

## Data sheet

### CPU 314ST (314-6CF23)

#### Technical data

|                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|---------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Order no.                                               | 314-6CF23                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Type                                                    | CPU 314ST                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| General information                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Note                                                    | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Features                                                | Powered by SPEED7<br>Work memory [KB]: 512...2.048<br>Onboard: 8x DI / 8x DIO / 4x AI [current/voltage] / 2x AO / 1x Pt100 / 4x Counter<br>SPEED-Bus<br>Interface [RJ45]: Ethernet PG/OP communication<br>Interface [2x RS485]: MPI, PROFIBUS master/slave, PtP: ASCII, STX/ETX, 3964 (R), USS master, Modbus master/slave<br>Including front connector<br>SD/MMC card slot with locking, up to 32 modules stackable, programmable with WinPLC7, SIMATIC Manager and TIA Portal |
| SPEED-Bus                                               | yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Technical data power supply                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Power supply (rated value)                              | DC 24 V                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Power supply (permitted range)                          | DC 20.4...28.8 V                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Reverse polarity protection                             | yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Current consumption (no-load operation)                 | 300 mA                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Current consumption (rated value)                       | 1 A                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Inrush current                                          | 5 A                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| I <sup>2</sup> t                                        | 0.5 A <sup>2</sup> s                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Max. current drain at backplane bus                     | 2.5 A                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Max. current drain load supply                          | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Power loss                                              | 14 W                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Technical data digital inputs                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Number of inputs                                        | 8                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Cable length, shielded                                  | 1000 m                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Cable length, unshielded                                | 600 m                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Rated load voltage                                      | DC 24 V                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Reverse polarity protection of rated load voltage       | yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Current consumption from load voltage L+ (without load) | 70 mA                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Rated value                                             | DC 24 V                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Input voltage for signal "0"                            | DC 0...5 V                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Input voltage for signal "1"                            | DC 15...28.8 V                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Input voltage hysteresis                                | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Signal logic input                                      | Sinking input                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Frequency range                                         | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Input resistance                                        | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Input current for signal "1"                            | 6 mA                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Connection of Two-Wire-BEROs possible                   | yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Max. permissible BERO quiescent current                 | 1.5 mA                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Input delay of "0" to "1"                               | parameterizable 2.56µs - 40ms                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Input delay of "1" to "0"                               | parameterizable 2.56µs - 40ms                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

|                                                                     |                                  |
|---------------------------------------------------------------------|----------------------------------|
| Number of simultaneously utilizable inputs horizontal configuration | 8                                |
| Number of simultaneously utilizable inputs vertical configuration   | 8                                |
| Input characteristic curve                                          | IEC 61131-2, type 1              |
| Initial data size                                                   | 34 Byte                          |
| <b>Technical data digital outputs</b>                               |                                  |
| Number of outputs                                                   | 8                                |
| Cable length, shielded                                              | 1000 m                           |
| Cable length, unshielded                                            | 600 m                            |
| Rated load voltage                                                  | DC 24 V                          |
| Reverse polarity protection of rated load voltage                   | -                                |
| Current consumption from load voltage L+ (without load)             | 30 mA                            |
| Total current per group, horizontal configuration, 40°C             | 4 A                              |
| Total current per group, horizontal configuration, 60°C             | 3 A                              |
| Total current per group, vertical configuration                     | 3 A                              |
| Output voltage signal "1" at min. current                           | L+ (-0.8 V)                      |
| Output voltage signal "1" at max. current                           | L+ (-0.8 V)                      |
| Output current at signal "1", rated value                           | 0.5 A                            |
| Signal logic output                                                 | Sourcing output                  |
| Output current, permitted range to 40°C                             | 5 mA to 0.6 A                    |
| Output current, permitted range to 60°C                             | 5 mA to 0.6 A                    |
| Output current at signal "0" max. (residual current)                | 100 µA                           |
| Output delay of "0" to "1"                                          | 100 µs                           |
| Output delay of "1" to "0"                                          | 100 µs                           |
| Minimum load current                                                | -                                |
| Lamp load                                                           | 5 W                              |
| Parallel switching of outputs for redundant control of a load       | possible                         |
| Parallel switching of outputs for increased power                   | not possible                     |
| Actuation of digital input                                          | yes                              |
| Switching frequency with resistive load                             | max. 2.5 kHz                     |
| Switching frequency with inductive load                             | max. 0.5 Hz                      |
| Switching frequency on lamp load                                    | max. 2.5 kHz                     |
| Internal limitation of inductive shut-off voltage                   | L+ (-52 V)                       |
| Short-circuit protection of output                                  | yes, electronic                  |
| Trigger level                                                       | 1 A                              |
| Number of operating cycle of relay outputs                          | -                                |
| Switching capacity of contacts                                      | -                                |
| Output data size                                                    | 18 Byte                          |
| <b>Technical data analog inputs</b>                                 |                                  |
| Number of inputs                                                    | 5                                |
| Cable length, shielded                                              | 200 m                            |
| Rated load voltage                                                  | DC 24 V                          |
| Reverse polarity protection of rated load voltage                   | yes                              |
| Current consumption from load voltage L+ (without load)             | 85 mA                            |
| Voltage inputs                                                      | yes                              |
| Min. input resistance (voltage range)                               | 120 kOhm                         |
| Input voltage ranges                                                | -10 V ... +10 V<br>0 V ... +10 V |
| Operational limit of voltage ranges                                 | +/-0.3%                          |

