K100 Solid State Modulator System Specification

006347-03

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Features

Technology
Solid State switching for improved performance and reliability

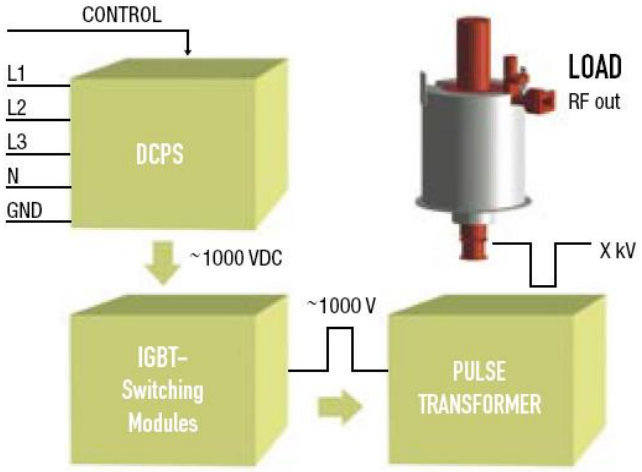
Design
Compact – for easy integration
Modular - enables power upgrade possibilities

Operation
Easy to service and maintain – Field Replaceable Units
Easy to use – turn-key solutions offers fully integrated system

Intended use

The intended use for this modulator is to generate pulses for a load with matching performance.

Functional description



The DCPS is the main power source of the system. It converts the three-phase AC power line voltage to a regulated DC voltage. It charges up all the IGBT Switching Modules to a primary voltage around 1000V. An external trigger pulse enters the modulator, gating all the Switching Modules and discharging some of the stored energy. The IGBT switches are high-power solid-state switches, which can be turned on and off electronically. A pulse transformer step-up the voltage to the required level.

All parts of the modulator are located inside a common enclosure. The pulse transformer and the load HV-interface are the only parts surrounded by transformer oil. The DCPS, Switching Modules and Control interface are all in air and easy accessible.

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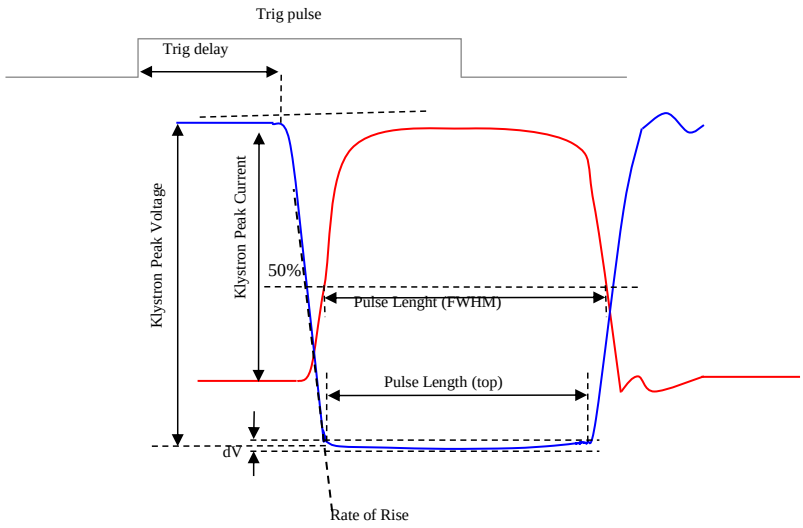
Pulse shape definition



Operational Parameters

		Unit			Notes
Pulse Output					
	Modulator Peak power	MW		17.6	
	Modulator Average power	kW		18.5	
	Operational Voltage range (min/max)	kV	0	160	see fig above.
	Operational Current range (min/max)	A	0	110	see fig above
	PRF range (min/max)	Hz	1	150	
	Pulse length (top)	µs		5.0	See fig above
	Top flatness (dV)	< +/- %		1	Deviation from constant voltage within the top of the pulse length
	Rate of rise (min/max)	kV/µs	100	150	Rate of rise at 50% of Peak voltage
	Amplitude stability	< +/- %		0.1	
	Trig delay	µs	~1.2		See fig above
	Pulse to Pulse time jitter	ns	<±4		
	Pulse width time jitter	ns	<±8		
Filament Output					
	Max voltage DC	VDC		10	Adapted to load data sheet
	Max current DC	ADC		35	Adapted to load data sheet
	Current regulation stability	%	<0.1%		

