

I/O systems

SIMATIC ET 200 systems for the control cabinet
SIMATIC ET 200SP

I/O modules > Analog output modules

Overview



- 2 and 4-channel analog output (AQ) modules
- Apart from the standard delivery form in an individual package, selected I/O modules and BaseUnits are also available in a pack of 10 units. The pack of 10 units enables the amount of waste to be reduced considerably, as well as saving the time of unpacking individual modules.

For different requirements, the digital output modules offer:

- Function classes Standard, High Feature and High-Speed
- BaseUnits for single or multiple-conductor connection with automatic slot coding
- Potential distributor modules for system-integrated expansion with potential terminals
- Individual system-integrated load group formation with self-assembling voltage distribution bars (a separate power module is no longer required for ET 200SP)

- Option for connecting current and voltage actuators
- Clear labeling on front of module
- LEDs for diagnostics, status, power supply and faults
- Electronically readable and non-volatile writable rating plate (I&M data 0 to 3)
- Extended functions and additional operating modes in some cases
 - Oversampling (n-fold equidistant output of an analog value within one PN cycle and thus the precisely timed output of an analog value or a sequence of analog values)
 - Isochronous mode (simultaneous equidistant output of analog values)
 - Output of substitute value in the event of interruptions to communication (shutdown, output adjustable substitute value, or keep last value)
 - Calibration during runtime
 - Re-parameterization during operation
 - Firmware update
 - Diagnosis of wire break, short circuit, overflow, underflow
 - Value status (optional binary validity information of the analog signal in the process image)
 - Support of the PROFINET profile
- Optional accessories
 - Labeling strips (film or card)
 - Equipment labeling plate
 - Color-coded label with module-specific CC code
 - Shielding terminal

A quick and clear comparison of the functions of the AQ modules is offered by the TIA Selection Tool.

Overview of analog output modules

Analog output	PU	Article No.	CC code	BU type
AQ 2 x U ST	1	6ES7135-6FB00-0BA1	CC00	A0, A1
AQ 2 x I ST	1	6ES7135-6GB00-0BA1	CC00	A0, A1
AQ 4 x U/I ST	1	6ES7135-6HD00-0BA1	CC00	A0, A1
AQ 2 x U/I HF	1	6ES7135-6HB00-0CA1	CC00	A0, A1
AQ 2xU/I HS	1	6ES7135-6HB00-0DA1	CC00	A0, A1
With two operating modes				
• High-speed isochronous AQ				
• Oversampling				

Overview of BaseUnits

BaseUnit	PU	Article No.	CC codes for process terminals	CC codes for AUX terminals
BU type A0 • New load group (light) • 16 process terminals • With 10 AUX terminals	1	6ES7193-6BP20-0DA0	CC01 to CC05	CC71 to CC73
BU type A0 • New load group (light) • 16 process terminals • With 10 AUX terminals	10	6ES7193-6BP20-2DA0	CC01 to CC05	CC71 to CC73
BU type A0 • New load group (light) • 16 process terminals • Without AUX terminals	1	6ES7193-6BP00-0DA0	CC01 to CC05	--

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Potential distributor module	PU	Article No.	CC codes for process terminals
PotDis-TB Type BR-W, 18x internally jumpered terminals, without reference to P1, P2 and AUX, (total current max. 10 A)	1	6ES7193-6TP00-0TP0	CC10 to CC13
PotDis-TB Type P1-R, 18x P1 potential, (total current max. 10 A)	1	6ES7193-6TP00-0TP1	CC10, CC12
PotDis-TB Type P2-B, 18x P2 potential, (total current max. 10 A)	1	6ES7193-6TP00-0TP2	CC10, CC13
PotDis-TB Type n.c.-G, 18x n.c. (not connected) terminals, without reference to P1, P2 and AUX	1	6ES7193-6TP00-0TN0	CC10

