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Energy Automation

SICAM T
Digital Measurement Transducer

Answers for infrastructure and cities.

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Contents – SICAM T

Device description
SICAM T is an digital measurement transducer that allows the measuring of electrical quantities in electrical networks in a single unit. In industries, power plants and substations, transducers are especially used for measurand (e.g. current, voltage, power, phase angle, energy or frequency) assignment into further processing through analog outputs or communication interface for precise control, notification or visualization tasks.

Device type
- Top-hat rail mounted device
- Plastic case 96 mm × 96 mm × 100 mm / 3.78 in. x 3.78 in. x 3.94 in. (W × H × D)
- Degree of protection IP20.

Input and output circuits
- 4 inputs for alternating voltage measurements
- 3 inputs for alternating current measurements up to 10 A continuous
- 4 optional DC analog outputs freely configurable:
  – Direct currents: 0 mA to 20 mA, 4 mA to 20 mA and -20 mA to 20 mA
  – Direct voltages: 0 V to 10 V and -10 V to 10 V
- Individually programmable binary outputs.

Signalization LEDs
Automatically monitor the functions of its hardware, software, and firmware components.

Communication
- Ethernet: IEC 61850 or MODBUS TCP communication protocol
- Optional serial RS485 interface that enables the device to communicate via the MODBUS RTU or the IEC 60870-5-103 communication protocol.

Measurands
The following measurands can be recorded or calculated from the measured quantities:
- TRMS (True RMS) for alternating voltage and current
- Active, reactive and apparent power
- Active, reactive and apparent energy
- Power frequency
- Phase angle
- Power factor and active power factor
- Voltage and current unbalance.

Time synchronization
- Voltage and current unbalance
  – Mean value of the 3 phase voltages: V_{avg}
  – Mean value of the 3 phase currents: I_{avg}

For a common time basis when communicating with peripheral devices and time stamping of the process data.
- External time synchronization via Ethernet NTP
- External time synchronization via field bus using the MODBUS RTU or the IEC 60870-5-103 communication protocol
- Internal time synchronization via RTC (if external time synchronization is not available).

Fig. 3/1 SICAM T digital measurement transducer

Response time for analog and binary outputs
The faster response time of the analog and binary output is a very important feature of SICAM T that enables a reliable reaction of the controlling applications. The response time of the device is 120 ms at 50 Hz and 100 ms at 60 Hz.

Applications
- Conversion and integration of measurands into substation automation, protection or SCADA process via RTU and/or via protocols IEC 61850 (for 7KG9662 variant), MODBUS TCP, IEC 60870-5-103 for further control and/or monitoring tasks
- Monitoring of lower voltage levels and heavy load control, e.g. air conditioning and motors
- Depending on the device type, the input circuits for voltage measurement are either designed as voltage dividers or they are galvanically isolated. Devices with galvanic isolation can be used without voltage transformers in the power systems IT, TT and TN. Devices with a voltage divider can also be used in these power systems; for IT power systems, however, an upstream voltage transformer is required.

Main features
- Design: Compact and robust for flexible application in industrial and utility environments
- Connections in 1-phase systems, in 3-wire and 4-wire systems
- Applications: Flexible for power utilities, industrial and commercial sector applications
- Measurements: up to 60 measured or calculated values available
- Temperature range: -25 °C to +55 °C/-13 °F to 131 °F
- Uncertainty: typically 0.1 % for voltage and current at rated input IEC 60688, and 0.2 s acc. to IEC 62053-21
- High EMC immunity: according to standards EN 61000-6-2 and EN 61000-6-4 for the EMC directives, and with the standard EN 61010-1 for the low-voltage directive
- UL Certfication: This product is UL-certified to standard UL 61010-1.

Device description

Highlights

- Flexible current measurement range (up to 2 × I_n)
- 4 fast analog outputs (reaction approx. 120 ms at 50 Hz and 100 ms at 60 Hz) for reliable control
- 2 individual binary outputs for fast switching, indications (e.g., limit violation) and operation status monitoring
- 4 LEDs for local status visualization
- Ethernet communications via IEC 61850 and MODBUS TCP and serial interface via MODBUS RTU or IEC 60870-5-103
- Internal battery for real time clock and saving of energy counter values in case of a power outage
- User-friendly operation through Web server (no extra software for parameterization needed, no converters and extra cables)
- Real time clock (RTC), field bus synchronization or network synchronization possible via NTP.

Applications

Applications

SICAM T applications: Local monitoring or control purposes through assignment of up to 60 available electrical parameters to analog outputs, notifications through binary outputs or integration into SCADA/monitoring systems through communication interface, e.g. serial or Ethernet.

