

DIGITAL INDUSTRIES SOFTWARE

# **Simcenter SCADAS RS 12 channel Sensor Unit Extended Bandwidth**

Simcenter/SCRS-S12-E/2024/20240610

## Product Information Sheet

### **Summary**

Simcenter SCADAS RS

12-channel Sensor Unit Extended Bandwidth

The SCRS S12-E is part of the Simcenter SCADAS RS data acquisition units. It combines 12 channels of sensor signal conditioning with extended bandwidth in a single unit.

## BENEFITS

- 12 channel inputs with multiple sensor conditioning options selectable per channel
- Channel to Unit supply isolation up to 100 V
- 576 kSamples/s combined throughput
- Up to 51.2 kHz sample rate and 22.1 kHz bandwidth at 24 bits
- Wide temperature range from -40 °C (-40 °F) to +65 °C (149 °F)
- On-board Simcenter SCADAS RS Configuration App

## FEATURES

- Easy mounting and instrumentation
- Easy stacking of units without tools
- Centralized and distributed configurations
- Daisy chaining with single cable for power and data
- Low power
- 100 g Shock and 10 g vibration resistance
- Water and dust tight IP66/IP67 certified
- Standardized connector for analog inputs
- Use with Simcenter Testlab or with the on-board App (accessible through any web browser)

### Simcenter SCADAS RS

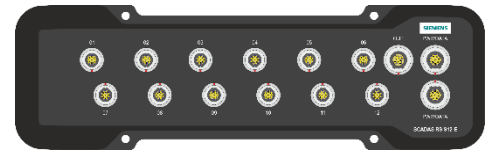
#### Product Family

Simcenter SCADAS RS is part of the Simcenter SCADAS signal conditioning and data acquisition systems and is designed for demanding test conditions.

Units connect in daisy chain to a Recorder unit for autonomous operation or in combination with a PC, tablet, or smartphone.

Use Simcenter Testlab or the on board Simcenter SCADAS RS Configuration or Recorder App for instrumentation, channel setup, calibration, sensor validation, measurement control, data viewing on-line and after a measurement.

Units are powered from an Uninterruptable Power Supply Unit (UPS) with flexible power distribution across multiple units.



#### Typical Sensors

Accelerometers, force cells, torque cells, fluid pressure sensors.

#### Conditioning Options

- Piezo electric ICP® sensors
- Piezo resistive and capacitive sensors
- Voltage inputs up to  $\pm 60$  V
- Sensors with external supply
- 0/4 to 20 mA transmitters (over shunt)

**General**

Product code	SCRS-S12-E
Description	Simcenter SCADAS RS 12-channel Sensor Unit Extended Bandwidth
Inputs	12 analog inputs
Other connections	2x daisy chain (power and data)
Dimensions	W255 mm x H85 mm x D90 mm (W10" x H3.34" x D3.54")
Weight	1.8 kg (4 lb) (approximately, without cables)
Power consumption	Up to 19 W (loaded with 12x mixed channels supplies). Up to 17 W (loaded with 12x voltage channels supplies). Up to 13.5 W (loaded with 12 x ICP® channels).
Power input	From daisy chain, UPS or Siemens certified AC/DC adapter

**Unit Feedback**

Sensor anomalies	<p>Following sensor information is reported via LED and in the user interface:</p> <ul style="list-style-type: none"> <li>• Overloads (analog and digital overloads up to the maximum bandwidth)</li> <li>• Open circuits (for piezo-electric ICP® sensors)</li> <li>• Short Circuits (for piezo-electric ICP® sensors)</li> <li>• Power overloads of sensor supplies and excitation voltage (power supply of the channel will be disabled automatically for protection)</li> </ul>
Unit information	<p>Following unit information is reported via LED and to the user interface:</p> <ul style="list-style-type: none"> <li>• Unit status (booting, upgrading, identification, internal error, active)</li> <li>• Channel enabled, channel supply overload, shunt active</li> </ul>

**Activation**

Boot time	< 40 s when a REC unit is present in the system
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**Unit Mounting**

