

# SIEMENS

## SICAM BC

### AI-5300/PASI55

System Element Manual

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**Note**

Please observe Notes and Warnings for your own safety in the Preface.

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**Disclaimer of Liability**

Although we have carefully checked the contents of this publication for conformity with the hardware and software described, we cannot guarantee complete conformity since errors cannot be excluded. The information provided in this manual is checked at regular intervals and any corrections that might become necessary are included in the next releases. Any suggestions for improvement are welcome.

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# Preface

This document is applicable to the following product(s):

- SICAM BC

## Purpose of this manual

This manual describes the functioning of the system element **AI-5300/PASI55** (Preprocessing for Analog Input and Output Signal) and essentially contains

- Functional descriptions
- Technical Specifications
- Descriptions of interfaces to the process and other system elements
- Possible Configurations

## Target Group

The document you are reading right now is addressed to users, who are in charge of the following engineering tasks:

- Conceptual activities, as for example design and configuration
- Creation of the assembly technical documentation using the designated engineering tools
- System parameterization and system diagnostic, using the designated engineering tools
- Technical system maintenance

## Placement in the Information Landscape

Document	Item no.
SICAM BC System Manual	DC5-014-2
Common Functions Peripheral Elements according to IEC 60870-5-101/104	DC0-011-2
SICAM RTUs • Ax 1703 Common Functions Protocol Elements	DC0-023-2
SICAM RTUs Common Functions System and Basic System Elements	DC0-015-2
SICAM RTUs Platforms Configuration Automation Units and Automation Networks	DC0-021-2

## Notes on Safety

This manual does not constitute a complete catalog of all safety measures required for operating the equipment (module, device) in question because special operating conditions might require additional measures. However, it does contain notes that must be adhered to for your own personal safety and to avoid damage to property. These notes are highlighted with a warning triangle and different keywords indicating different degrees of danger.

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### Danger

means that death, serious bodily injury or considerable property damage **will** occur, if the appropriate precautionary measures are not carried out.

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### Warning

means that death, serious bodily injury or considerable property damage **can** occur, if the appropriate precautionary measures are not carried out.

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### Caution

means that minor bodily injury or property damage could occur, if the appropriate precautionary measures are not carried out.

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### Note

is important information about the product, the handling of the product or the respective part of the documentation, to which special attention is to be given.

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### Qualified Personnel

Commissioning and operation of the equipment (module, device) described in this manual must be performed by qualified personnel only. As used in the safety notes contained in this manual, qualified personnel are those persons who are authorized to commission, release, ground, and tag devices, systems, and electrical circuits in accordance with safety standards.

### Use as Prescribed

The equipment (device, module) must not be used for any other purposes than those described in the Catalog and the Technical Description. If it is used together with third-party devices and components, these must be recommended or approved by Siemens.

Correct and safe operation of the product requires adequate transportation, storage, installation, and mounting as well as appropriate use and maintenance.

During operation of electrical equipment, it is unavoidable that certain parts of this equipment will carry dangerous voltages. Severe injury or damage to property can occur if the appropriate measures are not taken:

- Before making any connections at all, ground the equipment at the PE terminal.
- Hazardous voltages can be present on all switching components connected to the power supply.
- Even after the supply voltage has been disconnected, hazardous voltages can still be present in the equipment (capacitor storage).
- Equipment with current transformer circuits must not be operated while open.
- The limit values indicated in the manual or the operating instructions must not be exceeded; that also applies to testing and commissioning.

Consider obligatory the safety rules for the accomplishment of works at electrical plants:

1. Switch off electricity all-pole and on all sides!
  2. Ensure that electricity cannot be switched on again!
  3. Double check that no electrical current is flowing!
  4. Discharge, ground, short circuit!
  5. Cover or otherwise isolate components that are still electrically active!
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# 1 Introduction

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## 1.1 Application

The peripheral element AI-5300/PASI55 is used in automation units of the system SICAM BC. It is deployed in the field of telecontrol and automation. The peripheral element is used for the acquisition of currents.

<b>System element type</b>	Peripheral Element
<b>consists of</b>	a module AI-5300 with firmware PASI55
<b>can be used in</b>	SICAM BC
<b>Engineering</b>	SICAM TOOLBOX II with OPM II



## 1.2 Overview

System element for

- acquisition and processing of analog values

according to IEC 60870-5-101/104, with the following features:

- 8 analog inputs, galvanically insulated from logic ( $\pm 20$  mA)
- each input supplies an auxiliary voltage for external sensors

## 1.3 Architecture

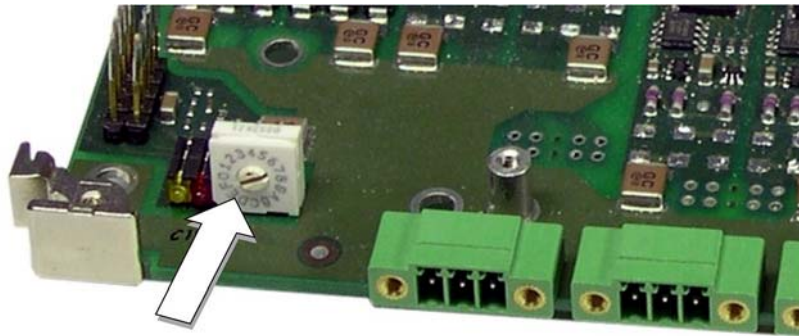
### 1.3.1 Mechanics

Module in double-euro format for equipping in a mounting rack.

