




SIMATIC ET 200SP HA, configurable I/O module, AI-DI16/DQ16X24VDC HART, suitable for terminal block H1, M1, color code CC00, channel diagnostics, 16-bit, +/-0.1%,

Figure similar

General information	
Product type designation	AI-DI 16/DQ 16x24VDC HART HA
Firmware version	V1.1
<ul style="list-style-type: none"> <li>FW update possible</li> </ul>	Yes; The firmware update can take more than 5 minutes.
Usable terminal block	TB type H1, M1, P0 and N0
Color code for module-specific color identification plate	CC00
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>SPPA-T3000 can be configured/integrated from version</li> </ul>	V8.0
Operating mode	
<ul style="list-style-type: none"> <li>DI</li> <li>Counter</li> <li>DQ</li> <li>DQ with energy-saving function</li> <li>PWM</li> <li>Oversampling</li> <li>MSI</li> <li>MSO</li> </ul>	Yes Yes Yes No No No No No
Redundancy	
<ul style="list-style-type: none"> <li>Redundancy capability</li> </ul>	Yes; With TB type M1
CiR - Configuration in RUN	
Reparameterization possible in RUN	Yes
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)	80 mA; without sensor supply
Current consumption, max.	90 mA; without sensor supply
Encoder supply	
Number of outputs	16
Output voltage, min.	18.2 V
Short-circuit protection	Yes; per channel, electronic
24 V encoder supply	
<ul style="list-style-type: none"> <li>24 V</li> <li>Short-circuit protection</li> <li>Output current per channel, max.</li> </ul>	Yes Yes; Electronic (response threshold 0.7 A to 1.5 A) 0.5 A

• Output current per module, max.	2 A
<b>Power loss</b>	
Power loss, typ.	4.5 W; without sensor supply
<b>Address area</b>	
Address space per module	
• Address space per module in mixed operation, max.	42 byte; 34 bytes for inputs, 2 bytes for outputs and 6 bytes for QI information
• Address space per module in mixed operation with HART, max.	82 byte; 34-byte inputs, 2-byte outputs, 40 bytes for HART secondary variables, and 6 bytes for QI information
• Address space per module in mixed operation with multiHART, max.	70 byte; 34-byte inputs, 2-byte outputs, 24-byte HART inputs, 4-byte HART outputs, and 6 bytes for QI information
• Address space per module in purely digital operation, max.	26 byte; 2 bytes for inputs, 2 bytes for outputs, 18 bytes for high-precision time stamping and 4 bytes for QI information.
• Address space per module in purely digital operation with counter/frequency measurement, max.	88 byte; 2 bytes for inputs, 2 bytes for outputs, 40 bytes for counter input data, 40 bytes for counter output data and 4 bytes for QI information.
<b>Digital inputs</b>	
Number of digital inputs	16
Digital inputs, parameterizable	Yes
Source/sink input	Yes; P-reading
Input characteristic curve in accordance with IEC 61131, type 1	Yes
Input characteristic curve in accordance with IEC 61131, type 2	No
Input characteristic curve in accordance with IEC 61131, type 3	Yes
Pulse extension	Yes; off, 50 ms, 100 ms, 200 ms, 500 ms, 1 s, 2 s
Time stamping	Yes; Resolution 10 ms
Time stamp (with precision of 1 ms)	Yes; Resolution 1ms
Digital input functions, parameterizable	
• Gate start/stop	Yes; Partner channel of n+8 counter
• Freely usable digital input	Yes; Parameterizable input filter
• Counter	Yes; Incl. frequency measurement
— Number, max.	8; Counter channel n=0 ... 7
— Counting frequency, max.	5 kHz
— Counting width	32 bit; Without sign
— Counting direction up/down	Yes; Up
Input voltage	
• Rated value (DC)	24 V
• for signal "0"	-30 to +5 V
• for signal "1"	+11 to +30V
Input current	
• for signal "1", typ.	2.5 mA
Input delay (for rated value of input voltage)	
for standard inputs	
— parameterizable	Yes; 0.05 / 0.1 / 0.4 / 0.8 / 1.6 / 3.2 / 12.8 / 20 ms (in each case + delay of 30 to 500 µs, depending on line length)
Cable length	
• shielded, max.	1 000 m
• unshielded, max.	600 m
<b>Digital outputs</b>	
Number of digital outputs	16
Current-sinking	No
Current-sourcing	Yes
Short-circuit protection	Yes; Response threshold 0.7 A to 1.3 A
Open-circuit detection	Yes
Overload protection	Yes
Limitation of inductive shutdown voltage to	L+ -(37 to 41V)
Controlling a digital input	Yes
Switching capacity of the outputs	
• with resistive load, max.	0.5 A
• on lamp load, max.	5 W
Load resistance range	
• lower limit	48 Ω
• upper limit	12 kΩ
Output current	
• for signal "1" rated value	0.5 A

