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APG-02

AS-Interface-Handheld

ASi INTERFACE

MANUAL

Contents

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1   Declaration of Conformity

This manual was written for the following product:

• AS-Interface-Handheld APG-02

The AS-Interface-Handheld was designed and manufactured in accordance with applicable European standards and guidelines.

A corresponding declaration of conformity can be requested from the manufacturer.

Note

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2   The Symbols Used

This symbol warns the user of possible danger.
Failure to heed this warning can lead to personal injury or death and/or
damage to equipment.

Warning

This symbol warns the user of a possible failure.
Failure to heed this warning can lead to total failure of the equipment or
any other connected equipment.

Attention

This symbol indicates an important hint.

Note

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3   Safety

3.1   Intended Use

STOP

Warning

The protection of operating personnel and the system against possible danger is not guaranteed if the sub-assembly is not operated in accordance with its intended use.
The device must only be operated by appropriately qualified personnel in accordance with this manual.

3.2   General Safety Notes

STOP

Warning

Safety and correct functioning of the device cannot be guaranteed if operated in any way other than that described in this manual.
The connection of the equipment and any maintenance work to be carried out while voltage is applied to the equipment must only be performed by appropriately qualified electro-technical personnel.
In the case that a failure cannot be repaired, the device must be taken out of operation and protected against inadvertently being put back into operation.
Repair work must only be carried out by the manufacturer. Additions or modifications to the equipment are not allowed and void the warranty.

Note

The responsibility for the observance to local safety standards lies with the operator.

4   Packing and Disposal

When not in use, the device should be packed in such a way that it is protected against humidity and shock. The original packaging offers optimal protection.

Note

Electronic waste can be hazardous. Pay attention to local regulations when disposing of the device.
The AS-Interface-Handheld APG-02 contains a NiMH battery. In order to ensure environment-friendly disposal, the battery must be disposed of in accordance with the relevant laws for the given country or returned to the distributor.

5 AS-Interface Version 2.1 Introduction

The functionality of AS-Interface has been expanded to support the operation of up to 62 AS-Interface slaves on one branch. Moreover, the transmission of analogue values with AS-Interface Version 2.1 and higher is as simple as transmitting binary values.

For the AS-Interface-Handheld APG-02 described in this manual, only the extension to 62 subscribers described below is relevant.

In order for the extension to be used, it is important that both the slaves as well as the master support AS-Interface Version 2.1.

AS-Interface makes available 5 bits for the address in the master request telegram. This is sufficient to address 32 subscribers. In normal operation, address 0 is not permitted, thus allowing 31 AS-Interface slaves to be operated. The address space will be doubled using data bit D3 as sixth bit for addressing. So 62 slaves will be addressed.

For reasons of compatibility, the telegram frame cannot be changed.

> *AS-Interface slaves which do **not** support Version 2.1 can be operated in mixed operation with AS-Interface slaves which do support Version 2.1.*

Note

Using the identification code, the master detects whether or not Version 2.1 is supported (ID code = $0A_{hex}$). If it is a Version 2.1 AS-Interface slave, this slave receives two additional identification codes (ID1 and ID2) which describe the functionality of the slave. A special feature of these additional ID codes is that the ID1 code can be written by the user.

> *The AS-Interface-Handheld APG-02 permits the writing of identification code ID1.*

Note

The automatic change of addressing a slave with address 0 by a master will only be executed when all ID codes of the new slave match those of the old slave.

> *If the ID-code ID1 is changed with an AS-Interface-Handheld by the user and automatic address programming is used, make certain that the correct ID-code 1 was stored in the slave **before** installing the new slave.*

Note

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In Versions 2.0 and earlier, AS-Interface supports 4 bits of input data (data from the field to the host) and 4 bits of output data (data from the host to the field) per slave. With Version 2.1 AS-Interface slaves, one bit of the output data is used to differentiate between so-called A slaves and B slaves. A Version 2.1 AS-Interface slave thus supports 4 bits of input data and 3 bits of output data. This means, when fully expanded, up to 248 bits of input data and 186 bits of output data.

