4.27 Analog Output Module SM 332; AO 4 × 12 bits; (6ES7 332-5HD01-0AB0)

Order number

6ES7 332-5HD01-0AB0

Characteristics

The analog output module SM 332; AO 4 × 12 bits has the following characteristic features:

- 4 outputs in 4 channel groups
- The individual output channels can be programmed as
    - Voltage outputs
    - Current outputs
- Resolution 12 bits
- Programmable diagnostics
- Programmable diagnostic interrupt
- Programmable substitute value output
- Isolated against backplane bus interface and load voltage

Terminal connection and block diagram of analog output module SM 332; AO 4 × 12 bits
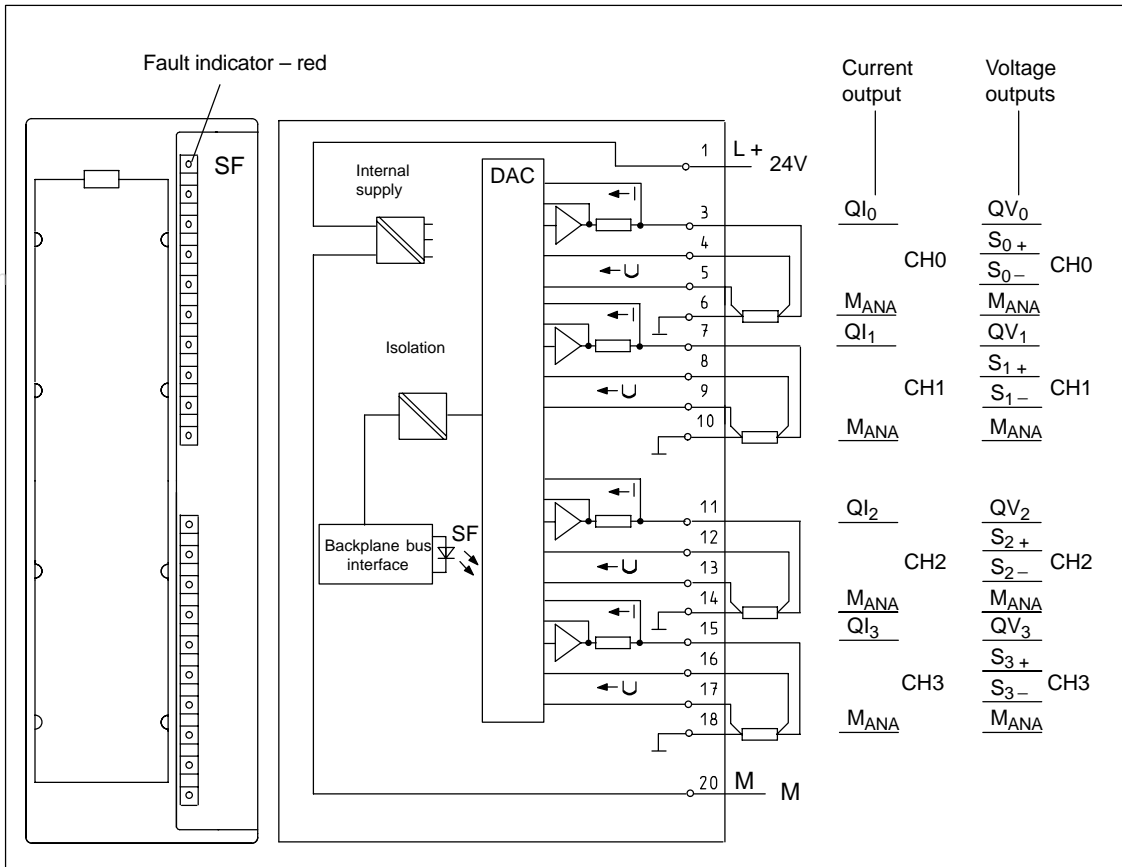

Figure 4-50   Module View and Block Diagram of the Analog Output Module SM 332; AO 4 × 12 bits

Technical specifications of the SM 332; AO 4 $\times$ 12 bits

Dimensions and Weight	
Dimensions W $\times$ H $\times$ D (in millimeters)	40 $\times$ 125 $\times$ 117
Weight	Approx. 220 g
Data for Specific Module	
Supports clocked operation	No
Number of outputs	4
Length of cable	
• Shielded	max. 200 m
Voltages, Currents, Potentials	
Rated load voltage L +	24 VDC
• Reverse polarity protection	Yes
Isolation	
• Between channels and backplane bus	Yes
• Between channels and power supply of the electronics	Yes
• Between the channels	No
• Between channels and load voltage L+	Yes
Permitted potential difference	
• Between S– and M_{ANA} (U_{CM})	3 VDC
• Between M_{ANA} and $M_{internal}$ (U_{ISO})	75 VDC / 60 VAC
Insulation tested with	500 VDC
Current consumption	
• From the backplane bus	max. 60 mA
• From the load voltage L+ (no load)	max. 240 mA
Power dissipation of the module	typ. 3 W