Mounting options	<p>Units can be mounted individually (mounting holes available).</p> <p>Units can be stacked (no tools required).</p> <p>Units can be mounted with tie-down straps using mounting clamp (optional).</p>
Maximum distance	<p>Up to 50 m between two units.</p> <p>Extra UPS units may be required, depending on required sensor power and distance between units.</p> <p>It is recommended to add a UPS at the long end of a 50 m cable.</p>

## General Signal Conditioning Specifications

Sampling	<p>Sample rate grids: up to 48 kHz (decimal) and up to 51.2 kHz (binary), with decimation filters.</p> <p>Sample rate independently selectable per channel, for all channels.</p>
Measurement bandwidth at -3 dB	Up to 20.7 kHz (decimal grid) and up to 22.1 kHz (binary grid)
Alias protection	<p>In-band alias rejection is guaranteed by anti-aliasing, decimation and shaping filter stages:</p> <ul style="list-style-type: none"> <li>• Maximum sample rate: better than 145 dB</li> <li>• Other sample rates: (see Shaping Filters section)</li> </ul>
Digital low-pass filters	<p>Freely selectable low pass shaping filters and cut-off frequencies (-3 dB) from 20.7 kHz down to 0.01 Hz allowing oversampling factors from 1 up to 50 (besides 1/3 FIR and Sharp FIR), per channel and independently from selected sample rate:</p> <ul style="list-style-type: none"> <li>• Bessel (4th order): overshoot &lt; 1 % when oversampling with factor <math>\geq 4</math></li> <li>• Butterworth (4th order), overshoot &lt; 11 % when oversampling with factor <math>\geq 4</math></li> <li>• Gaussian: no overshoot</li> <li>• 1/3 FIR: overshoot &lt; 7.7 % when oversampling factor <math>\geq 1.5</math></li> <li>• Sharp FIR: overshoot &lt; 13%</li> </ul> <p>Delays are automatically compensated: Accuracy better than 1 ° for Bessel when oversampling with factor &gt; 2, and exactly 0 ° for Gaussian and 1/3 FIR in any case.</p> <p>Pass-band ripple: <math>\pm 0.005</math> dB.</p> <p>Ratio bandwidth -1 dB to -3 dB: Bessel (60 %), Butterworth (86 %), Gaussian (60 %), 1/3 FIR (87 %), Sharp FIR (97.5 %).</p>
Throughput	576 kSamples/s (12ch@48 kHz)
Grounding and isolation	<p>Units have a provision for grounding.</p> <p>Input channel supply and input channel signal grounds:</p> <ul style="list-style-type: none"> <li>• Isolated from unit supply</li> <li>• Connected to chassis</li> </ul>
Isolation voltage	Isolation voltage: $\pm 100$ V (Class II)
Crosstalk (all channels at 1 kHz full scale)	<p>Range <math>\pm 60</math> V: &lt; -84 dB</p> <p>Other ranges: &lt; -100 dB</p>
Phase accuracy ( $\pm 2\sigma$ )	<ul style="list-style-type: none"> <li>• Intra-unit &lt; 0.45 ° at 10 kHz (124 ns)</li> <li>• Inter-unit &lt; 0.48 ° at 10 kHz (134 ns)</li> </ul> <p>Guaranteed for:</p> <ul style="list-style-type: none"> <li>• All ranges, mixed or not</li> <li>• All delivered units, from the same RS system or not</li> </ul>