As of Version 2.1, an address can be assigned twice, e. g. address 15A and 15B. In the field, this means that the data for slave 15A are written and read in the first cycle and the data for slave 15B in the following cycle, followed again by slave 15A. This increases the cycle time for slaves A and B to maximum 10 ms. The cycle time of conventional slaves remains unchanged, as these are queried in every cycle.

Attention

If an AS-Interface slave is used which does __not__ support Version 2.1, an address may be assigned only __once__.

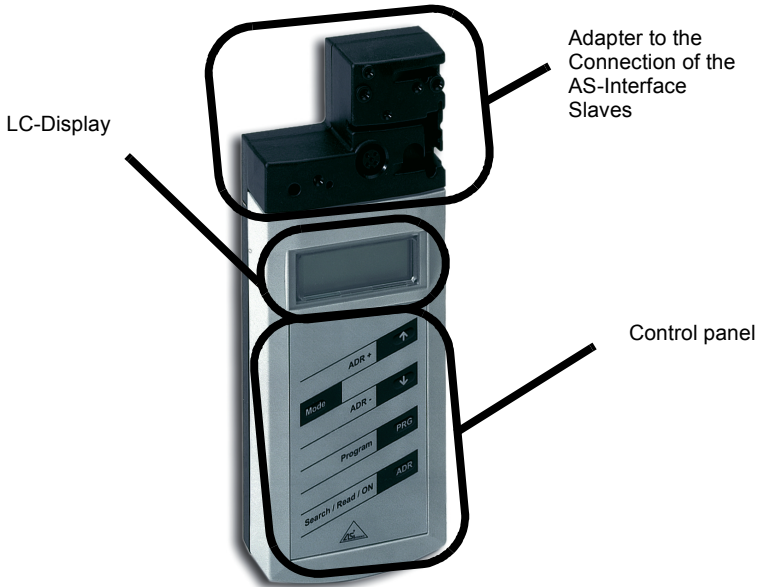## 6   Structure of the AS-Interface-Handheld

Note

The battery for the APG-02 is charged on delivery. It is, however, possible that the battery charge is inadequate due to long storage times and self-discharge. This is indicated by a battery symbol on the display. If this symbol illuminates, the AS-Interface-Handheld needs to be recharged with the battery charger.

Attention

For safety reasons, the AS-Interface-Handheld must only be charged using the power pack supplied. The power pack must not be connected while the AS-Interface-Handheld is connected to the AS-Interface power supply.

The structure of the APG-02 is shown in the following figure:

Adapter to the Connection of the AS-Interface Slaves

LC-Display

Control panel

The adapter is used to connect the AS-Interface slave to the AS-Interface-Handheld. Most AS-Interface slaves can be connected directly to the adapter without the use of any accessories.

All AS-Interface slaves with a 2.5 mm or 3.5 mm Cinch addressing socket can be programmed using the adressing cable .

AS-Interface slaves with an infrared programming interface can be programmed via the addressing cable.

The device can program and display all slave ICs of a multislave at the same time.

A slave with a higher current consumption then the one provided by the AS-Interface-Handheld can be powered by an external AS-Interface power supply.

Operation at the AS-Interface power supply is possible but cannot be guaranteed for all topologies. The AS-interface master has to be put off-line resp. disconnected. When operated at the AS-Interface power supply the AS-Interface-Handheld should be connected close to the power supply.

Note

All available slaves are then displayed in the LCD. The slave on which changes are to be made next can be selected from the control panel.

```
ADDR  DATA  RD  ┌──┐┌──┐  A
ID12  PARA  WR  │  ││  │
IO    PERI  ▭   └──┘└──┘  B
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 A
18 19 20 21 22 23 24 25 26 27 28 29 30 31 B
```

The LCD displays the current operating mode in the upper left-hand corner. Please refer to chapter 7 for the meanings and functions of the individual modes.