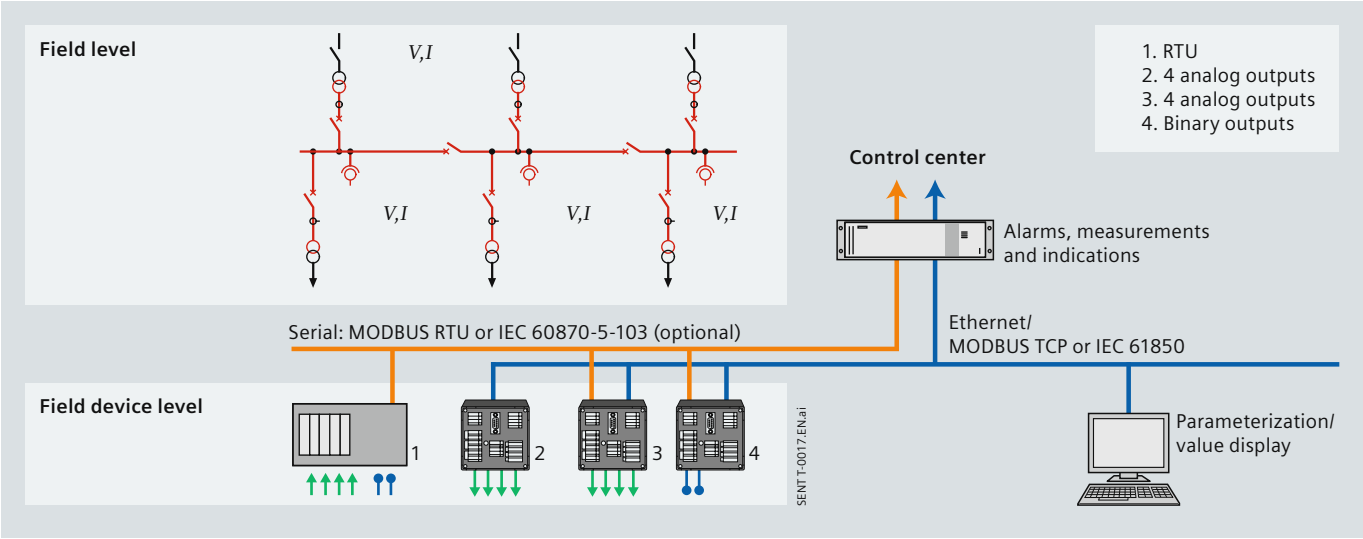


Fig. 3/2 2 SICAM T applications

Application area		Voltage	Current	Power	Frequency	Phase angle	Energy	Alarm	Internal cost allocation
Generation substation	Generator	■	■	■	■	■	■	■	
Transmission substation	Incoming line	■	■	■					
	Outgoing line	■	■	■					
Transformer substation	Incoming line	■							
	Bus	■	■	■	■		■		
	Feeder	■	■	■					
Transformer distribution	Incoming line	■							
	Bus	■	■	■	■		■		
	Feeder	■	■	■					
Process	SCADA / EMS / DMS	■	■	■	■	■	■		
	Energy management	■	■	■	■	■	■	■	■
	Motors	■	■	■	■	■		■	■
	Commercial (e.g. air conditioning)	■	■	■				■	■

Table 3/1 Selection and ordering data

Specific functions and design

Measurement process and connections

The measurements are obtained from the alternating quantities of current and voltage supplied to the different measuring inputs. Rated input alternating voltages up to $V_{ph\text{-}N}$ = 400 V and $V_{ph\text{-}ph}$ = 690 V can be fed in using internal resistive input voltage dividers.
The internal current transformers process rated input alternating currents up to 5 A. The circuits connected on the input side are isolated galvanically from the current transformers to ensure that the potential is decoupled. The input values are processed and then output as analog values or digital data by the corresponding interfaces, converted into direct currents and/or direct voltages depending on the parameter settings, or transmitted to peripheral devices for analysis.

Response time for analog outputs

The faster response time of the analog and binary output is a very important feature of SICAM T that enables a reliable reaction of the controlling applications. The response time of the device is 120 ms at 50 Hz and 100 ms at 60 Hz.

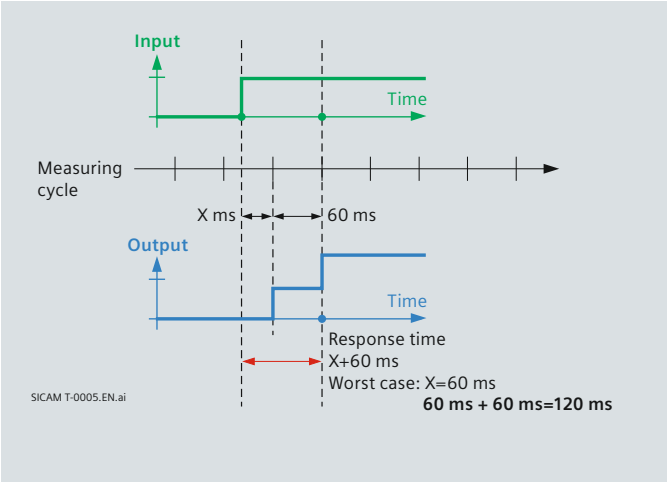


Fig. 3/3 Response time diagram

Communication

To communicate with the systems control and other process automation equipment, the device features an Ethernet interface, and if installed in the device model, an RS485 interface. Ethernet supports the device parameterization, the transmission of measured data, metered values and indications and the time synchronization via NTP. The communication protocols are HTTP, IEC 61850 (7KG9662) and MODBUS TCP. The RS485 interface supports the transmission of the measured data, metered values and indications, and the time synchronization. Depending on the device version, either the MODBUS RTU or the IEC 60870-5-103 communication protocol can be used.

Time synchronization

The following types of time synchronization can be executed:
- External time synchronization via Ethernet NTP (preferred)
- External time synchronization via field bus using the MODBUS RTU or the IEC 60870-5-103 communication protocol
- Internal time synchronization via RTC with quartz oscillator (if external time synchronization is not available).

Electrical assembly

SICAM T 7KG966 contains the following electrical modules depending on the device version:
- Digital signal processor (DSP)
- 4 inputs for AC voltage measurements
- 3 inputs for AC current measurements
- 4 DC analog outputs (optional)
- 2 binary outputs
- Supply voltage
- Serial RS485 interface (option for 7KG9661)
- Ethernet interface (standard).

