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Remote Terminal Units - Data sheet

Analog input 530AID01
RTU530 product line

Analog input with 8 channels

- AD converter resolution: 16 bit
- Measuring ranges:
  - 0... 2 mA, ± 2 mA
  - 0... 5 mA, ± 5 mA
  - 0... 10 mA, ± 10 mA
  - 0... 20 mA, 4... 20 mA, ± 20 mA
  - 0... 40 mA, 4... 40 mA, ± 40 mA

Application

The 530AID01 is a module of the RTU530 product line and records up to 8 analog measured values.

The module 530AID01 is able to process the following types of signals:

- Analog measured values (AMI)
- Measured floating point information (MFI)

Following measurement ranges can be configured:

- 0... 2 mA, ± 2 mA
- 0... 5 mA, ± 5 mA
- 0... 10 mA, ± 10 mA
- 0... 20 mA, 4... 20 mA, ± 20 mA
- 0... 40 mA, 4... 40 mA, ± 40 mA

The module is available in two versions (rubrics):

- 530AID01 R0001
- 530AID01 R1001 conformal coated

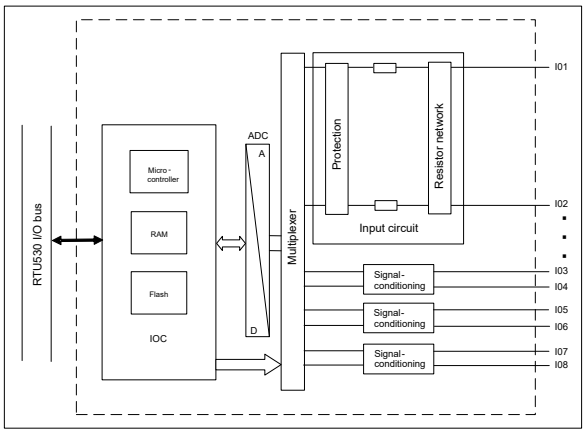

Figure 1: Block diagram 530AID01

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Characteristics

Analog inputs

Basic signal checks and cyclic processing functions are already be done locally in order to unburden the communication unit. The module transmits relevant changes as event via the RTU I/O bus.

The 8 differential inputs are galvanically connected to the power supply.

Single-ended or differential input values are resolved by up to 65536 steps (16 bit including sign) for 100 % measurement amplitude.

The differential inputs are protected against static and dynamic over-voltages by a protection circuit. A low-pass filter suppresses unwanted frequency components.

The internal high resolution of the AD converter allows to scan all measuring ranges with the same resolution. An additional measurement channel is used for automatic zero calibration. This compensates the longterm drift of the components.

For elimination of tolerances a calibration is done during production.

Measuring range and line frequency are easily to configure by the RTUtil500 configuration tool. The synchronization of the scan cycle with the line frequency is used to increase the line frequency interference suppression of the DC input signal.

Frequency	Conversion time per channel	Scan cycle time (same for all channels)
60 Hz	70 ms	630 ms
50 Hz	70 ms	630 ms
16.7 Hz	170 ms	1530 ms

I/O controller (IOC)

The micro-controller (MPU) on the module processes all time critical I/O tasks of the parameterized processing functions. Moreover it carries out the interactive communication with the RTU530 I/O bus. All configuration data and processing parameters are loaded by the communication unit via the RTU530 I/O bus.

In connection with an I/O adapter (e. g. 530ADD01) or the RTU530 communication unit the module is interfaced to the RTU530 I/O bus.

The analog input unit can execute the following processing functions on the measured values:

- Scan cycle and line frequency interference suppression
- Zero value supervision and switching detection
- Smoothing
- Threshold value monitoring on absolute value or with accumulation
- Periodic transmission and background cycles

The module provides a data buffer for temporally storing of up to 50 event messages including time stamps. The events are stored in chronological order designated for transmission to the communication unit (CMU).

During initialization and operation the module carries out a number of tests. If a fault occurs it is reported to the communication unit. A failure of the connected module(s) is detected and signalized by the communication unit.

Power supply input

The required power for the module is supplied via the RTU530 I/O bus connector.

Technical data

In addition to the RTU500 series general technical data, the following applies:

General standards	
Safety tested according to	• IEC 61010-1 • IEC 61010-2-201
Environmental conditions tested according to	• IEC 60255-21-1 class 1 • IEC 60255-21-2 class 1 • IEC 60870-2-2 class Bm and C1
Electromagnetic compatibility (EMC) tested according to	• IEC 61000-6-2 • IEC 61000-6-4 • IEC 61000-6-5
Insulation classification according to	IEC 60664-1 • Pollution degree 2 • Over voltage category II • Altitude: ≤ 3,000 m

Environmental conditions - climatic	
Operating temperature EN 60068-2-14	-25 °C ... 70 °C
Start up EN 60068-2-1	-40 °C
Max. operating temperature, max. 96h EN 60068-2-2	+85 °C
Relative humidity EN 60068-2-30	5 ... 95 % (non condensing)

