



Figure similar

SIMATIC S7-400, analog input SM 431, non-isolated 16 AI, resolution 13 bit, +/-10 V, +/-20 mA, 4 - 20 mA 20 ms conversion time

Supply voltage	
Load voltage L+	
• Rated value (DC)	24 V; Only required for supplying 2-wire transmitters
• Reverse polarity protection	Yes
Input current	
from load voltage L+ (without load), max.	400 mA; for 16 connected, fully controlled 2-wire transmitters
from backplane bus 5 V DC, max.	100 mA
Power loss	
Power loss, typ.	2 W
Analog inputs	
Number of analog inputs	16
• For voltage/current measurement	16
permissible input voltage for voltage input (destruction limit), max.	20 V; 20 V DC permanent, 75 V DC for max. 1 s (duty factor 1:20)
permissible input current for current input (destruction limit), max.	40 mA
Constant measurement current for resistance-type transmitter, typ.	1.67 mA
Input ranges	
• Voltage	Yes
• Current	Yes
• Thermocouple	No
• Resistance thermometer	No
• Resistance	No
Input ranges (rated values), voltages	
• 1 V to 5 V	Yes
— Input resistance (1 V to 5 V)	100 kΩ
• -1 V to +1 V	Yes
— Input resistance (-1 V to +1 V)	10 MΩ
• -10 V to +10 V	Yes
— Input resistance (-10 V to +10 V)	100 kΩ
Input ranges (rated values), currents	
• -20 mA to +20 mA	Yes
— Input resistance (-20 mA to +20 mA)	50 Ω
• 4 mA to 20 mA	Yes
— Input resistance (4 mA to 20 mA)	50 Ω
Cable length	
• shielded, max.	200 m
Analog value generation for the inputs	
Integration and conversion time/resolution per channel	

• Resolution with overrange (bit including sign), max. • Integration time, parameterizable • Basic conversion time (ms) • Integration time (ms) • Interference voltage suppression for interference frequency f1 in Hz • Basic execution time of the module (all channels released)	13 bit Yes 55 / 65 ms 50 / 60 ms 50 / 60 Hz 1 040 ms; 880 / 1 040 ms		
Encoder			
Connection of signal encoders			
• for voltage measurement • for current measurement as 4-wire transducer	Yes; possible Yes		
Errors/accuracies			
Temperature error (relative to input range), (+/-)	0.01 %/K		
Operational error limit in overall temperature range			
• Voltage, relative to input range, (+/-) • Current, relative to input range, (+/-)	0.65 %; 1.0 % at 1 to 5 V; 0.65 % at ±1 V, ±10 V 0.65 %		
Basic error limit (operational limit at 25 °C)			
• Voltage, relative to input range, (+/-) • Current, relative to input range, (+/-)	0.25 %; 0.5% at 1 to 5 V; 0.25% at ±1 V, ±10 V 0.25 %; at ±20 mA, 4 to 20 mA		
Interrupts/diagnostics/status information			
Diagnostics function	No		
Potential separation			
Potential separation analog inputs			
• Potential separation analog inputs • between the channels • between the channels and backplane bus • Between the channels and load voltage L+	No No No No		
Isolation			
Isolation tested with	500 V AC/707 V DC, type test		
Dimensions			
Width	25 mm		
Height	290 mm		
Depth	210 mm		
Weights			
Weight, approx.	500 g		
Classifications			
		Version	Classification
	eClass	14	27-24-22-01
	eClass	12	27-24-22-01
	eClass	9.1	27-24-22-01
	eClass	9	27-24-22-01
	eClass	8	27-24-22-01
	eClass	7.1	27-24-22-01
	eClass	6	27-24-22-01
	ETIM	9	EC001420
	ETIM	8	EC001420
	ETIM	7	EC001420
	IDEA	4	3562
	UNSPSC	15	32-15-17-05
Approvals / Certificates			
General Product Approval			



[Miscellaneous](#)

[China RoHS](#)



[KC](#)

General Product Approval	EMV	For use in hazardous locations
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[Metrological Approval](#)



For use in hazardous locations	Maritime application
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[EM](#)



[Type Examination Certificate](#)



Maritime application



[NK / Nippon Kaiji Kyokai](#)



Maritime application



[CCS \(China Classification Society\)](#)

last modified:

6/7/2025



Figure similar

SIMATIC S7-400, analog input SM 431, isolated 8 AI, resolution 13 bit, U/I/Resistor

Supply voltage	
Load voltage L+	
• Rated value (DC)	not necessary
Input current	
from backplane bus 5 V DC, max.	350 mA
Power loss	
Power loss, typ.	1.8 W
Analog inputs	
Number of analog inputs	8
• For voltage/current measurement	8
• For resistance measurement	4
permissible input voltage for voltage input (destruction limit), max.	50 V
permissible input current for current input (destruction limit), max.	50 mA; 40 mA continuous
Constant measurement current for resistance-type transmitter, typ.	1.67 mA
Input ranges	
• Voltage	Yes
• Current	Yes
• Thermocouple	No
• Resistance thermometer	No
• Resistance	Yes
Input ranges (rated values), voltages	
• 1 V to 5 V	Yes
— Input resistance (1 V to 5 V)	200 k Ω
• -1 V to +1 V	Yes
— Input resistance (-1 V to +1 V)	200 k Ω
• -10 V to +10 V	Yes
— Input resistance (-10 V to +10 V)	200 k Ω
Input ranges (rated values), currents	
• -20 mA to +20 mA	Yes
— Input resistance (-20 mA to +20 mA)	80 Ω
• 4 mA to 20 mA	Yes
— Input resistance (4 mA to 20 mA)	80 Ω
Input ranges (rated values), resistors	
• 0 to 600 ohms	Yes
— Input resistance (0 to 600 ohms)	usable up to 500 ohms
Cable length	
• shielded, max.	200 m

