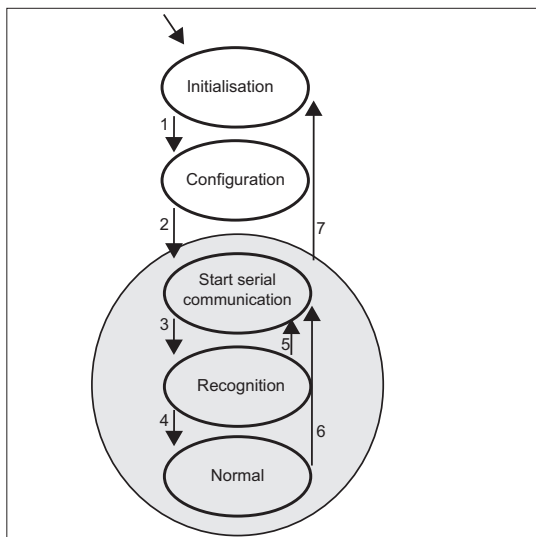
#### **4.2 Sending data via the RS-485 gateway**

The master sends "19, 3, xx, ... data..." (acyclic write service request to index 3 with a usable length of xx bytes) to transmit the output information.

If more than 32 bytes are to be transmitted, this write service may be repeated several times with a maximum length of 32 bytes. Since the RS-485 interface is faster than AS-Interface, there is no danger of buffer overrun.

## 5 Manufacturer-specific device behaviour

### 5.1 Status model (Root Device Profile)



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### 5.2 Status transition table

| Name                       |                                | Description   |   |
|----------------------------|--------------------------------|---|---|
| Initialisation             |                                | Initial state of the device upon power-up. The device switches all outputs into off-state.                                  |   |
| Configuration              |                                | The device is available for all AS-i commands except "Data_Exchange". The device is waiting for a command "Write_Parameter" |   |
| Start serial communication |                                | The device is waiting for the master to initialise serial data communication. Binary data bits are valid.                   |   |
| Recognition                |                                | The device is waiting for the message "Get ID". It will not respond to any other message.                                   |   |
| Normal                     |                                | The device is available for automatic operation.  |   |
| Transition                 | Output status                  | Final State   | Transition Condition  |
| 1                          | Initialisation                 | Configuration   | Initialisation performed without error                        |
| 2                          | Configuration                  | Start serial data transmission  | "Write_Parameter" received and processed without error        |
| 3                          | Start serial data transmission | Recognition   | Serial communication successfully established                 |
| 4                          | Recognition                    | Normal  | "Get ID" and "ID string" messages exchanged.                  |
| 5                          | Recognition                    | Start serial data transmission  | Serial communication error (e.g. timeout)                     |
| 6                          | normal                         | Start serial data transmission  | Serial communication error (e.g. timeout)                     |
| 7                          |                                | Initialisation  | Timeout of data communication (>40ms without "Data_Exchange") |

## 6 Acyclic CTT2 services

The following services are supported

Code 16 – Acyclic standard read requests

Code 18 – Acyclic read requests

Code 19 – Acyclic write request services

### Code 16 – Acyclic standard read requests

| Index no. | Description      |
|-----------|------------------|
| 0         | ID object        |
| 1         | Diagnosis object |

### Code 18 – Acyclic read requests

| Index no. | Description        |
|-----------|--------------------|
| 2         | Reading parameters |
| 3         | Read data          |

### Code 19 – Acyclic write request services

| Index no. | Description      |
|-----------|------------------|
| 2         | Write parameters |
| 3         | Write data       |

## 6.1 Standard services

### 6.1.1 Standard ID object

This object range describes and identifies the AS-i slave. Identification with reference to

- Manufacturer ID and
- Device ID

## Read standard ID object request

| Byte no. | Description                     |
|----------|---------------------------------|
| 0        | Command code 16 = read standard |
| 1        | Index 0 = ID object             |
| 2        | Length to be read = 5           |

## Read standard ID object reply

| Byte no. | Description  |
|----------|--|
| 0        | Command code 80 = read standard OK   |
| 1        | AS-i manufacturer ID (high) = 00 <sub>hex</sub>  |
| 2        | AS-i manufacturer ID (low) = 04 <sub>hex</sub>   |
| 3        | AS-i device ID (high) = 00 <sub>hex</sub>  |
| 4        | AS-i device ID (low) = 65 <sub>hex</sub>   |
| 5        | Number of analogue AS-i inputs and outputs 09 <sub>hex</sub><br>(no outputs, 1 byte input) |

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### 6.1.2 Standard diagnostic object

Verification if the module has an error on the AS-i side or if it functions without error.

