

# Current and Voltage Controls

## 1-Phase AC/DC Voltage Control

### Types SJ 135, SJ 185

CARLO GAVAZZI



- Voltage metering relay with absolute scale
- Measuring ranges:  
SJ 135: 12 mV - 500 mVDC divided into 10 ranges  
SJ 185: 20 mV - 500 VAC divided into 8 ranges
- Knob-adjustable set point
- Latching at set level possible
- Output: 10 A SPDT relay
- Plug-in type module
- S-housing
- LED-indication for output ON
- AC or DC power supply

### Product Description

1-phase AC or DC plug-in voltage metering relays. Often used in e.g. electrical heat controls where a specific reaction is desired when a certain voltage level is exceeded.

### Ordering Key **SJ 135 024 500V**

Housing \_\_\_\_\_  
 Function \_\_\_\_\_  
 Output \_\_\_\_\_  
 Type \_\_\_\_\_  
 Power supply \_\_\_\_\_  
 Measuring range \_\_\_\_\_

### Type Selection

Plug	Output	Measuring range	Supply: 24 VAC	Supply: 115 VAC	Supply: 230 VAC	Supply: 24 VDC
<b>DC-voltage metering</b>						
Circular SPDT		12 - 60 mVDC	<b>SJ 135 024 60mV</b>	<b>SJ 135 115 60mV</b>	<b>SJ 135 230 60mV</b>	<b>SJ 135 724 60mV</b>
		30 - 150 mVDC	<b>SJ 135 024 150mV</b>	<b>SJ 135 115 150mV</b>	<b>SJ 135 230 150mV</b>	<b>SJ 135 724 150mV</b>
		0.2 - 1 VDC	<b>SJ 135 024 1V</b>	<b>SJ 135 115 1V</b>	<b>SJ 135 230 1V</b>	<b>SJ 135 724 1V</b>
		1 - 5 VDC	<b>SJ 135 024 5V</b>	<b>SJ 135 115 5V</b>	<b>SJ 135 230 5V</b>	<b>SJ 135 724 5V</b>
		2 - 10 VDC	<b>SJ 135 024 10V</b>	<b>SJ 135 115 10V</b>	<b>SJ 135 230 10V</b>	<b>SJ 135 724 10V</b>
		4 - 20 VDC	<b>SJ 135 024 20V</b>	<b>SJ 135 115 20V</b>	<b>SJ 135 230 20V</b>	<b>SJ 135 724 20V</b>
		10 - 50 VDC	<b>SJ 135 024 50V</b>	<b>SJ 135 115 50V</b>	<b>SJ 135 230 50V</b>	<b>SJ 135 724 50V</b>
		30 - 150 VDC	<b>SJ 135 024 150V</b>	<b>SJ 135 115 150V</b>	<b>SJ 135 230 150V</b>	<b>SJ 135 724 150V</b>
		60 - 300 VDC	<b>SJ 135 024 300V</b>	<b>SJ 135 115 300V</b>	<b>SJ 135 230 300V</b>	<b>SJ 135 724 300V</b>
		100 - 500 VDC	<b>SJ 135 024 500V</b>	<b>SJ 135 115 500V</b>	<b>SJ 135 230 500V</b>	<b>SJ 135 724 500V</b>
<b>AC-voltage metering</b>						
Circular SPDT		20 - 100 mVAC	<b>SJ 185 024 100mV</b>	<b>SJ 185 115 100mV</b>	<b>SJ 185 230 100mV</b>	<b>SJ 185 724 100mV</b>
		0.2 - 1 VAC	<b>SJ 185 024 1V</b>	<b>SJ 185 115 1V</b>	<b>SJ 185 230 1V</b>	<b>SJ 185 724 1V</b>
		2 - 10 VAC	<b>SJ 185 024 10V</b>	<b>SJ 185 115 10V</b>	<b>SJ 185 230 10V</b>	<b>SJ 185 724 10V</b>
		4 - 20 VAC	<b>SJ 185 024 20V</b>	<b>SJ 185 115 20V</b>	<b>SJ 185 230 20V</b>	<b>SJ 185 724 20V</b>
		10 - 50 VAC	<b>SJ 185 024 50V</b>	<b>SJ 185 115 50V</b>	<b>SJ 185 230 50V</b>	<b>SJ 185 724 50V</b>
		30 - 150 VAC	<b>SJ 185 024 150V</b>	<b>SJ 185 115 150V</b>	<b>SJ 185 230 150V</b>	<b>SJ 185 724 150V</b>
		60 - 300 VAC	<b>SJ 185 024 300V</b>	<b>SJ 185 115 300V</b>	<b>SJ 185 230 300V</b>	<b>SJ 185 724 300V</b>
		100 - 500 VAC	<b>SJ 185 024 500V</b>	<b>SJ 185 115 500V</b>	<b>SJ 185 230 500V</b>	<b>SJ 185 724 500V</b>