Analog value generation for the inputs	
Integration and conversion time/resolution per channel	
• Resolution with overrange (bit including sign), max.	13 bit
• Integration time, parameterizable	Yes
• Basic conversion time (ms)	23 / 25 ms
• Integration time (ms)	16,7 / 20 ms
• Interference voltage suppression for interference frequency f1 in Hz	50 / 60 Hz
• Basic execution time of the module (all channels released)	200 ms; 184 / 200 ms
Encoder	
Connection of signal encoders	
• for voltage measurement	Yes; possible
• for current measurement as 2-wire transducer	Yes; with external transmitter supply
• for current measurement as 4-wire transducer	Yes
• for resistance measurement with two-wire connection	Yes; Line resistances are also measured
• for resistance measurement with three-wire connection	Yes; Line resistances are also measured
• for resistance measurement with four-wire connection	Yes
Errors/accuracies	
Temperature error (relative to input range), (+/-)	0.02 %/K; ± 0.02 %/K in impedance measuring range; ± 0.007 % in all other measuring ranges
Operational error limit in overall temperature range	
• Voltage, relative to input range, (+/-)	1 %; ± 1.0 % at ± 1 V; ± 0.6 % at ± 10 V; ± 0.7 % at 1 to 5 V
• Current, relative to input range, (+/-)	1 %; at ± 20 mA, 4 to 20 mA
• Resistance, relative to input range, (+/-)	1.25 %; 0 to 500 ohms (4-conductor measurement, in range of 600 ohms)
Basic error limit (operational limit at 25 °C)	
• Voltage, relative to input range, (+/-)	0.7 %; 0.7% at ± 1 V; 0.4% at ± 10 V; 0.5% at 1 to 5 V
• Current, relative to input range, (+/-)	0.7 %; at ± 20 mA, 4 to 20 mA
• Resistance, relative to input range, (+/-)	0.8 %; 0 to 500 ohms (4-conductor measurement, in range of 600 ohms)
Interrupts/diagnostics/status information	
Diagnostics function	No
Potential separation	
Potential separation analog inputs	
• Potential separation analog inputs	Yes; internal/external
• between the channels	No
• between the channels and backplane bus	Yes
Isolation	
Isolation tested with	2 120 V DC between bus and analog part; 500 V DC between bus and local ground; 2 120 V DC between analog part and local ground
Dimensions	
Width	25 mm
Height	290 mm
Depth	210 mm
Weights	
Weight, approx.	500 g
Classifications	

	Version	Classification
eClass	14	27-24-22-01
eClass	12	27-24-22-01
eClass	9.1	27-24-22-01
eClass	9	27-24-22-01
eClass	8	27-24-22-01
eClass	7.1	27-24-22-01
eClass	6	27-24-22-01
ETIM	10	EC001420
ETIM	9	EC001420
ETIM	8	EC001420
ETIM	7	EC001420
IDEA	4	3562

Approvals / Certificates

General Product Approval

[Miscellaneous](#)[China RoHS](#)[Metrological Approval](#)

General Product Approval

EMV

For use in hazardous locations

[KC](#)[EM](#)

For use in hazardous locations

Maritime application

[Type Examination Certificate](#)

Maritime application

[NK / Nippon Kaiji Kyokai](#)

Maritime application

[CCS \(China Classification Society\)](#)

last modified:

6/7/2025



SIMATIC S7-400, analog input SM 431, isolated 8 AI, resolution 14 bit, U/I/Resistor/Thermocouple/Pt100

Figure similar

Supply voltage	
Load voltage L+	
• Rated value (DC)	24 V; Only required for supplying 2-wire transmitters
• Reverse polarity protection	Yes
Input current	
from load voltage L+ (without load), max.	200 mA; for 8 connected, fully controlled 2-wire transmitters
from backplane bus 5 V DC, max.	600 mA
Power loss	
Power loss, typ.	3.5 W
Analog inputs	
Number of analog inputs	8
• For voltage/current measurement	8
• For resistance measurement	4
permissible input voltage for voltage input (destruction limit), max.	18 V; 18 V continuous, 75 V for 1 ms (mark to space ratio 1:20)
permissible input current for current input (destruction limit), max.	40 mA; Permanent
Constant measurement current for resistance-type transmitter, typ.	1.67 mA
Input ranges	
• Voltage	Yes
• Current	Yes
• Thermocouple	Yes
• Resistance thermometer	Yes
• Resistance	Yes
Input ranges (rated values), voltages	
• 1 V to 5 V	Yes
— Input resistance (1 V to 5 V)	1 MΩ
• -1 V to +1 V	Yes
— Input resistance (-1 V to +1 V)	1 MΩ
• -10 V to +10 V	Yes
— Input resistance (-10 V to +10 V)	1 MΩ
• -2.5 V to +2.5 V	Yes
— Input resistance (-2.5 V to +2.5 V)	1 MΩ
• -250 mV to +250 mV	Yes
— Input resistance (-250 mV to +250 mV)	1 MΩ
• -5 V to +5 V	Yes
— Input resistance (-5 V to +5 V)	1 MΩ
• -500 mV to +500 mV	Yes
— Input resistance (-500 mV to +500 mV)	1 MΩ

