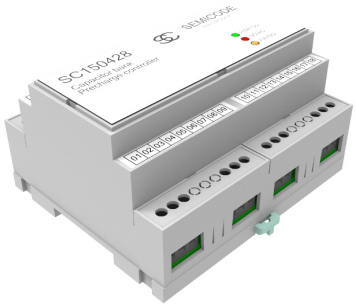
SC150428

DC-Link Capacitor bank precharge controller

PRELIMINARY TECHNICAL INFORMATION

HIGHLIGHTS

- Half-controlled SCR bridges up to 1800 V_{RRM}
- 100 to 550 V_{AC} mains voltage input
- Avoids in-rush current on DC-Link capacitor bank
- Standard dimensions for DIN rail



non-contractual image

TECHNICAL SPECIFICATIONS

Description		*notes/test conditions*	*min*	*typ*	*max*	
Input supply voltage	$V_{IN\ DC}$		20	24	36	V_{DC}
Input supply current	$I_{IN\ DC}$			300	350	mA
Power consumption	P_N				8.4	W
Protection degree				IP-20		
Combustibility class				UL94 V-0		
Storaging temperature range	T_{stg}		-40		80	ºC
Operating temperature range	T_{op}		-10		50	ºC
Power to SCR output isolation voltage	V_{ISOp-o}			6000		V_{AC}

Data at T_a = 25 °C, V_{IN} = 24 V_{DC} and rated values, unless otherwise indicated

INPUT AND OUTPUT SIGNALS

Description		*notes/test conditions*	*min*	*typ*	*max*	
Sensing inputs						
Continuous mains AC working voltage	$V_{AC\ IN}$		120	400	550	V_{AC}
Continuous DC-Link working voltage	$V_{DC\ IN}$				780	V_{DC}
External firing input						
High state ext. Firing signal	$V_{IN\ H\ EXT}$		4.5		24	V
Low state ext. Firing signal	$V_{IN\ L\ EXT}$		0		1.5	V
Output status signal relay						
Output signal relay current	I_{RLYSW}				2	A
Output signal relay switching voltage	$V_{RLY\ SW}$				250	V_{AC}

SIGNALING		
Board powered ON	*"PWR ON"*	Green LED
Undervoltage condition	*"NO AC"*	Red LED
Firing ON	*"FIRING"*	Orange LED

CONFORMALS

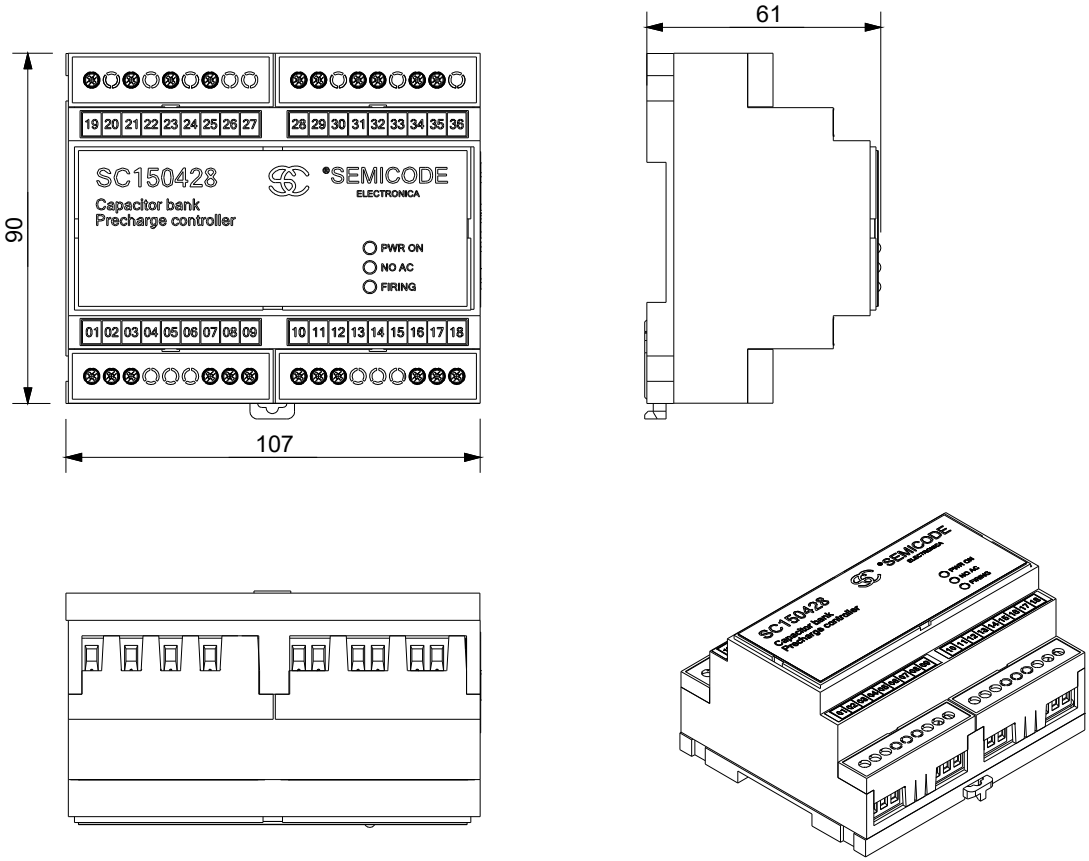
Conformal coating	MIL-1-46058, Type UR
Security	EN60950-1, UL60950-1
Internal power supply	EN 55022, Class A and FCC, level A