|                                                             |                                                          |
|-------------------------------------------------------------|----------------------------------------------------------|
| Operational limit of voltage ranges with SFU                | -                                                        |
| Basic error limit voltage ranges                            | +/-0.3%                                                  |
| Basic error limit voltage ranges with SFU                   | -                                                        |
| Destruction limit voltage                                   | max. 15V                                                 |
| Current inputs                                              | yes                                                      |
| Max. input resistance (current range)                       | 85 Ohm                                                   |
| Input current ranges                                        | -20 mA ... +20 mA<br>0 mA ... +20 mA<br>+4 mA ... +20 mA |
| Operational limit of current ranges                         | +/-0.3%                                                  |
| Operational limit of current ranges with SFU                | -                                                        |
| Basic error limit current ranges                            | +/-0.2%                                                  |
| Radical error limit current ranges with SFU                 | -                                                        |
| Destruction limit current inputs (electrical current)       | max. 50mA                                                |
| Destruction limit current inputs (voltage)                  | max. 15V                                                 |
| Resistance inputs                                           | yes                                                      |
| Resistance ranges                                           | 0 ... 600 Ohm                                            |
| Operational limit of resistor ranges                        | +/-0.4%                                                  |
| Operational limit of resistor ranges with SFU               | -                                                        |
| Basic error limit                                           | +/-0.2%                                                  |
| Basic error limit with SFU                                  | -                                                        |
| Destruction limit resistance inputs                         | max. 15V                                                 |
| Resistance thermometer inputs                               | yes                                                      |
| Resistance thermometer ranges                               | Pt100<br>Pt1000<br>Ni100<br>Ni1000                       |
| Operational limit of resistance thermometer ranges          | +/-0.6%                                                  |
| Operational limit of resistance thermometer ranges with SFU | -                                                        |
| Basic error limit thermoresistor ranges                     | +/-0.4%                                                  |
| Basic error limit thermoresistor ranges with SFU            | -                                                        |
| Destruction limit resistance thermometer inputs             | max. 15V                                                 |
| Thermocouple inputs                                         | -                                                        |
| Thermocouple ranges                                         | -                                                        |
| Operational limit of thermocouple ranges                    | -                                                        |
| Operational limit of thermocouple ranges with SFU           | -                                                        |
| Basic error limit thermocouple ranges                       | -                                                        |
| Basic error limit thermocouple ranges with SFU              | -                                                        |
| Destruction limit thermocouple inputs                       | -                                                        |
| Programmable temperature compensation                       | -                                                        |
| External temperature compensation                           | -                                                        |
| Internal temperature compensation                           | -                                                        |
| Technical unit of temperature measurement                   | °C                                                       |
| Resolution in bit                                           | 12                                                       |
| Measurement principle                                       | Sigma-Delta                                              |
| Basic conversion time                                       | 6 ms                                                     |
| Noise suppression for frequency                             | 80 dB                                                    |
| Initial data size                                           | 10 Byte                                                  |
| <b>Technical data analog outputs</b>                        |                                                          |
| Number of outputs                                           | 2                                                        |
| Cable length, shielded                                      | 200 m                                                    |