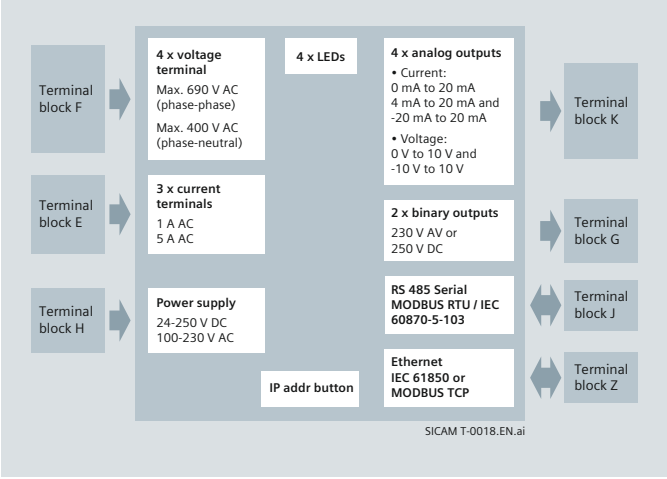


Fig. 3/4 Block diagram SICAM T 7KG9661

Mechanical design

The electrical modules are installed in a plastic case with the dimensions 96 mm × 96 mm × 100 mm / 3.78 in. x 3.78 in. x 3.94 in. (W × H × D). The case is prepared for mounting on a top-hat rail.
The top side of the device accommodates the RJ45 Ethernet connector with two LEDs and four additional LEDs.

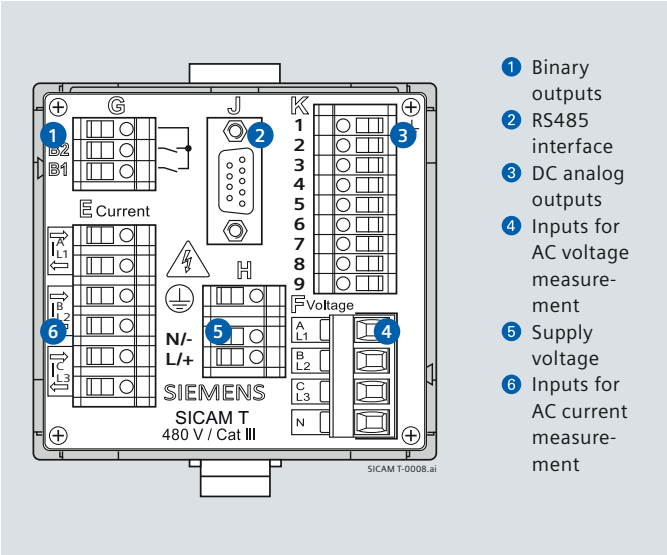


Fig. 3/5 Connectors on the device

Measurands

Measurand		Circuit	1-phase system	3-wire network (delta)			4-wire network (star)	
				balanced (1l)	unbal-anced (3l)	unbal-anced (2l)	balanced (1l)	unbal-anced (3l)
AC voltage	V_a	a-N	■				■	■
	V_b	b-N						■
	V_c	c-N						■
	V_{ab}, V_{bc}, V_{ca}	a-b, b-c, c-a		■	■	■		■
	V_N	a, b, c						■
	V_{avg}	a, b, c		$\Sigma V_{ph}/3$	$\Sigma V_{ph}/3$	$\Sigma V_{ph}/3$	a-N	$\Sigma V_{ph}/3$
	V_{unbal}	a-b, b-c, c-a		■	■	■		■
AC current	I_a	a	■	■	■	■	■	■
	I_b, I_c	b, c			■	■		■
	I_N	a, b, c			■			■
	I_{avg}	a, b, c			■	■		$\Sigma I_{ph}/3$
	I_{unbal}	a, b, c			■	■		■
Active power factor	cos φ (a)	a	■					■
	cos φ (b), cos φ (c)	b, c						■
	cos φ	a, b, c		■	■	■	■	■
Power factor	PF_a	a	■					■
	PF_b, PF_c	b, c						■
	PF	a, b, c		■	■	■	■	■
Phase angle	φ_a	a	■					■
	φ_b, φ_c	b, c						■
	φ	a, b, c		■	■	■	■	■
Frequency	f	a, b, c	■	■	■	■	■	■
Active power	P_a	a	■					■
	P_b, P_c	b, c						■
	P	a, b, c		■	■	■	■	■
Reactive power	Q_a	a	■					■
	Q_b, Q_c	b, c						■
	Q	a, b, c		■	■	■	■	■
Apparent power	S_a	a	■					■
	S_b, S_c	b, c						■
	S	a, b, c		■	■	■	■	■
Active energy – supply	$WP_{a\ supply}$	a	■					■
	$WP_{b\ supply}$, $WP_{c\ supply}$	b, c						■
	WP_{supply}	a, b, c		■	■	■	■	■
Active energy – demand	$WP_{a\ demand}$	a	■					■
	$WP_{b\ demand}$, $WP_{c\ demand}$	b, c						■
	WP_{demand}	a, b, c		■	■	■	■	■
Reactive energy – inductive	$WQ_{a\ inductive}$	a	■					■
	$WQ_{b\ inductive}$, $WQ_{c\ inductive}$	b, c						■
	$WQ_{inductive}$	a, b, c		■	■	■	■	■
Reactive energy – capacitive	$WQ_{a\ capacitive}$	a	■					■
	$WQ_{b\ capacitive}$, $WQ_{c\ capacitive}$	b, c						■
	$WQ_{capacitive}$	a, b, c		■	■	■	■	■
Apparent energy	WS_a	a	■					■
	WS_b, WS_c	b, c						■
	WS	a, b, c		■	■	■	■	■

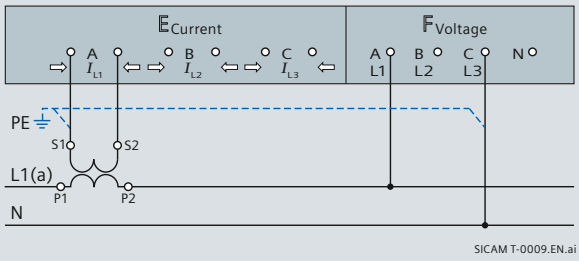
Table 3/2 Measurands according to the connection type: Power measurands in power systems

Connection types

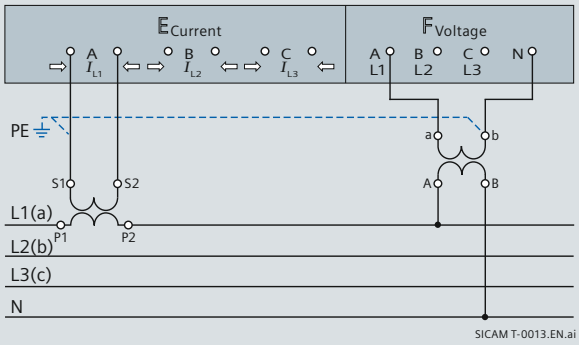
SICAM T 7KG9661 supports the following connection types:

- 1-phase system
- 3-wire network (balanced)
- 3-wire network (unbalanced), 2 current inputs
- 3-wire network (unbalanced), 3 current inputs
- 4-wire network (balanced)
- 4-wire network (unbalanced).