200602 Rev.:5

Reserves the right to change limits, test conditions and dimensions given in this data sheet at any time without previous notice.

MECHANICAL DIMENSIONS

Description		
Dimensions	107 x 90 x 61	mm
Fixation	Fast mounting on EN50022 rail.	
Weight (approx.)	250	g



All dimensions in mm.

TERMINAL CONNECTIONS

Description	*Notes/test conditions*	*min*	*typ*	*max*	
Supply, power and logic signals	Cable terminals with screw. Type MKDSN 2,5 (Phoenix Contact)				
Tightening torque		0.5		0.6	Nm
Cable section	Conductor cross section flexible	0.25		2.5	mm^2

AVAILABLE ACCESSORIES

NPSM20-24 - 120...240 V_{AC} input DIN rail power supply. Recommended as dedicated isolated power supply.

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CONTROLLER PINOUT

POWER SUPPLY

#	Designator	type	function
1	DC_IN	supply input	24VDC input supply
2	GND	supply input	0V input supply
3	GND	supply input	0V input supply

EXTERNAL FIRING

#	Designator	type	function
7	EN +	input	Positive input ext. Firing
8	EN -	input	Negative input ext. Firing (EXT GND)
9	NC	–	Do not connect

STATUS RELAY

#	Designator	type	function
10	RL NO	output	Output relay NO conn.
11	RL NC	output	Output relay NC conn.
12	RLCOM	output	Output relay common conn.

SENSING INPUTS

#	Designator	type	function
19	VDC+	input	DC-Link positive sense
21	VDC-	input	DC-Link negative sense
23	R INP	input	AC phase input sense
25	S INP	input	S phase input sense

SCR FIRING OUTPUTS

#	Designator	type	function
28	G1	output	SCR1 gate conn.
29	K1	output	SCR1 cathode conn.
31	G2	output	SCR2 gate conn.
32	K2	output	SCR2 cathode conn.
34	G3	output	SCR3 gate conn.
35	K3	output	SCR3 cathode conn.

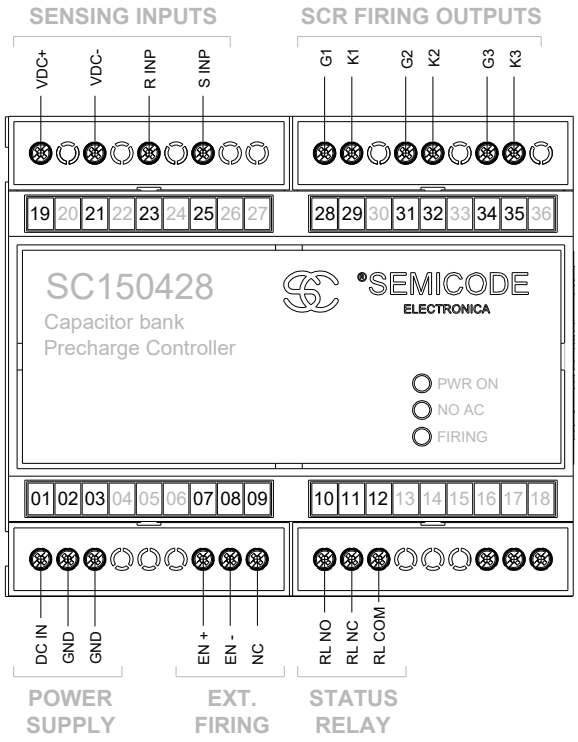


figure 1: terminal numbering detail.

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EXTERNAL DEDICATED POWER SUPPLY

SC150428 requires a dedicated 24 V_{DC} isolated power source in order to provide glavanic isolation between supply and signaling I/O. Internally the SCR firing stage provides isolation between firing stage SCR G/K and the rest of the circuitry but as voltage monitoring of precharge it is not internally isolated from its power rails an external 24 V_{DC} dedicated isolated power supply should be used.

