



SIMATIC S7-300, Analog input SM 331, isolated, 2 AI, Resolution 9/12/14 bits, U/I/thermocouple/resistor, alarm, diagnostics, 1x 20-pole, Removing/inserting with active backplane bus

Figure similar

General information	
Product function	
Protection function	
Engineering with	
Integrated drive control	
Operating mode	
Operator control and monitoring	
Process images	
User administration	
Alarms	
Recipes/user archives	
Display	
Line display	
Resolution (pixels)	
Control elements	
Input device	
Keyboard fonts	
Touch operation	
Connection type	
Special operator controls	
Frame size/design	
Ergonomics	
Supply voltage	
Line frequency	
Mains filter	
Mains buffering	
Load voltage L+	
<ul style="list-style-type: none"> <li>Rated value (DC)</li> <li>Reverse polarity protection</li> </ul>	24 V Yes
Load voltage 1L+	
Load voltage 2L+	
Load voltage L1	
Auxiliary voltage 1L+, load voltage 2L+	
Input voltage	
Input voltage acc. to VDE	
Input voltage acc. to UL	

Line frequency	
<b>Input current</b>	
from load voltage L+ (without load), max.	30 mA
from backplane bus 5 V DC, max.	50 mA
<b>Output current</b>	
horizontal installation	
vertical installation	
<b>Encoder supply</b>	
Output current	
5 V encoder supply	
24 V encoder supply	
Additional 24 V encoder supply	
<b>Power loss</b>	
Power loss, typ.	1 W
<b>Memory</b>	
Work memory	
Working memory for additional functions	
<b>Battery</b>	
Design	
<b>CPU-blocks</b>	
DB	
FB	
FC	
<b>Counters, timers and their retentivity</b>	
S7 counter	
IEC counter	
S7 times	
<b>Data areas and their retentivity</b>	
Flag	
<b>Address area</b>	
I/O address area	
of which distributed	
per integrated IO subsystem	
Process image	
Subprocess images	
Digital channels	
Analog channels	
Addressing volume	
<b>Hardware configuration</b>	
Formation of potential groups	
Module exchange	
Interface modules	
Number of DP masters	
Number of IO Controllers	
Number of operable FMs and CPs (recommended)	
Expansion modules	
Rack	
Submodules	
Selection of BaseUnit for connection variants	
PtP CM	
<b>Time of day</b>	
Clock	
Operating hours counter	
Time switching clocks	
<b>Digital inputs</b>	
Number of simultaneously controllable inputs	

all mounting positions	
horizontal installation	
Digital input functions, parameterizable	
Input voltage	
Input current	
for 10 k switched contact	
Internal preparation time	
Input delay (for rated value of input voltage)	
for standard inputs	
for interrupt inputs	
Encoder connection	
Connection method	
<b>Digital outputs</b>	
Digital output functions, parameterizable	
Control supply voltage	
Switching capacity of the outputs	
Load resistance range	
Trend key points E	
Output voltage	
Output current	
Output delay with resistive load	
Parallel switching of two outputs	
Switching frequency	
Total current of the outputs	
horizontal installation	
Total current of the outputs (per group)	
all mounting positions	
horizontal installation	
vertical installation	
Total current of the outputs (per module)	
all mounting positions	
horizontal installation	
Pulse output (passive)	
Frequency output	
Relay outputs	
Integrated high-speed cams	
<b>Analog inputs</b>	
Number of analog inputs	2
• For resistance measurement	1
permissible input voltage for voltage input (destruction limit), max.	20 V; continuous; 75 V for max. 1 s (mark to space ratio 1:20)
permissible input current for current input (destruction limit), max.	40 mA
Constant measurement current for resistance-type transmitter, typ.	1.67 mA
<b>Input ranges</b>	
• Voltage	Yes
• Current	Yes
• Thermocouple	Yes
• Resistance thermometer	Yes
• Resistance	Yes
<b>Measuring range</b>	
<b>Input ranges (rated values), voltages</b>	
• 0 to +10 V	No
• 1 V to 5 V	Yes
— Input resistance (1 V to 5 V)	100 kΩ
• 1 V to 10 V	No
• -1 V to +1 V	Yes
— Input resistance (-1 V to +1 V)	10 MΩ