### Input Specifications

Input	Measuring ranges (SJ 185)			Internal resist.	Max. volt.	Max. volt.			
Through pins 5 & 7	AC/DC voltage, pin 5 pos. at DC								
Measuring ranges (SJ 135)	12 - 60 mVDC	100 Ω	1 V	20 - 100 mVAC	100 Ω	1 V			
	30 - 150 mVDC	100 Ω	2 V	0.2 - 1 VAC	1 kΩ	10 V			
	0.2 - 1 VDC	1 kΩ	10 V	2 - 10 VAC	10 kΩ	50 V			
	1 - 5 VDC	3 kΩ	30 V	4 - 20 VAC	20 kΩ	100 V			
	2 - 10 VDC	10 kΩ	50 V	10 - 50 VAC	51 kΩ	150 V			
	4 - 20 VDC	20 kΩ	100 V	30 - 150 VAC	150 kΩ	350 V			
	10 - 50 VDC	51 kΩ	150 V	60 - 300 VAC	300 kΩ	500 V			
	30 - 150 VDC	150 kΩ	350 V	100 - 500 VAC	510 kΩ	600 V			
	60 - 300 VDC	300 kΩ	500 V	ranges equal rms-value of a sinusoidal voltage					
	100 - 500 VDC	510 kΩ	600 V						
<b>Max. line voltage</b>			277/480 AC/DC						
<b>Latching</b>			Interconnect pins 8 & 9 latching at set level possible						

## Output Specifications

<b>Output</b>	SPDT relay
Rated insulation voltage	250 VAC (rms) (cont./elect.)
<b>Contact ratings (AgCdO)</b>	$\mu$ (micro gap)
Resistive loads	AC 1 10 A/250 VAC (2500 VA)
	DC 1 1 A/250 VDC (250 W)
	or 10 A/25 VDC (250 W)
Small inductive loads	AC 15 2.5 A/230 VAC
	DC 13 5 A/24 VDC
<b>Mechanical life</b>	$\geq 30 \times 10^6$ operations
<b>Electrical life</b>	AC 1 $\geq 2.5 \times 10^5$ operations (at max. load)
<b>Operating frequency</b>	$\leq 7200$ operations/h
<b>Dielectric strength</b>	
Dielectric voltage	$\geq 2$ kVAC (rms) (cont./elect.)
Rated impulse withstand volt.	4 kV (1.2/50 $\mu$ s) (cont./elect.) (IEC 60664)

## Supply Specifications

<b>Power supply AC types</b>	Overvoltage cat. III (IEC 60664) (IEC 60038)
Rated operational voltage	24 VAC $\pm 15\%$ , 45 to 65 Hz
Through pins 2 & 10	024
	115
	230
Voltage interruption	$\leq 40$ ms
Dielectric voltage	$\geq 2$ kVAC (rms) (supply/elect.)
Rated impulse withstand volt.	4 kV (1.2/50 $\mu$ s) (line/neutral), no direct connection to electr.
<b>Power supply DC types</b>	Overvoltage cat. III (IEC 60664) (IEC 60038)
Rated operational voltage	24 VDC $\pm 15\%$
Through pins 2 & 10	724
Dielectric voltage	None (supply/elect.)
Rated impulse withstand volt.	800 V (1.2/50 $\mu$ s)