• -80 mV to +80 mV	Yes
— Input resistance (-80 mV to +80 mV)	1 MΩ
Input ranges (rated values), currents	
• 0 to 20 mA	Yes
— Input resistance (0 to 20 mA)	50 Ω
• 4 mA to 20 mA	Yes
— Input resistance (4 mA to 20 mA)	50 Ω
Input ranges (rated values), thermocouples	
• Type B	Yes
— Input resistance (Type B)	1 MΩ
• Type E	Yes
— Input resistance (Type E)	1 MΩ
• Type J	Yes
— Input resistance (type J)	1 MΩ
• Type K	Yes
— Input resistance (Type K)	1 MΩ
• Type L	Yes
— Input resistance (Type L)	1 MΩ
• Type N	Yes
— Input resistance (Type N)	1 MΩ
• Type R	Yes
— Input resistance (Type R)	1 MΩ
• Type S	Yes
— Input resistance (Type S)	1 MΩ
• Type T	Yes
— Input resistance (Type T)	1 MΩ
• Type U	Yes
— Input resistance (Type U)	1 MΩ
Input ranges (rated values), resistance thermometer	
• Ni 100	Yes
— Input resistance (Ni 100)	1 MΩ
• Ni 1000	Yes
— Input resistance (Ni 1000)	1 MΩ
• Pt 100	Yes
— Input resistance (Pt 100)	1 MΩ
• Pt 1000	Yes
• Pt 10000	Yes
• Pt 200	Yes
— Input resistance (Pt 200)	1 MΩ
• Pt 500	Yes
— Input resistance (Pt 500)	1 MΩ
Input ranges (rated values), resistors	
• 0 to 48 ohms	Yes
— Input resistance (0 to 48 ohms)	1 MΩ
• 0 to 150 ohms	Yes
— Input resistance (0 to 150 ohms)	1 MΩ
• 0 to 300 ohms	Yes
— Input resistance (0 to 300 ohms)	1 MΩ
• 0 to 600 ohms	Yes
— Input resistance (0 to 600 ohms)	1 MΩ
• 0 to 6000 ohms	Yes; Usable up to 5000 Ohm
— Input resistance (0 to 6000 ohms)	1 MΩ
Thermocouple (TC)	
Temperature compensation	
— parameterizable	Yes
— internal temperature compensation	No
— external temperature compensation with Pt100	Yes
— external temperature compensation with compensations socket	Yes
— dynamic reference temperature value	Yes
Characteristic linearization	

• parameterizable — for thermocouples — for resistance thermometer	Yes Type B, E, J, K, L, N, R, S, T, U Pt100, Pt200, Pt500, Pt1000, Ni100, Ni1000
Cable length	
• shielded, max.	200 m; 50 m with thermocouples and input ranges ≤ 80 mV
Analog value generation for the inputs	
Integration and conversion time/resolution per channel	
• Resolution with overrange (bit including sign), max. • Integration time, parameterizable • Basic conversion time (ms) • Integration time (ms) • Interference voltage suppression for interference frequency f1 in Hz • Basic execution time of the module (all channels released)	14 bit; with activated filtering: 16 bit Yes 20.1 / 23.5 ms 16,7 / 20 ms 50 / 60 Hz 161 ms; 161 / 188 ms
Encoder	
Connection of signal encoders	
• for voltage measurement • for current measurement as 2-wire transducer • for current measurement as 4-wire transducer • for resistance measurement with two-wire connection • for resistance measurement with three-wire connection • for resistance measurement with four-wire connection	Yes; possible Yes Yes Yes; Line resistances are also measured Yes Yes
Errors/accuracies	
Temperature error (relative to input range), (+/-)	0.004 %/K
Operational error limit in overall temperature range	
• Voltage, relative to input range, (+/-) • Current, relative to input range, (+/-) • Resistance, relative to input range, (+/-) • Resistance thermometer, relative to input range, (+/-) • Thermocouple, relative to input range, (+/-)	0.38 %; ± 0.38 % at ± 80 mV; ± 0.35 % at ± 250 mV, ± 500 mV, ± 1 V, ± 2.5 V, ± 5 V, ± 10 V 0.35 %; ± 20 mA, 0 to 20 mA, 4 to 20 mA 0.5 % 0.5 % TC Type B (± 14.8 K), TC Type R (± 9.4 K), TC Type S (± 10.6 K), TC Type T (± 2.2 K), TC Type E (± 4.0 K), TC Type J (± 5.2 K), TC Type K (± 7.6 K), TC Type U (± 3.5 K), TC Type L (± 5.1 K), TC Type N (± 5.5 K)
Basic error limit (operational limit at 25 °C)	
• Voltage, relative to input range, (+/-) • Current, relative to input range, (+/-) • Resistance, relative to input range, (+/-) • Resistance thermometer, relative to input range, (+/-) • Thermocouple, relative to input range, (+/-)	0.15 %; ± 0.15 % (± 250 mV, ± 500 mV, ± 1 V, ± 2.5 V, ± 5 V, ± 10 V); ± 0.17 % (± 80 mV) 0.15 %; ± 20 mA, 0 to 20 mA, 4 to 20 mA 0.15 %; ± 0.15 % at 0 to 48 ohms (4-conductor measurement), 0 to 150 ohms (4-conductor measurement), 0 to 300 ohms (4-conductor measurement), 0 to 600 ohms (4-conductor measurement), 0 to 5000 ohms (4-conductor measurement, in range of 6000 ohms); ± 0.3 % at 0 to 300 ohms (3-conductor measurement), 0 to 600 ohms (3-conductor measurement), 0 to 5000 ohms (3-conductor measurement, in range of 6000 ohms) 0.3 % TC Type B (± 8.2 K), TC Type R (± 5.2 K), TC Type S (± 5.9 K), TC Type T (± 1.2 K), TC Type E (± 1.8 K), TC Type J (± 2.3 K), TC Type K (± 3.4 K), TC Type U (± 1.8 K), TC Type L (± 2.3 K), TC Type N (± 2.9 K)
Interrupts/diagnostics/status information	
Diagnostics function	No
Potential separation	
Potential separation analog inputs	
• Potential separation analog inputs • between the channels • between the channels and backplane bus • Between the channels and load voltage L+	Yes; internal/external No Yes Yes
Isolation	
Isolation tested with	2 120 V DC between bus and L+/M; 2 120 V DC between bus and analog section; 500 V DC between bus and local ground; 500 V DC between analog section and L+/M; 2 120 V DC between analog section and local ground; 2 120 V DC between L+/M and local ground
Dimensions	
Width	25 mm
Height	290 mm
Depth	210 mm

