



SIMATIC S7-1500, F-analog input module, F-AI 8xI 0(4)..20 mA PROFI-safe; 35 mm, overall width; up to PL e (ISO 13849-1)/ SIL 3 (IEC 61508)

General information	
Product type designation	F-AI 8xI 0(4) ... 20 mA
Firmware version	
<ul style="list-style-type: none"> <li>FW update possible</li> </ul>	Yes
Product function	
<ul style="list-style-type: none"> <li>I&amp;M data</li> </ul>	Yes; I&M0 to I&M3
Engineering with	
<ul style="list-style-type: none"> <li>STEP 7 TIA Portal configurable/integrated from version</li> </ul>	V18 with HSP0394 (FW V1.0) / V19 with HSP0451 (FW V2.0)
Operating mode	
<ul style="list-style-type: none"> <li>MSI</li> </ul>	Yes; firmware V2.0 or higher
CiR - Configuration in RUN	
Reparameterization possible in RUN	No
Calibration possible in RUN	No
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)	75 mA
Current consumption, max.	2.5 A; All channels are supplied from the encoder supply
Encoder supply	
Number of outputs	8
Short-circuit protection	Yes
24 V encoder supply	
<ul style="list-style-type: none"> <li>24 V</li> </ul>	Yes; min. L+ (-1.5 V)
<ul style="list-style-type: none"> <li>Short-circuit protection</li> </ul>	Yes
<ul style="list-style-type: none"> <li>Output current per channel, max.</li> </ul>	300 mA
Power	
Power consumption from the backplane bus	0.5 W
Power loss	
Power loss, typ.	2.5 W
Address area	
Address space per module	
<ul style="list-style-type: none"> <li>Inputs</li> </ul>	23 byte
<ul style="list-style-type: none"> <li>Outputs</li> </ul>	6 byte
Hardware configuration	
Automatic encoding	Yes

Analog inputs	
Number of analog inputs	8
permissible input current for current input (destruction limit), max.	35 mA
Input ranges (rated values), currents	
<ul style="list-style-type: none"> <li>● 0 to 20 mA</li> <li style="padding-left: 20px;">— Input resistance (0 to 20 mA)</li> <li>● 4 mA to 20 mA</li> <li style="padding-left: 20px;">— Input resistance (4 mA to 20 mA)</li> </ul>	Yes 150 Ω Yes 150 Ω
Cable length	
<ul style="list-style-type: none"> <li>● shielded, max.</li> </ul>	1 000 m
Analog value generation for the inputs	
Measurement principle	Sigma Delta
Integration and conversion time/resolution per channel	
<ul style="list-style-type: none"> <li>● Resolution with overrange (bit including sign), max.</li> <li>● Integration time, parameterizable</li> <li>● Integration time (ms)</li> <li>● Interference voltage suppression for interference frequency f1 in Hz</li> </ul>	16 bit Yes 20 / 16,667 50 / 60 Hz
Smoothing of measured values	
<ul style="list-style-type: none"> <li>● Number of smoothing levels</li> <li>● parameterizable</li> <li>● Step: None</li> <li>● Step: low</li> <li>● Step: Medium</li> <li>● Step: High</li> </ul>	7 Yes Yes; 1x conversion time Yes; 2x / 4x conversion cycle time Yes; 8x / 16x conversion cycle time Yes; 32x / 64x conversion cycle time
Encoder	
Connection of signal encoders	
<ul style="list-style-type: none"> <li>● for current measurement as 2-wire transducer</li> <li style="padding-left: 20px;">— Burden of 2-wire transmitter, max.</li> <li>● for current measurement as 4-wire transducer</li> </ul>	Yes 650 Ω Yes
Errors/accuracies	
Linearity error (relative to input range), (+/-)	0.05 %
Temperature error (relative to input range), (+/-)	0.005 %/K
Crosstalk between the inputs, max.	-70 dB
Repeat accuracy in steady state at 25 °C (relative to input range), (+/-)	0.05 %
Operational error limit in overall temperature range	
<ul style="list-style-type: none"> <li>● Current, relative to input range, (+/-)</li> </ul>	0.3 %; without HART communication
Basic error limit (operational limit at 25 °C)	
<ul style="list-style-type: none"> <li>● Current, relative to input range, (+/-)</li> </ul>	0.05 %; without HART communication
Influence of a HART signal modulated on the input signal in relation to input range	
<ul style="list-style-type: none"> <li>● error occurred at interference frequency suppression: 60 Hz</li> <li>● error occurred at interference frequency suppression: 50 Hz</li> </ul>	0.12 % 0.12 %
Interference voltage suppression for $f = n \times (f1 \pm 1 \%)$ , f1 = interference frequency	
<ul style="list-style-type: none"> <li>● Series mode interference (peak value of interference &lt; rated value of input range), min.</li> <li>● Common mode voltage, max.</li> <li>● Common mode interference, min.</li> </ul>	40 dB 60 V DC/30 V AC 70 dB
Interrupts/diagnostics/status information	
Diagnostics function	Yes
Alarms	
<ul style="list-style-type: none"> <li>● Diagnostic alarm</li> <li>● Limit value alarm</li> </ul>	Yes No
Diagnoses	
<ul style="list-style-type: none"> <li>● Monitoring the supply voltage</li> <li>● Wire break</li> <li>● Short-circuit</li> </ul>	Yes Yes Yes