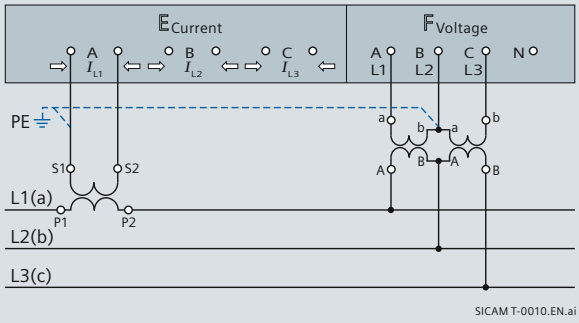
1-phase system, no voltage transformer



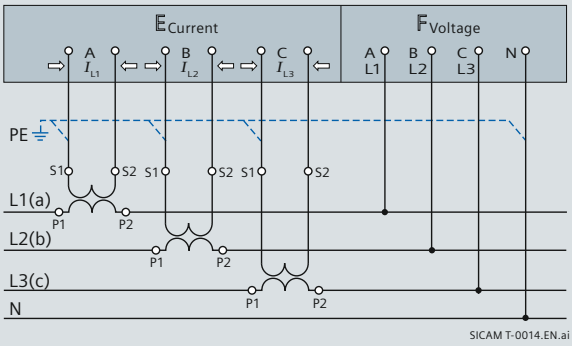
4-wire network, 1 voltage transformer and 1 current transformer, balanced



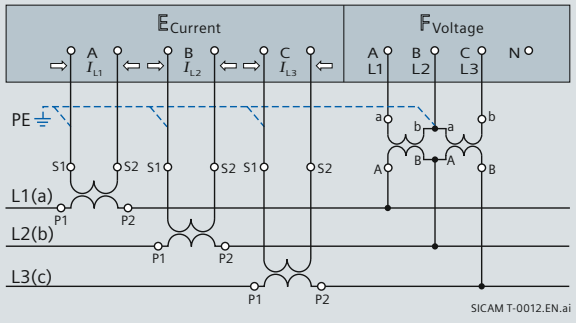
3-wire network, 2 voltage transformers and 1 current transformer, balanced*



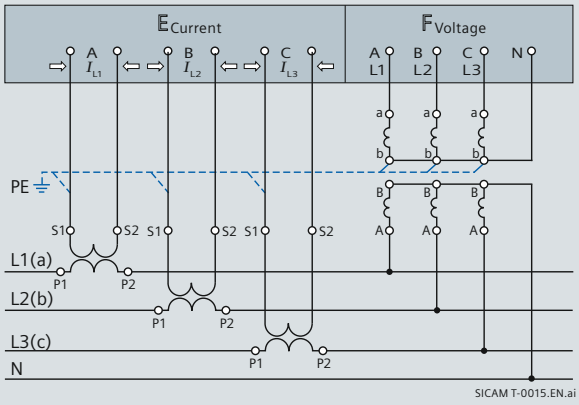
4-wire network, no voltage transformer and 3 current transformers, unbalanced



3-wire network, 2 voltage transformers and 3 current transformers, unbalanced*



4-wire network, 3 voltage transformers and 3 current transformers, unbalanced

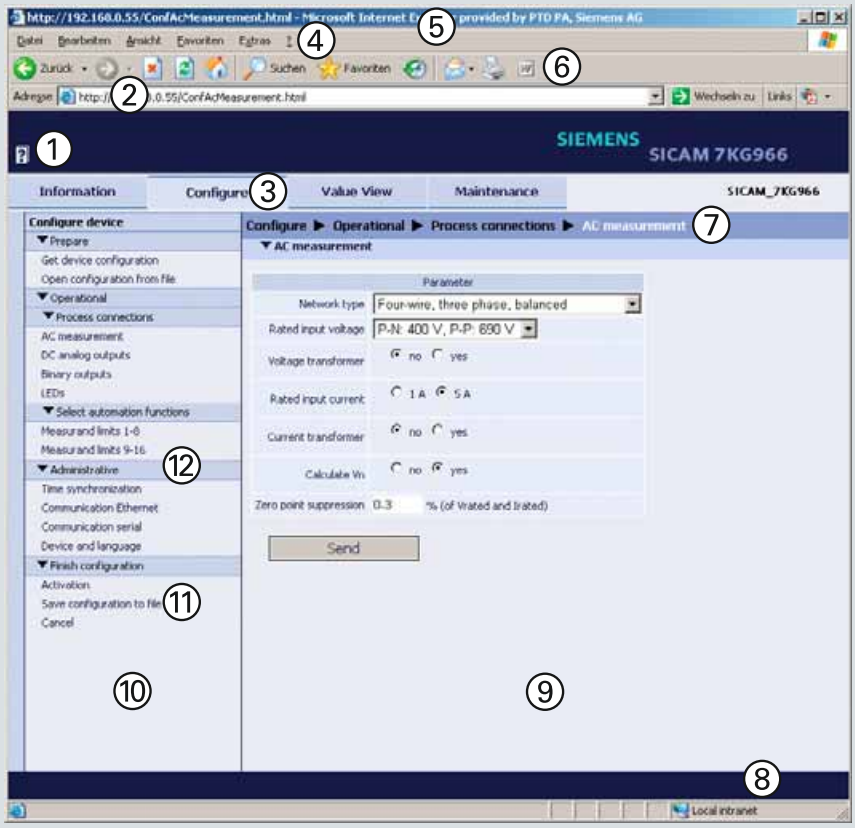


* **Important:** The maximum secondary voltage for this connection example is 480 V AC. The maximum allowable voltage between phase and ground must not be exceeded. For IT network connection, please read carefully the devices manual for detailed description.