<ul style="list-style-type: none"> <li>● -10 V to +10 V <ul style="list-style-type: none"> <li>— Input resistance (-10 V to +10 V)</li> </ul> </li> <li>● -2.5 V to +2.5 V <ul style="list-style-type: none"> <li>— Input resistance (-2.5 V to +2.5 V)</li> </ul> </li> <li>● -250 mV to +250 mV <ul style="list-style-type: none"> <li>— Input resistance (-250 mV to +250 mV)</li> </ul> </li> <li>● -5 V to +5 V <ul style="list-style-type: none"> <li>— Input resistance (-5 V to +5 V)</li> </ul> </li> <li>● -50 mV to +50 mV</li> <li>● -500 mV to +500 mV <ul style="list-style-type: none"> <li>— Input resistance (-500 mV to +500 mV)</li> </ul> </li> <li>● -80 mV to +80 mV <ul style="list-style-type: none"> <li>— Input resistance (-80 mV to +80 mV)</li> </ul> </li> </ul>	<p>Yes</p> <p>100 kΩ</p> <p>Yes</p> <p>100 kΩ</p> <p>Yes</p> <p>10 MΩ</p> <p>Yes</p> <p>100 kΩ</p> <p>No</p> <p>Yes</p> <p>10 MΩ</p> <p>Yes</p> <p>10 MΩ</p>
<b>Input ranges (rated values), currents</b>	
<ul style="list-style-type: none"> <li>● 0 to 20 mA <ul style="list-style-type: none"> <li>— Input resistance (0 to 20 mA)</li> </ul> </li> <li>● -10 mA to +10 mA <ul style="list-style-type: none"> <li>— Input resistance (-10 mA to +10 mA)</li> </ul> </li> <li>● -20 mA to +20 mA <ul style="list-style-type: none"> <li>— Input resistance (-20 mA to +20 mA)</li> </ul> </li> <li>● -3.2 mA to +3.2 mA <ul style="list-style-type: none"> <li>— Input resistance (-3.2 mA to +3.2 mA)</li> </ul> </li> <li>● 4 mA to 20 mA <ul style="list-style-type: none"> <li>— Input resistance (4 mA to 20 mA)</li> </ul> </li> </ul>	<p>Yes</p> <p>25 Ω</p> <p>Yes</p> <p>25 Ω</p> <p>Yes</p> <p>25 Ω</p> <p>Yes</p> <p>25 Ω</p> <p>Yes</p> <p>25 Ω</p>
<b>Input ranges (rated values), thermocouples</b>	
<ul style="list-style-type: none"> <li>● Type B</li> <li>● Type E <ul style="list-style-type: none"> <li>— Input resistance (Type E)</li> </ul> </li> <li>● Type J <ul style="list-style-type: none"> <li>— Input resistance (type J)</li> </ul> </li> <li>● Type K <ul style="list-style-type: none"> <li>— Input resistance (Type K)</li> </ul> </li> <li>● Type L</li> <li>● Type N <ul style="list-style-type: none"> <li>— Input resistance (Type N)</li> </ul> </li> <li>● Type R</li> <li>● Type S</li> <li>● Type T</li> <li>● Type U</li> <li>● Type TXK/TXK(L) to GOST</li> </ul>	<p>No</p> <p>Yes</p> <p>10 MΩ</p> <p>Yes</p> <p>10 MΩ</p> <p>Yes</p> <p>10 MΩ</p> <p>No</p> <p>Yes</p> <p>10 MΩ</p> <p>No</p> <p>No</p> <p>No</p> <p>No</p> <p>No</p> <p>No</p>
<b>Input ranges (rated values), resistance thermometer</b>	
<ul style="list-style-type: none"> <li>● Cu 10</li> <li>● Ni 100 <ul style="list-style-type: none"> <li>— Input resistance (Ni 100)</li> </ul> </li> <li>● Ni 1000</li> <li>● LG-Ni 1000</li> <li>● Ni 120</li> <li>● Ni 200</li> <li>● Ni 500</li> <li>● Pt 100 <ul style="list-style-type: none"> <li>— Input resistance (Pt 100)</li> </ul> </li> <li>● Pt 1000</li> <li>● Pt 200</li> <li>● Pt 500</li> </ul>	<p>No</p> <p>Yes</p> <p>10 MΩ; Standard</p> <p>No</p> <p>No</p> <p>No</p> <p>No</p> <p>No</p> <p>No</p> <p>Yes</p> <p>10 kΩ; Standard</p> <p>No</p> <p>No</p> <p>No</p>
<b>Input ranges (rated values), resistors</b>	
<ul style="list-style-type: none"> <li>● 0 to 150 ohms <ul style="list-style-type: none"> <li>— Input resistance (0 to 150 ohms)</li> </ul> </li> <li>● 0 to 300 ohms</li> </ul>	<p>Yes</p> <p>10 MΩ</p> <p>Yes</p>