|                                                         |                                                          |
|---------------------------------------------------------|----------------------------------------------------------|
| Rated load voltage                                      | DC 24 V                                                  |
| Reverse polarity protection of rated load voltage       | yes                                                      |
| Current consumption from load voltage L+ (without load) | -                                                        |
| Voltage output short-circuit protection                 | -                                                        |
| Voltage outputs                                         | yes                                                      |
| Min. load resistance (voltage range)                    | 1 kOhm                                                   |
| Max. capacitive load (current range)                    | 1 µF                                                     |
| Max. inductive load (current range)                     | 30 mA                                                    |
| Output voltage ranges                                   | -10 V ... +10 V<br>0 V ... +10 V                         |
| Operational limit of voltage ranges                     | +/-0.4%                                                  |
| Basic error limit voltage ranges with SFU               | +/-0.3%                                                  |
| Destruction limit against external applied voltage      | max. 15V                                                 |
| Current outputs                                         | yes                                                      |
| Max. in load resistance (current range)                 | 500 Ohm                                                  |
| Max. inductive load (current range)                     | 10 mH                                                    |
| Typ. open circuit voltage current output                | 16 V                                                     |
| Output current ranges                                   | -20 mA ... +20 mA<br>0 mA ... +20 mA<br>+4 mA ... +20 mA |
| Operational limit of current ranges                     | +/-0.4%                                                  |
| Radical error limit current ranges with SFU             | +/-0.3%                                                  |
| Destruction limit against external applied voltage      | max. 15V                                                 |
| Settling time for ohmic load                            | 0.2 ms                                                   |
| Settling time for capacitive load                       | 0.5 ms                                                   |
| Settling time for inductive load                        | 0.75 ms                                                  |
| Resolution in bit                                       | 12                                                       |
| Conversion time                                         | 1 ms                                                     |
| Substitute value can be applied                         | yes                                                      |
| Output data size                                        | 4 Byte                                                   |

## Technical data counters

|                          |         |
|--------------------------|---------|
| Number of counters       | 4       |
| Counter width            | 32 Bit  |
| Maximum input frequency  | 100 kHz |
| Maximum count frequency  | 100 kHz |
| Mode incremental encoder | yes     |
| Mode pulse / direction   | yes     |
| Mode pulse               | yes     |
| Mode frequency counter   | -       |
| Mode period measurement  | -       |
| Gate input available     | yes     |
| Latch input available    | yes     |
| Reset input available    | yes     |
| Counter output available | yes     |

## Load and working memory

|                                          |        |
|------------------------------------------|--------|
| Load memory, integrated                  | 2 MB   |
| Load memory, maximum                     | 2 MB   |
| Work memory, integrated                  | 512 KB |
| Work memory, maximal                     | 2 MB   |
| Memory divided in 50% program / 50% data | yes    |

Memory card slot

SD/MMC-Card with max. 2 GB

## Hardware configuration

|                                    |                                                   |
|------------------------------------|---------------------------------------------------|
| Racks, max.                        | 4                                                 |
| Modules per rack, max.             | 8 in multiple-, 32 in a single-rack configuration |
| Number of integrated DP master     | 1                                                 |
| Number of DP master via CP         | 4                                                 |
| Operable function modules          | 8                                                 |
| Operable communication modules PtP | 8                                                 |
| Operable communication modules LAN | 8                                                 |

## Status information, alarms, diagnostics

|                                  |                      |
|----------------------------------|----------------------|
| Status display                   | yes                  |
| Interrupts                       | yes                  |
| Process alarm                    | yes, parameterizable |
| Diagnostic interrupt             | yes, parameterizable |
| Diagnostic functions             | yes                  |
| Diagnostics information read-out | possible             |
| Supply voltage display           | green LED            |
| Group error display              | red SF LED           |
| Channel error display            | red LED per group    |

## Isolation

|                                                             |                  |
|-------------------------------------------------------------|------------------|
| Between channels                                            | yes              |
| Between channels of groups to                               | 8                |
| Between channels and backplane bus                          | yes              |
| Between channels and power supply                           | -                |
| Max. potential difference between circuits                  | DC 75 V/ AC 50 V |
| Max. potential difference between inputs (Ucm)              | -                |
| Max. potential difference between Mana and Mintern (Uiso)   | -                |
| Max. potential difference between inputs and Mana (Ucm)     | -                |
| Max. potential difference between inputs and Mintern (Uiso) | -                |
| Max. potential difference between Mintern and outputs       | -                |
| Insulation tested with                                      | DC 500 V         |