Fig. 3/6 Connection types

Graphical user interface

Parameterization and monitoring software
The device is configured from a connected PC or notebook only. The user interface SICAM T GUI (GUI = Graphical User Interface) is implemented in the device, meaning that for the whole operation and parameterization of the device no additional software is required. It is possible to navigate through the Microsoft Internet Explorer using the icons on the toolbar.
Device status, such as communication, parameterization, log files, value view and maintenance can be easily processed through SICAM T GUI interface.



① Online help
② Address bar
③ Tab
④ Menu bar
⑤ Microsoft Internet Explorer
⑥ Toolbar
⑦ Navigation bar
⑧ Status bar
⑨ Input/output window
⑩ Navigation window
⑪ Element
⑫ Menu

Fig. 3/7 Layout of the SICAM T GUI user interface

Information
The navigation window of the "Information" tab contains the device information, as well as operative and device logs. It offers the complete overview of the device status.

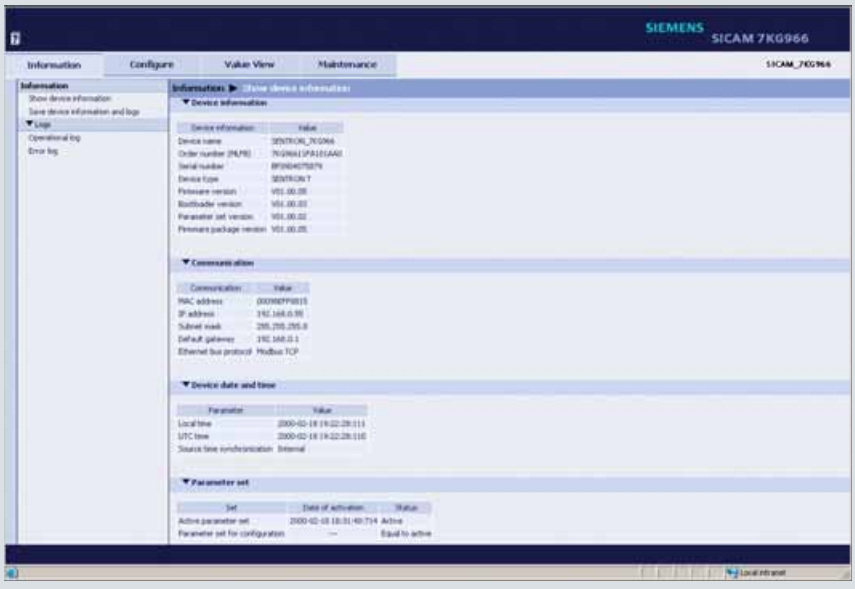


Fig. 3/8 Information tab, shows device information input/output window

Configuration
The configuration mode allows to set the device parameters. It is possible to tailor the process connections to the installation environment, specify the limits of the measuring ranges, parameterize the communication, and make various operational settings.

Analog outputs
The following types of characteristics are used for the transmission of measured values to the DC analog outputs:
Linear, Zoom, Live-Zero, Knee-point, Knee-point Zoom, Bipolar Linear, Bipolar Knee-point Zoom, Square Transfer Characteristic (U^2).

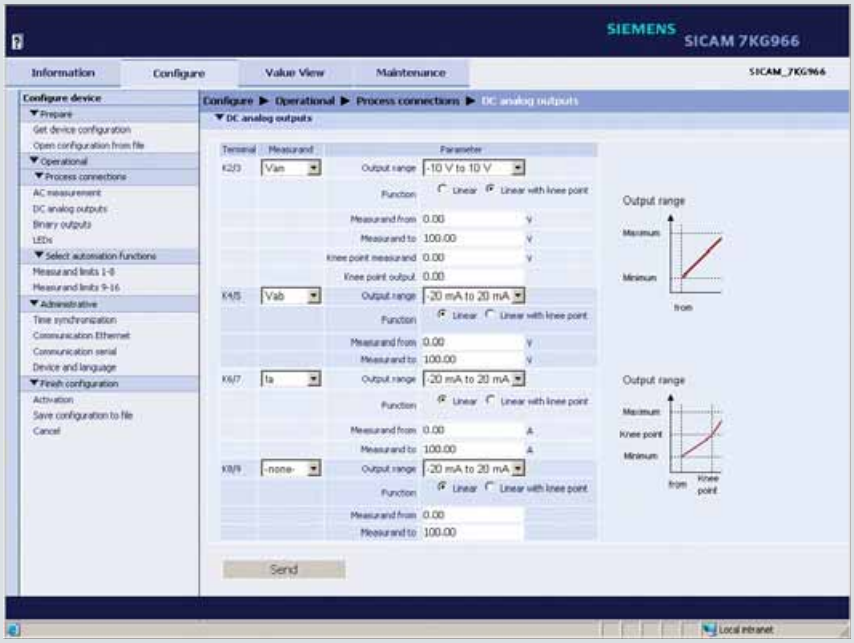


Fig. 3/9 DC analog outputs input/output window

Value View
The measured values are displayed in the "Value View" tab.
- AC operational values
- AC power and energy
- DC analog outputs
- Binary outputs
- Measurand limits

Depending on which operational parameters are selected, the input/output window displays the measured values of the measurands with the corresponding unit or indications in a tabular list that is updated every 5 s.

