

## I/O systems

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

### I/O modules > Analog input modules

#### Overview



- 2, 4 and 8-channel analog input (AI) 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 Basic, Standard, High Feature and High-Speed
- BaseUnits for single or multiple-conductor connection with automatic slot coding
- Individual system-integrated load group formation with self-assembling voltage distribution bars (a separate power module is no longer required for ET 200SP)
- Option of connecting current, voltage and resistance sensors, as well as thermocouples
- Energy Meter for recording up to 200 electrical variables
- 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
  - MSI operating mode (simultaneous reading of input data from as many as three other controllers)
  - Oversampling operating mode (n-fold equidistant acquisition of analog values within one PN cycle for increasing the time resolution for slow CPU cycles)
  - Isochronous mode (simultaneous equidistant reading in of all analog values)
  - Scalable measuring range (adaptation of measuring range, increase of the 16-bit resolution by adapting the measuring range to a limited section)
  - Scaling of the measured values (transmission of the analog value normalized to the required physical value as a 32-bit floating point value)
  - Internal compensation of the line resistance for thermocouples by means of terminal temperature measurement in the BaseUnit for BU type A1
  - Internal compensation also for 2-conductor resistance measurement by means of adjustable line resistance
  - Calibration during runtime
  - Single-channel electrical isolation
  - HART communication
  - Re-parameterization during operation
  - Firmware update
  - Diagnosis of wire break, short circuit, overflow, underflow
  - Two upper and lower hardware interrupts in each case, interference frequency suppression, smoothing
  - Value status (optional binary validity information of the analog signal in the process image)
  - Supports the PROFlenergy 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 AI modules is offered by the TIA Selection Tool.

**Overview** (continued)

## Overview of analog input modules

| Analog input                                                               | PU | Article No.        | CC code | BU type |
|----------------------------------------------------------------------------|----|--------------------|---------|---------|
| AI 8 x I 2/4-wire BA                                                       | 1  | 6ES7134-6GF00-0AA1 | CC01    | A0, A1  |
| AI 2 x U ST                                                                | 1  | 6ES7134-6FB00-0BA1 | CC00    | A0, A1  |
| AI 8 x U BA                                                                | 1  | 6ES7134-6FF00-0AA1 | CC02    | A0, A1  |
| AI 4 x U/I 2-wire ST                                                       | 1  | 6ES7134-6HD00-0BA1 | CC03    | A0, A1  |
| AI 4 x U/I 2-wire ST                                                       | 10 | 6ES7134-6HD00-2BA1 | CC03    | A0, A1  |
| AI 2 x I 2/4-wire ST                                                       | 1  | 6ES7134-6GB00-0BA1 | CC05    | A0, A1  |
| AI 4 x I 2/4-wire ST                                                       | 1  | 6ES7134-6GD00-0BA1 | CC03    | A0, A1  |
| AI 4 x I 2-wire 4...20 mA HART                                             | 1  | 6ES7134-6TD00-0CA1 | CC03    | A0, A1  |
| AI 2 x U/I 2/4-wire HF                                                     | 1  | 6ES7134-6HB00-0CA1 | CC05    | A0, A1  |
| AI 2xU/I 2/4-wire HS                                                       | 1  | 6ES7134-6HB00-0DA1 | CC00    | A0, A1  |
| With two operating modes:<br>• High-speed isochronous AI<br>• Oversampling |    |                    |         |         |
| AI 8 x RTD/TC 2-wire HF                                                    | 1  | 6ES7134-6JF00-0CA1 | CC00    | A0, A1  |
| AI 8 x RTD/TC 2-wire HF                                                    | 10 | 6ES7134-6JF00-2CA1 | CC00    | A0, A1  |
| AI 4 x RTD/TC 2/3/4-wire HF                                                | 1  | 6ES7134-6JD00-0CA1 | CC00    | A0, A1  |
| AI 4 x RTD/TC 2/3/4-wire HF                                                | 10 | 6ES7134-6JD00-2CA1 | CC00    | A0, A1  |
| AI Energy Meter 400 V AC ST                                                | 1  | 6ES7134-6PA01-0BD0 | --      | D0      |
| AI Energy Meter 480 V AC ST                                                | 1  | 6ES7134-6PA20-0BD0 | --      | D0      |