## Sensor Signal Conditioning Specifications

Supported sensors/signals	Piezo-electric ICP® sensors Voltage inputs up to ±60 V Sensors with external supply Current loop sensors (using shunt) (transmitters)																																																								
Voltage Input connection	Single Ended and Differential. Slew rate protected.																																																								
Sensor supply voltage	14.8 VDC ± 5 % (ripple less than 0.15 Vpp). Common supply for all channels: if supply is activated on one channel, it will be present on all other channels regardless of channel settings.																																																								
Inrush current limits	Constant budget up to 4 W (270 mA) distributed among the 12 channels																																																								
ICP Supply	4.1 mA (± 14 % at full temperature range) from a 24 VDC (± 1 %) supply. Detection thresholds: <ul style="list-style-type: none"><li>• Supply short &lt; 2 V</li><li>• Supply open &gt; 20 V</li></ul> Blanking times: <ul style="list-style-type: none"><li>• Boot: 5 s</li><li>• Enabling channel: 190 ms</li></ul>																																																								
Voltage Input ranges	<table><tr><th>Range:</th><th>±316 mV</th><th>±1 V</th><th>±3.16 V</th><th>±10 V</th><th>±60 V</th></tr><tr><td>Single ended</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr><tr><td>Differential</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>-</td></tr><tr><td>ICP®</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>-</td></tr></table> <p>Measurement maximum voltage: ±60 V (single ended), ±10 V (differential,  Vcm &lt; 2.5 V). Maximum voltage without damage: ±65 V (single ended), ±40 V (differential pins referred to signal ground).</p>	Range:	±316 mV	±1 V	±3.16 V	±10 V	±60 V	Single ended	✓	✓	✓	✓	✓	Differential	✓	✓	✓	✓	-	ICP®	✓	✓	✓	✓	-																																
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ICP®	✓	✓	✓	✓	-																																																				
AC coupling	0.48 Hz ±6 %																																																								
Voltage Input noise level measurements	<table><tr><td colspan="6">20.7 kHz band limited SE input noise (21 °C, 100 Ω resistor, 1 s)</td></tr><tr><th>Range:</th><th>±316 mV</th><th>±1 V</th><th>±3.16 V</th><th>±10 V</th><th>±60 V</th></tr><tr><td>±3σ &lt; [μVpp]</td><td>26</td><td>34</td><td>78</td><td>232</td><td>1640</td></tr><tr><td>[dB]</td><td>&lt; -96.8</td><td>&lt; -104.9</td><td>&lt; -107.3</td><td>&lt; -108.3</td><td>&lt; -106.8</td></tr><tr><td colspan="6">ICP® at ±316 mV range: &lt; 50 μVpp (-91.1 dB)</td></tr><tr><td colspan="6">ICP® at ±10 V range: &lt; 240 μVpp (-108 dB)</td></tr></table> <table><tr><td colspan="5">4 kHz band limited diff. input noise (21 °C, 2x100 Ω resistors, 1 s)</td></tr><tr><th>Range:</th><th>±316 mV</th><th>±1 V</th><th>±3.16 V</th><th>±10 V</th></tr><tr><td>±3σ &lt; [μVpp]</td><td>16</td><td>20</td><td>84</td><td>134</td></tr><tr><td>[dB]</td><td>&lt; -101.5</td><td>&lt; -109.5</td><td>&lt; -107.1</td><td>&lt; -113.0</td></tr></table>	20.7 kHz band limited SE input noise (21 °C, 100 Ω resistor, 1 s)						Range:	±316 mV	±1 V	±3.16 V	±10 V	±60 V	±3σ < [μVpp]	26	34	78	232	1640	[dB]	< -96.8	< -104.9	< -107.3	< -108.3	< -106.8	ICP® at ±316 mV range: < 50 μVpp (-91.1 dB)						ICP® at ±10 V range: < 240 μVpp (-108 dB)						4 kHz band limited diff. input noise (21 °C, 2x100 Ω resistors, 1 s)					Range:	±316 mV	±1 V	±3.16 V	±10 V	±3σ < [μVpp]	16	20	84	134	[dB]	< -101.5	< -109.5	< -107.1	< -113.0
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Voltage Input drift measurements	Gain drift: < 50 ppm/°C Offset drift: < 30 ppm/°C (of the range) Both for single ended and differential inputs.																																																								
Common Mode Rejection Ratio measurements	<table><tr><th>Range:</th><th>±316 mV</th><th>±1 V</th><th>±3.16 V</th><th>±10 V</th></tr><tr><td>56Hz [dB]</td><td colspan="2">&lt; -100</td><td colspan="2">&lt; -90</td></tr><tr><td>DC [dB]</td><td colspan="3">N/S</td><td>&lt; -90</td></tr></table>	Range:	±316 mV	±1 V	±3.16 V	±10 V	56Hz [dB]	< -100		< -90		DC [dB]	N/S			< -90																																									
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56Hz [dB]	< -100		< -90																																																						
DC [dB]	N/S			< -90																																																					
Total Harmonic Distortion (1 kHz full range span sine measurements)	SE: < -90 dB Diff: < -79 dB																																																								