Weights			
Weight, approx.		500 g	
Classifications			
		Version	Classification
	eClass	14	27-24-22-01
	eClass	12	27-24-22-01
	eClass	9.1	27-24-22-01
	eClass	9	27-24-22-01
	eClass	8	27-24-22-01
	eClass	7.1	27-24-22-01
	eClass	6	27-24-22-01
	ETIM	10	EC001420
	ETIM	9	EC001420
	ETIM	8	EC001420
	ETIM	7	EC001420
	IDEA	4	3562
	UNSPSC	15	32-15-17-05

Approvals / Certificates			
General Product Approval			

[Miscellaneous](#)


[China RoHS](#)

[KC](#)

General Product Approval	EMV			For use in hazardous locations
Metrological Approval				 FM
	RCM	RCM	RCM	ATEX

For use in hazardous locations				Maritime application	
		Type Examination Certificate			
CCC	IECEX		ATEX	ABS	BUREAU VERITAS

Maritime application					
		NK / Nippon Kaiji Kyokai			
DNV	LRS		PRS	RINA	RMRS

Maritime application					
CCS (China Classification Society)					



Figure similar

SIMATIC S7-400, analog input SM 431, isolated 8 AI, resolution 14 bit, U/I/Resistor
8 AI, cycle time 0.416 ms

Supply voltage	
Load voltage L+	
• Rated value (DC)	24 V; Only required for supplying 2-wire transmitters
• Reverse polarity protection	Yes
Input current	
from load voltage L+ (without load), max.	200 mA; for 8 connected, fully controlled 2-wire transmitters
from backplane bus 5 V DC, max.	1 000 mA
Power loss	
Power loss, typ.	4.9 W
Analog inputs	
Number of analog inputs	8
• For voltage/current measurement	8
• For resistance measurement	4
permissible input voltage for voltage input (destruction limit), max.	18 V; 18 V continuous, 75 V for 1 ms (mark to space ratio 1:20)
permissible input current for current input (destruction limit), max.	40 mA; Permanent
Constant measurement current for resistance-type transmitter, typ.	1.67 mA
Input ranges	
• Voltage	Yes
• Current	Yes
• Thermocouple	No
• Resistance thermometer	No
• Resistance	Yes
Input ranges (rated values), voltages	
• 1 V to 5 V	Yes
— Input resistance (1 V to 5 V)	10 MΩ
• -1 V to +1 V	Yes
— Input resistance (-1 V to +1 V)	10 MΩ
• -10 V to +10 V	Yes
— Input resistance (-10 V to +10 V)	100 kΩ
Input ranges (rated values), currents	
• -20 mA to +20 mA	Yes
— Input resistance (-20 mA to +20 mA)	50 Ω
• 4 mA to 20 mA	Yes
— Input resistance (4 mA to 20 mA)	50 kΩ
Input ranges (rated values), resistors	
• 0 to 600 ohms	Yes
Cable length	