Environmental conditions - mechanical	
Vibration sinusoidal, Test Fc , IEC 60068-2-6	3.5 mm (3 ... 9 Hz) 10 m/s² (9 ... 35 Hz) 1 octave/min, 1 cycle per axis IEC 60255-21-3 class 1 3 mm (3 ... 9 Hz) 10 m/s² (9 ... 200 Hz) 15 m/s² (200 ... 500 Hz) 1 octave/min, 10 cycles per axis IEC 60870-2-2 class Bm 0.035 mm (10 ... 60 Hz) 5 m/s² (60 ... 150 Hz) 1 octave/min, 1 cycle per axis IEC 60255-21-1 class 1
Shock and Bump, Test Ea, IEC 60068-2-27	250 m/s², 10 ms 4 shocks per direction IEC 60721-3-3 class 3M5 150 m/s², 11 ms 3 shocks per direction IEC 60255-21-2 class 1 IEC 60870-2-2 class Bm 100 m/s², 16 ms 1000 shocks per direction IEC 60255-21-2 class 1

Emission test	
Radiated emissions - enclosure ports (30 Mhz to 1 GHz), CISPR 16-2-3/ EN 55016-2-3	EN 55011/ CISPR 11 class A

Immunity test	
Electrostatic discharge, IEC 61000-4-2	8 kV air / 6 kV contact (level 3), criterion A
Radiated radio-frequency electromagnetic field, IEC 61000-4-3	80 MHz to 1 GHz: 10 V/m (level 3), criterion A 1 GHz to 2.7 GHz: 10 V/m (level 3), criterion A
Power frequency magnetic field, IEC 61000-4-8	100 A/m (level 5), criterion A
Impulse magnetic field, IEC 61000-4-9	100 A/m (level 3), criterion A

Mean time between failure (MTBF)	
Calculation according to Telcordia III 40°C	2,160,000 h

Mechanical layout	
Dimensions	30 mm x 125 mm x 85 mm (Width x Height x Depth)
Housing type	Plastic housing (V-2), RAL 7035 light gray
Mounting	DIN rail mounting (EN 50022 TS35: 35 mm x 15 mm or 35 mm x 7.5 mm)
Enclosure protection class	IP30
Weight	0.15 kg

Conformal coating	
Material base	Acrylate resins (AR)
Standards	• IPC-CC-830B • MIL-I-46058C • UL 94 • UL 746E
Noxious gas protection (coating material)	Noxious gas test according to DIN EN 60068-2-60 or BMW GS 95003-4
Dielectric strength (coating material)	60 kV/ mm according to IPC-TM-650 or DIN EN 60243-1
Resistance to condensation (coating material)	1.0 x 10^{10} Ohm based on DIN EN ISO 6270-2

Connection type	
Process connector (X4)	1 x 17 pole 5.08 mm pluggable screw terminals (included in delivery), 0.2... 2.5 mm²/ AWG 24 - AWG 12
Connector from CMU/ADD or other I/O module (X2)	2 x 6 pin, male

Connection type	
Connector to the I/O modules (X3)	2 x 6 pin, 2.54mm female header
Connector to next I/O module (X3)	

Current consumption for power supplied via RTU530 I/O bus	
5 V DC	75 mA
24 V DC	--

Analog input channels 530AID01	
Inputs	8 differential inputs
Configurable measuring range	• 0... 2 mA, ± 2 mA • 0... 5 mA, ± 5 mA • 0... 10 mA, ± 10 mA • 0... 20 mA, 4... 20 mA, ± 20 mA • 0... 40 mA, 4... 40 mA, ± 40 mA
Input impedance	50 Ω
Max. load	80 mA continuous
Resolution	16 bit including sign
AD converter resolution	16 bit
Accuracy at 25 °C	≤ 0.1 %
Linearity error at 25 °C	≤ 0.1 %
Temperature drift	≤ 100 ppm/K (0... 70 °C)
Max. common mode input voltage	±150 V DC (electrical limit)
Max. differential input voltage	± 4 V DC (current input)
Common mode rejection	> 70 dB @ 25 °C > 60 dB @ 0… 25 °C
Configurable line frequency f_N	• 16.7 Hz • 50 Hz • 60 Hz
Line frequency interference suppression	> 100 dB @ f_N ±2 % > 45 dB @ f_N ±10 %

Analog inputs - EMC tests	
Electrical fast transient / Burst, IEC 61000-4-4	4 kV (level 4), criterion A
Surge 1.2/50 µs, IEC 61000-4-5	2 kV (level 3), criterion A
Conducted disturbances, induced by radio-frequency fields, IEC 61000-4-6	10 V (level 3), criterion A
Ring wave, IEC 61000-4-12	2 kV (level 3), criterion A

Analog inputs - EMC tests	
Conducted, common mode disturbances in the frequency range 0 Hz to 150 kHz, IEC 61000-4-16	30 V continuous disturbance/ 300 V short duration disturbance (level 4), criterion A
Damped oscillatory wave, IEC 61000-4-18	2.5 kV (level 3), criterion A

Ordering information	
530AID01 R0001	1KGT050100R0001
530AID01 R1001 conformal coated	1KGT050100R1001

Hitachi Energy Germany AG

P.O. Box 42 01 30
68280 Mannheim, Germany

hitachienergy.com/rtu

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