To the right is the two-digit, seven-segment display. If the current AS-Interface slave does not support Version 2.1 the letters A and B in the right-hand corner are not displayed. If Version 2.1 is supported, the letters indicate whether the current address refers to slave A or B.

There are five buttons on the control panel which can be used to operate the AS-Interface-Handheld. They have the following meanings:

Key	Function
ADR	- Switch on the device - Search for the connected AS-Interface slaves - Activate the next higher address (in addressing mode only) - Reread in the slave information of the active slave address (not in addressing mode)
PRG	- Program the slave address from the active address to the displayed address (in addressing mode only) - Write the displayed data to the activated slave (not in addressing mode)
Mode	- Set the operating mode (see chapter 7)
↓	- Set the desired address (counting downward) or the desired data
↑	- Set the desired address (counting upward) or the desired data

7   Operating Modes

Before the desired operating mode can be set, the AS-Interface-Handheld must be switched on by pressing the ADR button.

The desired operating mode is set by pressing the MODE button. Press the MODE button until the desired operating mode is displayed in the LCD.

The AS-Interface-Handheld APG-02 supports the following operating modes.

Display in the LCD	Operating mode	Comments
ADDR	Addressing mode	Read and write AS-Interface slave addresses
ID	Read ID-code	
ID1	Read and write ID-code 1	
ID2	Read ID-code 2	
IO	Read IO-code	
DATA	Read and write data	Read and write input or output data of an AS-Interface slave
PARA	Display and write parameters	Display and write AS-Interface slave parameters
PERI	Read the peripheral fault flag	

STOP

Warning

Changing the variable values in running processes can cause personal injury and damage to equipment when function disturbances or program errors occur.
Before executing the functions DATA or PARA make sure that no dangerous conditions can occur.

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7.1 Addressing Mode

When the device is switched on by pressing the ADR button, it is automatically in the addressing mode and the connected subscribers are displayed.

If a different mode is to be used first, press the MODE button until ADDR appears in the LCD. The ADR button must then be pressed in order to detect the connected subscribers.

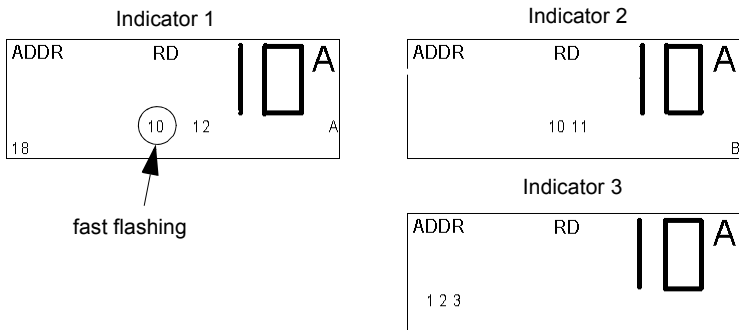|	
🔘 📖 **Note**	*If the AS-Interface-Handheld does not detect any slaves, error message F2 appears.*

All detected subscribers are displayed in the lower part of the display (small numbers). For conventional slaves neither the letter A nor B is displayed here. If new, Version 2.1 slaves are used, an A or B next to the address indicates whether the given slave is slave A or slave B.

If several different subscribers are connected to the AS-Interface-Handheld, the display switches between conventional (no letters) A slaves and B slaves every 2 seconds.

The address of the slave which is to be written next (activated slave) flashes at a frequency of 2 Hz. Press the ADR button again to activate the next higher available address.

To activate a specific slave, set the desired address in the upper-right field using the ↑ or ↓ button. When one of the two buttons is first pressed, the RD display is extinguished. Then press the ADR button.