Technical specifications

Article number	6ES7135-6FB00-0BA1 ET 200SP, AQ 2XU STANDARD, PU 1	6ES7135-6GB00-0BA1 ET 200SP, AQ 2XI STANDARD, PU 1	6ES7135-6HD00-0BA1 ET 200SP, AQ 4XU/I ST	6ES7135-6HB00-0DA1 ET 200SP, AQ 2 X U/I HIGH SPEED	6ES7135-6HB00-0CA1 ET 200SP, AQ 2 X U/I HIGH FEATURE
General information					
Product type designation	AQ 2xU ST	AQ 2xI ST	AQ 4xU/I ST	AQ 2xU/I HS	AQ 2xU/I HF
Product function					
• I&M data	Yes; I&M0 to I&M3	Yes; I&M0 to I&M3	Yes; I&M0 to I&M3	Yes; I&M0 to I&M3	Yes; I&M0 to I&M3
• Output range scalable	No	No	No		
Engineering with					
• STEP 7 TIA Portal configurable/integrated as of version	V13 SP1 / -	V13 SP1 / -	V11 SP2 / V13	V13 SP1	V13 / V13
• STEP 7 configurable/integrated as of version	V5.5 SP3 / -	V5.5 SP3 / -	V5.5 SP3 / -	V5.5 SP3 / -	V5.5 SP3 / -
• PCS 7 configurable/integrated as of version			V8.1 SP1		V8.1 SP1
• PROFIBUS as of GSD version/ GSD revision	GSD Revision 5	GSD Revision 5	GSD Revision 5	GSD Revision 5	GSD Revision 5
• PROFINET as of GSD version/ GSD revision	GSDML V2.3	GSDML V2.3	GSDML V2.3	GSDML V2.3	GSDML V2.3
Operating mode					
• Oversampling	No	No	No	Yes; 2 channels per module	No
• MSO	No	No	No	No	No
CiR – Configuration in RUN					
Reparameterization possible in RUN	Yes	Yes	Yes	Yes	Yes
Calibration possible in RUN	No	No	No	Yes	Yes
Supply voltage					
Type of supply voltage	DC	DC	DC	DC	DC
Rated value (DC)	24 V	24 V	24 V	24 V	24 V
Reverse polarity protection	Yes	Yes	Yes	Yes	Yes
Analog outputs					
Number of analog outputs	2	2	4	2	2
Cycle time (all channels), min.	1 ms	1 ms	5 ms	125 µs	750 µs
Analog output with oversampling	No	No	No	Yes	
• Values per cycle, max.				16	
• Resolution, min.				45 µs; (2 channels), 35 µs (1 channel)	

Technical specifications (continued)

Article number	6ES7135-6FB00-0BA1 ET 200SP, AQ 2XU STANDARD, PU 1	6ES7135-6GB00-0BA1 ET 200SP, AQ 2XI STANDARD, PU 1	6ES7135-6HD00-0BA1 ET 200SP, AQ 4XU/I ST	6ES7135-6HB00-0DA1 ET 200SP, AQ 2 X U/I HIGH SPEED	6ES7135-6HB00-0CA1 ET 200SP, AQ 2 X U/I HIGH FEATURE
Output ranges, voltage					
• 0 to 10 V	Yes; 15 bit		Yes; 15 bit	Yes; 15 bit	Yes; 15 bit
• 1 V to 5 V	Yes; 13 bit		Yes; 13 bit	Yes; 13 bit	Yes; 13 bit
• -5 V to +5 V	Yes; 15 bit incl. sign		Yes; 15 bit incl. sign	Yes; 15 bit incl. sign	Yes; 15 bit incl. sign
• -10 V to +10 V	Yes; 16 bit incl. sign		Yes; 16 bit incl. sign	Yes; 16 bit incl. sign	Yes; 16 bit incl. sign
Output ranges, current					
• 0 to 20 mA		Yes; 15 bit	Yes; 15 bit	Yes; 15 bit	Yes; 15 bit
• -20 mA to +20 mA		Yes; 16 bit incl. sign	Yes; 16 bit incl. sign	Yes; 16 bit incl. sign	Yes; 16 bit incl. sign
• 4 mA to 20 mA		Yes; 14 bit	Yes; 14 bit	Yes; 14 bit	Yes; 14 bit
Connection of actuators					
• for voltage output two-wire connection	Yes		Yes	Yes	Yes
• for voltage output four-wire connection	No		Yes	Yes	Yes
• for current output two-wire connection		Yes	Yes	Yes	Yes
Load impedance (in rated range of output)					
• with voltage outputs, min.	2 kΩ		2 kΩ	2 kΩ	2 kΩ
• with voltage outputs, capacitive load, max.	1 μF		1 μF	1 μF	1 μF
• with current outputs, max.		500 Ω	500 Ω	500 Ω	500 Ω
• with current outputs, inductive load, max.		1 mH	1 mH	1 mH	1 mH
Cable length					
• shielded, max.	200 m	1 000 m	1 000 m; 200 m for voltage output	1 000 m; 200 m for voltage output	1 000 m; 200 m for voltage output
Analog value generation for the outputs					
Integration and conversion time/resolution per channel					
• Resolution with overrange (bit including sign), max.	16 bit	16 bit	16 bit	16 bit	16 bit
Settling time					
• for resistive load	0.1 ms	0.1 ms; Typical value	0.1 ms	0.05 ms	0.05 ms
• for capacitive load	1 ms		1 ms	0.05 ms; Max. 47 nF and 20 m cable length	0.05 ms; Max. 47 nF and 20 m cable length
• for inductive load		0.5 ms	0.5 ms	0.05 ms	0.05 ms
Errors/accuracies					
Basic error limit (operational limit at 25 °C)					
• Voltage, relative to output range, (+/-)	0.3 %	0.3 %	0.3 %	0.1 %	0.1 %
• Current, relative to output range, (+/-)	0.3 %	0.3 %	0.3 %	0.1 %	0.1 %
Isochronous mode					
Isochronous operation (application synchronized up to terminal)	No	No	No	Yes	Yes
Execution and activation time (TCO), min.				70 μs	500 μs
Bus cycle time (TDP), min.				125 μs	750 μs