## Overview of BaseUnits

| BaseUnit                                                                                                    | PU | Article No.        | CC codes for process terminals | CC codes for AUX terminals |
|-------------------------------------------------------------------------------------------------------------|----|--------------------|--------------------------------|----------------------------|
| <b>BU type A0</b><br>• New load group (light)<br>• 16 process terminals<br>• With 10 AUX terminals          | 1  | 6ES7193-6BP20-0DA0 | CC01 to CC05                   | CC71 to CC73               |
| <b>BU type A0</b><br>• New load group (light)<br>• 16 process terminals<br>• With 10 AUX terminals          | 10 | 6ES7193-6BP20-2DA0 | CC01 to CC05                   | CC71 to CC73               |
| <b>BU type A0</b><br>• New load group (light)<br>• 16 process terminals<br>• Without AUX terminals          | 1  | 6ES7193-6BP00-0DA0 | CC01 to CC05                   | --                         |
| <b>BU type A0</b><br>• New load group (light)<br>• 16 process terminals<br>• Without AUX terminals          | 10 | 6ES7193-6BP00-2DA0 | CC01 to CC05                   | --                         |
| <b>BU type A0</b><br>• Forwarding of load group (dark)<br>• 16 process terminals<br>• With 10 AUX terminals | 1  | 6ES7193-6BP20-0BA0 | CC01 to CC05                   | CC71 to CC73               |
| <b>BU type A0</b><br>• Forwarding of load group (dark)<br>• 16 process terminals<br>• With 10 AUX terminals | 10 | 6ES7193-6BP20-2BA0 | CC01 to CC05                   | CC71 to CC73               |
| <b>BU type A0</b><br>• Forwarding of load group (dark)<br>• 16 process terminals<br>• Without AUX terminals | 1  | 6ES7193-6BP00-0BA0 | CC01 to CC05                   | --                         |
| <b>BU type A0</b><br>• Forwarding of load group (dark)<br>• 16 process terminals<br>• Without AUX terminals | 10 | 6ES7193-6BP00-2BA0 | CC01 to CC05                   | --                         |

## I/O systems

SIMATIC ET 200 systems for the control cabinet

SIMATIC ET 200SP

### I/O modules > Analog input modules

#### Technical specifications (continued)

|                                           |                                                              |                                                                  |
|-------------------------------------------|--------------------------------------------------------------|------------------------------------------------------------------|
| Article number                            | <b>6ES7134-6JF00-0CA1</b><br>ET 200SP, AI 8XRTD/TC 2-WIRE HF | <b>6ES7134-6JD00-0CA1</b><br>ET 200SP, AI 4XRTD/TC 2/3/4-WIRE HF |
| <b>Potential separation</b>               |                                                              |                                                                  |
| <b>Potential separation channels</b>      |                                                              |                                                                  |
| • between the channels and backplane bus  | Yes                                                          | Yes                                                              |
| <b>Isolation</b>                          |                                                              |                                                                  |
| Isolation tested with                     | 707 V DC (type test)                                         | 707 V DC (type test)                                             |
| <b>Standards, approvals, certificates</b> |                                                              |                                                                  |
| Suitable for safety functions             | No                                                           | No                                                               |
| <b>Dimensions</b>                         |                                                              |                                                                  |
| Width                                     | 15 mm                                                        | 15 mm                                                            |
| Height                                    | 73 mm                                                        | 73 mm                                                            |
| Depth                                     | 58 mm                                                        | 58 mm                                                            |
| <b>Weights</b>                            |                                                              |                                                                  |
| Weight, approx.                           | 32 g                                                         | 30 g                                                             |