Detailed specification

		Unit		Notes
Controls & Mon. Signals				
	BNC U pulse	V/kV	0.01	
	BNC I pulse	V/A	0.1	
Interface				
	Protocol		Ethernet	See Protocol spec. for detailed information. Options below.
	Max update rate	Hz	10	Set and read values update
Applicable Standards				
	Safety			
			LVD	
			EN 61010	
			UL 61010-1	
	EMC, Immunity			
			EN 61000-6-2	Generic emission, industrial environment
			IEC 61000-4-3	Radiated E-field
			IEC 61000-4-6	Conducted RF
			IEC 61000-4-4	EFT/Burst
			IEC 61000-4-2	ESD
			IEC 61000-4-8	Magnetic field (50Hz)
			IEC 61000-4-5	Surge
			IEC 61000-4-11	Voltage dips & interruptions
	EMC, Emission			
			EN 50081-2	Generic emission, industrial environment
			EN 55011	Conducted
			EN 55011	Radiated
	Environmental standards			
			RoHS 2002/95/EG	Restriction of the use of certain hazardous substances
Heat Dissipation				
	Max	kW	3.70	
Noise				
	Max	dBA	70	

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Installation requirements

		Unit		Notes
Mains(Three phase)				
	Mains	VAC	400	± 10%, L1, L2, L3, PE Optional 208 or 480 VAC
	Three phase current	A	45.01	
	Inrush	A	100	
	Frequency	Hz	50/60	Nominal ±3Hz
Mains (one phase)				
	Mains	VAC	230	± 10%, L1, N, PE Optional 230 VAC
	One phase current	A	6	
	Inrush	A	50	
	Frequency	Hz	50/60	Nominal ±3Hz
Trig signal				
	Signal level	V	5±0.1	into 50 Ω
	Rise time	ns	<300	
	Duration	µs	10 - 100	The HV pulse length is not dependent on the trig signal length
Cooling water				
	Temp	ºC	10 - 30	Non condensing
	Max pressure	bar	8	
	Flow (min)	l/min	16	Differential pressure of approx. 3 bar
Air				
	Ambient temperature	ºC	10 -35	
	Operating air pressure	mbar	800-1100	
	Humidity	%	30-80	
Storage and transport				When packed
	Temperature	ºC	-25 - 70	
	Air pressure	mbar	500 - 1100	
	Humidity	%	20 - 95	
Oil				
	Tank volume	liter	100	
	Recommended oil		Nytro 10X, Diala X, Voltway X7	Other oil should be approved by ScandiNova

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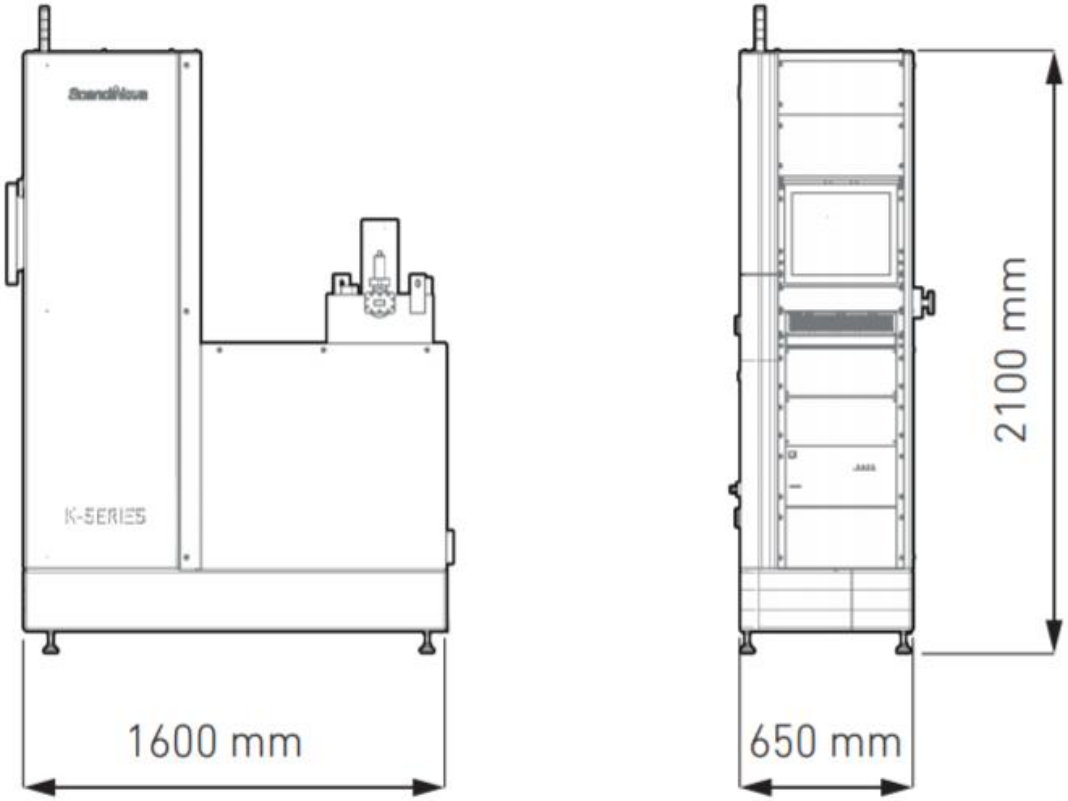
Size and Weight