An RD displayed to the left indicates that the activated address is being handled. In addition, the activated address begins to flash in the lower field. The following example should help illustrate this behavior:

Indicator 1

Indicator 2

fast flashing

Indicator 3

In this example, the AS-Interface-Handheld detected the following slaves:

• slave addresses 10A and 12A (display 1)

• slave addresses 10B and 11B (display 2)

• conventional slaves with the addresses 1, 2 and 3 (display 3)

In this example, only the address 10A (display 1) flashes rapidly. This is, thus, the activated slave which is to be written next.

The activated slave is reprogrammed to the address which is displayed in large text in the upper-right corner of the display (10A in the example).

Use the ↑ button to increment the value or the ↓ button to decrement the value. If the button is pressed once, the display increases or decreases by 1. If the button is held pressed, the AS-Interface-Handheld increments or decrements continuously.

To address, use the ↑ or ↓ button to set the new desired address. When one of the two buttons is first pressed, the RD display is extinguished. This indicates that the displayed value does not refer to a value read from a slave.

If the PRG button is pressed, the activated slave (small flashing number) is reprogrammed to the new address. In addition, the display WR appears next to the written address. This indicates that a slave has been readdressed. Note that there is no longer a slave present at the active, flashing address. Press the ADR button to update the display and activate the next higher address.

To readdress, the address 0 must be free. If an AS-Interface slave is connected to the AS-Interface-Handheld with the address 0, error message F5 appears.

Note

If the desired address is already assigned at the AS-Interface, error message F4 appears.

If you attempt to describe a conventional slave with an A or B address, error message F6 appears. If you attempt to readdress a Version 2.1 slave to an address without the extension A or B, error message F7 appears.

7.2   Other Operating Modes

Using the following operating modes, a wide range of AS-Interface data can be read and written. Several of these modes are for functional tests only.

> *In all operating modes, the slave from which data are to be read or to which data are to be written must first be activated in the addressing mode (display ADDR in the display)*

Note

Press the MODE button to set the desired operating mode.

7.2.1   Read ID-code or ID-code 2

If the Read ID-code or Read ID-code 2 mode is switched on by pressing the MODE button, the displays shows the corresponding ID-Code for the activated slave. This ID code can be read but **not** written. The function Read ID-code 2 is only supported by Version 2.1 slaves.

7.2.2   Read and Write ID-code 1

> *This function is only supported by Version 2.1 slaves.*

Note

If the ID1 mode is switched on by pressing the MODE button, the current value appears in the upper-right corner of the display. In addition, the RD display appears, indicating that the current value is a read value.

Use the ↑ or ↓ button to set the desired value. When one of the two buttons is first pressed, the RD display is extinguished. If the desired ID1-code is displayed, it can be stored in a nonvolatile manner in the slave by pressing the PRG button.

> *To write ID-code 1, address 0 must be free. If an AS-Interface slave is to be connected to the AS-Interface-Handheld with address 0, error message F5 appears.*

Note

> *If automatic address programming is used in the event of a malfunction, the new slave must have the same ID1 and ID2 codes as the slave which is being replaced.*

Note

7.2.3 Read IO-code

If the Read IO-code mode is switched on by pressing the MODE button, the display shows the IO-code of the activated slave. It is not possible to change this value.

7.2.4 Read and Write Data

This operating mode is for test purposes only. It is not possible to over-write the output data of the primary controller.

Attention

A special feature of this operating mode is that the AS-Interface supply voltage is not switched off following the read or write operation. As a result, output data which have been written are retained until the operating mode is changed or the connection between the AS-Interface-Handheld and the AS-Interface slave is interrupted. Please note that this operating mode places a large load on the battery.

The AS-Interface-Handheld transmits data as long as the PRG or ADR button is pressed.
Many AS-Interface products have an integrated watchdog, i. e. if no AS-Interface telegram is received from the subscriber after a predefined period of time, the output is switched to the safe (power-free) state. It is, thus, possible that the set outputs are reset at the same time as the PRG or ADR button is released.