|                                                           |                                                                 |                                                                 |
|-----------------------------------------------------------|-----------------------------------------------------------------|-----------------------------------------------------------------|
| Article number                                            | <b>6ES7134-6PA01-0BD0</b><br>ET 200SP AI ENERGY METER 400VAC ST | <b>6ES7134-6PA20-0BD0</b><br>ET 200SP AI ENERGY METER 480VAC ST |
| <b>General information</b>                                |                                                                 |                                                                 |
| Product type designation                                  | ET 200SP, AI Energy Meter 400 V AC ST, PU 1                     | ET 200SP, AI Energy Meter 480 V AC ST, PU 1                     |
| <b>Product function</b>                                   |                                                                 |                                                                 |
| • Voltage measurement                                     | Yes                                                             | Yes                                                             |
| • Voltage measurement with voltage transformers           | No                                                              | Yes                                                             |
| • Current measurement                                     | Yes                                                             | Yes                                                             |
| • Phase current measurement without current transformers  | No                                                              | No                                                              |
| • Phase current measurement with current transformers     | Yes                                                             | Yes                                                             |
| • Energy measurement                                      | Yes                                                             | Yes                                                             |
| • Frequency measurement                                   | Yes                                                             | Yes                                                             |
| • Power measurement                                       | Yes                                                             | Yes                                                             |
| • Active power measurement                                | Yes                                                             | Yes                                                             |
| • Reactive power measurement                              | Yes                                                             | Yes                                                             |
| • I&M data                                                | Yes; I&M0 to I&M3                                               | Yes; I&M0 to I&M3                                               |
| • Isochronous mode                                        | No                                                              | No                                                              |
| <b>Engineering with</b>                                   |                                                                 |                                                                 |
| • STEP 7 TIA Portal configurable/integrated as of version | V13 SP1                                                         | V13 SP1                                                         |
| • STEP 7 configurable/integrated as of version            | V5.5 SP4 and higher                                             | V5.5 SP4 and higher                                             |
| • PROFIBUS as of GSD version/GSD revision                 | GSD Revision 5                                                  | GSD Revision 5                                                  |
| • PROFINET as of GSD version/GSD revision                 | V2.3                                                            | V2.3                                                            |
| <b>Operating mode</b>                                     |                                                                 |                                                                 |
| • cyclic measurement                                      | Yes                                                             | Yes                                                             |
| • acyclic measurement                                     | Yes                                                             | Yes                                                             |
| • Acyclic measured value access                           | Yes                                                             | Yes                                                             |
| • Fixed measured value sets                               | Yes                                                             | Yes                                                             |
| • Freely definable measured value sets                    | No                                                              | Yes                                                             |
| <b>CiR – Configuration in RUN</b>                         |                                                                 |                                                                 |
| Reparameterization possible in RUN                        | Yes                                                             | Yes                                                             |
| Calibration possible in RUN                               | No                                                              | Yes                                                             |
| <b>Installation type/mounting</b>                         |                                                                 |                                                                 |
| Mounting position                                         | Any                                                             | Any                                                             |

