Kernel sistemi

STRING MONITORING UNITS SERIE ST



RELIABLE AND ACCURATE SOLUTIONS FOR MONITORING LARGE PHOTOVOLTAIC PLANTS

Solutions with shunt and hall sensors Data transmission via RS485, optic fiber and wireless Common voltage measure up to 1500 VDC Modbus RTU, IEC60870, KERNEL and custom communication protocols Until 45 Amps measurement current Environment temperature from -40°C to +80° Compliant with EN61326-1, EN 61000-6-4, EN 61000-6-2

SHUNT AND HALL EFFECT SENSOR SMU

STON and ST2N Series Shunt Technology SMU for 8, 12, 16, 20, 24 and 32 strings

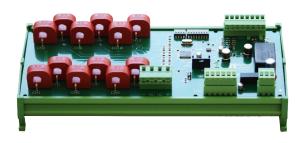




MAIN FEATURES

- Recommended for monitoring new solar plants
- Current measurement on negative of the strings
- Big accurancy
- Drift in temperature very low
- String parallel busbar on board
- Low consumption
- Current measure from 15 to 40 Amps
- SMU for 8, 12, 16, 20, 24, 32 strings
- Available ST0N and ST2N series
- Available with RS485 serial
- Available with optic fiber data connection

ST0HS Series Hall Effect Sensors Technology SMU for 8, 12, 16, 20 and 24 strings

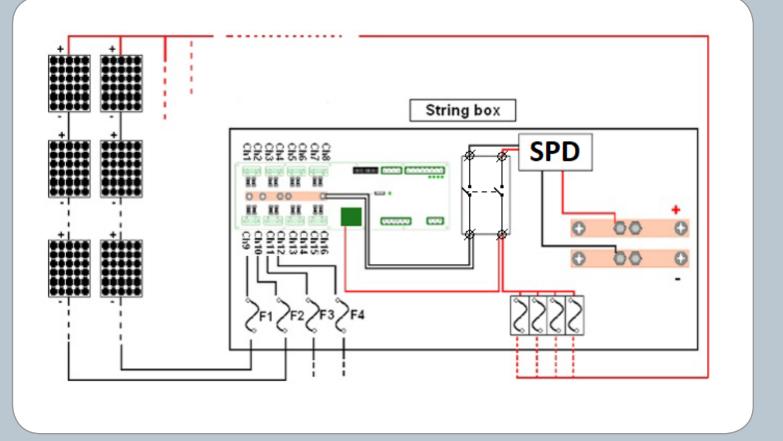




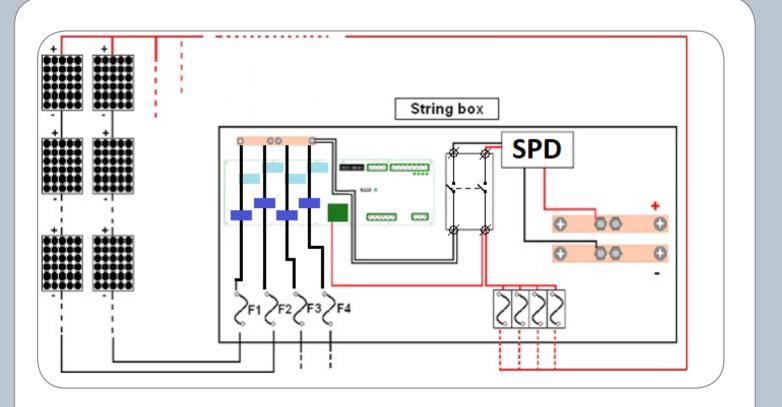
MAIN FEATURES

- Suitable for monitoring new solar plants and retrofit of plants
- Recommended when string inverters are used in the solar plant
- Current measurement on positive or on negative of the string
- Absence of busbar parallel
- Measurement of the passing current without interruption of the string cable
- Current measure up to 25 Amps or up to 60 Amps
- SMU for 8, 12, 16, 20, 24 strings
- Available with RS485 serial
- Available with optic fiber data connection

