




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                                                                                   |                                                     |

|                                                                            |                                                                                               |
|----------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| • 0 to 10 V                                                                | Yes                                                                                           |
| • 1 V to 5 V                                                               | Yes                                                                                           |
| • -5 V to +5 V                                                             | No                                                                                            |
| • -10 V to +10 V                                                           | Yes                                                                                           |
| <b>Output ranges, current</b>                                              |                                                                                               |
| • 0 to 20 mA                                                               | Yes                                                                                           |
| • -20 mA to +20 mA                                                         | Yes                                                                                           |
| • 4 mA to 20 mA                                                            | Yes                                                                                           |
| <b>Connection of actuators</b>                                             |                                                                                               |
| • for voltage output two-wire connection                                   | Yes                                                                                           |
| • for voltage output four-wire connection                                  | Yes                                                                                           |
| • for current output two-wire connection                                   | Yes                                                                                           |
| <b>Load impedance (in rated range of output)</b>                           |                                                                                               |
| • with voltage outputs, min.                                               | 1 k $\Omega$ ; 0.5 k $\Omega$ m at 1 to 5 V                                                   |
| • with voltage outputs, capacitive load, max.                              | 1 $\mu$ F                                                                                     |
| • with current outputs, max.                                               | 750 $\Omega$                                                                                  |
| • with current outputs, inductive load, max.                               | 10 mH                                                                                         |
| <b>Cable length</b>                                                        |                                                                                               |
| • shielded, max.                                                           | 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>              |                                                                                               |
| • Resolution with overrange (bit including sign), max.                     | 16 bit                                                                                        |
| • Conversion time (per channel)                                            | 125 $\mu$ s; independent of number of activated channels                                      |
| <b>Settling time</b>                                                       |                                                                                               |
| • for resistive load                                                       | 0.2 ms; see additional description in the manual                                              |
| • for capacitive load                                                      | 1.8 ms; see additional description in the manual                                              |
| • for inductive load                                                       | 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>                |                                                                                               |
| • Voltage, relative to output range, (+/-)                                 | $\pm$ 10 V; 0 V to 10 V: $\pm$ 0.12%; 1 V to 5 V: $\pm$ 0.1%                                  |
| • Current, relative to output range, (+/-)                                 | $\pm$ 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>                      |                                                                                               |
| • Voltage, relative to output range, (+/-)                                 | 0.06 %                                                                                        |
| • Current, relative to output range, (+/-)                                 | 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>                                                              |                                                                                               |
| • Diagnostic alarm                                                         | Yes                                                                                           |
| <b>Diagnoses</b>                                                           |                                                                                               |
| • Monitoring the supply voltage                                            | Yes                                                                                           |
| • Wire-break                                                               | Yes; Only for output type "current"                                                           |
| • Short-circuit                                                            | Yes; Only for output type "voltage"                                                           |
| • 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 LED                                                                                |

|                                                                                                                                                                                                                              |                                                                                                                                                                                                                             |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• Channel status display</li> <li>• for channel diagnostics</li> <li>• for module diagnostics</li> </ul>                                                                              | <p>Yes; green LED</p> <p>Yes; red LED</p> <p>Yes; red LED</p>                                                                                                                                                               |
| <b>Potential separation</b>                                                                                                                                                                                                  |                                                                                                                                                                                                                             |
| Potential separation channels                                                                                                                                                                                                |                                                                                                                                                                                                                             |
| <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                                                                                                                                                                                                              |
| Highest safety class achievable for safety-related tripping of standard modules                                                                                                                                              |                                                                                                                                                                                                                             |
| <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> <p><a href="https://support.industry.siemens.com/cs/de/de/view/39198632">https://support.industry.siemens.com/cs/de/de/view/39198632</a></p>                                         |
| <b>Ambient conditions</b>                                                                                                                                                                                                    |                                                                                                                                                                                                                             |
| Ambient temperature during operation                                                                                                                                                                                         |                                                                                                                                                                                                                             |
| <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                                                                                                                                                                                                                       |
| <b>last modified:</b>                                                                                                                                                                                                        | 4/27/2022                                                                                                                                |