## Technical specifications (continued)

| Article number                                                                    | <b>6ES7134-6PA01-0BD0</b><br>ET 200SP AI ENERGY METER 400VAC ST                                   | <b>6ES7134-6PA20-0BD0</b><br>ET 200SP AI ENERGY METER 480VAC ST                                    |
|-----------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| <b>Supply voltage</b>                                                             |                                                                                                   |                                                                                                    |
| Design of the power supply                                                        | Supply via voltage measurement channel L1                                                         | Supply via voltage measurement channel L1                                                          |
| Type of supply voltage                                                            | 100 - 240 V AC                                                                                    | AC 100 - 277 V                                                                                     |
| permissible range, lower limit (AC)                                               | 90 V                                                                                              | 90 V                                                                                               |
| permissible range, upper limit (AC)                                               | 264 V                                                                                             | 293 V                                                                                              |
| <b>Line frequency</b>                                                             |                                                                                                   |                                                                                                    |
| • permissible range, lower limit                                                  | 47 Hz                                                                                             | 47 Hz                                                                                              |
| • permissible range, upper limit                                                  | 63 Hz                                                                                             | 63 Hz                                                                                              |
| <b>Address area</b>                                                               |                                                                                                   |                                                                                                    |
| <b>Address space per module</b>                                                   |                                                                                                   |                                                                                                    |
| • Address space per module, max.                                                  | 44 byte; 32 byte input / 12 byte output                                                           | 268 byte; 256 byte input / 12 byte output                                                          |
| <b>Analog inputs</b>                                                              |                                                                                                   |                                                                                                    |
| Cycle time (all channels), typ.                                                   | 50 ms; Time for consistent update of all measured and calculated values (cyclic und acyclic data) | 50 ms; Time for consistent update of all measured and calculated values (cyclic und acyclic data)  |
| <b>Interrupts/diagnostics/<br/>status information</b>                             |                                                                                                   |                                                                                                    |
| <b>Alarms</b>                                                                     |                                                                                                   |                                                                                                    |
| • Diagnostic alarm                                                                | Yes                                                                                               | Yes                                                                                                |
| • Limit value alarm                                                               | No                                                                                                | Yes                                                                                                |
| • Hardware interrupt                                                              | No                                                                                                | Yes; Monitoring of up to 16 freely selectable process values (exceeding or undershooting of value) |
| <b>Diagnostics indication LED</b>                                                 |                                                                                                   |                                                                                                    |
| • Monitoring of the supply voltage (PWR-LED)                                      | Yes                                                                                               | Yes                                                                                                |
| • Channel status display                                                          | Yes; Green LED                                                                                    | Yes; Green LED                                                                                     |
| • for channel diagnostics                                                         | Yes; red Fn LED                                                                                   | Yes; red Fn LED                                                                                    |
| • for module diagnostics                                                          | Yes; green/red DIAG LED                                                                           | Yes; green/red DIAG LED                                                                            |
| <b>Integrated Functions</b>                                                       |                                                                                                   |                                                                                                    |
| <b>Measuring functions</b>                                                        |                                                                                                   |                                                                                                    |
| • Measuring procedure for voltage measurement                                     | TRMS                                                                                              | TRMS                                                                                               |
| • Measuring procedure for current measurement                                     | TRMS                                                                                              | TRMS                                                                                               |
| • Type of measured value acquisition                                              | seamless                                                                                          | seamless                                                                                           |
| • Curve shape of voltage                                                          | Sinusoidal or distorted                                                                           | Sinusoidal or distorted                                                                            |
| • Buffering of measured variables                                                 | No                                                                                                | Yes                                                                                                |
| • Parameter length                                                                | 38 byte                                                                                           | 74 byte                                                                                            |
| • Bandwidth of measured value acquisition                                         | 2 kHz; Harmonics: 39 / 50 Hz, 32 / 60 Hz                                                          | 2 kHz; Harmonics: 39 / 50 Hz, 32 / 60 Hz                                                           |
| <b>Operating mode for measured value acquisition</b>                              |                                                                                                   |                                                                                                    |
| - automatic detection of line frequency                                           | No; Parameterizable                                                                               | No; Parameterizable                                                                                |
| <b>Measuring range</b>                                                            |                                                                                                   |                                                                                                    |
| - Frequency measurement, min.                                                     | 45 Hz                                                                                             | 45 Hz                                                                                              |
| - Frequency measurement, max.                                                     | 65 Hz                                                                                             | 65 Hz                                                                                              |
| <b>Measuring inputs for voltage</b>                                               |                                                                                                   |                                                                                                    |
| - Measurable line voltage between phase and neutral conductor                     | 230 V                                                                                             | 277 V                                                                                              |
| - Measurable line voltage between the line conductors                             | 400 V                                                                                             | 480 V                                                                                              |
| - Measurable line voltage between phase and neutral conductor, min.               | 90 V                                                                                              | 90 V                                                                                               |
| - Measurable line voltage between phase and neutral conductor, max.               | 264 V                                                                                             | 293 V                                                                                              |
| - Measurable line voltage between the line conductors, min.                       | 155 V                                                                                             | 155 V                                                                                              |
| - Measurable line voltage between the line conductors, max.                       | 460 V                                                                                             | 508 V                                                                                              |
| - Measurement category for voltage measurement in accordance with IEC 61010-2-030 | CAT II; CAT III in case of guaranteed protection level of 1.5 kV                                  | CAT II; CAT III in case of guaranteed protection level of 1.5 kV                                   |
| - Internal resistance line conductor and neutral conductor                        | 3.4 MΩ                                                                                            | 3.4 MΩ                                                                                             |