• for signal "0" residual current, max.	0.7 mA
<b>Output delay with resistive load</b>	
• "0" to "1", typ.	50 µs
• "1" to "0", typ.	100 µs
<b>Parallel switching of two outputs</b>	
• for uprating	No
• for redundant control of a load	Yes
<b>Switching frequency</b>	
• with resistive load, max.	100 Hz
• on lamp load, max.	10 Hz
<b>Total current of the outputs</b>	
• Current per channel, max.	0.5 A
• Current per module, max.	2 A
<b>Cable length</b>	
• shielded, max.	1 000 m
• unshielded, max.	600 m
<b>Analog inputs</b>	
Number of analog inputs	16
permissible input current for current input (destruction limit), max.	30 mA
<b>Input ranges</b>	
• Current	Yes; 0 ... 10 mA, 0 ... 20 mA, 4 ... 20 mA, 4 ... 20 mA HART
<b>Input ranges (rated values), currents</b>	
• 0 to 10 mA	Yes
— Input resistance (0 to 10 mA)	250 Ω
• 0 to 20 mA	Yes; 16 bit incl. sign
— Input resistance (0 to 20 mA)	250 Ω
• 4 mA to 20 mA	Yes; 16 bit incl. sign
— Input resistance (4 mA to 20 mA)	250 Ω
<b>Analog value generation for the inputs</b>	
Measurement principle	integrating (Sigma-Delta)
<b>Integration and conversion time/resolution per channel</b>	
• Resolution with overrange (bit including sign), max.	16 bit; Resolution with overrange (bit including sign), max. 16 bits, exception: 15 bits at 60 Hz interference suppression and 0 to 10 mA
• Integration time, parameterizable	Yes; channel by channel
<b>Smoothing of measured values</b>	
• parameterizable	Yes; none, weak, medium, strong, channel-by-channel
<b>Encoder</b>	
<b>Connection of signal encoders</b>	
• for current measurement as 2-wire transducer	Yes
<b>Connectable encoders</b>	
• 2-wire sensor	Yes
— permissible quiescent current (2-wire sensor), max.	1.5 mA
<b>Errors/accuracies</b>	
Linearity error (relative to input range), (+/-)	0.01 %
Temperature error (relative to input range), (+/-)	0.005 %/K
Crosstalk between the inputs, min.	60 dB
Repeat accuracy in steady state at 25 °C (relative to input range), (+/-)	0.05 %
<b>Operational error limit in overall temperature range</b>	
• Current, relative to input range, (+/-)	0.5 %
<b>Basic error limit (operational limit at 25 °C)</b>	
• Current, relative to input range, (+/-)	0.1 %
<b>Interrupts/diagnostics/status information</b>	
Diagnostics function	Yes
Substitute values connectable	Yes
<b>Alarms</b>	
• Diagnostic alarm	Yes
• Limit value alarm	Yes; two upper and two lower limit values in each case
• Hardware interrupt	Yes; Parameterizable, channels 0 to 15, rising/falling edge
<b>Diagnoses</b>	

<ul style="list-style-type: none"> <li>Monitoring the supply voltage</li> <li>Wire-break</li> <li>Short-circuit to M</li> <li>Group error</li> <li>Overflow/underflow</li> </ul>	<p>Yes</p> <p>Yes; channel by channel</p> <p>Yes; Encoder supply to M, channel by channel</p> <p>Yes</p> <p>Yes; channel by channel</p>
<b>Diagnostics indication LED</b>	
<ul style="list-style-type: none"> <li>MAINT LED</li> <li>Monitoring of the supply voltage (PWR-LED)</li> <li>Channel status display</li> <li>for channel diagnostics</li> <li>for module diagnostics</li> </ul>	<p>Yes; Yellow LED</p> <p>Yes; green PWR LED</p> <p>No</p> <p>No</p> <p>Yes; green/red DIAG LED</p>
<b>Integrated Functions</b>	
<p>Frequency measurement</p> <ul style="list-style-type: none"> <li>Number of frequency meters</li> </ul>	<p>Yes</p> <p>8</p>
<b>Counting functions</b>	
<ul style="list-style-type: none"> <li>Continuous counting</li> <li>Counter response parameterizable</li> <li>Hardware gate via digital input</li> <li>Software gate</li> </ul>	<p>Yes</p> <p>Yes</p> <p>Yes; Via partner channel (digital input n+8)</p> <p>Yes</p>
<b>Measuring functions</b>	
<ul style="list-style-type: none"> <li>Dynamic measurement period adjustment</li> </ul>	<p>Yes</p>
<b>Measuring range</b>	
<ul style="list-style-type: none"> <li>Frequency measurement, min.</li> <li>Frequency measurement, max.</li> </ul>	<p>0.1 Hz</p> <p>5 kHz</p>
<b>Accuracy</b>	
<ul style="list-style-type: none"> <li>Frequency measurement</li> </ul>	<p>100 ppm; depending on measuring interval and signal evaluation</p>
<b>Potential separation</b>	
<b>Potential separation channels</b>	
<ul style="list-style-type: none"> <li>between the channels</li> <li>between the channels and backplane bus</li> <li>Between the channels and load voltage L+</li> </ul>	<p>No</p> <p>Yes</p> <p>No</p>
<b>Isolation</b>	
<p>Isolation tested with</p>	<p>1 500 V DC/1 min, type test</p>
<b>Ambient conditions</b>	
<b>Ambient temperature during operation</b>	
<ul style="list-style-type: none"> <li>horizontal installation, min.</li> <li>horizontal installation, max.</li> <li>vertical installation, min.</li> <li>vertical installation, max.</li> </ul>	<p>-40 °C</p> <p>70 °C; Observe derating</p> <p>-40 °C</p> <p>60 °C; Observe derating</p>
<b>Dimensions</b>	
<p>Width</p> <p>Height</p> <p>Depth</p>	<p>22.5 mm</p> <p>115 mm</p> <p>138 mm</p>
<b>Weights</b>	
<p>Weight, approx.</p>	<p>150 g</p>
<p><b>last modified:</b></p>	<p>4/25/2024 </p>