

# PU[REC]

**PORTABLE AND RELIABLE DATA ACQUISITION SYSTEM FOR FIELD TESTS, TROUBLESHOOTING AND MAINTENANCE IN VARIOUS APPLICATION AREAS.**

- > 16 analog input channels  
(expandable to any signal input via Modular Smart Interfaces)
- > Quasi-static channel expansion via EPAD2
- > Available with 50 kS/s or 200 kS/s (optional) sampling rate
- > 15.6" multi-touch display
- > Rugged and portable housing for easy transportation









## SPECIFICATIONS

PU[REC]	
<b>Configuration</b>	
Sampling rate / resolution	PUREC-50: 50 kS/s per channel 16-bit PUREC-200: 50 kS/s to 200 kS/s 18-bit 100 S/s to 50 kS/s 24-bit
Digital input	2x counter shared with 8x digital inputs; 4x digital outputs
CAN bus	1x highspeed CAN 2.0 (ordering option PUREC-OPT-CAN )
Quasi-static channel expansion	EPAD2 interface connector
Expansion	SYNC-BUS (requires ordering option OXY-OPT-NET)
<b>Main system</b>	
Display	15.6" multi-touch TFT (full HD 1920 x 1080)
Additional Connectors	2x Display Port; 1x HDMI; Audio interface (3x 3.5mm connectors) 4x USB 3.0; 2x Gbit LAN;
Operating system	Microsoft Windows 10 64-bit; (optional Linux OS)
Data Storage	1 TB SSD in a removeable drive bay (870 GB useable for data storing) up to 7 days of recording all channels at 50 kS/s or 300 days at 1 kS/s
MTBF	27800 hours
Noise emission	system idle 38 dBA CPU max. heat; max. fan: 45 dBA
Dimensions (W x D x H)	463 x 129 x 318 mm (18.2 x 5.1 x 12.5 in.)
Weight	7.3 kg (16.1 lb.)
<b>Power supply</b>	
Rated input voltage	100 to 240 V <sub>AC</sub> (max 90 to 264 V <sub>AC</sub> ), active PFC
Input frequency	47 to 63 Hz
Maximal input current	2 A (230 V <sub>AC</sub> ) / 4 A (115 V <sub>AC</sub> )
Inrush current	80 A (264 V <sub>AC</sub> )
Power consumption	max. 300 W; typical 65W (fully equipped with MSI, recording data)
<b>Environmental specifications</b>	
Operating temperature	0 to +50 °C, down to -20 °C with prewarmed unit
Storage temperature	-20 to +70 °C
Humidity	10 to 80 % non cond., 5 to 95 % rel. humidity
Max. altitude	2000 m (6561 ft)
Sine vibration (EN 60068-2-6:2008)	Acceleration: 20 m/s <sup>2</sup> Frequency range: 10 Hz - 150 Hz Sweep: 1 oct/min 20 cycles
Shock (EN 60028-2-27:2009)	Acceleration: 15 g Duration: 11 ms Pulse form half sine 3 pumps/direction 6 directions
Random vibration (EN IEC 60721-3-2:2018)	Class 2M4 Spectral acceleration density: 1 m <sup>2</sup> /s <sup>3</sup> Frequency range: 10 Hz-200 Hz Duration: 30 min/direction

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Input types					
	Input	Sensor excitation	Bandwidth <sup>(max.)</sup> <small>consider limit of PU[REC]</small>	Accuracy <sup>(typ.)</sup>	Sensor connection
Direct voltage input	±10 V; ±5 V	±5 V; 12 V	DC to 70 kHz	0.02 %	D-SUB-9
MSI2-250R-20mA <sup>1)</sup>	 4 to 20 mA sensors	n/a	DC to 70 kHz	±0.1 %	Miniature spring terminals
MSI2-STG <sup>1)</sup>	 Bridge-type sensors full-bridge, half-bridge, quarter-bridge 120 Ω and 350 Ω	5 V and 10 V	60 kHz	±0.1 %	Miniature spring terminals
MSI2-LVDT <sup>1)</sup>	 LVDT and RVDT sensors, 5- or 6-wire connection	3 V at 2.5, 5 or 18 kHz	1 kHz	±0.1 %	Soldering pads
MSI-BR-ACC <sup>1)</sup>	 IEPE <sup>®</sup> sensors, typ. accelerometer, microphone	4 mA	1.4 Hz to 70 kHz	±0.2 %	BNC
MSI2-CH-x <sup>1)</sup>	 Charge type sensors up to 100 000 pC	n/a	0.08 Hz to 70 kHz	±0.5 %	BNC
MSI2-TH-x <sup>1)</sup>	 Thermocouple sensors standard models for type K, J, T, others on request	n/a	DC to 70 kHz	±1 °C	Mini TC socket
MSI-BR-V-200 <sup>1)</sup>	 Voltage up to 200 V	n/a	DC to 60 kHz	±0.1 %	BNC
MSI2-V-600 <sup>1)</sup>	 Voltage up to 600 V	n/a	DC to 60 kHz	±0.1 %	Banana sockets
MSI-BR-RTD <sup>1)</sup>	 RTD sensors Pt100, Pt200, Pt500, Pt1000, Pt2000; 2-, 3- and 4-wire connection	1.25 mA	DC to 10 kHz	±0.1 %	Binder 712 series 5-pin socket