#### Read standard diagnostic object request

| Byte no. | Description                     |
|----------|---------------------------------|
| 0        | Command code 16 = read standard |
| 1        | Index 1 = ID object             |
| 2        | Length to be read = 1           |

#### Read standard diagnostic object reply

| Byte no. | Description  |
|----------|--|
| 0        | Command code 80 = read standard OK   |
| 1        | Standard diagnostic code:<br>00 <sub>hex</sub> = no error<br>01...05 see chapter 6.5 |

## 6.2 Exchange device parameters

### Write device parameters

#### Request write device parameters

| byte no. | Exchange requirement    |
|----------|-------------------------|
| 0        | Command code 19 = write |
| 1        | Index = 2 (parameter)   |
| 2        | Write length = 4        |
| 3        | Parameter data 0        |
| 4        | Parameter data 1        |
| 5        | Parameter data 2        |
| 6        | Parameter data 3        |

#### Reply write device parameters

| Byte no. | Exchange reply                     |
|----------|------------------------------------|
| 0        | Command code 83 = data exchange OK |

Parameter data see chapter 6.4

### Read device parameters

#### Read devices parameter reply

| Byte no. | Exchange requirement            |
|----------|---------------------------------|
| 0        | Command code 18 = read standard |
| 1        | Index = 2 (parameter)           |
| 2        | Reading length = 4              |

#### Read device parameters reply

| Byte no. | Exchange reply                     |
|----------|------------------------------------|
| 0        | Command code 82 = data exchange OK |
| 1        | Parameter data 0                   |
| 2        | Parameter data 1                   |
| 3        | Parameter data 2                   |
| 4        | Parameter data 3                   |

Parameter data see chapter 6.4

## 6.3 Exchange serial data

### Write serial data

#### Write serial data reply

| Byte no. | Exchange reply                                 |
|----------|--|
| 0        | Command code 19 = write                        |
| 1        | Index = 3 (serial data)                        |
| 2        | Write length (1...32)                          |
| 3...34   | Data to be sent (length corresponds to byte 2) |

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#### Write serial data answer

| Byte no. | Exchange reply                    |
|----------|-----------------------------------|
| 0        | Command code 83= data exchange OK |

### Read serial data

#### Read serial data request

| Byte no. | Exchange reply          |
|----------|-------------------------|
| 0        | Command code 18= read   |
| 1        | Index = 3 (serial data) |
| 2        | Read length = 1...32    |

#### Read serial data answer

| byte no. | Exchange reply                     |
|----------|------------------------------------|
| 0        | Command code 82 = data exchange OK |
| 1...32   | received data                      |

## 6.4 Data structures

| <b>Diagnostics</b>      | <b>Description</b>  |
|-------------------------|---|
| 0                       | good  |
| >0                      | error   |
| <b>Parameter data 0</b> | <b>Description</b>  |
| 0                       | reserved  |
| <b>Parameter data 1</b> | <b>Description</b>  |
| 0                       | reserved  |
| <b>Parameter data 2</b> | <b>Description</b>  |
| 0                       | 1200 baud   |
| 1                       | 2400 baud   |
| 2                       | 4800 baud   |
| 3                       | 9600 baud   |
| 4                       | 19200 baud  |
| 5                       | 38400 baud  |
| >5                      | reserved  |
| <b>Parameter data 3</b> | <b>Description</b>  |
| XXXXXX00 <sub>bin</sub> | no parity   |
| XXXXXX01 <sub>bin</sub> | odd parity  |
| XXXXXX10 <sub>bin</sub> | even parity   |
| XXXXX0XX <sub>bin</sub> | 1 stop bit  |
| XXXXX1XX <sub>bin</sub> | 2 stop bits   |
| XX00XXXX <sub>bin</sub> | 8 data bits   |
| XX01XXXX <sub>bin</sub> | 7 data bits   |
| <b>Error code</b>       | <b>Description</b>  |
| 0                       | no error  |
| 1                       | illegal index   |
| 2                       | illegal length  |
| 3                       | request not implemented   |
| 4                       | busy<br>(request was not executed within time frame;<br>please try again later) |
| 5                       | last acyclic request not acknowledged   |