SCHEMATIC OF COMBINER BOX WITH SHUNT SMU

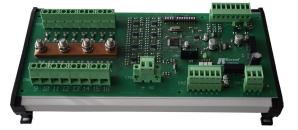


SCHEMATIC OF COMBINER BOX WITH HALL EFFECT SENSORS SMU



ST SERIES - SOLAR STRING MONITORING UNITS

STON



S	72	N



FEATURES				
Power supply	2	24Vdc max 3 W		
Number of monitored strings	8, 12, 16, 20, 24 or 32			
Max. common voltage	1500V with (),5% precision	on full scale	
Max. current for each string	8, 12, 16, 20	8, 12, 16, 20 ch.= 25A; 24, 32 ch.= 15A		
	8 ch.	12 ch.	16 ch.	
	0200	0300	0400	
Range of measurement (A)	20 ch.	24 ch.	32 ch.	
	0500	0360	0480	
Communication				
	K9	485, Optical Fi	Iber	
Digital inputs	2			
Analog inputs	1 PT100 input			
SMB temperature measurement	With solid state temperature sensor on board			
Working temperature's range	From -40 °C to +85 °C			
Working atmosphere	Without corrosive gas			
Temperature's drift -40°C÷85°C	Better than 60 mA at 12,5A			
Current reading accuracy	Better than 0,15%			
Current reading precision	Typical 0,5%			
Size (mm)	8 ch.	12 ch.	16 ch.	
	108x208,9	108x249,8	108x249,8	
	20 ch.	24 ch.	32 ch.	
	108x279,7	108x279,7	108x338,1	
Working humidity	Lower 95% without condensation			

FEATURES			
Power supply	2	24Vdc max 3 V	V
Number of monitored strings	8, 12, 16 or 24		
Max. common voltage	1500V with (),5% precision	on full scale
Max. current for each string	8, 12 ch.= 404	A; 16 ch.= 35A	; 24 ch.= 25A
Range of measurement (A)	8 ch. 0320	12 ch. 0480	16 ch. 0560
	24 ch. 0600		
Communication	RS	485, Optical Fi	iber
Digital inputs	4		
Analog inputs	1 PT100 input, 1 current input (020mA) and 1 voltage input (010V)		
SMB temperature measurement	With solid state temperature sensor on board		
Working temperature's range	From -40 °C to +85 °C		
Working atmosphere	Without corrosive gas		
Temperature's drift -40°C÷85°C	Better than 60mA at 17A		
Current reading accuracy	Better than 0,15%		
Current reading precision	Typical 0,5%		
Size (mm)	8 ch.	12 ch.	16 ch.
	108x208,9	108x249,9	108x279,7
	24 ch.		
	108x338,1		
Working humidity	Lower 95% without condensation		

STOHS SERIES - SOLAR STRING MONITORING UNITS

ST0HSXX25



P		SIII SII2	A REAL
	cia	3	es EN4 #

STOHSXX45



FEATURES			
Power supply	24Vdc lower then 3 W		
Number of monitored strings	8, 12, 16, 20 or 24		
Max. common voltage	1500V with (),5% precision	on full scale
Max. current for each string	25A		
	8 ch.	12 ch.	16 ch.
	0200	0300	0400
Range of measurement (A)	20 ch.	24 ch.	
	0500	0600	
Communication	RS485, Optical Fiber		
Digital inputs	2		
Analog inputs	1 PT100 input		
SMB temperature measurement	With solid state temperature sensor on board		
Working temperature's range	From -20 °C to +80 °C		
Working atmosphere	Without corrosive gas		
Temperature's drift -20°C÷80°C	120 mA		
Current reading accuracy	Better than 0,3%		
Current reading precision	Typical 1%		
	8 ch.	12 ch.	16 ch.
	108x208,9	108x249,8	108x279,7
Size (mm)	20 ch.	24 ch.	
	108x338,1	108x338,1	
Working humidity	Lower 95% without condensation		