1) MSIs are automatically detected

Direct voltage input specification					
Input connector	16x 9-pin female D-SUB				
Input ranges	±10 V; ±5V				
Sensor excitation	±5 V	Accuracy: ±0.2 %; balanced around GND; remote sense support max. 40 mA per channel	Protection: Continuous short to GND; short circuit limit is 70 mA		
	12V	Accuracy: ±5 %; max. 1 A in total for all channels, including EPAD2 supply	Protection: Self resetting fuse."		
Input noise	0 to 10 Hz: 10 μV <sub>pp</sub> full bandwidth: 1.35 mV <sub>pp</sub>				
Input impedance	1 MΩ single ended, 2 MΩ differential				
Input bias current	<25 pA				
Input coupling	DC				
Accuracy <sup>1)</sup>	Voltage	DC to 1 kHz	±0.02 % of reading ± 0.01 % of range ±20 μV		
		>1 kHz to 5 kHz	±0.5 % of reading ± 0.01 % of range ±20 μV		
		>5 kHz to 10 kHz <sup>2)</sup>	±1 % of reading ± 0.01 % of range ±20 μV		
Gain drift	typical 10 ppm/°C max. 20 ppm/°C				
Offset drift	typical 0.3 μV/°C + 10 ppm of range/°C, max 15 μV/°C + 20 ppm of range/°C				
Typical Signal-to-noise ratio, Spurious-free SNR, Effective number of Bits, VPP <sup>2)</sup>	10 V range				
		SNR	SFDR <sup>3)</sup>	ENOB <sup>4)</sup>	Noise peak to peak
	Sample rate	[dB]	[dB]	[Bit]	[mV <sub>pp</sub> ]
	0.1 kS/s	127	130	20.8	0.015
	1 kS/s	118	130	19.3	0.055
	10 kS/s	109	130	17.8	0.22
	20 kS/s	106	130	17.3	0.33
	50 kS/s <sup>2)</sup>	102 <sup>2)</sup>	130 <sup>2)</sup>	16.7	0.52
	100 kS/s <sup>2)</sup>	99 <sup>2)</sup>	130 <sup>2)</sup>	16.2	0.66
	200 kS/s <sup>2)</sup>	96 <sup>2)</sup>	125 <sup>2)</sup>	15.7	1.00
Linearity	<20 ppm				
Input configuration	differential				
Typical THD	-95 dB				

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<b>Typical CMRR in differential mode</b>		100 dB @ 50 Hz; >70 dB @ 1 kHz
<b>Low pass Filter (-3 dB, IIR)</b>	<b>Characteristic</b>	1 Hz to 40 % of sample rate freely programmable or OFF
	<b>Filter order</b>	Bessel or Butterworth
		2nd, 4th, 6th, 8th
<b>Analog antialiasing filter</b>		3 <sup>rd</sup> order Butterworth
<b>Bandwidth (-3 dB, deactivated IIR filter)</b>		70 kHz 3 <sup>rd</sup> order Butterworth filter
<b>Crosstalk fin 1 kHz [10 kHz]</b>		>108 dB
<b>Channel to channel phase mismatch</b>		typically <30 nsec when using the same input range
<b>Common mode voltage</b>		$\pm 12.5 V_{DC}$
<b>Overvoltage protection (IN+, IN-, Sense)</b>		$\pm 50 V_{DC}$
<b>Digital IN specification</b>		
<b>Digital Input</b>		8 CMOS/TTL compatible digital inputs; weak pullup via 100 k $\Omega$
<b>Overvoltage protection</b>		$\pm 30 V, 50 V_{pk}$ (for 100 ms)
<b>Counter</b>		2 counter channels; TTL input; shared with digital inputs
<b>Counter modes</b>		
	<b>Event counting</b>	Basic event counting, gated counting, up/down counting and encoder mode (X1, X2 and X4)
	<b>Waveform timing</b>	Period, frequency, pulse width duty cycle and edge separation
	<b>Sensor modes</b>	Encoder (angle and linear)
<b>Digital OUT specification</b>		
<b>Digital output</b>		4 DO; TTL
<b>Output indication</b>		LED (green = high; off = low)
<b>Maximum current</b>		25 mA continuously
<b>Power-on default</b>		Low
<b>Interfaces</b>		
<b>CAN bus</b>		1 CAN Bus; not isolated
	<b>CAN specification</b>	CAN 2.0B
	<b>CAN Physical Layer</b>	High Speed
	<b>Bus pin fault protection</b>	$\pm 36 V$
	<b>Termination</b>	Programmable: High impedance or 120 $\Omega$

<sup>1</sup> 1 year accuracy 23 °C  $\pm 5$  °C

<sup>2</sup> LP Filter in auto mode

<sup>3</sup> SFDR excluding harmonics

<sup>4</sup> ENOB calculated from SNR