

**PLC  
+ HMI**  
ALL IN ONE™

**spectra**  
Industrie-PC & Automation



**SAMBA™**

**All-in-One SPS mit High-Resolution Farb-Touchscreen & onboard E/A-Konfiguration. Hohe Leistung zum kleinen Preis.**

## Merkmale:

### HMI

- Display: Farb-Touchscreen  
3.5" – 320 x 240 | 4.3" – 480 x 272 | 7" – 800 x 480
- 24 benutzerdefinierbare Displays und 40 Bilder pro Applikation
- Farbige Prozessbilder und Trendgrafiken
- Eingebaute Alarmdisplays
- Textbibliothek – einfache Sprachanpassung für mehrsprachige Applikationen
- Fehlerdiagnose via HMI Panel – kein PC nötig

### SPS

- E/A-Optionen: digital, analog, inkl. High-Speed
- Auto-tune PID, 2 unabhängige Regelkreise
- Tabellen für Rezepte und Datenlogger
- Zeitbasierte Steuerung

### Kommunikation

- TCP/IP via Ethernet
- SMS, E-Mail
- GPRS/GSM
- Fernzugriff über Modem
- Unterstützt MODBUS Protokoll
- BACnet, M-bus – via 3rd-party Konverter
- CANbus: CANopen, UniCAN, SAE J1939, ...
- DF1 Slave
- Ports: RS-232 Programmierport für 3.5",  
USB für 4.3" & 7" Modell
- Erweiterungsmöglichkeit um 2 Ports:  
1 x seriell (RS-232/RS-485) / Ethernet & 1 CANbus

