



SIMATIC S7-1500, analog output module AQ 4xU/I HF, 16-bit resolution accuracy 0.1%, 4 channels in groups of 1, common mode voltage: 30 V AC/60 V DC, diagnostics; substitute value, isochronous mode; the module supports the safety-oriented shutdown of load groups up to SIL2 according to EN IEC 62061:2021 and Category 3 / PL d according to EN ISO 13849-1:2015. delivery including infeed element, shielding bracket and shield terminal: front connector (screw terminals or push-in) to be ordered separately

General information	
Product type designation	AQ 4xU/I HF
HW functional status	From FS01
Firmware version	V1.1.0
<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
<ul style="list-style-type: none"> <li>Isochronous mode</li> </ul>	Yes
<ul style="list-style-type: none"> <li>Prioritized startup</li> </ul>	Yes
Engineering with	
<ul style="list-style-type: none"> <li>STEP 7 TIA Portal configurable/integrated from version</li> </ul>	V14 / -
<ul style="list-style-type: none"> <li>STEP 7 configurable/integrated from version</li> </ul>	V5.5 SP3 / -
<ul style="list-style-type: none"> <li>PROFIBUS from GSD version/GSD revision</li> </ul>	V1.0 / V5.1
<ul style="list-style-type: none"> <li>PROFINET from GSD version/GSD revision</li> </ul>	V2.3 / -
Operating mode	
<ul style="list-style-type: none"> <li>Oversampling</li> </ul>	No
<ul style="list-style-type: none"> <li>MSO</li> </ul>	Yes
CiR - Configuration in RUN	
Reparameterization possible in RUN	Yes
Calibration 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, max.	160 mA
Power	
Power available from the backplane bus	0.95 W
Power loss	
Power loss, typ.	5 W
Analog outputs	
Number of analog outputs	4
Voltage output, short-circuit protection	Yes
Voltage output, short-circuit current, max.	24 mA
Current output, no-load voltage, max.	22 V
Cycle time (all channels), min.	125 µs; independent of number of activated channels
Output ranges, voltage	
<ul style="list-style-type: none"> <li>0 to 10 V</li> </ul>	Yes