• shielded, max.	200 m		
Analog value generation for the inputs			
Integration and conversion time/resolution per channel			
• Resolution with overrange (bit including sign), max.	14 bit; 14 / 14 / 14		
• Integration time, parameterizable	Yes		
• Basic conversion time (ms)	52 μs		
• Interference voltage suppression for interference frequency f1 in Hz	none / 400 / 60 / 50 Hz		
• Time constant of the input filter	15 μs		
• Basic execution time of the module (all channels released)	0.42 ms		
Encoder			
Connection of signal encoders			
• for voltage measurement	Yes; possible		
• for current measurement as 2-wire transducer	Yes		
• for current measurement as 4-wire transducer	Yes		
• for resistance measurement with two-wire connection	Yes; Line resistances are also measured		
• for resistance measurement with three-wire connection	Yes; Line resistances are also measured		
• for resistance measurement with four-wire connection	Yes		
Errors/accuracies			
Temperature error (relative to input range), (+/-)	0.03 %/K		
Operational error limit in overall temperature range			
• Voltage, relative to input range, (+/-)	0.7 %; ±0.7 % at ±1 V; ±0.9 % at ±10 V, 1 to 5 V		
• Current, relative to input range, (+/-)	0.8 %; at ±20 mA, 4 to 20 mA		
• Resistance, relative to input range, (+/-)	1 %		
Basic error limit (operational limit at 25 °C)			
• Voltage, relative to input range, (+/-)	0.6 %; 0.6 % at ±1 V; 0.75 % at ±10 V, 1 to 5 V		
• Current, relative to input range, (+/-)	0.7 %; at ±20 mA, 4 to 20 mA		
• Resistance, relative to input range, (+/-)	0.7 %; 0 to 600 ohms		
Interrupts/diagnostics/status information			
Diagnostics function	No		
Potential separation			
Potential separation analog inputs			
• Potential separation analog inputs	Yes; internal/external		
• between the channels	No		
• between the channels and backplane bus	Yes		
• Between the channels and load voltage L+	Yes		
Isolation			
Isolation tested with	2 120 V DC between bus and analog section; 500 V DC between bus and local ground; 500 V DC between analog part and L+/M; 2 120 V DC between analog part and local ground; 2 120 V DC between L+/M and local ground		
Dimensions			
Width	25 mm		
Height	290 mm		
Depth	210 mm		
Weights			
Weight, approx.	500 g		
Classifications			
		Version	Classification
	eClass	14	27-24-22-01
	eClass	12	27-24-22-01
	eClass	9.1	27-24-22-01
	eClass	9	27-24-22-01
	eClass	8	27-24-22-01
	eClass	7.1	27-24-22-01
	eClass	6	27-24-22-01
	ETIM	9	EC001420
	ETIM	8	EC001420
	ETIM	7	EC001420

IDEA	4	3562
UNSPSC	15	32-15-17-05

Approvals / Certificates

General Product Approval



EG-Konf.

[Miscellaneous](#)



UL

[Metrological Approval](#)

[KC](#)

General Product Approval	EMV	For use in hazardous locations
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RCM



RCM



RCM



IECEX



ATEX

[EM](#)

For use in hazardous locations	Maritime application
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CCC



IECEX

[Type Examination Certificate](#)



ATEX



ABS



BUREAU
VERITAS

Maritime application



DNV



LRS

[NK / Nippon Kaiji Kyokai](#)



PRS



RINA



RMRS

Maritime application

[CCS \(China Classification Society\)](#)

last modified:

6/7/2025



SIMATIC S7-400, analog input SM 431, 8 AI, resolution 16 bit, U/I/Thermocouple, isolated with single routing, diagnostics, alarm, 20 ms conversion time

Figure similar

Input current	
from backplane bus 5 V DC, max.	1 200 mA
Power loss	
Power loss, typ.	4.6 W
Analog inputs	
Number of analog inputs	8
• For voltage/current measurement	8
permissible input voltage for voltage input (destruction limit), max.	35 V; 35 V continuous, 75 V for max. 1 s (mark to space ratio 1:20)
permissible input current for current input (destruction limit), max.	32 mA
Input ranges	
• Voltage	Yes
• Current	Yes
• Thermocouple	Yes
• Resistance thermometer	No
• Resistance	No
Input ranges (rated values), voltages	
• 1 V to 5 V	Yes
— Input resistance (1 V to 5 V)	> 2 000 ohms
• -1 V to +1 V	Yes
• -10 V to +10 V	Yes
• -100 mV to +100 mV	Yes
• -2.5 V to +2.5 V	Yes
• -20 mV to +20 mV	Yes
• -250 mV to +250 mV	Yes
• -5 V to +5 V	Yes
• -50 mV to +50 mV	Yes
• -500 mV to +500 mV	Yes
• -80 mV to +80 mV	Yes
Input ranges (rated values), currents	
• 0 to 20 mA	Yes
• -10 mA to +10 mA	Yes
• -20 mA to +20 mA	Yes
• -3.2 mA to +3.2 mA	Yes
• 4 mA to 20 mA	Yes
— Input resistance (4 mA to 20 mA)	50 Ω
• -5 mA to +5 mA	Yes
Input ranges (rated values), thermocouples	
• Type B	Yes

— Input resistance (Type B)	> 2 000 ohms
• Type E	Yes
• Type J	Yes
• Type K	Yes
• Type L	Yes
• Type N	Yes
— Input resistance (Type N)	> 2 000 ohms
• Type R	Yes
• Type S	Yes
• Type T	Yes
• Type U	Yes
Thermocouple (TC)	
Temperature compensation	
— connection for compensating the cold junction	6ES7431-7KF00-6AA0
— parameterizable	Yes
— internal temperature compensation	Yes
— external temperature compensation with compensations socket	Yes
— dynamic reference temperature value	Yes
Characteristic linearization	
• parameterizable	Yes
— for thermocouples	Type B, E, J, K, L, N, R, S, T, U
Cable length	
• shielded, max.	200 m
Analog value generation for the inputs	
Integration and conversion time/resolution per channel	
• Resolution with overrange (bit including sign), max.	16 bit
• Integration time, parameterizable	Yes
• Basic conversion time (ms)	10 / 16,7 / 20 / 100
• Integration time (ms)	2,5 / 16,7 / 20 / 100
• Interference voltage suppression for interference frequency f1 in Hz	400 / 60 / 50 / 10 Hz
Encoder	
Connection of signal encoders	
• for voltage measurement	Yes; possible
• for current measurement as 4-wire transducer	Yes
• for resistance measurement with four-wire connection	Yes
Errors/accuracies	
Operational error limit in overall temperature range	
• Voltage, relative to input range, (+/-)	0.3 %
• Current, relative to input range, (+/-)	0.5 %
Basic error limit (operational limit at 25 °C)	
• Voltage, relative to input range, (+/-)	0.1 %
• Current, relative to input range, (+/-)	0.17 %
Interrupts/diagnostics/status information	
Diagnostics function	Yes; Parameterizable
Alarms	
• Diagnostic alarm	Yes; Parameterizable
• Limit value alarm	Yes
• Hardware interrupt	Yes; Parameterizable
Diagnoses	
• Diagnostic information readable	Yes; possible
Potential separation	
Potential separation analog inputs	
• Potential separation analog inputs	Yes; internal/external
• between the channels	Yes
• between the channels and backplane bus	Yes
Isolation	
Isolation tested with	1 500 V DC
Dimensions	
Width	25 mm