## I/O systems

SIMATIC ET 200 systems for the control cabinet

SIMATIC ET 200SP

### I/O modules > Analog input modules

#### Technical specifications (continued)

| Article number                                                    | <b>6ES7134-6PA01-0BD0</b><br>ET 200SP AI ENERGY METER 400VAC ST       | <b>6ES7134-6PA20-0BD0</b><br>ET 200SP AI ENERGY METER 480VAC ST       |
|-------------------------------------------------------------------|-----------------------------------------------------------------------|-----------------------------------------------------------------------|
| <b>Measuring inputs for voltage (continued)</b>                   |                                                                       |                                                                       |
| - Power consumption per phase                                     | 20 mW                                                                 | 20 mW                                                                 |
| - Impulse voltage resistance<br>1,2/50µs                          | 1 kV                                                                  | 1 kV                                                                  |
| <b>Measuring inputs for current</b>                               |                                                                       |                                                                       |
| - measurable relative current (AC),<br>min.                       | 5 %; Relative to the secondary rated current; 1 A, 5 A                | 1 %; Relative to the secondary rated current 5 A                      |
| - measurable relative current (AC),<br>max.                       | 100 %; Relative to the secondary rated current; 1 A, 5 A              | 100 %; Relative to the secondary rated current 5 A                    |
| - Continuous current with AC,<br>maximum permissible              | 5 A                                                                   | 5 A                                                                   |
| - Apparent power consumption per<br>phase for measuring range 5 A | 0.6 V·A                                                               | 0.6 V·A                                                               |
| - Rated value short-time withstand<br>current restricted to 1 s   | 100 A                                                                 | 100 A                                                                 |
| - Input resistance measuring range<br>0 to 5 A                    | 25 mΩ; At the terminal                                                | 25 mΩ; At the terminal                                                |
| - Zero point suppression                                          | Parameterizable: 20 - 250 mA, default 50 mA                           | Parameterizable: 2 - 250 mA, default 50 mA                            |
| - Surge strength                                                  | 10 A; for 1 minute                                                    | 10 A; for 1 minute                                                    |
| <b>Accuracy class according to<br/>IEC 61557-12</b>               |                                                                       |                                                                       |
| - Measured variable voltage                                       | 0.5                                                                   | 0.2                                                                   |
| - Measured variable current                                       | 0.5                                                                   | 0.2                                                                   |
| - Measured variable apparent<br>power                             | 1                                                                     | 0.5                                                                   |
| - Measured variable active power                                  | 1                                                                     | 0.5                                                                   |
| - Measured variable reactive power                                | 1                                                                     | 1                                                                     |
| - Measured variable power factor                                  | 0.5                                                                   | 0.5                                                                   |
| - Measured variable active energy                                 | 1                                                                     | 0.5                                                                   |
| - Measured variable reactive energy                               | 2                                                                     | 1                                                                     |
| - Measured variable neutral current                               |                                                                       | 0.5; calculated                                                       |
| - Measured variable phase angle                                   | ±1 °; not covered by IEC 61557-12                                     | ±1 °; not covered by IEC 61557-12                                     |
| - Measured variable frequency                                     | 0.05                                                                  | 0.05                                                                  |
| <b>Potential separation</b>                                       |                                                                       |                                                                       |
| <b>Potential separation channels</b>                              |                                                                       |                                                                       |
| • between the channels and<br>backplane bus                       | Yes; 3 700V AC (type test) CAT III                                    | Yes; 3 700V AC (type test) CAT III                                    |
| <b>Isolation</b>                                                  |                                                                       |                                                                       |
| Isolation tested with                                             | 2 300V AC for 1 min. (type test)                                      | 2 300V AC for 1 min. (type test)                                      |
| <b>Ambient conditions</b>                                         |                                                                       |                                                                       |
| <b>Ambient temperature during<br/>operation</b>                   |                                                                       |                                                                       |
| • horizontal installation, min.                                   | 0 °C                                                                  | 0 °C                                                                  |
| • horizontal installation, max.                                   | 60 °C                                                                 | 60 °C                                                                 |
| • vertical installation, min.                                     | 0 °C                                                                  | 0 °C                                                                  |
| • vertical installation, max.                                     | 50 °C                                                                 | 50 °C                                                                 |
| <b>Dimensions</b>                                                 |                                                                       |                                                                       |
| Width                                                             | 20 mm                                                                 | 20 mm                                                                 |
| Height                                                            | 73 mm                                                                 | 73 mm                                                                 |
| Depth                                                             | 58 mm                                                                 | 58 mm                                                                 |
| <b>Weights</b>                                                    |                                                                       |                                                                       |
| Weight (without packaging)                                        | 45 g                                                                  | 45 g                                                                  |
| <b>Data for selecting a current<br/>transformer</b>               |                                                                       |                                                                       |
| • Burden power current<br>transformer x/1A, min.                  | As a function of cable length and cross section,<br>see device manual | As a function of cable length and cross section,<br>see device manual |
| • Burden power current<br>transformer x/5A, min.                  | As a function of cable length and cross section,<br>see device manual | As a function of cable length and cross section,<br>see device manual |

[illegible]