— Input resistance (0 to 300 ohms)	10 MΩ
• 0 to 600 ohms	Yes
— Input resistance (0 to 600 ohms)	10 MΩ
• 0 to 6000 ohms	No
<b>Input ranges (rated values), strain gauges (full bridges)</b>	
<b>Thermocouple (TC)</b>	
Temperature compensation	
— parameterizable	Yes
— internal temperature compensation	Yes
— external temperature compensation with compensations socket	Yes
— for definable comparison point temperature	Yes
<b>Characteristic linearization</b>	
• parameterizable	Yes
— for thermocouples	Type E, J, K, L, N
— for resistance thermometer	Pt100 (standard, climatic range), Ni100 (standard, climatic range)
<b>Connection method</b>	
<b>Cable length</b>	
• shielded, max.	200 m; 50 m at 80 mV and thermocouples
<b>Analog outputs</b>	
Output ranges, voltage	
Output ranges, current	
Connection of actuators	
Load impedance (in rated range of output)	
<b>Analog value generation for the inputs</b>	
Integration and conversion time/resolution per channel	
• Resolution with overrange (bit including sign), max.	15 bit; Unipolar: 9/12/12/14 bit; bipolar: 9 bit + sign/12 bit + sign/12 bit + sign/14 bit + sign
• Integration time, parameterizable	Yes
• Interference voltage suppression for interference frequency f1 in Hz	400 / 60 / 50 / 10 Hz
<b>Analog value generation for the outputs</b>	
Integration and conversion time/resolution per channel	
<b>Encoder</b>	
Connection of signal encoders	
• for voltage measurement	Yes
• for current measurement as 2-wire transducer	Yes
• for current measurement as 4-wire transducer	Yes
• for resistance measurement with two-wire connection	Yes
• for resistance measurement with three-wire connection	Yes
• for resistance measurement with four-wire connection	Yes
Connectable encoders	
Incremental encoder	
Encoder signals, incremental encoder (symmetrical)	
Encoder signals, incremental encoder (asymmetrical)	
Encoder signals, absolute encoder (SSI)	
Encoder signals, IEPE	
<b>Drive axis</b>	
EC motor	
<b>Errors/accuracies</b>	
Operational error limit in overall temperature range	
• Voltage, relative to input range, (+/-)	1 %; ±1% (80 mV); ±0.6% (250 mV to 1 000 mV); ±0.8% (2.5 V to 10 V)
• Current, relative to input range, (+/-)	0.7 %; From 3.2 to 20 mA
• Resistance, relative to input range, (+/-)	0.7 %; 150, 300, 600 Ohm
• Resistance thermometer, relative to input range, (+/-)	0.7 %; ±0.7 % (Pt100/ Ni100); ±0.8 % (Pt100 climate)

• Thermocouple, relative to input range, (+/-)	1.1 %; Type E, J, K, L, N
<b>Basic error limit (operational limit at 25 °C)</b>	
• Voltage, relative to input range, (+/-)	0.6 %; ±0.6% (80 mV, 2.5 V to 10 V); ±0.4% (250 mV to 1 000 mV)
• Current, relative to input range, (+/-)	0.5 %; 3.2 to 20 mA
• Resistance, relative to input range, (+/-)	0.5 %; 150, 300, 600 Ohm
• Resistance thermometer, relative to input range, (+/-)	0.6 %; ±0.5% (Pt100/ Ni100), ±0.6% (Pt100 climate)
• Thermocouple, relative to input range, (+/-)	0.7 %; Type E, N, J, K, L
<b>Power electronics</b>	
Control of heating elements	
Load connection type	
Setpoint input	
Heating power	
<b>Interfaces</b>	
Video interfaces	
Touch interfaces	
MPI	
PROFIBUS DP	
PROFIBUS PA	
Supports protocol for PROFINET IO	
PROFINET functions	
Industrial Ethernet	
Point-to-point connection	
Integrated protocol driver	
Telegram length, max.	
Transmission rate, 20 mA (TTY)	
Transmission rate, RS 422/485	
Transmission speed, RS 232	
Signals	
ET-Connection	
EtherNet/IP	
AS-Interface	
WLAN	
<b>1. Interface</b>	
Interface types	
Protocols	
MPI	
PROFIBUS DP master	
Services	
PROFIBUS DP slave	
PROFINET IO Controller	
Services	
Update time for IRT	
PROFINET IO Device	
Services	
PROFINET CBA	
Open IE communication	
CAN	
BACnet	
<b>2. Interface</b>	
Interface types	
Protocols	
PROFIBUS DP master	
Services	
PROFIBUS DP slave	
PROFINET IO Controller	
Services	
Update time for IRT	