Height	290 mm				
Depth	210 mm				
Weights					
Weight, approx.	650 g				
Classifications					
		Version	Classification		
	eClass	14	27-24-22-01		
	eClass	12	27-24-22-01		
	eClass	9.1	27-24-22-01		
	eClass	9	27-24-22-01		
	eClass	8	27-24-22-01		
	eClass	7.1	27-24-22-01		
	eClass	6	27-24-22-01		
	ETIM	9	EC001420		
	ETIM	8	EC001420		
	ETIM	7	EC001420		
	IDEA	4	3562		
	UNSPSC	15	32-15-17-05		
Approvals / Certificates					
General Product Approval					
	Manufacturer Declaration	Miscellaneous			Metrological Approval
General Product Approval		EMV	For use in hazardous locations		
KC					FM
For use in hazardous locations				Maritime application	
			Type Examination Certificate		
Maritime application					
			NK / Nippon Kaiji Kyokai		
Maritime application					
	CCS (China Classification Society)				



SIMATIC S7-400, analog input SM 431, 8 AI, resolution 16 bit, resistor/PT100/Ni100 isolated, diagnostics alarm, 20 ms conversion time

Figure similar

Input current	
from backplane bus 5 V DC, max.	650 mA
Power loss	
Power loss, typ.	3.3 W
Analog inputs	
Number of analog inputs	8
• For resistance measurement	8
permissible input voltage for voltage input (destruction limit), max.	35 V; 35 V continuous, 75 V for max. 1 s (mark to space ratio 1:20)
Constant measurement current for resistance-type transmitter, typ.	1 mA
Input ranges	
• Voltage	No
• Current	No
• Thermocouple	No
• Resistance thermometer	Yes
• Resistance	Yes
Input ranges (rated values), resistance thermometer	
• Ni 100	Yes
— Input resistance (Ni 100)	> 10 000 ohms
• Ni 1000	Yes; Different characteristics selectable: Europe/U.S.
— Input resistance (Ni 1000)	> 10 000 ohms
• Pt 100	Yes
— Input resistance (Pt 100)	> 10 000 ohms
• Pt 1000	Yes
— Input resistance (Pt 1000)	> 10 000 ohms
• Pt 200	Yes
— Input resistance (Pt 200)	> 10 000 ohms
• Pt 500	Yes
— Input resistance (Pt 500)	> 10 000 ohms
Characteristic linearization	
• parameterizable	Yes
— for resistance thermometer	Pt100, Pt200, Pt500, Pt1000, Ni100, Ni1000; different characteristics selectable (Europe/U.S.)
Cable length	
• shielded, max.	200 m; 50 m with thermocouples and input ranges ± 80 mV
Analog value generation for the inputs	
Integration and conversion time/resolution per channel	
• Resolution with overrange (bit including sign), max.	16 bit
• Integration time, parameterizable	Yes

• Basic conversion time (ms)	8 / 23 / 25 ms
• Integration time (ms)	20 ms at 50 Hz (entire module incl. wire break)
• Interference voltage suppression for interference frequency f1 in Hz	none/ 60 / 50 Hz
• Basic execution time of the module (all channels released)	8 ms; 8 / 23 / 25 ms

Encoder

Connection of signal encoders

• for resistance measurement with three-wire connection	Yes
• for resistance measurement with four-wire connection	Yes

Errors/accuracies

Operational error limit in overall temperature range

• Resistance thermometer, relative to input range, (+/-)	±1 °C
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Basic error limit (operational limit at 25 °C)

• Resistance thermometer, relative to input range, (+/-)	±0,2 °C
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Interrupts/diagnostics/status information

Diagnostics function	Yes; Parameterizable
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Alarms

• Diagnostic alarm	Yes; Parameterizable
• Limit value alarm	Yes
• Hardware interrupt	Yes; Parameterizable

Diagnoses

• Diagnostic information readable	Yes; possible
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Potential separation

Potential separation analog inputs

• Potential separation analog inputs	Yes; internal/external
• between the channels	No
• between the channels and backplane bus	Yes

Isolation

Isolation tested with	500 V DC
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Dimensions

Width	25 mm
Height	290 mm
Depth	210 mm

Weights

Weight, approx.	650 g
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Classifications

