

DIGITAL INDUSTRIES SOFTWARE

Simcenter SCADAS ES

Charge and Voltage Conditioning Units

Simcenter/SCES/C/2026

Product Information Sheet

Summary

The following Simcenter SCADAS ES Unit(s) provide single-ended input channels of Voltage/ICP[®]/Charge (for regular and Quasi-Static measurements), differential input channels of charge signal conditioning and semi-differential monitor out DAC channels:

	Analog in			Channel supply	Analog out (Semi-diff)
Code	Voltage SE	Charge SE	Charge Diff	ICP	Monitor
SCES-VC9	9	9		✓	
SCES-VC9QS	9	9		✓	
SCES-VC9MO	9	9		✓	9
SCES-DC6			6		

FEATURES

- Charge or voltage channels up to ± 10 V with ICP[®] supply
- Single-ended charge channels for regular and Quasi-Static measurements
- Differential charge channels
- Support of piezo-electric sensors and sensors with external supply
- Semi-Differential monitor output DAC channels
- Available in different connectors: UNC10-32 (10-32 Microdot[®] Simcenter SCADAS Mobile/Lab VC8 compatible), Camac and 2-pin LEMO (Simcenter SCADAS Mobile/Lab DCH4 compatible)

BENEFITS

- High performance lab and mobile solutions
- Reliable high-speed, high-channel data acquisition
- Easy mounting and instrumentation
- Easy stacking of units without tools
- Centralized and distributed configurations
- Daisy chaining between stacks
- Use with Simcenter Testlab or with the on-board Simcenter SCADAS Go Configuration / Recorder (accessible through any web browser via PNI or PNU units)

Simcenter SCADAS ES Product Family

Simcenter SCADAS ES is a laboratory and mobile system, part of the Simcenter SCADAS signal conditioning and data acquisition systems family.

Simcenter SCADAS ES is both a distributed and centralized system for front-end signal conditioning and data acquisition hardware. Simcenter SCADAS ES is especially designed for high-performance lab and mobile solutions, reliable and high-speed throughput data acquisition, ideal for high-channel count testing.

Simcenter SCADAS ES Units are combined and stacked by a toolless mechanism, and come in 1 or 2 slot sizes. Some of them come in different connector flavours, normally indicated by its product code suffix.

Each Simcenter SCADAS ES stack can deliver a total throughput up to 17 MSamples/s using 1 Gbps Ethernet ports via a Powered Network Interface Unit (PNI) or a Uninterruptible Power Network Interface Unit (PNU), and supports up to 8x slots of Conditioning Units and a REC unit.

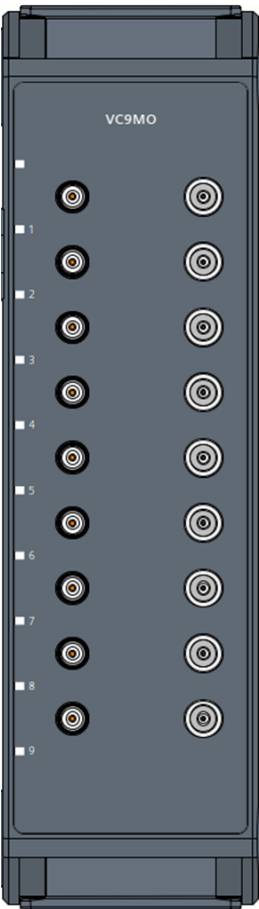
Use Simcenter Testlab or the on-board Simcenter SCADAS Go Configuration and Simcenter SCADAS Go Recorder for instrumentation, channel setup, calibration, sensor validation, measurement control, on-line data viewing and after measurement.