| MODELL                                       |   | SAMBA   |   |  |   |            |                 |             |                 |
|--|---|---|---|--|---|------------|-----------------|-------------|-----------------|
|  |   | SM35-J-R20  | Art. Nr. 132422   | SM35-J-RA22  | Art. Nr. 147880   | SM35-J-T20 | Art. Nr. 132423 | SM35-J-TA22 | Art. Nr. 148167 |
|  |   | SM43-J-R20  | Art. Nr. 141764   | SM43-J-RA22  | Art. Nr. 147900   | SM43-J-T20 | Art. Nr. 141763 | SM43-J-TA22 | Art. Nr. 148171 |
|  |   | SM70-J-R20  | Art. Nr. 143790   | SM70-J-RA22  | Art. Nr. 148161   | SM70-J-T20 | Art. Nr. 143791 | SM70-J-TA22 | Art. Nr. 148162 |
|  |   | 10 digitale Eingänge<br>2 analoge / digitale Eingänge <sup>1</sup><br>8 Relais-Ausgänge | 8 digitale Eingänge<br>2 analoge / digitale Eingänge<br>2 Pt100 / TC / digitale Eingänge<br>8 Relais-Ausgänge<br>2 analoge Ausgänge | 10 digitale Eingänge<br>2 analoge / digitale Eingänge<br>8 Transistor-Ausgänge | 8 digitale Eingänge<br>2 analoge / digitale Eingänge<br>2 Pt100 / TC / digitale Eingänge<br>8 Transistor-Ausgänge<br>2 analoge Ausgänge |            |                 |             |                 |
| EINGÄNGE                                     |   |   |   |  |   |            |                 |             |                 |
| Digital                                      |   | 12  | 12  | 12   | 12  |            |                 |             |                 |
| HSC/Schalt-Encoder/Max. Freq. <sup>2,3</sup> |   | 1x 32-bit 30 kHz  | 1x 32-bit 30 kHz  | 3x 32-bit 30 kHz   | 1x 32-bit 30 kHz  |            |                 |             |                 |
| Analog                                       |   | 2x 0-10 V oder<br>0-20 mA, 4-20 mA<br>10-bit  | 2x 0-10 V oder<br>0-20 mA, 4-20 mA<br>2 Modi: Normal: 14-bit, Fast: 12-bit  | 2x 10-bit, 0-10 V<br>0-20 mA, 4-20 mA  | 2x 0-10 V oder<br>0-20 mA, 4-20 mA<br>2 Modi: Normal: 14-bit, Fast: 12-bit  |            |                 |             |                 |
| Temperatureingänge                           |   | -   | und als<br>2x Pt100/TC  | -  | und als<br>2x Pt100/TC  |            |                 |             |                 |
| AUSGÄNGE                                     |   |   |   |  |   |            |                 |             |                 |
| Digital                                      |   | 8 Relais  | 8 Relais  | 8 npn  | 8 npn   |            |                 |             |                 |
| High-Speed Ausgänge/PWM                      |   | -   | -   | Ausgänge 0 bis 6 können als PWM Ausgang<br>0,5 kHz genutzt werden              | Ausgänge 0 bis 4 können als PWM Ausgang<br>0,5 kHz genutzt werden   |            |                 |             |                 |
| Analog                                       |   | -   | 2x 12-bit, 0-10 V, 4-20 mA  | -  | 2x 12-bit, 0-10 V, 4-20 mA  |            |                 |             |                 |
| E/A-Erweiterung                              |   |   |   |  |   |            |                 |             |                 |
| Remote E/As via CANbus                       |   |   |   |  |   |            |                 |             |                 |
| PROGRAMM                                     |   |   |   |  |   |            |                 |             |                 |
| Application Memory                           | SM35  | Anwendungslogik: 112 kb, Bilder: 1 MB, Schriften: 512 k                                 |   |  |   |            |                 |             |                 |
|  | SM43  | Anwendungslogik: 112 kb, Bilder: 2 MB, Schriften: 512 k                                 |   |  |   |            |                 |             |                 |
|  | SM70  | Anwendungslogik: 112 kb, Bilder: 5 MB, Schriften: 512 k                                 |   |  |   |            |                 |             |                 |
| Zykluszeit                                   | 15µs per 1K für typ. Anwendung  |   |   |  |   |            |                 |             |                 |
| Speicheroperanden                            | 512 coils, 256 registers, 32 long integers (32-bit), 32 double words (32-bit unsigned), 24 floats, 32 timer (32-bit), 16 counter.<br>Zusätzliche flüchtige Operanden: 64 X-bits, 32 X-integers, 16 X-long integers, 16 X-double words |   |   |  |   |            |                 |             |                 |
| Tabellen                                     | 32 k dynamische RAM Daten (Rezeptparameter, Datalogging, etc.), bis zu 16 k Flash Daten   |   |   |  |   |            |                 |             |                 |
| SD Card (Micro)                              | -   |   |   |  |   |            |                 |             |                 |
| Erweiterte Funktionen                        | Trends: Liniengrafik für alle Werte und Anzeige auf Display, Textbibliothek: einfache Sprachumschaltung   |   |   |  |   |            |                 |             |                 |
| BEDIENFELD                                   |   |   |   |  |   |            |                 |             |                 |
| Art & Farbe                                  | TFT LCD • 65.536 Farben • 16-bit Auflösung • Helligkeit einstellbar via Touchscreen oder Software   |   |   |  |   |            |                 |             |                 |
| Display                                      | SM35  | Auflösung: 320 x 240 Pixel • Größe: 3.5" (QVGA)   |   |  |   |            |                 |             |                 |
|  | SM43  | Auflösung: 480 x 272 Pixel • Größe: 4.3"  |   |  |   |            |                 |             |                 |
|  | SM70  | Auflösung: 800 x 480 Pixel • Größe: 7"  |   |  |   |            |                 |             |                 |
| Touchscreen                                  | resistiv, analog  |   |   |  |   |            |                 |             |                 |
| Tastatur                                     | Anzeige der virtuellen Tastatur, wenn die Anwendung Dateneingabe benötigt   |   |   |  |   |            |                 |             |                 |
| ALLGEMEINES                                  |   |   |   |  |   |            |                 |             |                 |
| Stromversorgung                              | 24 VDC  |   |   |  |   |            |                 |             |                 |
| Batterie                                     | Stützbatterie für RTC und Systemdaten, inkl. variabler Daten, 7 Jahre typ. bei 25°C   |   |   |  |   |            |                 |             |                 |
| Uhr  | Echtzeituhr-Funktionen (Datum und Zeit)   |   |   |  |   |            |                 |             |                 |
| Schutzart                                    | NEMA4X / IP66 / IP65 (bei Schalttafelmontage)   |   |   |  |   |            |                 |             |                 |
| Zertifizierung                               | CE, UL  |   |   |  |   |            |                 |             |                 |