## Command processing times

|                                 |         |
|---------------------------------|---------|
| Bit instructions, min.          | 0.01 µs |
| Word instruction, min.          | 0.01 µs |
| Double integer arithmetic, min. | 0.01 µs |
| Floating-point arithmetic, min. | 0.06 µs |

## Timers/Counters and their retentive characteristics

|                                 |               |
|---------------------------------|---------------|
| Number of S7 counters           | 512           |
| S7 counter remanence            | 0 .. 512      |
| S7 counter remanence adjustable | C0 .. C7      |
| Number of S7 times              | 512           |
| S7 times remanence              | 0 .. 512      |
| S7 times remanence adjustable   | not retentive |

## Data range and retentive characteristic

|                                                  |             |
|--------------------------------------------------|-------------|
| Number of flags                                  | 8192 Byte   |
| Bit memories retentive characteristic adjustable | 0 .. 8192   |
| Bit memories retentive characteristic preset     | MB0 .. MB15 |

|                                          |           |
|------------------------------------------|-----------|
| Number of data blocks                    | 4095      |
| Max. data blocks size                    | 64 KB     |
| Max. local data size per execution level | 1024 Byte |

## Blocks

|                                                     |      |
|-----------------------------------------------------|------|
| Number of OBs                                       | 23   |
| Number of FBs                                       | 2048 |
| Number of FCs                                       | 2048 |
| Maximum nesting depth per priority class            | 8    |
| Maximum nesting depth additional within an error OB | 4    |

## Time

|                                    |              |
|------------------------------------|--------------|
| Real-time clock buffered           | yes          |
| Clock buffered period (min.)       | 6 w          |
| Accuracy (max. deviation per day)  | 10 s         |
| Number of operating hours counter  | 8            |
| Clock synchronization              | yes          |
| Synchronization via MPI            | Master/Slave |
| Synchronization via Ethernet (NTP) | no           |

## Address areas (I/O)

|                              |           |
|------------------------------|-----------|
| Input I/O address area       | 8192 Byte |
| Output I/O address area      | 8192 Byte |
| Input process image maximal  | 2048 Byte |
| Output process image maximal | 2048 Byte |
| Digital inputs               | 65536     |
| Digital outputs              | 65536     |
| Digital inputs central       | 1032      |
| Digital outputs central      | 1032      |
| Integrated digital inputs    | 8         |
| Integrated digital outputs   | 8         |
| Analog inputs                | 1024      |
| Analog outputs               | 1024      |
| Analog inputs, central       | 261       |
| Analog outputs, central      | 258       |
| Integrated analog inputs     | 5         |
| Integrated analog outputs    | 2         |

## Communication functions

|                                           |          |
|-------------------------------------------|----------|
| PG/OP channel                             | yes      |
| Global data communication                 | yes      |
| Number of GD circuits, max.               | 4        |
| Size of GD packets, max.                  | 22 Byte  |
| S7 basic communication                    | yes      |
| S7 basic communication, user data per job | 76 Byte  |
| S7 communication                          | yes      |
| S7 communication as server                | yes      |
| S7 communication as client                | -        |
| S7 communication, user data per job       | 160 Byte |
| Number of connections, max.               | 32       |

## PWM data

|              |   |
|--------------|---|
| PWM channels | - |
|--------------|---|

|                     |   |
|---------------------|---|
| PWM time basis      | - |
| Period length       | - |
| Minimum pulse width | - |
| Type of output      | - |

## Functionality Sub-D interfaces

|                          |                          |
|--------------------------|--------------------------|
| Type                     | X2                       |
| Type of interface        | RS485                    |
| Connector                | Sub-D, 9-pin, female     |
| Electrically isolated    | yes                      |
| MPI                      | yes                      |
| MP2I (MPI/RS232)         | -                        |
| DP master                | -                        |
| DP slave                 | -                        |
| Point-to-point interface | -                        |
| 5V DC Power supply       | max. 90mA, isolated      |
| 24V DC Power supply      | max. 100mA, non-isolated |

|                          |                          |
|--------------------------|--------------------------|
| Type                     | X3                       |
| Type of interface        | RS485                    |
| Connector                | Sub-D, 9-pin, female     |
| Electrically isolated    | yes                      |
| MPI                      | -                        |
| MP2I (MPI/RS232)         | -                        |
| DP master                | yes                      |
| DP slave                 | yes                      |
| Point-to-point interface | yes                      |
| 5V DC Power supply       | max. 90mA, isolated      |
| 24V DC Power supply      | max. 100mA, non-isolated |