Analog Value Generation		
Resolution including sign		
• $\pm$ 10 V; $\pm$ 20 mA; 4 to 20 mA; 1 to 5 V	11 bits + sign	
• 0 to 10 V; 0 to 20 mA	12 bits	
Conversion time (per channel)	max. 0.8 ms	
Settling time		
• For resistive load	0.2 ms	
• For capacitive load	3.3 ms	
• For inductive load	0.5 ms (1 mH)	
	3.3 ms (10 mH)	
Suppression of Interference, Limits of Error		
Crosstalk between the outputs	> 40 dB	
Operational limit (in the entire temperature range, with reference to the output range)		
• Voltage outputs	$\pm$ 0.5 %	
• Current outputs	$\pm$ 0.6 %	
Basic error (operational limit at 25° C, referred to output range)		
• Voltage outputs	$\pm$ 0.4 %	
• Current outputs	$\pm$ 0.5 %	
Temperature error (with reference to the output range)	$\pm$ 0.002 %/K	
Linearity error (with reference to the output range)	$\pm$ 0.05 %	
Repeatability (in steady state at 25 °C, referred to output range)	$\pm$ 0.05 %	
Output ripple; range 0 to 50 kHz (referred to output range)	$\pm$ 0.05 %	
Status, Interrupts, Diagnostics		
Interrupts		
• Diagnostic interrupt	Parameters can be assigned	
Diagnostic functions	Programmable	
• Group error display	Red LED (SF)	
• Diagnostic information readable	Possible	
Substitute value can be applied	Yes, programmable	

Data for Selecting an Actuator		Destruction limit against voltages/currents applied from outside	
Output ranges (rated values)			
• Voltage	±10 V 0 to 10 V 1 to 5 V	• Voltage at outputs to M$_{ANA}$	max. 18 V continuous; 75 V for max. 1 s (duty factor 1:20)
• Current	±20 mA 0 to 20 mA 4 to 20 mA	• Current	max. 50 mA DC
Load resistance (in the nominal range of the output)		Connection of actuators	
		• For voltage output	
• For voltage outputs	min. 1 kΩ	– Four-conductor connection (measuring circuit)	Possible
– Capacitive load	max. 1 µF		
• For current outputs	max. 500 Ω	• For current output	
– At U$_{CM}$< 1V	max. 600 Ω	– Two-conductor connection	Possible
– Inductive load	max. 10 mH		
Voltage outputs			
• Short-circuit protection	Yes		
• Short-circuit current	max. 25 mA		
Current outputs			
• No-load voltage	max. 18 V		

4.27.1   Commissioning the SM 332; AO 4 × 12 bits

Note

When switching on and off the rated load voltage (L+), wrong intermediate values can occur across the output for approximately 10 ms.

Parameter

You will find a description of the general procedure for assigning parameters to analog modules in Section 4.7.

You will find an overview of the programmable parameters and their default values in Table 4-42, on page 4-47.

Assigning parameters to channels

You can configure each output channel of the SM 332; AO 4 × 12 bits individually. You can thus assign separate parameters for each output channel.

When you set the parameters with SFCs in the user program, the parameters are assigned to channel groups. Every output channel of the SM 332; AO 4 × 12 bits is assigned to a channel group in this instance – in other words, for example output channel 0 = channel group 0.

Note

If you modify output ranges when the analog output module SM 332; AO 4 × 12 bits is in operation, incorrect intermediate values may arise across the output.

Diagnostics

You will find the diagnostic messages that are grouped under the ”group diagnosis” parameter in Table 4-47, on page 4-79.

4.27.2 Output Ranges of the Analog Output Module SM 332; AO 4 × 12 bits

Connecting the analog outputs

You can connect the outputs as voltage or current outputs, or disable them. You perform connection of the outputs with the ”output type” parameter in *STEP 7*.

Unused channels

So that unused output channels of the SM 332; AO 4 × 12 bits remain de-energized, you must set the ”output type” parameter to ”disabled” and leave the terminal open.

Output ranges

You program the output ranges for voltage and current outputs in *STEP 7*.

Table 4-81   Output Ranges of the Analog Output Module SM 332; AO 4 $\times$ 12 bits

Selected Type of Output	Output Range	Description
Voltage	1 to 5 V 0 to 10 V $\pm$ 10 V	You will find the digital analog values in Section 4.3.2 in the voltage and current output ranges
Current	0 to 20 mA 4 to 20 mA $\pm$ 20 mA	

Default settings

The default settings of the module are "Voltage" for the output type and "$\pm$ 10 V" for the output range. You can use this combination of output type and output range without parameterizing the SM 332; AO 4 $\times$ 12 bits in *STEP 7*.

Wire-break check

The analog output module SM 332; AO 4 $\times$ 12 bits carries out a wire-break check only for current outputs.

Short-circuit test

The analog output module SM 332; AO 4 $\times$ 12 bits carries out a short-circuit test only for voltage outputs.

Substitute values

You can configure the SM 332; AO 4 $\times$ 12 bits for the CPU operating mode STOP as follows: Outputs De-energized, Hold Last Value or Inject Substitute Values. If you inject substitute values, they must be within the output range.

Special characteristic of substitute values for output ranges 1 to 5 V and 4 to 20 mA

The following special characteristic applies to output ranges 1 to 5 V and 4 to 20 mA:

You have to set the substitute value E500$_H$ for the output to become de-energized (refer to Tables 4-35 and 4-37 on pages 4-29 and 4-30).