1. Wenn die digitalen Eingänge als npn genutzt werden, steht die Analogoption nicht zur Verfügung.

2. Bestimmte Eingänge können als High-Speed Zähler, Schalt-Encoder Eingang oder als normaler digitaler Eingang genutzt werden.

3. Diese Spezifikation hängt von der Kabellänge ab.

## Ordering Information

### Item

|             |   |
|-------------|---|
| SM35-J-RA22 | PLC with Flat panel, Color touch display 3.5" |
| SM43-J-RA22 | PLC with Flat panel, Color touch display 4.3" |
| SM70-J-RA22 | PLC with Flat panel, Color touch display 7"   |

You can find additional information, such as wiring diagrams, in the product's installation guide located in the Technical Library at [www.unitronics.com](http://www.unitronics.com).

## Power Supply

| Item                     | SM35-J-RA22                                  | SM43-J-RA22 | SM70-J-RA22 |
|--------------------------|--|-------------|-------------|
| Input voltage            | 24VDC  |             |             |
| Permissible range        | 20.4VDC to 28.8VDC with less than 10% ripple |             |             |
| Max. current consumption | See Note 1                                   |             |             |
| nnp inputs               | 275mA@24VDC                                  | 275mA@24VDC | 330mA@24VDC |
| nnp inputs               | 235mA@24VDC                                  | 235mA@24VDC | 295mA@24VDC |

### Notes:

- To calculate the actual power consumption, subtract the current for each unused element from the maximum current consumption value according to the values below:

|           | Backlight | Ethernet card | Relay Outputs (per output) | All Analog Outputs, voltage/current |
|-----------|-----------|---------------|----------------------------|-------------------------------------|
| SM35/SM43 | 20mA      | 35mA          | 5mA                        | 48mA/30mA*                          |
| SM70      | 80mA      | 35mA          | 5mA                        | 48mA/30mA*                          |

\*If the analog outputs are not configured, then subtract the higher value.

## Digital Inputs

|                       |  |
|-----------------------|--|
| Number of inputs      | 12. See Note 2                                       |
| Input type            | See Note 2   |
| Galvanic isolation    | None   |
| Nominal input voltage | 24VDC  |
| Input voltage         |  |
| nnp (source)          | 0-5VDC for Logic '0'<br>17-28.8VDC for Logic '1'     |
| nnp (sink)            | 17-28.8VDC for Logic '0'<br>0-5VDC for Logic '1'     |
| Input current         | 3.7mA@24VDC  |
| Input impedance       | 6.5KΩ  |
| Response time         | 10ms typical, when used as normal digital inputs     |
| Input cable length    |  |
| Normal digital input  | Up to 100 meters                                     |
| High Speed Input      | Up to 50 meters, shielded, see Frequency table below |

High speed inputs Specifications below apply when wired as HSC/shaft-encoder.  
See Note 2  
Frequency (max) See Note 3

| Cable length (max.) | HSC   | Shaft-encoder pnp | Shaft-encoder npn |
|---------------------|-------|-------------------|-------------------|
| 10m                 | 30kHz | 20kHz             | 16kHz             |
| 25m                 | 25kHz | 12kHz             | 10kHz             |
| 50m                 | 15kHz | 7kHz              | 5kHz              |

Duty cycle 40-60%  
Resolution 32-bit

**Notes:**

2. This model comprises a total of 12 inputs.

All 12 inputs may be used as digital inputs. They may be wired in a group via a single jumper as either npn or pnp.