Fig. 3/10 Value View tab

Maintenance
The "Maintenance" tab allows to update the firmware, perform calibration, make various presettings, view and delete logs, and analyze protocol-specific communication data.

Fig. 3/11 Maintenance tab

Technical data

Electrical data / inputs

Inputs for alternating voltage measurements	
Rated input voltage (selectable via parameter)	ph-N: 63.5 V AC, ph-ph: 110 V AC ph-N: 110 V AC, ph-ph: 190 V AC ph-N: 230 V AC, ph-ph: 400 V AC ph-N: 400 V AC (max. 347 V at UL) ph-ph: 690 V AC (max. 600 V at UL)
Max. input voltage	1.2 × rated input voltage
Max. supply voltage phase-N/PE phase-phase	480 V 831 V
Power consumption per input for U_{rated} 400 V AC	38 mW
Permissible power frequency	45 Hz to 65 Hz
Input impedances a, b, c to N a, b, c, N to PE a-b, b-c, c-a	7.9 MΩ 3.9 MΩ 7.9 MΩ
Measuring error (with calibration) at 23 °C ±1 °C; 50 Hz or 60 Hz	typically 0.2 % at rated input voltage
Continuous overload capacity	1.5 × rated input voltage (600 V)
Surge overload capacity	2 × rated input voltage (800 V) according to IEC 60255-27

Inputs for alternating current measurements	
Rated input current ranges (selectable via parameter)	1 A, 5 A
Max. input current	2 × rated input current
Max. rated input voltage	150 V
Power consumption per input at 1 A AC at 5 A AC	 1 mVA 2.5 mVA
Permissible power frequency	45 Hz to 65 Hz
Measuring error (with calibration) at 23 °C ±1 °C; 50 Hz or 60 Hz:	typically 0.2 % at rated input current
Thermal stability	10 A continuous 100 A for max. 1 s according to IEC 60688

Electrical data / outputs

DC analog outputs	
Use as current outputs (direct current)	
Rated output current	±20 mA
Maximum output current	±24 mA
Maximum load impedance (incl. line impedance)	< 400 Ω
Short-circuit current (short-circuit proof)	±24 mA
No-load voltage (idling-proof)	15 V,
Measuring error (with calibration) at 23 °C ±1 °C	max. 0.1% at rated current
Response time	120 ms (50 Hz), 100 ms (60 Hz)

DC analog outputs	
Use as voltage outputs (direct voltage)	
Rated output voltage	±10 V
Maximum output voltage	±12 V
Minimum load impedance	1 kΩ
Short-circuit current (short-circuit proof)	±24 mA
Measuring error (with calibration) at 23 °C ±1 °C	max. 0.1 % at rated voltage
Response time	120 ms (50 Hz), 100 ms (60 Hz)

Binary outputs	
Maximum switching voltage Alternating voltage Direct voltage	 230 V 250 V
Maximum continuous contact current	100 mA
Maximum pulse current for 0.1 s	300 mA
Internal impedance	35 Ω
Admissible switching frequency	10 Hz
Number of switching cycles	unlimited

Table 3/3 Technical data

Tolerance limits

Measurands	Unit	Rated Value	Operat. measurem. uncertainty	
			acc. to IEC 61557-12	acc. to IEC 60688 [1]
Voltage $V_{ph\text{-}ph}$ (delta) acc. to parameterization	V	110 V AC 190 V AC 400 V AC 690 V AC (max. 600 V AC for UL)	±0.2 %	±0.1 %
Voltage $V_{ph\text{-}N}$ (star) acc. to parameterization	V	63.5 V AC 110 V AC 230 V AC 400 V AC (max. 347 V AC for UL)	±0.2 %	±0.1 %
Voltage unbalanced V_{unbal}	%	–	±0.15 %	±0.15 %
Current I acc. to parameterization	A	1 A AC 5 A AC	±0.2 %	±0.1 %
Current unbalanced I_{unbal}	%	–	±0.15 %	±0.15 %
Active power P + demand, -supply	W	–	±0.5 % 0.2 s acc. to IEC 62053-21	±0.2 %
Reactive power Q + inductive, -capacitive	var	–	±0.5 %	±0.2 %
Apparent power S	VA		±0.5 %	±0.2 %
Power factor PF [2]	–	–	±1.0 %	±0.5 %
Active power factor cos φ [2]	–	–	±1.0 %	±0.5 %
Phase angle φ [2]	Degree	–	±2 °	±1 °
Frequency f	Hz	50 Hz and 60 Hz	10 mHz (from 30 % to 120 % Urated)	10 mHz (from 30 % to 120 % Urated)
Active energy WP_{demand}	Wh	–	±0.5 %	±0.5 %
Active energy WP_{supply}	Wh	–	±0.5 %	±0.5 %
Reactive energy $WQ\_{inductive}$	varh	–	±0.5 %	±0.5 %
Reactive energy $WQ\_{capacitive}$	varh	–	±0.5 %	±0.5 %
Apparent energy WS	VAh	–	±0.5 %	±0.5 %

1) At reference conditions are applicable from 0.1 to 1.2 x nominal range.
2) Measurements from 2 % of the rated apparent power value onwards in the selected measuring range.
3) Valid for operating temperature.