<b>Rated operational power</b>	
AC supply	2.5 VA
DC supply	1.5 W

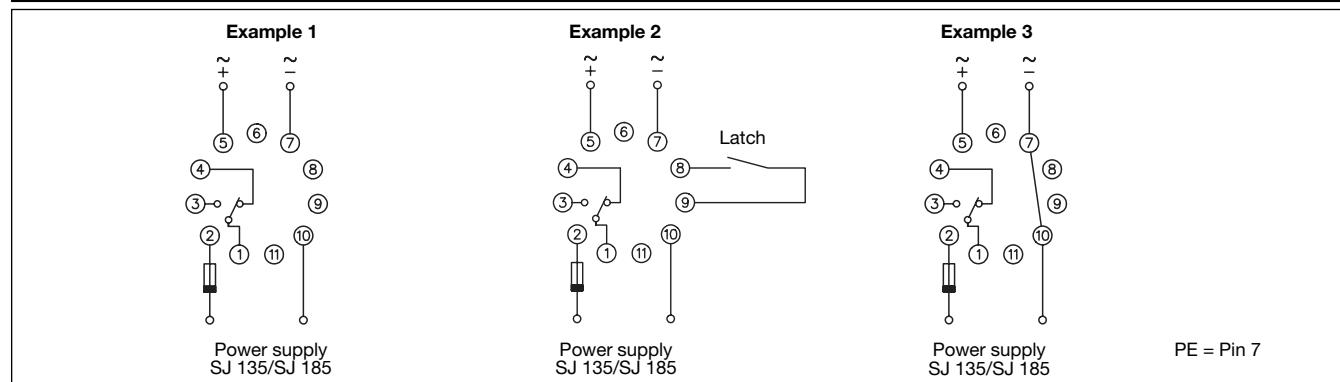
## General Specifications

<b>Reaction time</b>	Relay operates: $\tau = 22$ ms Relay releases: $\tau = 2.2$ s, worst case reaction time may be up to $5 \times \tau$
<b>Accuracy</b>	
Input	0 to 10% on max. Min. actual level $\leq$ min. set level
<b>Indication for</b>	
Output ON	LED, yellow
<b>Environment</b>	
Degree of protection	(IEC 60947-1) IP 20 B (IEC 60947-1)
Pollution degree	2 (IEC 60664)
Operating temperature	-20° to +50°C (-4° to +122°F)
Storage temperature	-50° to +85°C (-58° to +185°F)
<b>Weight</b>	AC supply 200 g DC supply 125 g
<b>Approvals</b>	UL, CSA, SEV

## Mode of Operation

<b>SJ 135</b>	<b>SJ 185</b>
<b>Example 1</b>	The SJ 185 measures the average of a sinusoidal voltage (input). The set point, calibrated to rms-value, is set on built-in potentiometer.
<b>DC voltage metering (AC power supply)</b>	
The relay operates when the actual voltage reaches set point.	
The relay releases when the voltage drops min. 10% below set point (see hysteresis) or when power supply is interrupted.	
<b>Example 2</b>	<b>Example 1</b>
<b>DC voltage metering - latching (AC power supply)</b>	<b>AC voltage metering (AC power supply)</b>
The relay operates and remains in operating position when the actual voltage reaches set point.	The relay operates when the voltage reaches set point.
Provided that the voltage has dropped min. 10% below the set point (see hysteresis) the relay will release when the interconnection between pins 8 and 9 is interrupted. The relay also releases when power supply is interrupted.	The relay releases again when the voltage has dropped min. 10% below the set point (see hysteresis), or when power supply is interrupted.
<b>Example 3</b>	<b>Example 2</b>
<b>AC or DC metering (DC power supply)</b>	<b>AC voltage metering - latching (AC Power supply)</b>
Please note that pins 7 and 10 are internally connected at DC power supply. No current must pass through this internal connection.	The relay operates and remains in operating position when the voltage reaches set point.
Provided that the voltage has dropped min. 10% below set point (see hysteresis) the relay releases when the interconnection between pins 8 and 9 is interrupted. The relay also releases when power supply is interrupted.	Provided that the voltage has dropped min. 10% below set point (see hysteresis) the relay releases when the interconnection between pins 8 and 9 is interrupted. The relay also releases when power supply is interrupted.
<b>Example 3</b>	<b>Example 3</b>
<b>AC or DC metering (DC power supply)</b>	<b>AC or DC metering (DC power supply)</b>
Please note that pins 7 and 10 are internally connected at DC power supply. No current must pass through this internal connection.	Please note that pins 7 and 10 are internally connected at DC power supply. No current must pass through this internal connection.

## Wiring Diagrams



## Range Setting

### Range setting

Adjustable set point on absolute scale.

tended to approx. 75% by connecting a suitable resistor between pins 8 and 9.

Resistor limits are 470 k $\Omega$  / 3k $\Omega$  (0.25 W).

The hysteresis increases by decreasing resistance.

### Hysteresis

Approx. 10%.

The hysteresis may be ex-

## Accessories

Sockets◊

S 411

Hold down spring◊

HF

Mounting rack

SM 13

Socket covers

BB 4

Front mounting bezel

FRS 2

Potentiometer lock

PL 1

For further information refer to "Accessories".

## Operation Diagrams

### Example 1

Power supply

Set value

Input voltage  
pins 5 & 7  
Relay ON



### Example 2

Power supply

Latching

Set value

Input voltage  
pins 5 & 7  
Relay ON