Power supply 24Vdc lower then 3 W Number of monitored strings 8, 12, 16, 20 or 24 Max. common voltage 1500V with 0,5% precision on full scale Max. current for each string 45A Max. aurrent for each string 8 ch. 12 ch. 16 ch. Max. current for each string 8 ch. 12 ch. 16 ch. Max. aurrent for each string 8 ch. 12 ch. 16 ch. Max. aurrent for each string 8 ch. 12 ch. 16 ch. Max. aurrent for each string 20 ch. 24 ch. 0720 Range of measurement (A) 0360 0540 0720 20 ch. 24 ch. 0900 01080 1 Digital inputs 2 2 1 1 1 SMB temperature measurement With solid state temperature sensor on board S 1	FEATURES				
strings Image: Strings Max. common voltage 1500V with 0,5% precision on full scale Max. current for each string 45A Max. current for each string 8 ch. 12 ch. 16 ch. 0360 0540 0720 Range of measurement (A) 8 ch. 22 ch. 24 ch. 0900 20 ch. 24 ch. 0900 01080 Communication RS485, Optical Fiber Digital inputs 2 Analog inputs 1 PT100 input SMB temperature measurement With solid state temperature sensor on board Working temperature's range From -40 °C to +80 °C Working atmosphere Without corrosive gas Temperature's drift -20°C+80°C 120 mA Current reading accuracy Better than 0,3% Current reading precision Typical 1% Size (mm) 8 ch. 12 ch. 16 ch. Size (mm) 8 ch. 24 ch. 108x338,1 108x338,1	Power supply	24V	dc lower then	3 W	
Max. current for each string 45A Max. current for each string 8 ch. 12 ch. 16 ch. Range of measurement (A) 8 ch. 12 ch. 16 ch. 0360 0540 0720 20 ch. 24 ch. 0900 01080 20 ch. 24 ch. 0900 01080 Communication RS485, Optical Fiber Digital inputs 2 1 Analog inputs 1 PT100 input SMB temperature measurement With solid state temperature sensor on board Working temperature's range From -40 °C to +80 °C Working atmosphere Without corrosive gas Temperature's drift -20°C+80°C 120 mA Current reading accuracy Better than 0,3% Current reading precision Typical 1% Size (mm) 8 ch. 12 ch. 16 ch. 108x338,1 108x338,1 108x338,1 108x338,1		8,	8, 12, 16, 20 or 24		
Range of measurement (A) 8 ch. 12 ch. 16 ch. 0360 0540 0720 20 ch. 24 ch. 0.000 0900 01080 0.000 Communication RS485, Optical Fiber Digital inputs 2 Analog inputs 1 PT100 input SMB temperature measurement With solid state temperature sensor on board Working temperature's range From -40 °C to +80 °C Working atmosphere Without corrosive gas Temperature's drift -20°C +80°C 120 mA Current reading accuracy Better than 0,3% Current reading precision Typical 1% Size (mm) 8 ch. 12 ch. 16 ch. 108x338,1 108x338,1 108x338,1 108x338,1	Max. common voltage	1500V with (),5% precision	on full scale	
Range of measurement (A) 0360 0540 0720 20 ch. 24 ch. 0.0.000 0.0.1080 Communication RS485, Optical Fiber Digital inputs 2 Analog inputs 1 PT100 input SMB temperature measurement With solid state temperature sensor on board Working temperature's range From -40 °C to +80 °C Working atmosphere Without corrosive gas Temperature's drift -20°C+80°C 120 mA Current reading accuracy Better than 0,3% Current reading precision Typical 1% Size (mm) 20 ch. 24 ch. 108x338,1 108x279,7 20 ch. 24 ch. 108x338,1 108x338,1	Max. current for each string		45A		
Range of measurement (A) 20 ch. 24 ch. 20 ch. 24 ch.		8 ch.	12 ch.	16 ch.	
20 ch.24 ch.090001080CommunicationRS485, Optical FiberDigital inputs2Analog inputs1 PT100 inputSMB temperature measurementWith solid state temperature sensor on boardWorking temperature's rangeFrom -40 °C to +80 °CWorking atmosphereWithout corrosive gasTemperature's drift -20°C+80°C120 mACurrent reading accuracyBetter than 0,3%Current reading precisionTypical 1%Size (mm)8 ch.12 ch.108x338,1108x338,1108x338,1108x338,1		0360	0540	0720	
