

Technical specifications

Technical specifications of the AI-DI16/DQ16 x 24VDC HART HA

Article number	6DL1133-6EW00-0EH1
General information	
Product type designation	AI-DI 16/DQ 16x24VDC HART HA
Firmware version	V1.1
• FW update possible	Yes
Color code for module-specific color identification plate	CC00
Product function	
• I&M data	Yes; I&M0 to I&M3
Engineering with	
• SPPA-T3000 can be configured/integrated from version	V8.0
Operating mode	
• DI	Yes
• Counter	Yes
• DQ	Yes
• DQ with energy-saving function	No
• PWM	No
• Oversampling	No
• MSI	No
• MSO	No
Redundancy	
• Redundancy capability	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

Article number	6DL1133-6EW00-0EH1
Short-circuit protection	Yes; per channel, electronic
24 V encoder supply	
• 24 V	Yes
• Short-circuit protection	Yes; Electronic (response threshold 0.7 A to 1.5 A)
• Output current per channel, max.	0.5 A
• Output current per module, max.	2 A
Power loss	
Power loss, typ.	4.5 W; without sensor supply
Address area	
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.
Digital inputs	
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

Article number	6DL1133-6EW00-0EH1
Input voltage - Rated value (DC) - for signal "0" - for signal "1"	24 V -30 to +5 V +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. - unshielded, max.	1 000 m 600 m
Digital outputs	
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. - on lamp load, max.	0.5 A 5 W
Load resistance range - lower limit - upper limit	48 Ω 12 kΩ
Output current - for signal "1" rated value - for signal "0" residual current, max.	0.5 A 0.7 mA
Output delay with resistive load "0" to "1", typ. "1" to "0", typ.	50 µs 100 µs
Parallel switching of two outputs - for uprating - for redundant control of a load	No Yes
Switching frequency - with resistive load, max. - on lamp load, max.	100 Hz 10 Hz
Total current of the outputs Current per channel, max.	0.5 A

Article number	6DL1133-6EW00-0EH1
Current per module, max.	2 A
Cable length	
shielded, max.	1 000 m
unshielded, max.	600 m
Analog inputs	
Number of analog inputs	16
permissible input current for current input (destruction limit), max.	30 mA
Input ranges	
Current	Yes; 0 ... 10 mA, 0 ... 20 mA, 4 ... 20 mA, 4 ... 20 mA HART
Input ranges (rated values), currents	
0 to 10 mA - Input resistance (0 to 10 mA)	Yes 250 Ω
0 to 20 mA - Input resistance (0 to 20 mA)	Yes; 16 bit incl. sign 250 Ω
4 mA to 20 mA - Input resistance (4 mA to 20 mA)	Yes; 16 bit incl. sign 250 Ω
Analog value generation for the inputs	
Measurement principle	integrating (Sigma-Delta)
Integration and conversion time/resolution per channel	
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
Smoothing of measured values	
parameterizable	Yes; none, weak, medium, strong, channel-by-channel
Encoder	
Connection of signal encoders	
for current measurement as 2-wire transducer	Yes
Connectable encoders	
2-wire sensor - permissible quiescent current (2-wire sensor), max.	Yes 1.5 mA
Errors/accuracies	
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 %
Operational error limit in overall temperature range	

Article number	6DL1133-6EW00-0EH1
Current, relative to input range, (+/-)	0.5 %
Basic error limit (operational limit at 25 °C)	
Current, relative to input range, (+/-)	0.1 %
Interrupts/diagnostics/status information	
Diagnostics function	Yes
Substitute values connectable	Yes
Alarms	
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
Diagnoses	
Monitoring the supply voltage	Yes
Wire-break	Yes; channel by channel
Short-circuit to M	Yes; Encoder supply to M, channel by channel
Group error	Yes
Overflow/underflow	Yes; channel by channel
Diagnostics indication LED	
MAINT LED	Yes; Yellow LED
Monitoring of the supply voltage (PWR-LED)	Yes; green PWR LED
Channel status display	No
for channel diagnostics	No
for module diagnostics	Yes; green/red DIAG LED
Integrated Functions	
Frequency measurement	Yes
Number of frequency meters	8
Counting functions	
Continuous counting	Yes
Counter response parameterizable	Yes
Hardware gate via digital input	Yes; Via partner channel (digital input n+8)
Software gate	Yes
Measuring functions	
Dynamic measurement period adjustment	Yes
Measuring range	
Frequency measurement, min.	0.1 Hz
Frequency measurement, max.	5 kHz
Accuracy	
Frequency measurement	100 ppm; depending on measuring interval and signal evaluation
Potential separation	
Potential separation channels	
between the channels	No

Article number	6DL1133-6EW00-0EH1
• between the channels and backplane bus • Between the channels and load voltage L+	Yes No
Isolation	
Isolation tested with	1 500 V DC/1 min, type test
Ambient conditions	
Ambient temperature during operation	
• horizontal installation, min. • horizontal installation, max. • vertical installation, min. • vertical installation, max.	-40 °C 70 °C; Observe derating -40 °C 60 °C; Observe derating
Dimensions	
Width	22.5 mm
Height	115 mm
Depth	138 mm
Weights	
Weight, approx.	150 g