Spurious Free Floor measurements

62 Hz to full band FFT (21 °C, 100 Ω)					
Range diff:	±316 mV	±1 V	±3.16 V	±10 V	-
[dB]	> 120	> 130	> 127	> 130	-
Range SE:	±316 mV	±1 V	±3.16 V	±10 V	±60 V
[dB]	> 125	> 130			

Other Voltage Input accuracy

Both for single ended and differential inputs :

- Linearity better than 0.01 % at 95 % range span
- Gain accuracy better than 0.1 % (1kHz full range at ambient temperature, all ranges)
- Offset accuracy better than 0.1 %

Gain and offset can be set respectively to the desired values by sensitivity calibration and balancing operation in software.

Voltage Input impedance

Single ended:

> 1 MΩ for voltage input

> 100 kΩ for ICP® input

< 300 pF

Differential:

20 MΩ and < 400 pF

## Output

Digital interface

1x proprietary low latency, high speed digital output for RT applications (i.e., to ECAT unit)

## Environmental Certification

Temperature range

Operating: -40 °C to +65 °C (-40 °F to 149 °F)

Storage: -40 °C to +85 °C (-40 °F to 185 °F)

Because of internal heating, please exercise caution when touching the housing and connectors and attached accessories at ambient temperatures higher than 40 °C. Ensure proper protection (i.e., gloves) against burns or other injuries.

Ambient pressure

0.5 bar to 1.3 bar.

Altitude: -2000 m (mining) to 5000 m (mountains).

Water and dust protection

IP66/IP67

Humidity

Fully protected against humidity.

Feet vents equalize internal and external pressure and allow an outgoing path for humidity and moisture, being expelled during warming up and cooling down during normal usage.

Vibration

MIL-STD-810G, method 514.6, procedure I, category 24, 20-2000 Hz, random vibration 10 g (rms), 1 h per axis.

NOTE: Tested against more severe conditions than required by MIL-STD-810G (10 instead of 7.7 grms).

Shock

MIL-STD-810G, method 516.6, procedure I, trapezoidal shock, 100 g (peak), 11 ms, three shocks per direction

Drop

MIL-STD-810G method 516.6, Procedure IV – Transit Drop (26 drops from a height of 122 cm on each surface, edge and corner)

Salt protection

Salt spray test according to ISO 12944-2, ISO 12944-2, class C5I, exterior applications, average lifetime (720 h test corresponding to 10 years life)

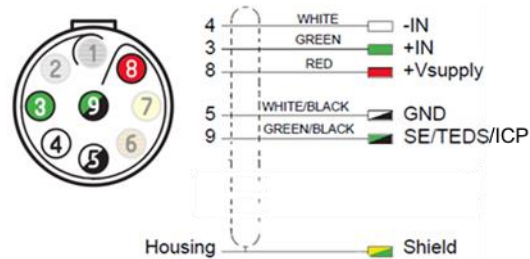
ESD	EN61000-4-2 level 4 ISO10605
EMC requirements	IEC 61326-1
Calibration	Compliant with ISO17025. Calibration formally traceable to international measurement standards from our accredited ISO17025:2017 fully compliant laboratory.
Certifications	CE, FCC

Connectors and Pinout

Analog Input connector chassis type YCP-TIA09BCG-09FPCY-18708

Analog Input connector plug type YCP-TPR09BCX-09MSCBX-051X  
5.1 mm max collet (YCP-ABR09BT051X bend relief)

Analog Input connector pinout



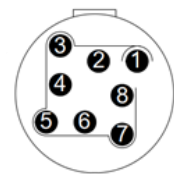
- Housing and GND are connected internally
- 0 V supply selection on all channels renders Vsupply floating (high impedance)