CommunicationRS485, Optical FiberDigital inputs2Analog inputs1 PT100 inputSMB temperature measurementWith solid state temperature sensor on boardWorking temperature's rangeFrom -40 °C to +80 °CWorking atmosphereWithout corrosive gasTemperature's drift -20°C+80°C120 mACurrent reading accuracyBetter than 0,3%Current reading precisionTypical 1%Size (mm)8 ch.12 ch.108x338,1108x338,1108x338,1108x338,1	Range of measurement (A)	20 ch.	24 ch.		
Digital inputs2Analog inputs1 PT100 inputSMB temperature measurementWith solid state temperature sensor on boardWorking temperature's rangeFrom -40 °C to +80 °CWorking atmosphereWithout corrosive gasTemperature's drift -20°C+80°C120 mACurrent reading accuracyBetter than 0,3%Current reading precisionTypical 1%Size (mm) $\frac{8 \text{ ch.} 12 \text{ ch.} 16 \text{ ch.} 108x208,9 108x249,8 108x279,7} 20 \text{ ch.} 24 \text{ ch.} 108x338,1 108x38,1 108x338,1 108x38,1 108x338,1 108x38x38,1 108x38x38,1 108x38x38,1 108x38x38,1 108x38x38,1 108x38x38,1 108x38x38,1 108x38x38,1 108x38x38x38,1 108x38x38x38x38x38x38x38x38x38x38x38x38x38$		0900	01080		
Analog inputs1 PT100 inputSMB temperature measurementWith solid state temperature sensor on boardWorking temperature's rangeFrom -40 °C to +80 °CWorking atmosphereWithout corrosive gasTemperature's drift -20°C+80°C120 mACurrent reading accuracyBetter than 0,3%Current reading precisionTypical 1%Size (mm)8 ch.12 ch.108x208,9108x249,8108x279,720 ch.24 ch.108x338,1108x338,1108x338,1108x338,1	Communication	RS	485, Optical Fi	iber	
SMB temperature measurementWith solid state temperature sensor on boardWorking temperature's rangeFrom -40 °C to +80 °CWorking atmosphereWithout corrosive gasTemperature's drift -20°C+80°C120 mACurrent reading accuracyBetter than 0,3%Current reading precisionTypical 1%Size (mm)8 ch.12 ch.108x208,9108x249,8108x279,720 ch.24 ch.108x338,1108x338,1108x338,1108x338,1	Digital inputs		2		
measurementsensor on boardWorking temperature's rangeFrom -40 °C to +80 °CWorking atmosphereWithout corrosive gasTemperature's drift -20°C+80°C120 mACurrent reading accuracyBetter than 0,3%Current reading precisionTypical 1%Size (mm)8 ch.12 ch.108x208,9108x249,8108x279,720 ch.24 ch.108x338,1108x338,1108x338,1108x338,1	Analog inputs	1 PT100 input			
rangeFrom -40 °C to +80 °CWorking atmosphereWithout corrosive gasTemperature's drift -20°C÷80°C120 mACurrent reading accuracyBetter than 0,3%Current reading precisionTypical 1%Size (mm)8 ch.12 ch.108x208,9108x249,8108x279,720 ch.24 ch.108x338,1108x338,1108x338,1	•				
Temperature's drift -20°C+80°C 120 mA Current reading accuracy Better than 0,3% Current reading precision Typical 1% Size (mm) 8 ch. 12 ch. 16 ch. 108x208,9 108x249,8 108x279,7 20 ch. 24 ch. 108x338,1 108x338,1 108x338,1 108x338,1	U 1	From -40 °C to +80 °C			
-20°C+80°C 120 mA Current reading accuracy Better than 0,3% Current reading precision Typical 1% Size (mm) 8 ch. 12 ch. 16 ch. 108x208,9 108x249,8 108x279,7 20 ch. 24 ch. 108x338,1 108x338,1 108x338,1 108x338,1	Working atmosphere	Without corrosive gas			
Current reading precision Typical 1% 8 ch. 12 ch. 16 ch. 108x208,9 108x249,8 108x279,7 20 ch. 24 ch. 108x338,1 108x338,1 108x338,1 108x338,1		120 mA			
8 ch. 12 ch. 16 ch. 108x208,9 108x249,8 108x279,7 20 ch. 24 ch. 108x338,1 108x338,1 108x338,1 108x338,1	Current reading accuracy	Better than 0,3%			
Size (mm) 108x208,9 108x249,8 108x279,7 20 ch. 24 ch. 108x338,1 108x338,1	Current reading precision	Typical 1%			
Size (mm) 20 ch. 24 ch. 108x338,1 108x338,1	Size (mm)	8 ch.	12 ch.	16 ch.	
20 ch. 24 ch. 108x338,1 108x338,1		108x208,9	108x249,8	108x279,7	
		20 ch.	24 ch.		
Working humidity Lower 95% without condensation		108x338,1	108x338,1		
	Working humidity	Lower 95% without condensation			