Note

First activate the slave from which you would like to read data or the slave to which you would like to write data.

To switch on the *read and write data* mode, press the button MODE until DATA appears in the display. When this mode is switched on, the current input data are read in and displayed in the upper-right corner of the display. In addition, the RD display appears, indicating that the data are read data.

To write data, use the ↑ or ↓ button to set the desired value. When one of the two buttons is first pressed, the RD display is extinguished.

Upon pressing the PRG button, the data are transmitted once to the slave and the WR display appears in the display. If the PRG button is held pressed, data are transmitted to the slave until the button is released.

7.2.5   Display and Write Parameters

Attention

This operating mode is for test purposes only. It is not possible to store or configure parameter values in a nonvolatile manner in the AS-Interface master or slave.

A special feature of this operating mode is that the AS-Interface supply voltage is not switched off following the read or write operation. Please note that this operating mode places a large load on the battery.

First activate the slave to which you would like to write parameter values.

To switch on the *Display and Write Parameters* operating mode, press the MODE button until PARA appears in the display. When this mode is switched on, the default parameters are displayed in the upper-right corner.

Note

*In this operating mode, the parameter values are <u>**not**</u> read from the slave. When this operating mode is switched on, the default values are displayed. If the ADR button is pressed again following the write operation to read the parameter values, this display shows the most recently written values.*

To write parameters, use the ↑ or ↓ button to set the desired value. When one of the two buttons is first pressed, the RD display is extinguished.

Upon pressing the PRG button, the parameters are transmitted once to the slave and the WR display appears in the display. As long as the activated AS-Interface slave is connected to the AS-Interface-Handheld or as long as the PARA operating mode is switched on, the slave functions using the written parameter values. If the connection is interrupted or the operating mode is changed, the values are lost.

Note

Due to the device structure, pressing the MODE button first switches on the PARA operating mode. Press the button again to switch on the DATA operating mode. If you switch from the PARA operating mode to the DATA operating mode, the AS-Interface voltage remains switched on and the parameter value retained.

7.2.6   Displaying the Peripheral Fault Flag

The peripheral fault flag is an optional bit which indicates an error in the slave. This function is only supported by Version 2.1 slaves. This flag can be read with the AS-Interface-Handheld.

Activate the slave from which you would like to read this bit.

Press the MODE button until PERI appears in the display. The display *0* indicates that no error is present, *1* indicates an error.

8　Error Messages

The AS-Interface-Handheld supports the following error messages:

Error code	Meaning	Description
F1	Overload AS-Interface	Current drain of the slave(s) connected to the AS-Interface-Handheld is too high
F2	Slave not found	No slave found at the active address
F3	Error during programming	During programming of the address or of the extended ID-code 1, the value could not be permanently stored in the slave's EEPROM.
F4	Target address occupied	The target address to which the activated slave is to be readdressed is occupied.
F5	Address 0 occupied	When readdressing a slave or when writing the extended ID-code 1, address 0 must be free. This is occupied by a connected slave.
F6	Standard slave instead of extended slave found	The operation cannot be executed as the activated slave is not a Version 2.1 slave.
F7	Extended slave instead of standard slave found	The standard slave at the active address was replaced with a Version 2.1 slave.
F8	Reception error	Due to an error, the slave answer could not be correctly received.

If error code F1 is displayed, the AS-Interface-Handheld is not able to provide adequate supply current. This can be corrected by connecting an AS-Interface power pack.

Error message F6 always occurs when a standard slave is activated and you switch from addressing mode to the mode *Read IO-code*, *Display and Write Parameter Values* or *Read and Write Data*. Pressing the MODE button here activates operating modes which are not supported by the standard slave.

Error code F7 always occurs when you attempt to set a Version 2.1 slave to an address when neither the extension A nor B is shown in the display.