### 1.3.2 Ax 1703 Peripheral Bus

The peripheral element is coupled to the basic system element via the Ax 1703 peripheral bus. The address of the peripheral element at the Ax 1703 peripheral bus is already specified during the assembly of the SICAM BC system.

This address can be changed afterwards also by a configuration change with the SICAM TOOLBOX II. This address is then to be set by means of the PBA switch (⇑) on the peripheral element.



## 2 Peripheral Element AI-5300/PASI55

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## 2.1 Features and Functions

### Acquisition Functions

- **Currents**
  - settable acquisition grid  $n \cdot 100 \text{ ms}^t$
  - measurement range settable with a resolution of  $t$ 
    - 13 bits + sign at  $\pm 20 \text{ mA}$
    - shrinking the range results in decreasing resolution
  - revision  $t$
  - acquisition
    - noise rejection  $t$
    - automatic calibration  $t$
  - smoothing  $t$
  - adaption  $t$ 
    - linear (normalized, technologically scaled or short floating point)
    - suppression of zero range
    - plausibility check
  - change monitoring  $t$
  - spontaneous transmission of changes  $t$

**Note**

The above mentioned functions are described in detail in the document *Common Functions Peripheral Elements according to IEC 60870-5-101/104*

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**<sup>t</sup> Telecontrol**

the function affects process information which is **spontaneously** transmitted

**<sup>a</sup> Automation**

the function affects process information which is **periodically** transmitted

## 2.2 Details Regarding Selected Functions

### 24 V Sensor Supply

For each analog input a 24 V auxiliary voltage output is supplied which can be used to supply a connected sensor.

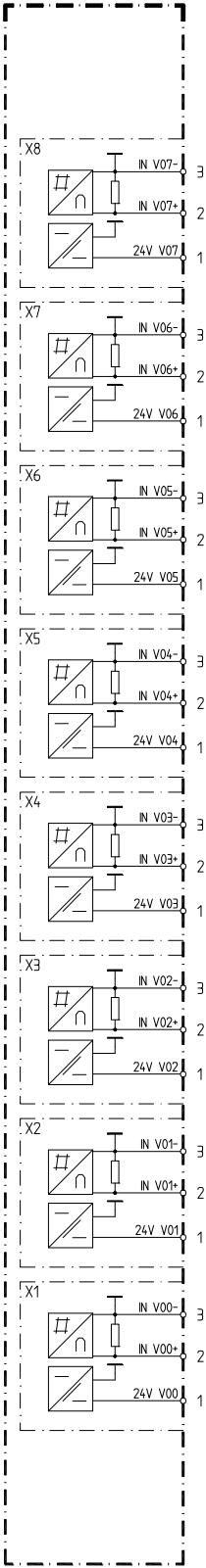
Each single sensor supply is monitored on overload. If overload is detected, the concerned input is marked with the diagnostic information "Overload of the sensor supply". The measured value is transmitted with Status IV and the disturbed value Y\_0%.

After deactivating the sensor supply it is tried in a 500 ms grid to switch on the voltage again. When the sensor supply can be switched on again (current load was reduced), the diagnostic information of the concerned input is reset and the actual valid measured value transmitted.

## 2.3 Engineering

For diagnosis, testing, parameter setting or documentation, the system element is supported by the engineering tools of SICAM TOOLBOX II. OPM II is required.