• Overflow/Underflow	Yes	
<b>Diagnostics indication LED</b>		
• RUN LED	Yes; green LED	
• ERROR LED	Yes; red LED	
• Monitoring of the supply voltage (PWR-LED)	Yes; green PWR LED	
• Channel status display	Yes; green LED	
• for channel diagnostics	Yes; red LED	
<b>Potential separation</b>		
<b>Potential separation analog inputs</b>		
• between the channels	No	
• between the channels, in groups of	4	
• between the channels and backplane bus	Yes	
• between the channels and the power supply of the electronics	Yes	
<b>Permissible potential difference</b>		
between the inputs (UCM)	60 V DC/30 V AC	
<b>Isolation</b>		
Isolation tested with	707 V DC (type test)	
<b>Standards, approvals, certificates</b>		
<b>Highest safety class achievable in safety mode</b>		
• Performance level according to ISO 13849-1	PLe	
• Category according to ISO 13849-1	Cat. 4	
• SIL acc. to IEC 61508	SIL 3	
<b>Probability of failure (for service life of 20 years and repair time of 100 hours)</b>		
— Low demand mode: PFDavg in accordance with SIL3	< 4.00E-05	
— High demand/continuous mode: PFH in accordance with SIL3	< 1.00E-09 1/h	
<b>Ambient conditions</b>		
<b>Ambient temperature during operation</b>		
• horizontal installation, min.	0 °C	
• horizontal installation, max.	60 °C	
• vertical installation, min.	0 °C	
• vertical installation, max.	40 °C	
<b>Dimensions</b>		
Width	35 mm	
Height	147 mm	
Depth	129 mm	
<b>Weights</b>		
Weight, approx.	290 g	
<b>Classifications</b>		
	<b>Version</b>	<b>Classification</b>
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
<b>Approvals / Certificates</b>		
<b>General Product Approval</b>		



[Miscellaneous](#)



General Product Approval For use in hazardous locations

[China RoHS](#)



[FM](#)

[CCC-Ex](#)



[Type Examination Certificate](#)

For use in hazardous locations Functional Safety Maritime application



IECEX

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[TUEV](#)

[Type Examination Certificate](#)



ABS

Maritime application



LRS

[NK / Nippon Kaiji Kyokai](#)



RINA

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

Maritime application other

[KR \(Korean Register of Shipping\)](#)

[PROFIsafe](#)

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