Simcenter SCADAS ES Stack

Included Units

Simcenter SCADAS ES 9-ch V/ICP [®] /Charge Unit	Simcenter SCADAS ES 9-ch V/ICP [®] /Charge(QS) Unit
A vertical, dark grey rack-mountable unit with a top handle. It features nine circular Microdot connectors arranged vertically, each labeled with a number from 1 to 9. The label 'VC9' is printed near the top. Product Code SCES-VC9 Description This SCES unit provides 9 single-ended input channels of Voltage/ICP[®]/Charge signal conditioning via Microdot connectors in a single slot unit Supported sensors Charge coupled sensors (>100 kΩ output resistance), piezo-electric ICP[®] sensors, voltage inputs up to ±10 V, sensors with external supply. Features 9x single-ended charge or voltage channels with ICP[®] supply. Connectors 9x UNC10-32 (10-32 Microdot[®] Simcenter SCADAS Mobile/Lab VC8 compatible) Size 1-slot Power input Via stack backbone Connectivity Accessible in a Simcenter SCADAS ES stack via PNI or PNU units	A vertical, dark grey rack-mountable unit with a top handle. It features nine circular Microdot connectors arranged vertically, each labeled with a number from 1 to 9. The label 'VC9QS' is printed near the top. Product Code SCES-VC9QS Description This SCES unit provides 9 single-ended input channels of Voltage/ICP[®]/Charge signal conditioning for Quasi-Static measurements via Microdot connectors in a single slot unit Supported sensors Charge coupled sensors (>100 kΩ output resistance), piezo-electric ICP[®] sensors, voltage inputs up to ±10 V, sensors with external supply. Features 9x single-ended charge with very low AC coupling, or voltage channels with ICP[®] supply. Connectors 9x UNC10-32 (10-32 Microdot[®] Simcenter SCADAS Mobile/Lab VC8 compatible) Size 1-slot Power input Via stack backbone Connectivity Accessible in a Simcenter SCADAS ES stack via PNI or PNU units

Simcenter SCADAS ES 9-ch V/ICP [®] /Charge 9-ch Out Unit	Simcenter SCADAS ES 6-ch differential Charge Unit
 Product Code SCES-VC9MO Description This SCES unit combines 9 single-ended input channels of Voltage/ICP[®]/Charge signal conditioning and 9 semi-differential monitoring DAC output channels via 9 Microdot and 9 Camac connectors in a double slot unit Supported sensors Charge coupled sensors (>100 kΩ output resistance), piezo-electric ICP[®] sensors, voltage inputs up to ± 10 V, sensors with external supply. Features • 9x single-ended charge or voltage channels with ICP[®] supply. • 9x semi-differential monitor out DAC channels. Connectors • 9x UNC10-32 (10-32 Microdot[®] Simcenter SCADAS Mobile/Lab VC8 compatible) • 9x Camac Size 2-slot Power input Via stack backbone Connectivity Accessible in a Simcenter SCADAS ES stack via PNI or PNU units	 Product Code SCES-DC6 Description This SCES unit provides 6 differential input channels of differential Charge signal conditioning via 2-pin LEMO connectors in a single slot unit Supported sensors Charge coupled sensors Features • 6x differential charge channels with single-ended mode. Connectors • 2-pin LEMO (Simcenter SCADAS Mobile/Lab DCH4 compatible) Size 1-slot Power input Via stack backbone Connectivity Accessible in a Simcenter SCADAS ES stack via PNI or PNU units

General

Each system may consist of one or more Simcenter SCADAS ES stacks and is based on Linux OS, providing connectivity and the on-board web app Simcenter SCADAS Go Configuration (or Simcenter SCADAS Go Recorder when a Recorder unit is present in the stack).

Data protocol	Ethernet based.
Backbone bus	Each unit shares this bus with power and data when stacked via backbone connector. • Input power • 1 Gbit Ethernet for data and control 48V DC distribution power • Clock reference signal • Real-time bus with low latency • Calibration and input channel diagnostics reference signal • System & Power control signals
Non-volatile memory	Configuration and channel settings stored in the unit.
Unit feedback	Following unit information is reported via LED and to the user interface: booting, upgrading, identification, internal error, active.
Grounding	Units in a stack have a provision for grounding from PNI or PNU via backbone.
Boot time	PNI or PNU will boot a stack of units within 3 min.
User interface	Via on-board Simcenter SCADAS Go Configuration / Recorder web application available in PNI and PNU units.
Dimensions	• Units come in 2 flavors: 1 slot or 2 slot units. • Dimensions when stacked [W x H x D]: ◦ 1 slot unit: 24 x 173 x 282 [mm]. ◦ 2 slot unit: 49 x 173 x 282 [mm]. NOTES: ▪ Width does not include 8 mm stacking feet ▪ Depth does not include front connector sockets
Weight	1 slot unit: 1.3 kg average. 2 slot unit: 2 kg average.
Stack calibration	Via dedicated CAL connector available in PNI and PNU units.

Clock synchronization

Clock source

Internal (PNI or PNU): generates the internal clock signal PTP for the backbone of the stack of units.

External: supports a present clock source in the backbone generated by another unit.

Clock accuracies

PTP (IEEE1588)	< 70 ns (when Sync-E is not supported in the network)
Sync-E + PTP	< 10 ns

GNSS	180 ns (typ, from another unit in the stack like REC)
IRIG-B	< 100 ns
NTP	< 1 ms (TBC)
Free running mode	< 5 ppm at 25 °C

Units Channels

General

All (conditioning) units are internally based on a sub-channel modularity, called channel group, usually a 3-channel group for analog conditioning units.