WORKING DESCRIPTION

When powered ON the controller will permanently sense the AC mains voltage. If this voltage is greater than the minimum voltage of operation (by default 100 V_{AC}) the board will start comparing its input mains voltage (23:R_IN, 25:S_IN) with DC-Link Capacitor bank voltage (19:VDC+, 21:VDC-).

When the capacitor bank is approximately charged to its 90% maximum voltage charge through its precharge resistor (see figure 4) then the controller will switch ON the SCR firing outputs activating the half-controlled bridge.

Once triggered, this firing condition is interlocked and will only reset to its stand-by state if input grid voltage falls under its minimum voltage of operation (by default 100 V_{AC}) or in the case the controller is reset by removing its supply.

It is possible to force ON the firing condition at any time by setting to high state input EXT. FIRING inputs (07:EN+, 08:EN-) with an external voltage signal level of 0-10 V or up to 0-24 V. When triggered this way the firing of half-controlled bridge is interlocked and only will return to its OFF-state when input mains voltage falls below its under voltage condition.

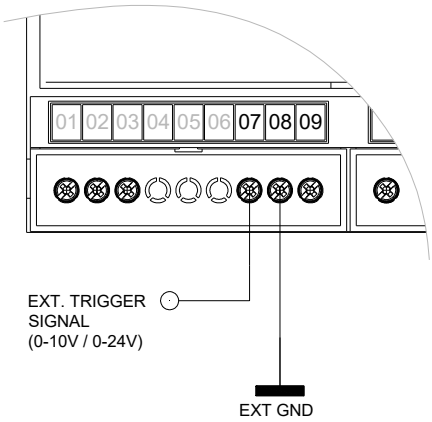


figure 2: Example external trigger connection.

The current status of the half controlled bridge can be monitorized at any time by means of its external output relay (10:RL_NO, 11:RL_NC, 12:RL_COM) (see figure 3). When on firing condition 12:RL_COM and 11:RL_NC are switched ON otherwise 12:RL_COM and 10:RL_NO are switched ON.

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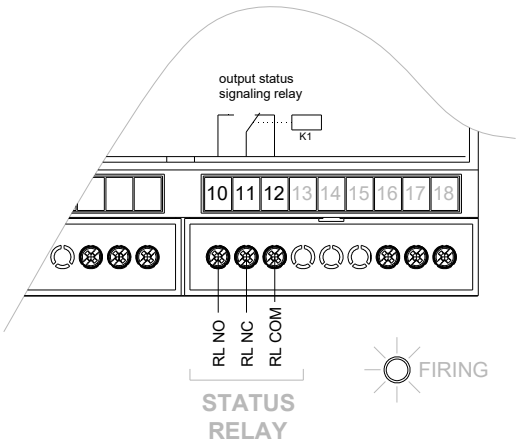


figure 3: Relay status example when firing.

Note: Under-voltage threshold has an approximate hysteresis of 25 V ($V_{AC\ IN}$) in order to prevent and avoid spureous switching or jittering on output firing signal.

MINIMUM VOLTAGE THRESHOLD AND FIRING THRESHOLD

SC150428 is factory adjusted to work with a minimum input voltage of 100 V_{AC}. If this minimum voltage is not reached on Input AC terminals (23:R_IN, 25:S_IN) undervoltage condition is set and the corresponding state LED ("NO AC") will be turned ON. Under this state the board will not trigger the half-controlled bridge. Samewise SC150428 is factory adjusted to fire the half-controlled bridge when DC-Link Capacitor has reached about the 90% of its maximum voltage charge enabling a safe non-inrush current charge of capacitor bank in use.

MOUNTING CONSIDERATIONS

1- Avoid using long cables for SCR G/K firing outputs, it is recommended to use twisted or shielded cables.

2- Protect the controller from strong magnetic fields, large power transformers for example. It is also recommended to locate the controller over a surface connected to ground.

3- For specific and exclusive applications, which are not described in this document, it is possible to make adaptations of the controller. Please, contact our technical department.