<ul style="list-style-type: none"> <li>• 1 V to 5 V</li> </ul>	Yes
<ul style="list-style-type: none"> <li>• -5 V to +5 V</li> </ul>	No
<ul style="list-style-type: none"> <li>• -10 V to +10 V</li> </ul>	Yes
<b>Output ranges, current</b>	
<ul style="list-style-type: none"> <li>• 0 to 20 mA</li> </ul>	Yes
<ul style="list-style-type: none"> <li>• -20 mA to +20 mA</li> </ul>	Yes
<ul style="list-style-type: none"> <li>• 4 mA to 20 mA</li> </ul>	Yes
<b>Connection of actuators</b>	
<ul style="list-style-type: none"> <li>• for voltage output two-wire connection</li> </ul>	Yes
<ul style="list-style-type: none"> <li>• for voltage output four-wire connection</li> </ul>	Yes
<ul style="list-style-type: none"> <li>• for current output two-wire connection</li> </ul>	Yes
<b>Load impedance (in rated range of output)</b>	
<ul style="list-style-type: none"> <li>• with voltage outputs, min.</li> </ul>	1 k $\Omega$ ; 0.5 k $\Omega$ m at 1 to 5 V
<ul style="list-style-type: none"> <li>• with voltage outputs, capacitive load, max.</li> </ul>	1 $\mu$ F
<ul style="list-style-type: none"> <li>• with current outputs, max.</li> </ul>	750 $\Omega$
<ul style="list-style-type: none"> <li>• with current outputs, inductive load, max.</li> </ul>	10 mH
<b>Cable length</b>	
<ul style="list-style-type: none"> <li>• shielded, max.</li> </ul>	800 m; for current, 200 m for voltage
<b>Analog value generation for the outputs</b>	
<b>Integration and conversion time/resolution per channel</b>	
<ul style="list-style-type: none"> <li>• Resolution with overrange (bit including sign), max.</li> </ul>	16 bit
<ul style="list-style-type: none"> <li>• Conversion time (per channel)</li> </ul>	125 $\mu$ s; independent of number of activated channels
<b>Settling time</b>	
<ul style="list-style-type: none"> <li>• for resistive load</li> </ul>	0.2 ms; see additional description in the manual
<ul style="list-style-type: none"> <li>• for capacitive load</li> </ul>	1.8 ms; see additional description in the manual
<ul style="list-style-type: none"> <li>• for inductive load</li> </ul>	2 ms; see additional description in the manual
<b>Errors/accuracies</b>	
Output ripple (relative to output range, bandwidth 0 to 50 kHz), (+/-)	0.02 %
Linearity error (relative to output range), (+/-)	0.015 %
Temperature error (relative to output range), (+/-)	0.002 %/K
Crosstalk between the outputs, max.	-100 dB
Repeat accuracy in steady state at 25 °C (relative to output range), (+/-)	0.005 %
note regarding accuracy	at temperatures below 0 °C, the figures for operating error and temperature error are doubled
<b>Operational error limit in overall temperature range</b>	
<ul style="list-style-type: none"> <li>• Voltage, relative to output range, (+/-)</li> </ul>	$\pm$ 10 V; 0 V to 10 V: $\pm$ 0.12%; 1 V to 5 V: $\pm$ 0.1%
<ul style="list-style-type: none"> <li>• Current, relative to output range, (+/-)</li> </ul>	$\pm$ 20 mA; 0 mA to 20 mA: $\pm$ 0.2%; 4 mA to 20 mA: $\pm$ 0.12%
<b>Basic error limit (operational limit at 25 °C)</b>	
<ul style="list-style-type: none"> <li>• Voltage, relative to output range, (+/-)</li> </ul>	0.06 %
<ul style="list-style-type: none"> <li>• Current, relative to output range, (+/-)</li> </ul>	0.1 %
<b>Isochronous mode</b>	
Execution and activation time (TCO), min.	100 $\mu$ s
Bus cycle time (TDP), min.	250 $\mu$ s
<b>Interrupts/diagnostics/status information</b>	
Diagnostics function	Yes
Substitute values connectable	Yes
<b>Alarms</b>	
<ul style="list-style-type: none"> <li>• Diagnostic alarm</li> </ul>	Yes
<b>Diagnoses</b>	
<ul style="list-style-type: none"> <li>• Monitoring the supply voltage</li> </ul>	Yes
<ul style="list-style-type: none"> <li>• Wire-break</li> </ul>	Yes; Only for output type "current"
<ul style="list-style-type: none"> <li>• Short-circuit</li> </ul>	Yes; Only for output type "voltage"
<ul style="list-style-type: none"> <li>• Overflow/underflow</li> </ul>	Yes
<b>Diagnostics indication LED</b>	
<ul style="list-style-type: none"> <li>• RUN LED</li> </ul>	Yes; green LED
<ul style="list-style-type: none"> <li>• ERROR LED</li> </ul>	Yes; red LED
<ul style="list-style-type: none"> <li>• Monitoring of the supply voltage (PWR-LED)</li> </ul>	Yes; green LED
<ul style="list-style-type: none"> <li>• Channel status display</li> </ul>	Yes; green LED
<ul style="list-style-type: none"> <li>• for channel diagnostics</li> </ul>	Yes; red LED
<ul style="list-style-type: none"> <li>• for module diagnostics</li> </ul>	Yes; red LED
<b>Potential separation</b>	

<b>Potential separation channels</b>	
<ul style="list-style-type: none"> <li>• between the channels</li> <li>• between the channels, in groups of</li> <li>• between the channels and backplane bus</li> <li>• Between the channels and load voltage L+</li> </ul>	<p>Yes</p> <p>1</p> <p>Yes</p> <p>Yes</p>
<b>Permissible potential difference</b>	
between different circuits	60 V DC/30 V AC; insulation rated for 120 V AC basic insulation: between the channels and the supply voltage L+; between the channels and the backplane bus; between the channels
<b>Isolation</b>	
Isolation tested with	2 000 V DC between the channels and the supply voltage L+; 2 000 V DC between the channels and the backplane bus; 2 000 V DC between the channels; 707 V DC (type test) between the supply voltage L+ and the backplane bus
<b>Standards, approvals, certificates</b>	
Suitable for safety-related tripping of standard modules	Yes; From FS03
<b>Highest safety class achievable for safety-related tripping of standard modules</b>	
<ul style="list-style-type: none"> <li>• Performance level according to ISO 13849-1</li> <li>• Category according to ISO 13849-1</li> <li>• SIL acc. to IEC 62061</li> <li>• remark on safety-oriented shutdown</li> </ul>	<p>PL d</p> <p>Cat. 3</p> <p>SIL 2</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>-25 °C; From FS02</p> <p>60 °C</p> <p>-25 °C; From FS02</p> <p>40 °C</p>
<b>Dimensions</b>	
Width	35 mm
Height	147 mm
Depth	129 mm
<b>Weights</b>	
Weight, approx.	300 g