	Version	Classification
eClass	14	27-24-22-01
eClass	12	27-24-22-01
eClass	9.1	27-24-22-01
eClass	9	27-24-22-01
eClass	8	27-24-22-01
eClass	7.1	27-24-22-01
eClass	6	27-24-22-01
ETIM	10	EC001420
ETIM	9	EC001420
ETIM	8	EC001420
ETIM	7	EC001420
IDEA	4	3562
UNSPSC	15	32-15-17-05

Approvals / Certificates

General Product Approval



[Manufacturer Declaration](#)

[Miscellaneous](#)



[China RoHS](#)



General Product Approval	EMV	For use in hazardous locations
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[Metrological Approval](#)

[KC](#)



For use in hazardous locations

[FM](#)



[Type Examination Certificate](#)



Maritime application



[NK / Nippon Kaiji Kyokai](#)



Maritime application



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last modified: 6/7/2025



Figure similar

SIMATIC S7-400, analog input SM 431, isolated 16 AI; resolution 16 bit, U/I/Resistor/Thermocouple/Pt100 , alarm, diagnostics

Supply voltage	
Load voltage L+	
• Rated value (DC)	24 V; Only required for supplying 2-wire transmitters
• Reverse polarity protection	Yes
Input current	
from load voltage L+ (without load), max.	400 mA; for 16 connected, fully controlled 2-wire transmitters
from backplane bus 5 V DC, max.	700 mA
Power loss	
Power loss, typ.	4.5 W
Analog inputs	
Number of analog inputs	16
• For voltage/current measurement	16
• For resistance measurement	8
permissible input voltage for voltage input (destruction limit), max.	18 V; 18 V continuous, 75 V for 1 ms (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
Input ranges	
• Voltage	Yes
• Current	Yes
• Thermocouple	Yes
• Resistance thermometer	Yes
• Resistance	Yes
Input ranges (rated values), voltages	
• 1 V to 5 V	Yes
— Input resistance (1 V to 5 V)	1 MΩ
• -1 V to +1 V	Yes
— Input resistance (-1 V to +1 V)	1 MΩ
• -10 V to +10 V	Yes
— Input resistance (-10 V to +10 V)	1 MΩ
• -2.5 V to +2.5 V	Yes
— Input resistance (-2.5 V to +2.5 V)	1 MΩ
• -25 mV to +25 mV	Yes
— Input resistance (-25 mV to +25 mV)	1 MΩ
• -250 mV to +250 mV	Yes
— Input resistance (-250 mV to +250 mV)	1 MΩ
• -5 V to +5 V	Yes
— Input resistance (-5 V to +5 V)	1 MΩ

• -50 mV to +50 mV — Input resistance (-50 mV to +50 mV) • -500 mV to +500 mV — Input resistance (-500 mV to +500 mV) • -80 mV to +80 mV — Input resistance (-80 mV to +80 mV)	Yes 1 MΩ Yes 1 MΩ Yes 1 MΩ
Input ranges (rated values), currents	
• 0 to 20 mA — Input resistance (0 to 20 mA) • -10 mA to +10 mA — Input resistance (-10 mA to +10 mA) • -20 mA to +20 mA — Input resistance (-20 mA to +20 mA) • 4 mA to 20 mA — Input resistance (4 mA to 20 mA) • -5 mA to +5 mA — Input resistance (-5 mA to +5 mA)	Yes 50 Ω Yes 50 Ω Yes 50 Ω Yes 50 Ω Yes 50 Ω
Input ranges (rated values), thermocouples	
• Type B — Input resistance (Type B) • Type E — Input resistance (Type E) • Type J — Input resistance (type J) • Type K — Input resistance (Type K) • Type L — Input resistance (Type L) • Type N — Input resistance (Type N) • Type R — Input resistance (Type R) • Type S — Input resistance (Type S) • Type T — Input resistance (Type T) • Type U — Input resistance (Type U)	Yes 1 MΩ Yes 1 MΩ Yes 1 MΩ Yes 1 MΩ Yes 1 MΩ Yes 1 MΩ Yes 1 MΩ Yes 1 MΩ Yes 1 MΩ
Input ranges (rated values), resistance thermometer	
• Ni 100 — Input resistance (Ni 100) • Ni 1000 — Input resistance (Ni 1000) • Pt 100 — Input resistance (Pt 100) • Pt 1000 — Input resistance (Pt 1000) • Pt 200 — Input resistance (Pt 200) • Pt 500 — Input resistance (Pt 500)	Yes 1 MΩ Yes 1 MΩ Yes 1 MΩ Yes 1 MΩ Yes 1 MΩ
Input ranges (rated values), resistors	
• 0 to 48 ohms — Input resistance (0 to 48 ohms) • 0 to 150 ohms — Input resistance (0 to 150 ohms) • 0 to 300 ohms — Input resistance (0 to 300 ohms) • 0 to 600 ohms — Input resistance (0 to 600 ohms) • 0 to 6000 ohms	Yes 1 MΩ Yes 1 MΩ Yes 1 MΩ Yes 1 MΩ Yes; Usable up to 5000 Ohm