In addition, according to jumper settings and appropriate wiring:

- Inputs 5 and 6 can function as either digital or analog inputs.
- Input 0 can function as a high-speed counter, as part of a shaft-encoder, or as normal digital inputs.
- Input 1 can function as either counter reset, normal digital input, or as part of a shaft-encoder.
- If input 0 is set as a high-speed counter (without reset), input 1 can function as a normal digital input.
- Inputs 7-8 and 9-10 can function as digital, thermocouple, or PT100 inputs; input 11 can also serve as the CM signal for PT100.

3. pnp/npn maximum frequency is at 24VDC.

**Analog Inputs**

|                           |   |         |
|---------------------------|---|---------|
| Number of inputs          | 2, according to wiring as described above in Note 2 |         |
| Input type                | Multi-range inputs: 0-10V, 0-20mA, 4-20mA           |         |
| Input range               | 0-20mA, 4-20mA                                      | 0-10VDC |
| Input impedance           | 37Ω   | 12.77kΩ |
| Maximum input rating      | 30mA, 1.1V  | ±15V    |
| Galvanic isolation        | None  |         |
| Conversion method         | Voltage to frequency                                |         |
| Normal mode               |   |         |
| Resolution, except 4-20mA | 14-bit (16384units)                                 |         |
| Resolution, at 4-20mA     | 3277 to 16383 (13107 units)                         |         |
| Conversion time           | 100ms minimum per channel. See Note 4.              |         |
| Fast mode                 |   |         |
| Resolution, except 4-20mA | 12-bit (4096 units)                                 |         |
| Resolution, at 4-20mA     | 819 to 4095 (3277 units)                            |         |
| Conversion time           | 30ms minimum per channel. See Note 4.               |         |
| Accuracy                  | ±0.44%  |         |
| Status indication         | Yes. See Note 5                                     |         |

**Notes:**

4. Conversion times are accumulative and depend on the total number of analog inputs configured. For example, if only one analog input (fast mode) is configured, the conversion time will be 30ms; however, if two analog (normal mode) and two RTD inputs are configured, the conversion time will be 100ms + 100ms + 300ms + 300ms = 800ms.
5. The analog value can indicate faults as shown below:

| Value: 12-bit | Value: 14-bit | Possible Cause                                  |
|---------------|---------------|---|
| -1            | -1            | Deviates slightly below the input range         |
| 4096          | 16384         | Deviates slightly above the input range         |
| 32767         | 32767         | Deviates greatly above or below the input range |

**RTD Inputs**

|                                  |   |
|----------------------------------|---|
| RTD Type                         | PT100                                       |
| Temperature coefficient $\alpha$ | 0.00385/0.00392                             |
| Input range                      | -200 to 600°C/-328 to 1100°F. 1 to 320Ω.    |
| Isolation                        | None  |
| Conversion method                | Voltage to frequency                        |
| Resolution                       | 0.1°C/0.1°F                                 |
| Conversion time                  | 300ms minimum per channel. See Note 4 above |
| Input impedance                  | >10MΩ                                       |
| Auxiliary current for PT100      | 150μA typical                               |
| Accuracy                         | ±0.44%                                      |
| Status indication                | Yes. See Note 6                             |
| Cable length                     | Up to 50 meters, shielded                   |

**Notes:**

6. The analog value can indicate faults as shown below:

| Value  | Possible Cause   |
|--------|--|
| 32767  | Sensor is not connected to input, or value exceeds permissible range |
| -32767 | Sensor is short-circuited  |