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Interrupts/diagnostics/ status information					
Diagnostics function	Yes	Yes	Yes	Yes	Yes
Substitute values connectable	Yes	Yes	Yes	Yes	Yes
Alarms					
• Diagnostic alarm	Yes	Yes	Yes	Yes	Yes
Diagnostic messages					
• Monitoring the supply voltage	Yes	Yes	Yes	Yes	Yes
• Wire-break		Yes	Yes	Yes; channel-by-channel, only for output type "current"	Yes; channel-by-channel, only for output type "current"
• Short-circuit	Yes		Yes	Yes; channel-by- channel, only for output type "voltage"	Yes; channel-by- channel, only for output type "voltage"
• Group error	Yes	Yes	Yes	Yes	Yes
• Overflow/underflow	Yes	Yes	Yes	Yes	Yes
Diagnostics indication LED					
• Monitoring of the supply voltage (PWR-LED)	Yes; green PWR LED	Yes; green PWR LED	Yes; green PWR LED	Yes; green PWR LED	Yes; green PWR LED
• Channel status display	Yes; Green LED	Yes; Green LED	Yes; Green LED	Yes; Green LED	Yes; Green LED
• for channel diagnostics	No	No	No	Yes; Red LED	Yes; Red LED
• for module diagnostics	Yes; green/red DIAG LED	Yes; green/red DIAG LED	Yes; green/red DIAG LED	Yes; green/red DIAG LED	Yes; green/red DIAG LED
Potential separation					
Potential separation channels					
• between the channels and backplane bus	Yes	Yes	Yes	Yes	Yes
Isolation					
Isolation tested with	707 V DC (type test)	707 V DC (type test)	707 V DC (type test)	707 V DC (type test)	707 V DC (type test)
Ambient conditions					
Ambient temperature during operation					
• horizontal installation, min.	0 °C	0 °C	0 °C	0 °C	0 °C
• horizontal installation, max.	60 °C	60 °C	60 °C; Observe derating	60 °C	60 °C
• vertical installation, min.	0 °C	0 °C	0 °C	0 °C	0 °C
• vertical installation, max.	50 °C	50 °C	50 °C; Observe derating	50 °C	50 °C
Dimensions					
Width	15 mm	15 mm	15 mm	15 mm	15 mm
Height	73 mm	73 mm	73 mm	73 mm	73 mm
Depth	58 mm	58 mm	58 mm	58 mm	58 mm
Weights					
Weight, approx.	31 g	31 g	31 g	31 g	31 g