General electrical data and reference conditions

Supply voltage	
Rated input voltages	110 V AC to 230 V AC or 24 V DC to 250 V DC
System frequency at AC	45 Hz to 65 Hz
Admissible input voltage tolerance (valid for all input voltages)	±20 %
Permitted ripple of the input voltage at 24 V DC, 48 V DC, 60 V DC, 110 V DC, 220 V DC, 250 V DC	15 %
Permitted harmonics at 115 V, 230 V	2 kHz
Max. inrush current at ≤ 110 V DC; ≤ 115 V AC at 220 V DC to 300 V DC; 230 V AC	 < 15 A ≤ 22 A (after 250 µs: < 5 A)
Maximum power consumption	6 W / 9 VA

Battery	
Type	CR2032
Voltage	3 V
Capacity	230 mAh

Degree of protection according to IEC 60529	
Device front	IP20
Device rear (connections)	IP20

Reference conditions for determining the test data (precision specifications under reference conditions)	
Rated input current	±1 %
Rated input voltage	±1 %
Frequency	45 Hz to 65 Hz
Curve shape sine, total harmonic distortion	≤ 5 %
Ambient temperature	23 °C ±1 °C
Supply voltage	VHN ±1 %
Warm-up time	≥ 15 min
Interfering fields	none

Table 3/4 Technical data

Technical data

Communication data

Ethernet	
Bus protocol	IEC 61850 Server or MODBUS TCP
Transmission rate	10/100 Mbit/s
Communication protocol	IEEE 802.3
Connection	100Base-T (RJ45)
Cable for 100Base-T	100 Ω to 150 Ω STP, CAT5
Maximum cable length 100Base-T	100 m (if well installed)
Voltage strength	700 V DC

Serial RS485 interface	
Connection	9-pin D-sub plug connector

Bus protocol MODBUS RTU	
Baud rate	9,600 bit/s, 19,200 bit/s, 38,400 bit/s, 57,600 bit/s
Parity	even, even (fixed) ,odd, no (1 or 2 stop bits)
Protocol	half-duplex
Max. cable length, depending on data rate	1,000 m
Transmission level	low: -5 V to -1.5 V high: +5 V to +1.5 V
Reception level	low: ≤ -0.2 V high: ≥ +0.2 V
Bus termination	not integrated, bus termination using plugs with integrated bus terminating resistors

Bus protocol IEC 60870-5-103	
Baud rate	9,600 bit/s, 19,200 bit/s, 38,400 bit/s
Max. cable length, depending on data rate	1,000 m
Transmission level	low: -5 V to -1.5 V high: +5 V to +1.5 V
Reception level	low: ≤ -0.2 V high: ≥ +0.2 V
Bus termination	not integrated, bus termination using plugs with integrated bus terminating resistors

Table 3/5 Technical data

Environmental data

Supply voltage	
Operating temperature continuous operation	 -25 °C to +55 °C / -13 °F to 151 °F
Temperature during transportation during storage	 -25 °C to +70 °C / -13 °F to 158 °F -25 °C to +70 °C / -13 °F to 158 °F
Maximum temperature gradient	20 K/h
Air humidity mean relative air humidity per year maximum relative air humidity	 ≤ 75 % 95 % 30 days a year
Condensation during operation during transportation and storage	 not permitted permitted

Regulations and standards

Climate	
Cold	IEC 60688-2-1 Test Ad IEEE C37.90
Dry heat during operation, storage, and transportation	IEC 60688-2-2 Test Bd IEEE C37.90
Damp heat	DIN EN 60688-2-78:2002-09 IEEE C37.90
Damp heat – cyclic	IEC 60688-2-30 Test Db
Change of temperature	IEC 60688-2-14 Tests Na and Nb
Individual gas test, industrial atmosphere, sequential gas test	IEC 60688-2-42 Test Kc IEC 60688-2-43
Flowing mixed gas	IEC 60688-2-60 Method 4
Salt fog test	IEC 60688-2-11 Test Ka

Mechanics	
Vibration during operation	IEC 60688-2-6 Test Fc IEC 60255-21-1

Connection diagram / dimension drawings

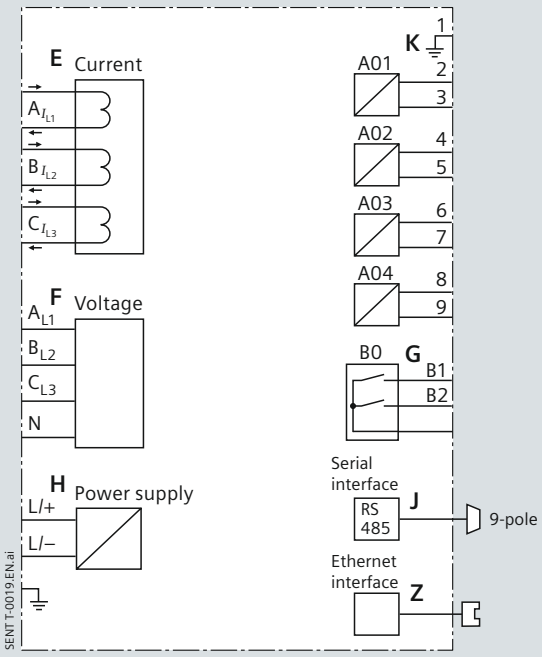
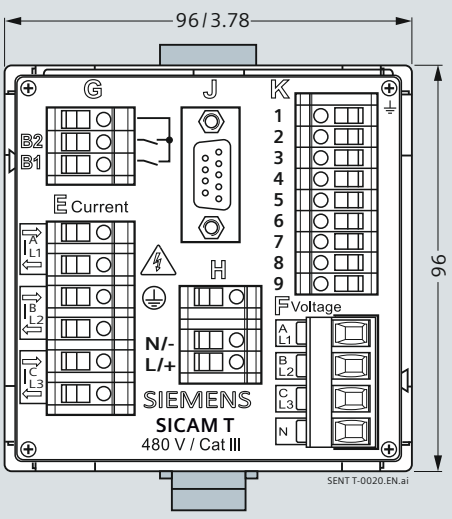


Fig. 3/12 Connection diagram



Dimensions in mm / in.