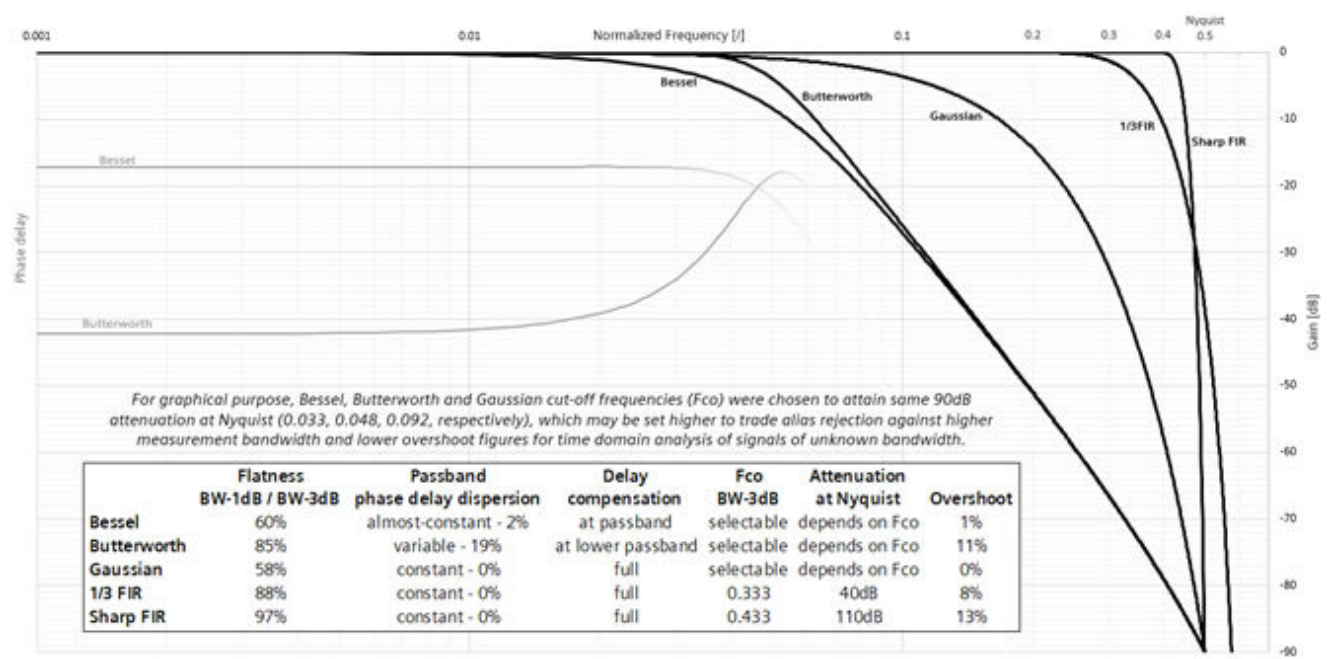
Analog inputs

General

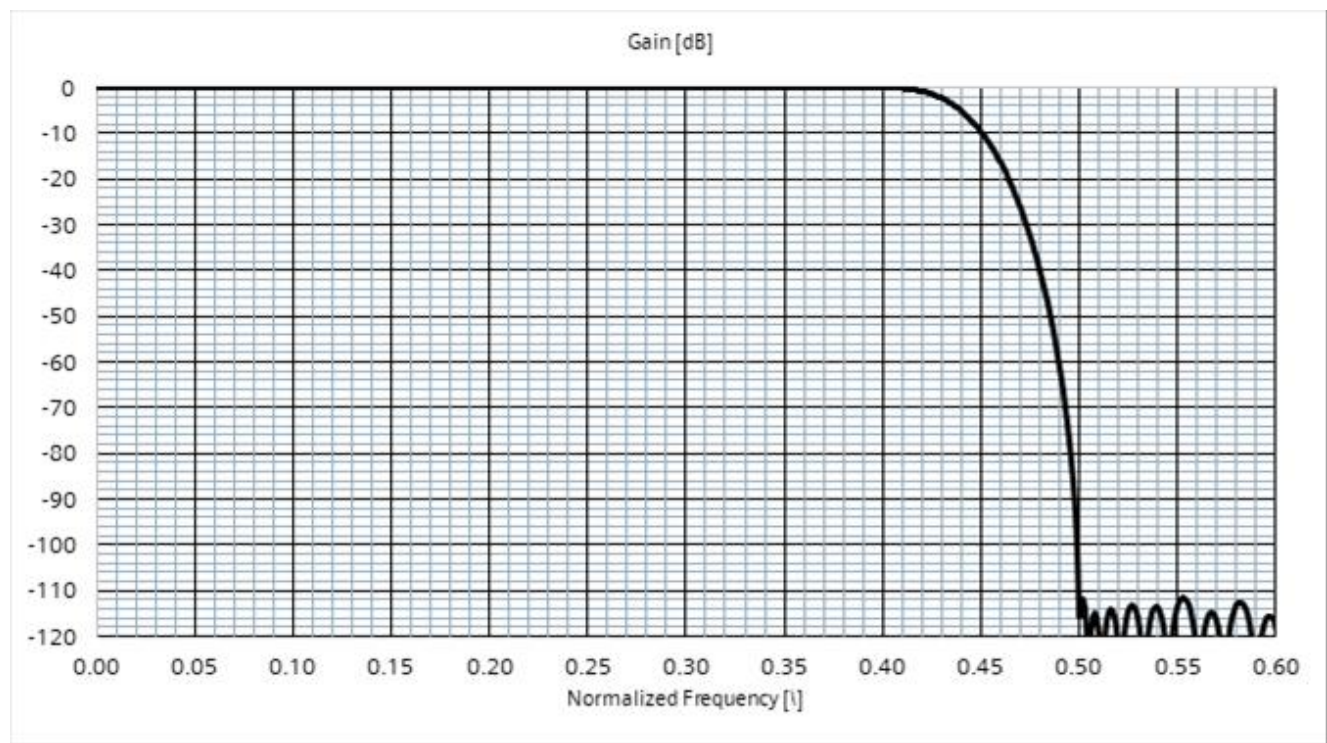
ADC	Sigma-delta operating at very high frequency, allowing noise-shaping away from measurement band of interest and optimal noise figures.
Analog anti-aliasing and slew rate protection filters	Input amplifiers are prevented to enter in (non-linear) undesired behavior due to high frequency disturbances thanks to modified Bessel filter stages operating at far higher frequencies than the measurement band of interest, providing optimal in-band anti-aliasing, linearity and flatness.
Data samples	Published in engineering units (32-bit).
Sample rates	Binary grid: up to 204.8 kHz Decimal grid: up to 192 kHz Sample rate independently selectable per channel, for all channels.
Throughput	Max: 204.8k * #Channels [kSamples/s] 204.8k * 32 * #Channels [kbps]
Alias protection	Alias rejection is guaranteed by analog and digital anti-aliasing filter stages. Completely alias-free bandwidth (always better than 105 dB rejection): Up to 88.6 kHz (-3 dB).
Digital low pass filters	Freely selectable digital low pass decimation filters, per channel and independently from selected sample rate, ordered by flatness (ratio of the bandwidth at -1 dB to bandwidth at -3 dB): 97.5 %: Sharp FIR (cut-off at 0.433 normalized frequency). Flattest (< ±0.005 dB) up to 0.4, performant and linear: 87 %: 1/3 FIR (cut-off at 0.33 normalized frequency). Gentler and linear. 86 %: Butterworth 4th order (cut-off freely selectable). 60 %: Bessel 4th order (cut-off freely selectable). 60 %: Gaussian (cut-off freely selectable). Most gentle and linear.