Daisy Chain connector chassis type YCP-TIA12FCG-08FPEZX-000X

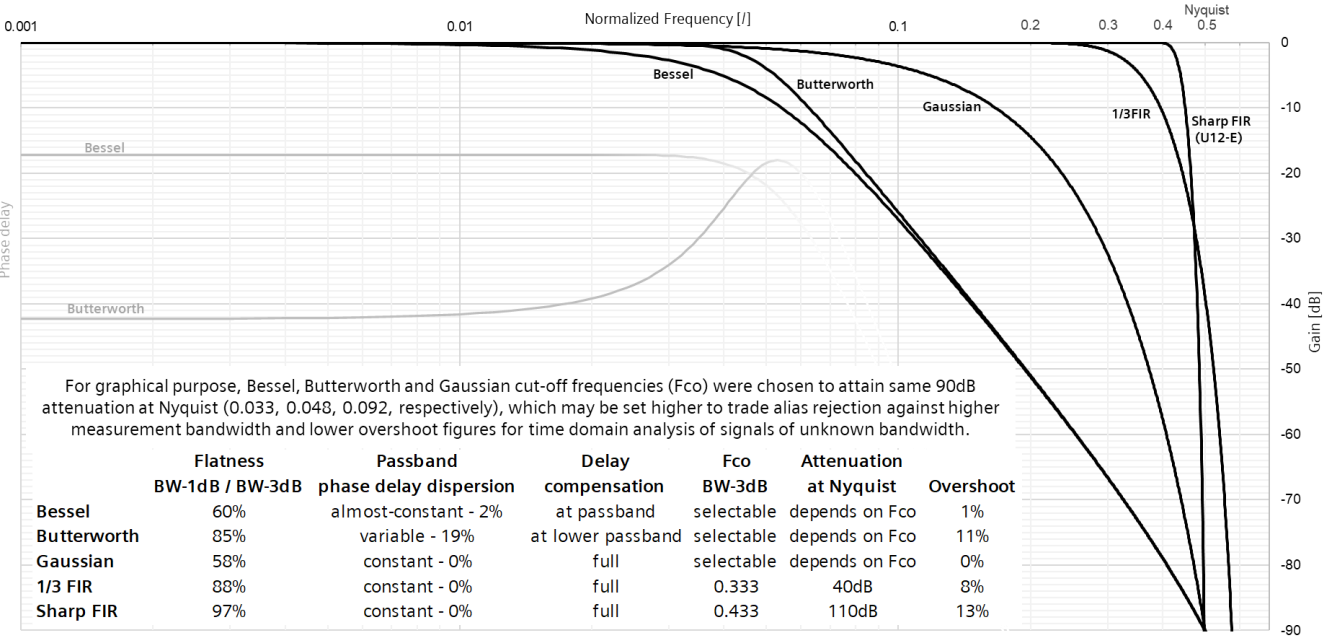
Daisy Chain connector plug type YCP-TPR12FCX-08MSEEX-065X