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TYPICAL APPLICATION

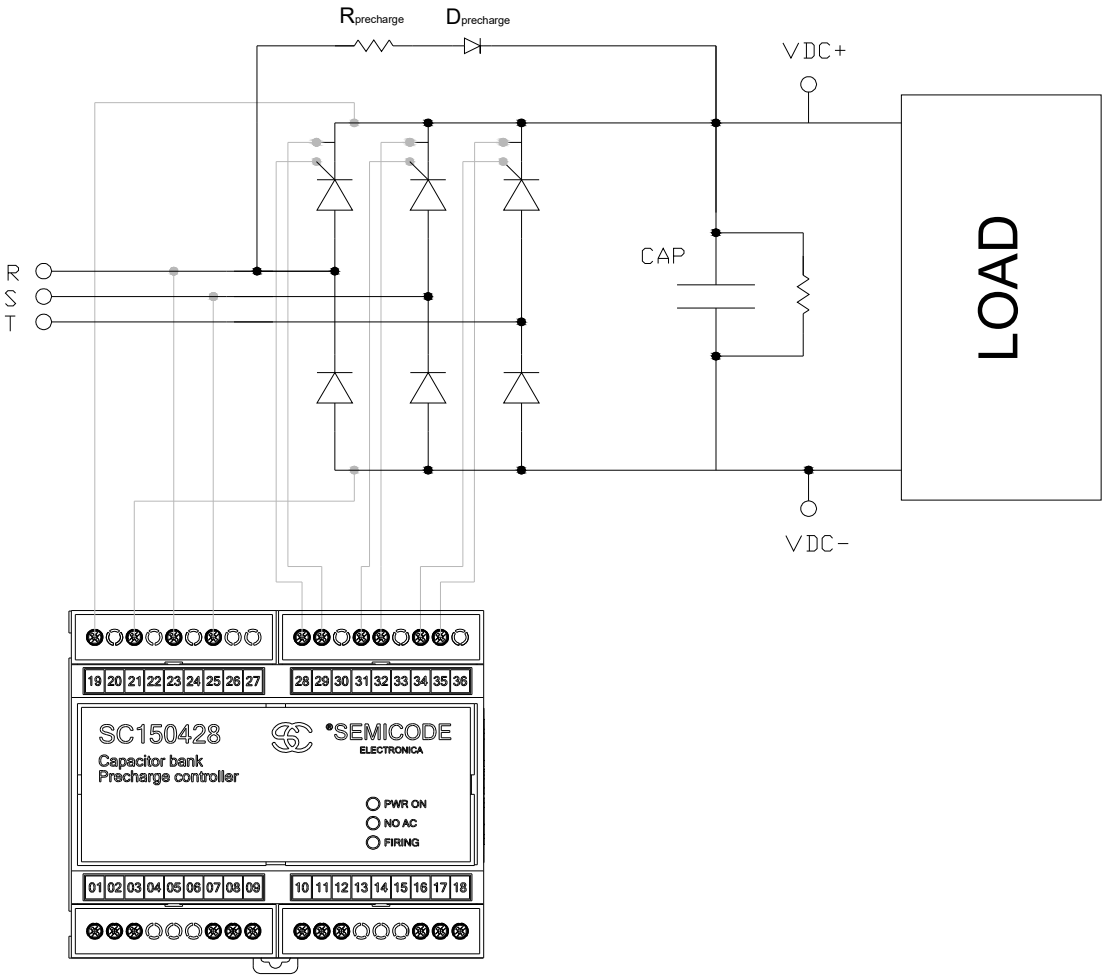


figure 4: Typical application for DC capacitor bank precharge control.

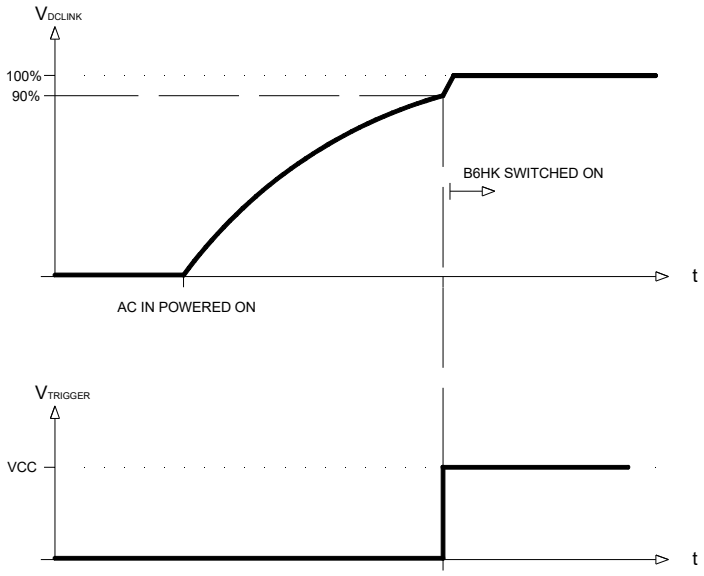


figure 5: example of DC-Link voltage and output trigger signal waveforms.

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