



SIMATIC ET 200SP HA, analog input module, safety-oriented, F-AI 8x1 2-wire/4-wire HART HA, 16-bit, 2-wire/4-wire, SIL3 (IEC 61508), up to PL e (ISO 13849-1), suitable for terminal block H1, F1, color code CC00, channel diagnostics

General information	
Product type designation	F-AI 8x1 2-/4-wire HART HA
Firmware version	V1.0
<ul style="list-style-type: none"> FW update possible 	Yes
Usable terminal block	TB type H1, F1, H0 and N0
Color code for module-specific color identification plate	CC00
Product function	
<ul style="list-style-type: none"> I&M data 	Yes; I&M0 to I&M3
Redundancy	
<ul style="list-style-type: none"> Redundancy capability 	Yes; with TB type F1
Supply voltage	
Rated value (DC)	24 V
permissible range, lower limit (DC)	19.2 V
permissible range, upper limit (DC)	28.8 V
Reverse polarity protection	Yes
Input current	
Current consumption (rated value)	90 mA; without sensor supply
Encoder supply	
Number of outputs	8
Short-circuit protection	Yes
24 V encoder supply	
<ul style="list-style-type: none"> 24 V Short-circuit protection Output current per channel, max. 	Yes Yes 30 mA
Power	
Power available from the backplane bus	90 mW
Power loss	
Power loss, typ.	2.8 W
Address area	
Address space per module	
<ul style="list-style-type: none"> Inputs Outputs 	22 byte 5 byte
Analog inputs	
Number of analog inputs	
<ul style="list-style-type: none"> For current measurement 	8
permissible input current for current input (destruction limit), max.	35 mA
Input ranges (rated values), currents	
<ul style="list-style-type: none"> 0 to 20 mA — Input resistance (0 to 20 mA) 	Yes 150 Ω

<ul style="list-style-type: none"> • 4 mA to 20 mA — Input resistance (4 mA to 20 mA) 	Yes 150 Ω
HART communication	
<ul style="list-style-type: none"> • Primary Master • Secondary Master • input resistance (with HART communication) 	Yes No 150 Ω; for operation with an external secondary master (e.g. communicator), an external load may be necessary to achieve a total impedance of 230 - 600 Ω.
Cable length	
<ul style="list-style-type: none"> • shielded, max. 	1 000 m; shielded, twisted pair
Analog value generation for the inputs	
Measurement principle	Sigma Delta
Integration and conversion time/resolution per channel	
<ul style="list-style-type: none"> • Resolution with overrange (bit including sign), max. • Integration time, parameterizable • Integration time (ms) • Interference voltage suppression for interference frequency f1 in Hz 	16 bit Yes 20 ms (at 50 Hz); 16.66 ms (at 60 Hz) 50 / 60 Hz
Smoothing of measured values	
<ul style="list-style-type: none"> • parameterizable 	Yes; in 4 stages (1, 4, 16, 64 conversion cycles), channel-by-channel
Encoder	
Connection of signal encoders	
<ul style="list-style-type: none"> • for current measurement as 2-wire transducer • for current measurement as 4-wire transducer 	Yes Yes
Errors/accuracies	
Crosstalk between the inputs, min.	-70 dB
Repeat accuracy in steady state at 25 °C (relative to input range), (+/-)	0.008 %
safety-relevant accuracy	
<ul style="list-style-type: none"> • up to 40 °C, max. • up to 70 °C, max. 	0.6 %; (0.7% in vertical installation) 0.9 %
note regarding accuracy	the safety-relevant accuracy consists of a basic error, a temperature-dependent drift, aging and internal safety measures
Influence of a HART signal modulated on the input signal in relation to input range	
<ul style="list-style-type: none"> • error at 16.6 ms integration time • error at 20 ms integration time 	0.11 % 0.11 %
Interference voltage suppression for $f = n \times (f_1 \pm 1 \%)$, f1 = interference frequency	
<ul style="list-style-type: none"> • Series mode interference (peak value of interference < rated value of input range), min. • Common mode voltage, max. • Common mode interference, min. 	40 dB 35 V 80 dB
Protocols	
HART protocol	Yes
<ul style="list-style-type: none"> • Protocol version 	up to Revision 7
Interrupts/diagnostics/status information	
Alarms	
<ul style="list-style-type: none"> • Diagnostic alarm 	Yes
Diagnoses	
<ul style="list-style-type: none"> • Monitoring the supply voltage • Wire-break • Short-circuit • Overflow/underflow 	Yes Yes Yes Yes
Diagnostics indication LED	
<ul style="list-style-type: none"> • MAINT LED • Monitoring of the supply voltage (PWR-LED) • Channel status display • for channel diagnostics • for module diagnostics 	Yes; Yellow LED Yes; green PWR LED Yes; green LED Yes; red LED Yes; green/red DIAG LED
Potential separation	
Potential separation channels	
<ul style="list-style-type: none"> • between the channels • between the channels and backplane bus • Between the channels and load voltage L+ 	No Yes No

Permissible potential difference	
between the inputs (UCM)	30 V DC / 25 V AC
Isolation	
tested with	
<ul style="list-style-type: none"> • between backplane bus and load voltage 	1 500 V DC (load voltage L+ and channels I+n bridged)
<ul style="list-style-type: none"> • between the backplane bus and functional ground (FE) 	1 500 V DC
<ul style="list-style-type: none"> • between load voltage and functional ground (FE) 	1 500 V DC (load voltage L+ and channels I+n bridged)
<ul style="list-style-type: none"> • between the channels and load voltage 	370 V AC
<ul style="list-style-type: none"> • between the potential groups of the channels 	370 V AC
Standards, approvals, certificates	
Highest safety class achievable in safety mode	
<ul style="list-style-type: none"> • Performance level according to ISO 13849-1 	PLd (PLe for 1oo2 voting on the F-CPU)
<ul style="list-style-type: none"> • Category according to ISO 13849-1 	cat. 3 (cat. 4 for 1oo2 voting on the F-CPU)
<ul style="list-style-type: none"> • SIL acc. to IEC 61508 	Up to SIL 3
Probability of failure (for service life of 20 years and repair time of 100 hours)	
— Low demand mode: PFDavg in accordance with SIL3	< 27E-05 (< 9E-05 for 1oo2 voting on the F-CPU)
— High demand/continuous mode: PFH in accordance with SIL3	< 4E-09 1/h (< 1E-09 1/h for 1oo2 voting on the F-CPU)
Ambient conditions	
Ambient temperature during operation	
<ul style="list-style-type: none"> • horizontal installation, min. 	-40 °C
<ul style="list-style-type: none"> • horizontal installation, max. 	70 °C
<ul style="list-style-type: none"> • vertical installation, min. 	-40 °C
<ul style="list-style-type: none"> • vertical installation, max. 	60 °C
Dimensions	
Width	22.5 mm
Height	115 mm
Depth	138 mm
Weights	
Weight, approx.	220 g

last modified: 4/1/2022 