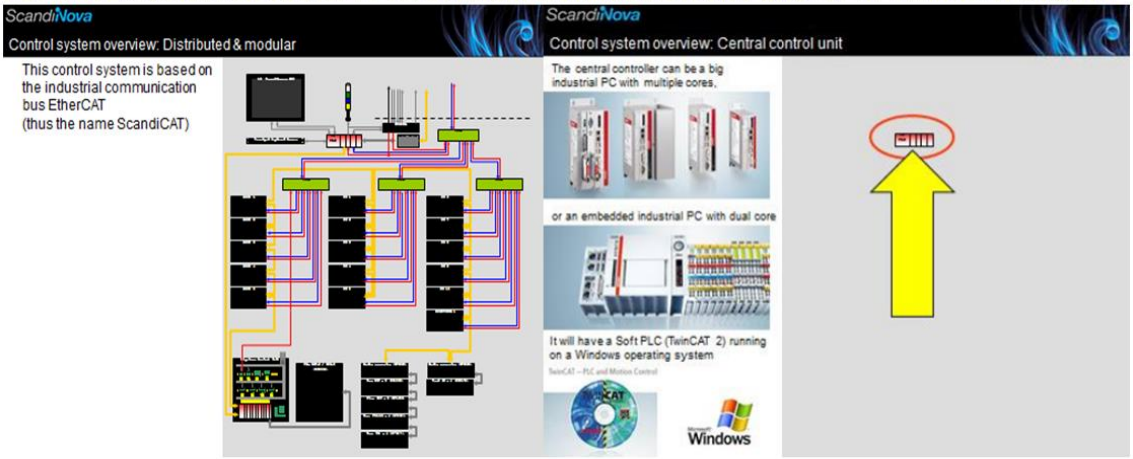
Parameter	Value
Size (Approx)	L x W x H: 650mm x 1600mm x 2100mm
Weight (Approx)	1000 kg (excluding load, magnet and oil)

Drawings



Modulator interface

PLC BASED CONTROL SYSTEM FOR SCANDINOVA MODULATORS BASED ON ETHERCAT SYSTEM



SINCE PERIPHERAL SENSORS ARE NOW HANDLED BY DISTRIBUTED I/O BOXES FLEXIBILITY IS SIGNIFICANTLY IMPROVED REGARDING CHOICE OF HARDWARE AND "SYSTEM CABLING" IS REDUCED

PULSE DATA CAN BE STREAMED BETWEEN EACH PULSE TO A EXTERNAL CONTROL SYSTES SUPPORTING PULSE RATES UP TO 1 KHZ, ALSO WAVEFORMS FROM PULSE SENSORS, RF DETECTORS AND POWER SUPPLIES CAN BE STREAMED (ASYNCHRONOUS WITH RATES UP TO TYPICALLY 10HZ REFRESH RATE, THERE WILL ALSO BE A BUFFER OF THE LAST FIVE PULSES AVAILABLE WHEN THE MODULATOR IS INTERRUPTED)

Ext		Water Cooling In/Out	Swagelock 12mm
Ext		Mains power input 1-phase (L_1, N, GND)	Terminal Blocks in PDU
Ext		Mains power input	Terminal Blocks in PDU