Samba™ PLC+HMI

SM35-J-RA22
SM43-J-RA22
SM70-J-RA22
Technical Specifications

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.

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		
npn inputs	275mA@24VDC	275mA@24VDC	330mA@24VDC
pnp inputs	235mA@24VDC	235mA@24VDC	295mA@24VDC

Notes:

1. 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	
pnp (source)	0-5VDC for Logic '0' 17-28.8VDC for Logic '1'
npn (sink)	17-28.8VDC for Logic '0' 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 α	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
Auxillary 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
mV	-5 to 56mV
B	200 to 1820˚C (300 to 3276˚F)
E	-200 to 750˚C (-328 to 1382˚F)
J	-200 to 760˚C (-328 to 1400˚F)
K	-200 to 1250˚C (-328 to 2282˚F)

Type	Temp. Range
N	-200 to 1300˚C (-328 to 2372˚F)
R	0 to 1768˚C (32 to 3214˚F)
S	0 to 1768˚C (32 to 3214˚F)
T	-200 to 400˚C (-328 to 752˚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 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 *Increasing Contact Life Span* 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 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 (4.29 x 4.49 x 2.67"). See Note 11	136 x 105.1 x 61.3mm (5.35 x 4.13 x 2.41"). See Note 11	210 x 146.4 x 42.3mm (8.26 x 5.76 x 1.66"). 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 50ºC (32 to 122ºF)
Storage temperature	-20 to 60ºC (-4 to 140ºF)
Relative Humidity (RH)	10% to 95% (non-condensing)
Mounting method	Panel mounted (IP65/66/NEMA4X)
	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, 8.4Hz to 150Hz, 1G acceleration.

02/16