## 2.4 Block Diagram



## 2.5 View

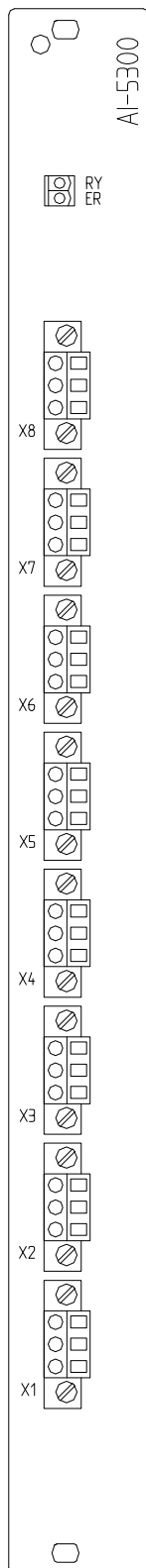




## 2.6 Technical Specifications

Processor and Memory			
Main Processor	DSP Analog Devices BLACKFIN BF531, 400 MHz		
Program memory	Flash	2 Mbyte	
Main memory	DRAM	8 Mbyte	
Parameter memory	EEPROM	256 Byte	
Inputs for Currents			
8 current inputs (X1 – X8)	<ul style="list-style-type: none"> <li>Nominal measuring range -20 mA...0...+20 mA</li> <li>Burden 121 <math>\Omega</math></li> <li>Burden voltage 2.45 V</li> <li>All inputs are galvanically insulated from logic circuits and ground</li> <li>Each input is galvanically insulated from each other input</li> </ul>		
Resolution	13 Bit + sign		
Scan rate	125 $\mu$ s		
Accuracy	<ul style="list-style-type: none"> <li>Start failure 0.25% max @ 25°C</li> <li>Temperature failure 0.5% max @ -25...+75°C</li> <li>Long time failure 0.3% max per anno</li> <li>50/60 Hz-Signals 5% max</li> <li>Differential Non Linearity (DNL) +1 Bit / -2 Bit</li> </ul>		
Noise rejection (NMRR)	16 $\frac{1}{2}$ Hz, 50 Hz, 60 Hz:		
Common mode rejection ratio (CMRR)	> 60dB		
Power supply			
Operating voltage	5 VDC $\pm$ 5%	11 W max 8 W typ 5.5 W typ 3 W typ	$I_{out} = 8 \times 30$ mA $I_{out} = 8 \times 20$ mA $I_{out} = 8 \times 10$ mA $I_{out} = 8 \times 0$ mA
Auxiliary voltage	Each input group has an auxiliary voltage output with: <ul style="list-style-type: none"> <li>Voltage 24 VDC</li> <li>Tolerance <math>\pm 15\%</math></li> <li>Output current 30 mA</li> <li>Overload protection 35 mA typ</li> </ul>		
The voltage is picked off at the bus of mounting rack			
Mechanics and Connectors			
Ax 1703 peripheral bus	Transmission rate 16 Mbps		
Bus connector (X99, rear side)	VG-connector, 96-pole (DIN 41612), type C (partly equipped)		
Peripheral connectors (X1 - X8, front side)	<ul style="list-style-type: none"> <li>FMC 1,5/3-STF-3,5 Phoenix Contact</li> </ul>		
Dimensions	Double-Euroformat 233.4 x 160 mm, 4WU		
Weight	Approx. 260 g		

## 2.7 Front Panel



## 2.8 Pin Assignment

Removeable screw terminals are used as peripheral connectors. They are assigned according to the following tables. The abbreviations which are used for the signals of the various pins are explained below.

X8:

pin	signal
3	IN V07-
2	IN V07+
1	24V V07

X7:

pin	signal
3	IN V06-
2	IN V06+
1	24V V06

X6:

pin	signal
3	IN V05-
2	IN V05+
1	24V V05

X5:

pin	signal
3	IN V04-
2	IN V04+
1	24V V04

X4:

pin	signal
3	IN V03-
2	IN V03+
1	23V V03

X3:

pin	signal
3	IN V02-
2	IN V02+
1	24V V02

X2:

pin	signal
3	IN V01-
2	IN V01+
1	24V V01

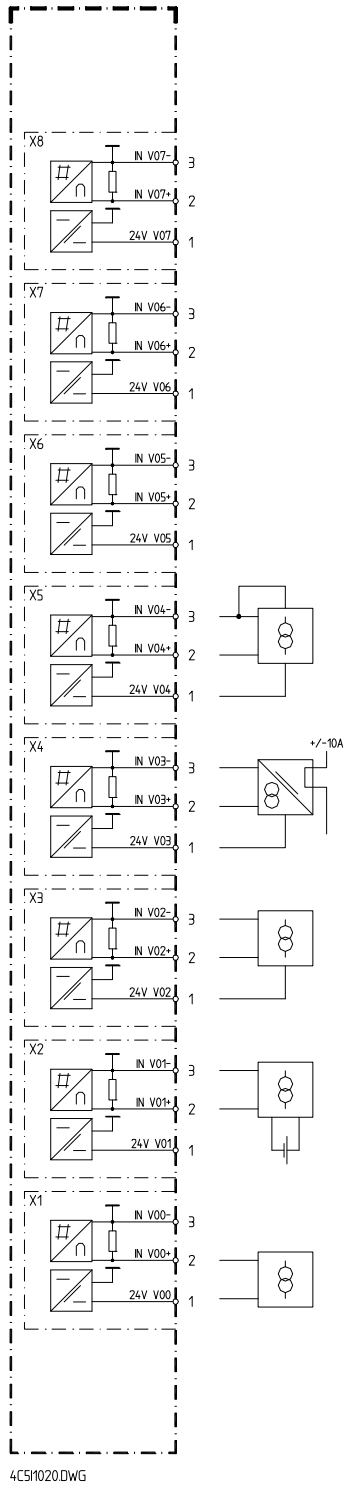
X1:

pin	signal
3	IN V00-
2	IN V00+
1	24V V00

The abbreviations have the following meaning:

24V V00 ... 24V V07 . . . . auxiliary voltage 24VDC (sensor supply)  
 IN V00+/- ... IN V07+/- . . . analog current inputs 0 ... 7

## 2.9 External Circuit Elements



# A Order Information

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## A.1 System Element



Designation	Item Number/MLFB
AI-5300/PASI55 Analog Input (+20 mA)	BC5-300 6MF10130FD000AA0