Output connector plug type YCP-TPR12FCX-E8MSCBX-065X

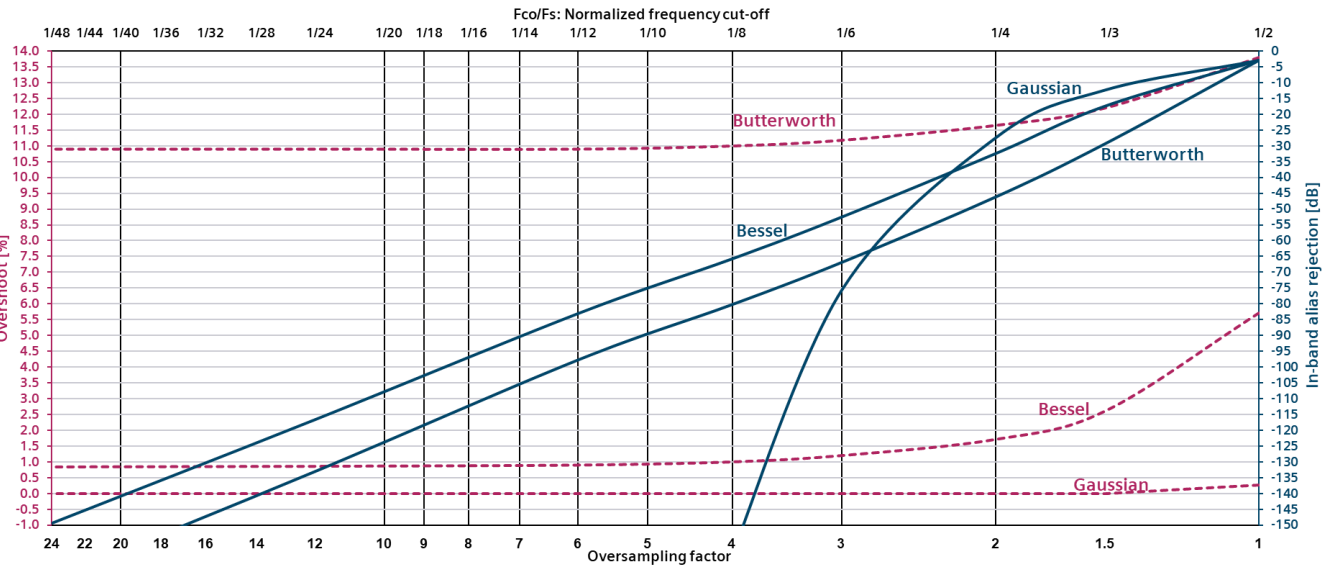
Output connector layout



Filter overview



Shaping Filters: Bessel, Butterworth, Gaussian

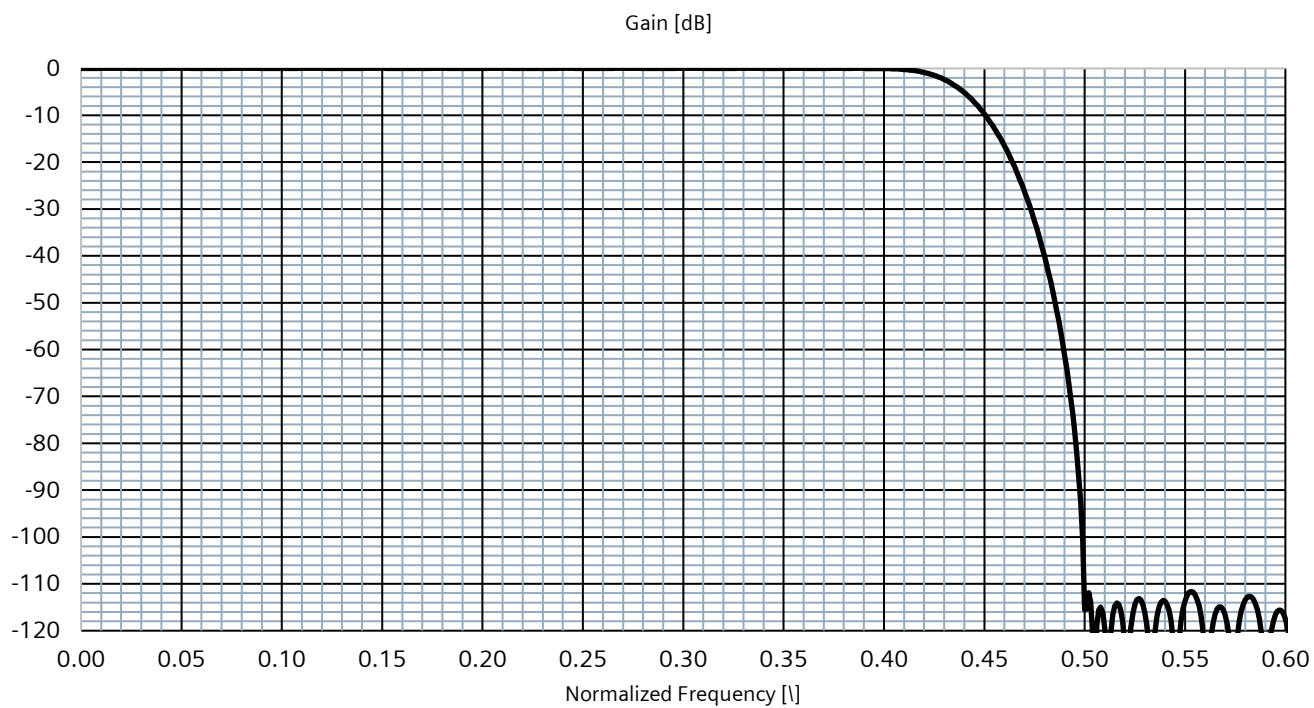


Notes

For  $F_s = 48 \text{ kHz}$ , in-band alias rejection is better than 110 dB in any case