**Thermocouple Inputs**

|                                  |   |
|----------------------------------|---|
| Input range                      | See Note 7                                  |
| Isolation                        | None  |
| Conversion method                | Voltage to frequency                        |
| Resolution                       | 0.1°C/ 0.1°F maximum                        |
| Conversion time                  | 100ms minimum per channel. See Note 7 above |
| Input impedance                  | >10MΩ                                       |
| Cold junction compensation       | Local, automatic                            |
| Cold junction compensation error | ±1.5°C/±2.7°F maximum                       |
| Absolute maximum rating          | ±0.6VDC                                     |
| Accuracy                         | ±0.44%                                      |
| Warm-up time                     | ½ hour typically, ±1°C/±1.8°F repeatability |
| Status indication                | Yes. See Note 6 above                       |

**Notes:**

7. The device can also measure voltage within the range of -5 to 56mV, at a resolution of 0.01mV.  
The device can also measure raw value frequency at a resolution of 14-bits (16384). Input ranges are shown in the following table:

| Type | Temp. Range                     | Type | Temp. Range                     |
|------|---------------------------------|------|---------------------------------|
| mV   | -5 to 56mV                      | N    | -200 to 1300°C (-328 to 2372°F) |
| B    | 200 to 1820°C (300 to 3276°F)   | R    | 0 to 1768°C (32 to 3214°F)      |
| E    | -200 to 750°C (-328 to 1382°F)  | S    | 0 to 1768°C (32 to 3214°F)      |
| J    | -200 to 760°C (-328 to 1400°F)  | T    | -200 to 400°C (-328 to 752°F)   |
| K    | -200 to 1250°C (-328 to 2282°F) |      |                                 |

**Digital Outputs**

|                                 |   |
|---------------------------------|---|
| Number of outputs               | 8 relay (in 2 groups). See Note 8   |
| Output type                     | SPST-NO (Form A)  |
| Isolation                       | By relay  |
| Type of relay                   | Tyco PCN-124D3MHZ or compatible   |
| Output current (resistive load) | 3A maximum per output<br>8A maximum total per common  |
| Rated voltage                   | 250VAC / 30VDC  |
| Minimum load                    | 1mA, 5VDC   |
| Life expectancy                 | 100k operations at maximum load   |
| Response time                   | 10ms (typical)  |
| Contact protection              | External precautions required (see <i>Increasing Contact Life Span</i> in the product's Installation Guide) |

**Notes:**

8. Outputs 0, 1, 2 and 3 share a common signal. Outputs 4, 5, 6, and 7 share a common signal.

**Analog Outputs**

|                    |   |
|--------------------|---|
| Number of outputs  | 2   |
| Output range       | 0-10V, 4-20mA. See Note 9                   |
| Resolution         | 12-bit (4096 units)                         |
| Conversion time    | Both outputs are updated per scan           |
| Load impedance     | 1kΩ minimum—voltage<br>500Ω maximum—current |
| Galvanic isolation | None  |
| Accuracy           | ±0.3%                                       |

**Notes:**

9. Note that the range of each I/O is defined by wiring, jumper settings, and within the controller's software.

**Graphic Display Screen**

| Item                      | SM35-J-RA22   | SM43-J-RA22       | SM70-J-RA22       |
|---------------------------|---|-------------------|-------------------|
| LCD Type                  | TFT, LCD display  | TFT, LCD display  | TFT, LCD display  |
| Illumination backlight    | White LED   | White LED         | White LED         |
| Display resolution        | 320x240 pixels  | 480x272 pixels    | 800x480 pixels    |
| Viewing area              | 3.5"  | 4.3"              | 7"                |
| Colors                    | 65,536 (16-bit)   | 65,536 (16-bit)   | 65,536 (16-bit)   |
| Touchscreen               | Resistive, analog   | Resistive, analog | Resistive, analog |
| Screen brightness control | Via software (Store value to SI 9, values range: 0 to 100%)         |                   |                   |
| Virtual Keypad            | Displays virtual keyboard when the application requires data entry. |                   |                   |