STOHS SERIES - SOLAR STRING MONITORING UNITS

STOHSXX60



FEATURES

Power supply	24Vdc lower then 3 W		
Number of monitored strings	8, 12, 16, 20 or 24		
Max. common voltage	1500V with 0,5% precision on full scale		
Max. current for each string	45A		
Range of measurement (A)	8 ch. 0480	12 ch. 0720	16 ch. 0960
	20 ch. 01200	24 ch. 01440	
Communication	RS485, Optical Fiber		
Digital inputs	2		
Analog inputs	1 PT100 input		
SMB temperature measurement	With solid state temperature sensor on board		
Working temperature's range	From -40 °C to +80 °C		
Working atmosphere	Without corrosive gas		
Temperature's drift -20°C÷80°C	120 mA		
Current reading accuracy	Better than 0,3%		
Current reading precision	Typical 1%		
Size (mm)	8 ch. 108x208,9	12 ch. 108x249,8	16 ch. 108x279,7
	20 ch. 108x338,1	24 ch. 108x338,1	
Working humidity	Lower 95% without condensation		

DATA TRANSMISSION PROTOCOLS

MODBUS RTU, IEC60870 AND CUSTOMIZED PROTOCOLS

RS485: THE ECONOMIC AND RELIABLE SOLUTION

- It's possible connect up to a maximum of 128 slaves
- 3 Wire connection: TX + RX + GND for the stabilization of the static potentials
- Surge and electrostatic discarge protection up to 16 KV
- Static potential protection from -70 to +70 V
- Serial repetition on the same terminal block for a fast installation
- Galvanic isolation to potentials of the strings and power supply

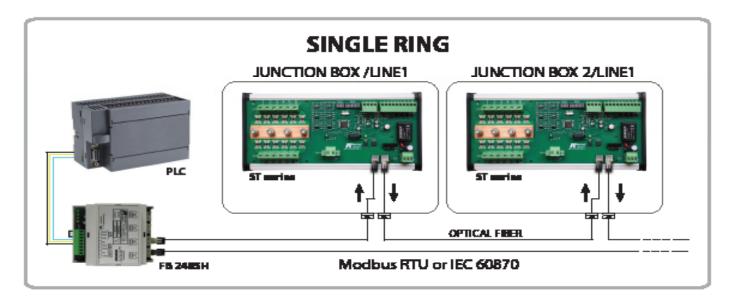


OPTICAL FIBER: THE SOLUTION FOR DIFFICULT ENVIRONMENTAL CONDITIONS

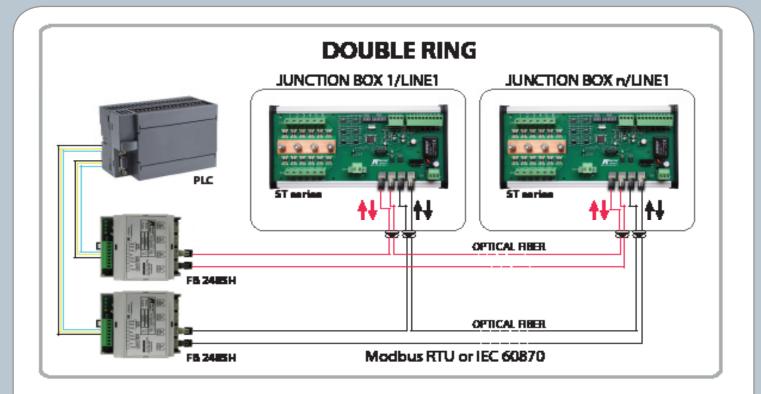
- Use of multimode optical fiber standard OM2 standard or higher 50/125, 62,5/125
- Connection realization in single ring and double ring or multidrop with redundancy
- Maximum distance guarantee few kilometers without optical signal regeneration

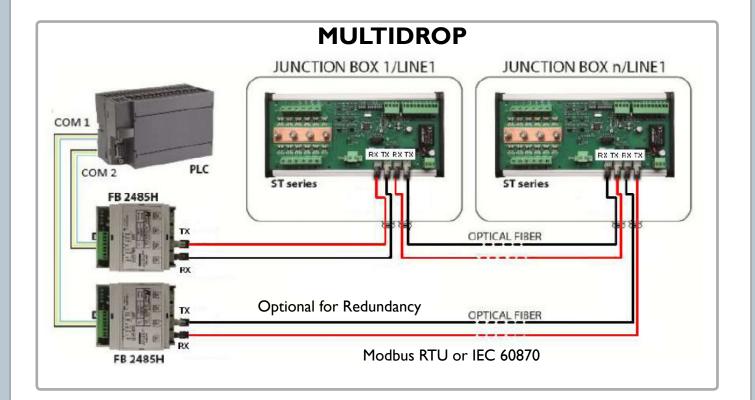
- Regeneration of the optical signal inside each SMU or of the FB2485H converter to have virtually infinite length of the ring

- SPD devices not required, because optical fibers are connected directly to the board, without any kind of converter



DATA TRANSMISSION PROTOCOLS





KERNEL Sistemi S.r.l. Via Vignolese, 1138 41126 Modena (MO) ITALY Tel. +39 059 469978 Fax. +39 059 468874 sales@kernelgroup.it www.kernelgroup.it