Sharp FIR

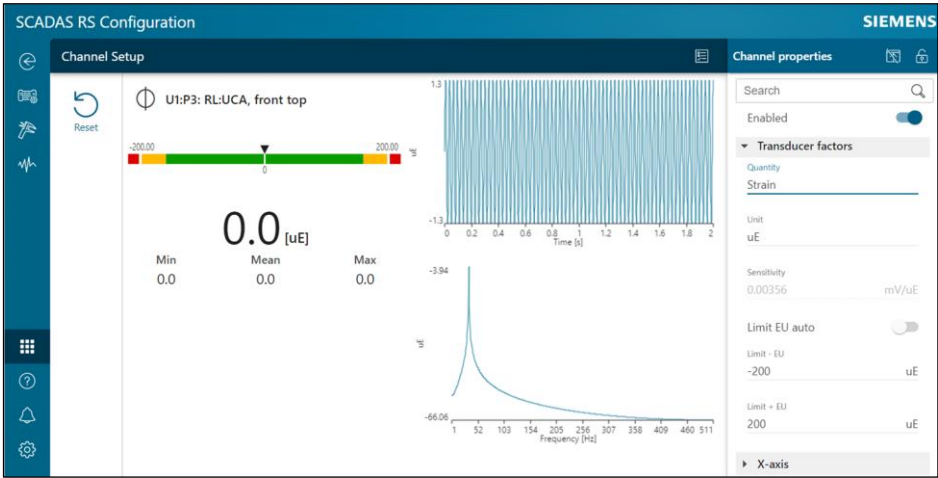


Notes

Alias rejection always better than 110 dB

On-board Simcenter SCADAS RS Configuration App

General	License-free software embedded on the SCADAS RS unit. Accessible through any web browser via UTP connection.
Instrumentation	<ul style="list-style-type: none"><li>• Single channel setup</li><li>• Channel list (grid and card views)</li><li>• Persist settings on unit</li></ul>
Calibration & checks	<ul style="list-style-type: none"><li>• DC calibration</li><li>• Shunt calibration</li><li>• Offset balancing</li><li>• Shunt, offset and headroom checks</li></ul>
Monitoring	<ul style="list-style-type: none"><li>• Status info: health status, warnings and alarms</li><li>• Statistics: overall and instantaneous</li><li>• Time data</li><li>• Frequency data (FFT)</li><li>• Variety of customizable displays: digital, analog, strip chart, XY, 2D</li></ul>



Detailed Info See Simcenter SCADAS RS Configuration App

## Ordering Information

SCRS-S12-E

Simcenter SCADAS RS 12-E-channel Sensor Unit Extended Bandwidth

## Options and Accessories

Connectivity	SCRSA-CABD01	Daisy chain cable, 0.4 m
	SCRSA-CABD02	Daisy chain cable, 1 m
	SCRSA-CABD03	Daisy chain cable, 5 m
	SCRSA-CABD04	Daisy chain cable, 10 m
	SCRSA-CABD05	Daisy chain cable, 50 m
	SCRSA-CABN01	Daisy chain cable to RJ45, 5 m
	SCRSA-CAB-ADP2	UTP to USB Ethernet adapter for PC
	SCRSA-CAB017	Digital OUT cable to ECAT, 1m
	SCRSA-CAB018	Digital OUT cable to ECAT, 10m
Measurement	SCRSA-CABA01	Analog input cable pigtail, 3 m
	SCRSA-CABA02	Analog input cable BNC, 1 m
	SCRSA-CABA03	Analog input cable with resistor, 3 m
	SCRSA-CABS01	Analog input cable to LEMO 0B, 30cm
	SCRSA-CABS02	1/4 BRG analog input to LEMO 0B, 30cm
	SCRSA-CAB021	Analog input cable to M8 6-pin
Mechanic	SCRSA-CAB001	Grounding cable, 3 m
	SCRSA-CASE01	Travel case single unit
	SCRSA-CASE02	Travel case 6 units
	SCRSA-ACC-001	Side clamps (set of 2)
	SCRSA-ACC-002	Brackets (set of 2)
	SCRSA-ACC-005	Stacking tools (set of 4)
Power	SCRSA-CAP002	Protective caps CU 12 connectors
	SCRSA-ACDC-01	AC/DC adapter unit