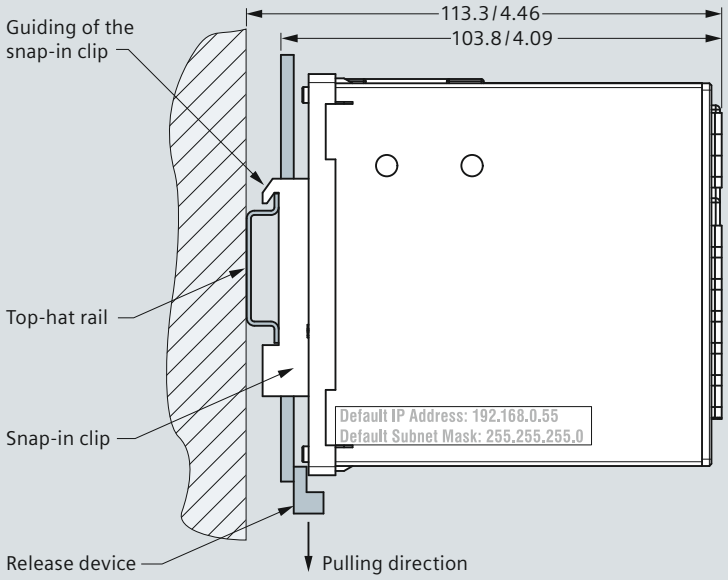


Fig. 3/13 Dimension drawings

Selection and ordering data

Description	Order No.
Multifunctional transducer	
SICAM T	**7KG9661 - □□A□0-1AA0**
Type – Snap-on mounting unit – Dimensions 96 mm x 96 mm x 100 mm / 3.78 in. x 3.78 in. x 3.94 in. (W x H x D) – 2 binary outputs – IP20 – Web server – UL-Certification – Measurements: *V, I, f, P, Q, S,* cos phi, energy – MODBUS TCP	
Input circuits	
Resistive divider	**1**
Galvanic isolated voltage transformer	**2**
I/O board or I/O module	
Without	**A**
4 analog outputs (-20_0_20 mA/ -10 V_0_10 V)	**F**
Serial interface and communication protocol	
Without	**0**
RS 485 - MODBUS RTU	**1**
RS 485 - IEC 60870-5-103 and MODBUS RTU	**3**

Description	Order No.
Multifunctional transducer	
SICAM T – IEC 61850	**7KG9662 - □□A00-2AA0**
Type – Snap-on mounting unit – Dimensions 96 mm x 96 mm x 100 mm / 3.78 in. x 3.78 in. x 3.94 in. (W x H x D) – 2 binary outputs – IP20 – Web server – UL-Certification – Measurements: *V, I, f, P, Q, S,* cos phi, energy – IEC 61850	
Input circuits	
Resistive divider	**1**
Galvanic isolated voltage transformer	**2**
I/O board or I/O module	
Without	**A**
4 analog outputs (-20_0_20 mA/ -10 V_0_10 V)	**F**
Ethernet patch cable for parameterization	**7KE6000-8GE00-3AA0**
With double shield (SFTP), cross-over connection, LAN connector at both ends, SICAM T <–> PC; length: 3 m / 9.84 in.	

Table 3/6 Selection and ordering data

CE, UL, IEC 61850 and IEC 60870-5-103 conformity certificate

CE conformity

This product complies with the directive of the Council of the European Communities on the approximation of the laws of the Member States relating to electromagnetic compatibility (EMC Council Directive 2004/108/EC) and concerning electrical equipment for use within specified voltage limits (Low-voltage Directive 2006/95/EC).
This conformity has been established by means of tests conducted by Siemens AG according to the Council Directive in agreement with the generic standards EN 61000-6-2 and EN 61000-6-4 for the EMC directives, and with the standard EN 61010-1 for the low-voltage directive.
The device has been designed and produced for industrial use.
The product conforms to the standard EN 60688.

This product is UL-certified to Standard UL 61010-1, based on the specification stated in chapter 3.10–3.12 (Technical Data).

UL File No.: E228586.

Open-type Measuring Equipment
2UD1

IEC 61850 Certificate Level A[1]

No. 74100726-MOC/INC 11-2049

Issued to:
Siemens A.G., PTD EA
Protection and Substation Control Systems
Wernerwerkdamm 5
D-13623 Berlin
Germany

For the product:
SENTRON T 7KG966 Multifunctional Transducer
Firmware V02.00.04

Issued by: KEMA

The product has not shown to be non-conforming to:

IEC 61850-6, 7-1, 7-2, 7-3, 7-4 and 8-1

Communication networks and systems in substations

The conformance test has been performed according to IEC 61850-10 with product's protocol, model and technical issue implementation conformance statements: "SIEMENS Multifunctional Transducer SENTRON T 7KG966 Device Manual, E50417-H1040-C493-A1" also including the product's extra information for testing.

The following IEC 61850 conformance blocks have been tested with a positive result (number of relevant and executed test cases / total number of test cases as defined in the UCA International Users Group Device Test procedures v2.2b):

1	Basic Exchange (15/24)	6	Buffered Reporting (15/20)
2	Data Sets (3/6)	6+	Enhanced Buffered Reporting (11/12)
5	Unbuffered Reporting (13/18)	13	Time Synchronization (3/5)

This Certificate includes a summary of the test results as carried out at KEMA in the Netherlands with UniCAsim 61850 version 3.21.02 with test suite 3.21.02 and UniCA 61850 analyzer 4.23.02. The test is based on the UCA International Users Group Device Test Procedures version 2.2b. This document has been issued for information purposes only, and the original paper copy of the KEMA report: No. 74100726-MOC/INC 11-2048 will prevail.

The test has been carried out on one single specimen of the product as referred above and submitted to KEMA by Siemens. The manufacturer's production process has not been assessed. This Certificate does not imply that KEMA has certified or approved any product other than the specimen tested.

Arnhem, 25 August 2011

M. Adriaensen
Regional Director Management & Operations Consulting

R. Schimmel
Certification Manager

1 Level A - Independent Test lab with certified ISO 9000 or ISO 17025 Quality System

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