— Input resistance (0 to 6000 ohms)	1 MΩ
Thermocouple (TC)	
Temperature compensation	
— parameterizable	Yes
— external temperature compensation with Pt100	Yes
— external temperature compensation with compensations socket	Yes
— dynamic reference temperature value	Yes
Characteristic linearization	
• parameterizable	Yes
— for thermocouples	Type B, E, J, K, L, N, R, S, T, U
— for resistance thermometer	Pt100, Pt200, Pt500, Pt1000, Ni100, Ni1000
Cable length	
• shielded, max.	200 m; 50 m with thermocouples and input ranges ≤ 80 mV
Analog value generation for the inputs	
Integration and conversion time/resolution per channel	
• Resolution with overrange (bit including sign), max.	16 bit; 16 / 16 / 16
• Integration time, parameterizable	Yes
• Basic conversion time (ms)	6 / 20,1 / 23,5 ms
• Integration time (ms)	2,5 / 16,7 / 20 ms
• Interference voltage suppression for interference frequency f1 in Hz	400 / 60 / 50 Hz
Encoder	
Connection of signal encoders	
• for voltage measurement	Yes; possible
• for current measurement as 2-wire transducer	Yes
• for current measurement as 4-wire transducer	Yes
• for resistance measurement with two-wire connection	Yes; Line resistances are also measured
• for resistance measurement with three-wire connection	Yes
• for resistance measurement with four-wire connection	Yes
Errors/accuracies	
Temperature error (relative to input range), (+/-)	0.004 %/K
Operational error limit in overall temperature range	
• Voltage, relative to input range, (+/-)	0.3 %; ±0.3 % at ±250 mV, ±500 mV, ±1 V, ±2.5 V, ±5 V, 1 to 5 V, ±10 V; ±0.31 % at ±80 mV; ±0.32 % at ±50 mV; ±0.35 % at ±25 mV
• Current, relative to input range, (+/-)	0.3 %; at 0 to 20 mA, ±5 mA, ±10 mA, ±20 mA, 4 to 20 mA
• Resistance, relative to input range, (+/-)	0.3 %; ±0.3 % at 0 to 48 Ohm (4-conductor measurement), 0 to 150 Ohm (4-conductor measurement), 0 to 300 Ohm (4-conductor measurement), 0 to 600 Ohm (4-conductor measurement), 0 to 5000 Ohm (4-conductor measurement, in range of 6000 Ohm); ±0.4 % at 0 to 300 Ohm (3-conductor measurement), 0 to 600 Ohm (3-conductor measurement), 0 to 5000 Ohm (3-conductor measurement, in range of 6000 Ohm);
• Resistance thermometer, relative to input range, (+/-)	0.4 %
• Thermocouple, relative to input range, (+/-)	TC Type B (±11.5 K), TC Type R (±7.3 K), TC Type S (±8.3 K), TC Type T (±1.7 K), TC Type E (±3.2 K), TC Type J (±4.3 K), TC Type K (±6.2 K), TC Type U (±2.8 K), TC Type L (±4.2 K), TC Type N (±4.4 K)
Basic error limit (operational limit at 25 °C)	
• Voltage, relative to input range, (+/-)	0.15 %; ±0.15 % at ±250 mV, ±500 mV, ±1 V, ±2.5 V, ±5 V, 1 V to 5 V, ±10 V; ±0.17 % at ±80 mV; ±0.19 % at ±50 mV; ±0.23 % at ±25 mV
• Current, relative to input range, (+/-)	0.15 %; at 0 to 20 mA, ±5 mA, ±10 mA, ±20 mA, 4 to 20 mA
• Resistance, relative to input range, (+/-)	0.15 %; ±0.15 % at 0 to 48 ohms (4-conductor measurement), 0 to 150 ohms (4-conductor measurement), 0 to 300 ohms (4-conductor measurement), 0 to 5000 ohms (4-conductor measurement, in range of 6000 ohms); ±0.3 % at 0 to 300 ohms (3-conductor measurement), 0 to 600 ohms (3-conductor measurement), 0 to 5000 ohms (3-conductor measurement, in range of 6000 ohms)
• Resistance thermometer, relative to input range, (+/-)	0.3 %
• Thermocouple, relative to input range, (+/-)	TC Type B (±7.6 K), TC Type R (±4.8 K), TC Type S (±5.4 K), TC Type T (±1.1 K), TC Type E (±1.8 K), TC Type J (±2.3 K), TC Type K (±3.4 K), TC Type U (±1.7 K), TC Type L (±2.3 K), TC Type N (±2.6 K)
Interrupts/diagnostics/status information	
Diagnostics function	Yes; Parameterizable
Alarms	
• Diagnostic alarm	Yes; Parameterizable
• Limit value alarm	Yes; Parameterizable
• Hardware interrupt	Yes; Parameterizable

Diagnoses	
• Diagnostic information readable	Yes
Diagnostics indication LED	
• internal fault INTF (red)	Yes
• external fault EXTf (red)	Yes
Potential separation	
Potential separation analog inputs	
• Potential separation analog inputs	Yes; internal/external
• between the channels	No
• between the channels and backplane bus	Yes
• Between the channels and load voltage L+	Yes
Isolation	
Isolation tested with	2 120 V DC between bus and L+/M; 2 120 V DC between bus and analog section; 500 V DC between bus and local ground; 500 V DC between analog section and L+/M; 2 120 V DC between analog section and local ground; 2 120 V DC between L+/M and local ground
Dimensions	
Width	25 mm
Height	290 mm
Depth	210 mm
Weights	
Weight, approx.	500 g
Classifications	

	Version	Classification
eClass	14	27-24-22-01
eClass	12	27-24-22-01
eClass	9.1	27-24-22-01
eClass	9	27-24-22-01
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Approvals / Certificates
General Product Approval



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Metrological Approval				

For use in hazardous locations	Maritime application			
FM			Type Examination Certificate	

Maritime application



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