PROFINET IO Device
Services
PROFINET CBA
<b>3. Interface</b>
Interface types
Protocols
PROFIBUS DP master
Services
PROFIBUS DP slave
PROFINET IO Controller
PROFINET IO Device
Services
PROFINET CBA
<b>4. Interface</b>
Interface types
Protocols
PROFIBUS DP master
PROFINET IO Controller
<b>Interface types</b>
RJ 45 (Ethernet)
RS 232
RS 485
RS 422
USB port
<b>Protocols</b>
Protocols (USB)
Protocols (Ethernet)
WEB characteristics
Protocols (terminal link)
Number of connections
PROFINET IO Device
Redundancy mode
SIMATIC communication
EtherNet/IP
Services
Updating times
Redundancy mode
Open IE communication
Web server
PROFIBUS DP
PROFdrive
DALI
Integrated protocols
Freeport
3964 (R)
OPC UA
<b>Communication functions</b>
Global data communication
S7 basic communication
S7 communication
LOGO! communication
S5 compatible communication
Standard communication (FMS)
PROFINET CBA (at set setpoint communication load)
Remote interconnections with acyclic transmission
Remote interconnections with cyclic transmission
iPAR server
Number of connections

Test commissioning functions	
Status/control	
Forcing	
Diagnostic buffer	
Interrupts/diagnostics/status information	
Diagnostics function	Yes; Parameterizable
Alarms	
<ul style="list-style-type: none"> <li>Diagnostic alarm</li> </ul>	Yes
<ul style="list-style-type: none"> <li>Limit value alarm</li> </ul>	Yes; Parameterizable, channel 0
Diagnoses	
<ul style="list-style-type: none"> <li>Diagnostic information readable</li> </ul>	Yes
Diagnoses indication LED	
<ul style="list-style-type: none"> <li>Group error SF (red)</li> </ul>	Yes
Integrated Functions	
Monitoring functions	
Safety monitoring functions	
Counting functions	
Load cell	
Position detection	
Control technology	
Step-by-step controllers	
Pulse generator	
Measuring functions	
Operating mode for measured value acquisition	
Measuring range	
Accuracy	
Measuring inputs for voltage	
Measuring inputs for current	
Measuring inputs for current (Rog. or I/U converter)	
Error limits	
Counter	
Counting mode	
External gate counters	
Counter input 5 V	
Counter input 24 V	
Drive interface	
Signal Input	
Potential separation	
Potential separation digital inputs	
Potential separation digital outputs	
Potential separation analog inputs	
<ul style="list-style-type: none"> <li>between the channels</li> </ul>	No
<ul style="list-style-type: none"> <li>between the channels and backplane bus</li> </ul>	Yes
<ul style="list-style-type: none"> <li>between the channels and the power supply of the electronics</li> </ul>	Yes; Not for 2-wire transmitters
Potential separation analog outputs	
Potential separation channels	
Potential separation valve outputs	
Potential separation counter	
Potential separation controller	
Isolation	
Isolation tested with	500 V DC
EMC	
Interference immunity against discharge of static electricity	
Interference immunity against high-frequency electromagnetic fields	
Interference immunity to cable-borne interference	
Interference immunity against voltage surge	



Interference immunity against conducted variable disturbance induced by high-frequency fields
Interference immunity to magnetic fields
Emission of radio interference acc. to EN 55 011
Emission of radio interference acc. to EN 55 022
<b>Standards, approvals, certificates</b>
Highest safety class achievable in safety mode
Highest safety class achievable for safety-related tripping of standard modules
Highest safety class achievable for deactivated dark test
Use in hazardous areas
Marine approval
<b>Ambient conditions</b>
Free fall
Ambient temperature during operation
Operation (vertical installation)
Air pressure acc. to IEC 60068-2-13
Vibrations
Shock testing
Resistance
Coolants and lubricants
Fire resistance
Pollutant concentrations
<b>Hardware requirement</b>
Processor
Graphic
<b>Operating systems</b>
pre-installed operating system
Runs under operating system
<b>Software</b>
Preinstalled
Software functions
Multi-user system
Runtime software
Runtime
Block
Adjustable parameters
<b>Configuration</b>
Configuration
Configuration software
Script languages (Runtime)
Programming
Programming language
Configuration examples
Software libraries
Know-how protection
Access protection
<b>Languages</b>
Online languages
<b>Functionality under WinCC (TIA Portal)</b>
Multiproject
Message system
Recipe management
Variables
Images
Image objects
Complex image objects
Attributes for dynamic objects
Lists

Archiving	
Filters	
Security	
Data carrier support	
Logging through printer	
Character sets	
Transfer (upload/download)	
Process coupling	
Functions	
<b>Functionality under WinCC Unified</b>	
Parameter set management (recipes)	
Image objects	
<b>Connection method</b>	
required front connector	20-pin
ET-Connection	
Terminals	
Connection I/O signals	
Conductor cross-section in mm <sup>2</sup>	
Conductor cross-section acc. to AWG	
<b>Dimensions</b>	
Width	40 mm
Height	125 mm
Depth	120 mm
<b>Weights</b>	
Weight, approx.	250 g
<b>Other</b>	
Data for selecting a voltage transformer	

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