## Functionality MPI

|                             |             |
|-----------------------------|-------------|
| Number of connections, max. | 32          |
| PG/OP channel               | yes         |
| Routing                     | yes         |
| Global data communication   | yes         |
| S7 basic communication      | yes         |
| S7 communication            | yes         |
| S7 communication as server  | yes         |
| S7 communication as client  | -           |
| Transmission speed, min.    | 19.2 kbit/s |
| Transmission speed, max.    | 12 Mbit/s   |

## Functionality PROFIBUS master

|                                      |     |
|--------------------------------------|-----|
| Number of connections, max.          | 32  |
| PG/OP channel                        | yes |
| Routing                              | yes |
| S7 basic communication               | yes |
| S7 communication                     | yes |
| S7 communication as server           | yes |
| S7 communication as client           | -   |
| Activation/deactivation of DP slaves | yes |

|                                                     |            |
|-----------------------------------------------------|------------|
| Direct data exchange (slave-to-slave communication) | -          |
| DPV1                                                | yes        |
| Transmission speed, min.                            | 9.6 kbit/s |
| Transmission speed, max.                            | 12 Mbit/s  |
| Number of DP slaves, max.                           | 124        |
| Address range inputs, max.                          | 1 KB       |
| Address range outputs, max.                         | 1 KB       |
| User data inputs per slave, max.                    | 244 Byte   |
| User data outputs per slave, max.                   | 244 Byte   |

## Functionality PROFIBUS slave

|                                                     |            |
|-----------------------------------------------------|------------|
| Number of connections, max.                         | 32         |
| PG/OP channel                                       | yes        |
| Routing                                             | yes        |
| S7 communication                                    | yes        |
| S7 communication as server                          | yes        |
| S7 communication as client                          | -          |
| Direct data exchange (slave-to-slave communication) | -          |
| DPV1                                                | yes        |
| Transmission speed, min.                            | 9.6 kbit/s |
| Transmission speed, max.                            | 12 Mbit/s  |
| Automatic detection of transmission speed           | -          |
| Transfer memory inputs, max.                        | 244 Byte   |
| Transfer memory outputs, max.                       | 244 Byte   |
| Address areas, max.                                 | 32         |
| User data per address area, max.                    | 32 Byte    |

## Functionality RJ45 interfaces

|                             |                      |
|-----------------------------|----------------------|
| Type                        | X5                   |
| Type of interface           | Ethernet 10/100 MBit |
| Connector                   | RJ45                 |
| Electrically isolated       | yes                  |
| PG/OP channel               | yes                  |
| Number of connections, max. | 4                    |
| Productive connections      | -                    |

## Point-to-point communication

|                          |                      |
|--------------------------|----------------------|
| PtP communication        | yes                  |
| Interface isolated       | yes                  |
| RS232 interface          | -                    |
| RS422 interface          | -                    |
| RS485 interface          | yes                  |
| Connector                | Sub-D, 9-pin, female |
| Transmission speed, min. | 150 bit/s            |
| Transmission speed, max. | 115.5 kbit/s         |
| Cable length, max.       | 500 m                |

## Point-to-point protocol

|                  |     |
|------------------|-----|
| ASCII protocol   | yes |
| STX/ETX protocol | yes |
| 3964(R) protocol | yes |
| RK512 protocol   | -   |

|                                 |                         |
|---------------------------------|-------------------------|
| USS master protocol             | yes                     |
| Modbus master protocol          | yes                     |
| Modbus slave protocol           | -                       |
| Special protocols               | -                       |
| <b>Housing</b>                  |                         |
| Material                        | PPE                     |
| Mounting                        | Rail System 300         |
| <b>Mechanical data</b>          |                         |
| Dimensions (WxHxD)              | 80 mm x 125 mm x 120 mm |
| Net weight                      | 480 g                   |
| Weight including accessories    | -                       |
| Gross weight                    | -                       |
| <b>Environmental conditions</b> |                         |
| Operating temperature           | 0 °C to 60 °C           |
| Storage temperature             | -25 °C to 70 °C         |
| <b>Certifications</b>           |                         |
| UL certification                | yes                     |
| KC certification                | yes                     |