Ordering data	Article No.		Article No.
Analog output modules		Usable type A1 BaseUnits (temperature detection)	
Analog output module AQ 2xU Standard, BU type A0 or A1, color code CC00, 16-bit	6ES7135-6FB00-0BA1	BU15-P16+A0+12D/T BU type A1; BaseUnit (light) with 16 process terminals (1 ... 16) to the module and an additional 2x5 internally jumpered additional terminals (1 B to 5 B and 1 C to 5 C); for starting a new load group (max. 10 A)	6ES7193-6BP40-0DA1
Analog output module AQ 2xI Standard, BU type A0 or A1, color code CC00, 16-bit	6ES7135-6GB00-0BA1		
Analog output module AQ 4xU/I Standard, BU type A0 or A1, color code CC00, 16-bit, ± 0.3%	6ES7135-6HD00-0BA1	BU15-P16+A0+2D/T BU type A1; BaseUnit (light) with 16 process terminals to the module; for starting a new load group (max. 10 A)	6ES7193-6BP00-0DA1
Analog output module AQ 2xU/I High Feature, BU type A0 or A1, color code CC00, 16-bit, ±0.1%	6ES7135-6HB00-0CA1		
Analog output module AQ 2xU/I High Speed, BU type A0 or A1, color code CC00, 16-bit, ±0.3%	6ES7135-6HB00-0DA1	BU15-P16+A0+12B/T BU type A1; BaseUnit (dark) with 16 process terminals (1 ... 16) to the module and an additional 2x5 internally jumpered additional terminals (1 B to 5 B and 1 C to 5 C); for continuing the load group	6ES7193-6BP40-0BA1
Usable type A0 BaseUnits		BU15-P16+A0+2B/T BU type A1; BaseUnit (dark) with 16 process terminals to the module; for continuing the load group	6ES7193-6BP00-0BA1
Type of delivery: Apart from the standard type of delivery in an individual package, selected BaseUnits are also available in a pack of 10 units. The pack of 10 units enables the amount of waste to be reduced considerably, as well as saving the time of unpacking individual modules.		Potential distributor modules	
The number of modules required is the number of modules ordered. The type of packaging is chosen by selecting the article number. Packs of 10 can therefore only be ordered in integer multiples of 10.		PotDis-BU	
BU15-P16+A10+2D		PotDis-BU, type P1 (light), 17x P1 potential, 1x P2 potential, for starting a new load group (max. 10 A)	6ES7193-6UP00-0DP1
BU type A0; BaseUnit (light) with 16 process terminals (1 ... 16) to the module and an additional 10 internally jumpered AUX terminals (1 A to 10 A); for starting a new load group (max. 10 A)		PotDis-BU, type P1 (dark), 17x P1 potential, 1x P2 potential, for continuing the load group	6ES7193-6UP00-0BP1
• 1 unit	6ES7193-6BP20-0DA0	PotDis-BU, type P2 (light), 1x P1 potential, 17x P2 potential, for starting a new load group (max. 10 A)	6ES7193-6UP00-0DP2
• 10 units	6ES7193-6BP20-2DA0	PotDis-BU, type P2 (dark), 1x P1 potential, 17x P2 potential, for continuing the load group	6ES7193-6UP00-0BP2
BU15-P16+A0+2D		PotDis-TB	
BU type A0; BaseUnit (light) with 16 process terminals to the module; for starting a new load group (max. 10 A)		PotDis-TB, type BR-W, 18x internally jumpered terminals, without reference to P1, P2 and AUX, (total current max. 10 A)	6ES7193-6TP00-0TP0
• 1 unit	6ES7193-6BP00-0DA0	PotDis-TB, type P1-R, 18x P1 potential, (total current max. 10 A)	6ES7193-6TP00-0TP1
• 10 units	6ES7193-6BP00-2DA0	PotDis-TB, type P2-B, 18x P2 potential, (total current max. 10 A)	6ES7193-6TP00-0TP2
BU15-P16+A10+2B		PotDis-TB, type n.c.-G, 18x n.c. (not connected) terminals, without reference to P1, P2 and AUX	6ES7193-6TP00-0TN0
BU type A0; BaseUnit (dark) with 16 process terminals (1 ... 16) to the module and an additional 10 internally jumpered AUX terminals (1 A to 10 A); for continuing the load group			
• 1 unit	6ES7193-6BP20-0BA0		
• 10 units	6ES7193-6BP20-2BA0		
BU15-P16+A0+2B			
BU type A0; BaseUnit (dark) with 16 process terminals to the module; for continuing the load group			
• 1 unit	6ES7193-6BP00-0BA0		
• 10 units	6ES7193-6BP00-2BA0		