**Program**

| Item              | SM35-J-RA22 | SM43-J-RA22 | SM70-J-RA22 |
|-------------------|-------------|-------------|-------------|
| Memory size       |             |             |             |
| Application Logic | 112KB       | 112KB       | 112KB       |
| Images            | 1MB         | 2MB         | 5MB         |
| Fonts             | 512KB       | 512KB       | 512KB       |

| Operand type       | Quantity | Symbol | Value                                       |
|--------------------|----------|--------|---|
| Memory Bits        | 512      | MB     | Bit (coil)                                  |
| Memory Integers    | 256      | MI     | 16-bit signed/unsigned                      |
| Long Integers      | 32       | ML     | 32-bit signed/unsigned                      |
| Double Word        | 32       | DW     | 32-bit unsigned                             |
| Memory Floats      | 24       | MF     | 32-bit signed/unsigned                      |
| Fast Bits          | 64       | XB     | Fast Bits (coil) – not retained             |
| Fast Integers      | 32       | XI     | 16 bit signed/unsigned (fast, not retained) |
| Fast Long Integers | 16       | XL     | 32 bit signed/unsigned (fast, not retained) |
| Fast Double Word   | 16       | XDW    | 32 bit unsigned (fast, not retained)        |
| Timers             | 32       | T      | Res. 10 ms; max 99h, 59 min, 59.99s         |
| Counters           | 16       | C      | 32-bit                                      |

Data Tables                   32K dynamic data (recipe parameters, datalogs, etc.)  
 16K fixed data (read-only data, ingredient names, etc)

HMI displays                   Up to 24

Program scan time           15µs per 1kb of typical application

**Communication Ports**

Port 1                           1 channel, RS232 (SM35) , USB device (SM43/SM70)

Galvanic isolation           SM35 and SM43 – No  
 SM70 - Yes

Baud rate                      300 to 115200 bps

**RS232 (SM35 only)**

  Input voltage               ±20VDC absolute maximum

  Cable length               15m maximum (50')

**USB device (SM43,SM70 only)**

  Port type                   Mini-B

  Specification               USB 2.0 complaint; full speed

  Cable                        USB 2.0 complaint; up to 3m

Port 2 (optional)            See Note 10

CANbus (optional)           See Note 10

**Notes:**

10. The user may order and install one or both of the following modules:
- A serial RS232/RS485 isolated/non-isolated interface module, or an Ethernet Interface module in port 2.
  - A CANbus module
- modules documentation is available on the Unitronics website.

**Miscellaneous**

Clock (RTC)                   Real-time clock functions (date and time)

Battery back-up              7 years typical at 25°C, battery back-up for RTC and system data, including variable data

Battery replacement        Yes. Coin-type 3V, lithium battery, CR2450

**Dimensions**

| Item   | SM35-J-RA22   | SM43-J-RA22   | SM70-J-RA22   |
|--------|---|---|---|
| Size   | 109 x 114.1 x 68mm<br>(4.29 x 4.49 x 2.67").<br>See Note 11 | 136 x 105.1 x 61.3mm<br>(5.35 x 4.13 x 2.41").<br>See Note 11 | 210 x 146.4 x 42.3mm<br>(8.26 x 5.76 x 1.66").<br>See Note 11 |
| Weight | 226g (7.97 oz)  | 365g (12.87 oz)   | 654g (23.07 oz)   |

**Notes:**

11. For exact dimensions, refer to the product's Installation Guide.

**Environment**

|                         |  |
|-------------------------|--|
| Operational temperature | 0 to 50°C (32 to 122°F)  |
| Storage temperature     | -20 to 60°C (-4 to 140°F)  |
| Relative Humidity (RH)  | 10% to 95% (non-condensing)  |
| Mounting method         | Panel mounted (IP65/66/NEMA4X)<br>DIN-rail mounted (IP20/NEMA1)                            |
| Operating Altitude      | 2000m (6562 ft)  |
| Shock                   | IEC 60068-2-27, 15G, 11ms duration   |
| Vibration               | IEC 60068-2-6, 5Hz to 8.4Hz, 3.5mm constant amplitude,<br>8.4Hz to 150Hz, 1G acceleration. |

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