	Delays are automatically compensated, allowing data streams to be aligned to the sample, with accuracy: • Butterworth: optimized for low frequencies • Bessel: all in-band frequencies, always better than 1 ° • Others: all in-band frequencies, exactly 0 °	
TEDS	Class I and Class II (when connector supports it).	
Gain / offset	Active Temperature Stabilization (ATS) provides new grounds for temperature stability and drift accuracy figures (see subsequent sections). Gain and offset can be set respectively to the desired values by sensitivity calibration and balancing operation in software. Gain and offset can be further set respectively to the desired values by sensitivity calibration and balancing operation in software.	
Calibration signal	Built-in. Adjustment and Calibration executed at Siemens using a traceable reference source.	
Phase accuracy	Following values guaranteed for all units and all ranges, mixed or not:	
	Intra-stack	< 56 ns (0.2 ° @ 10 kHz)
	Inter-stack	< 10 ns (under certain conditions)
Linearity	Always better than 0.01 % of full scale at 95 % Nyquist.	
Cable length	Up to 80 m (between sensor and unit).	
Channel feedback	Following basic information is reported via LED per channel (and/or channel group) and in the user interface. For specific channel feedback, see function-specific chapter.	
	Sensor feedback	Measurement overloads (up to an internal maximum broadband)
	Supply feedback	Short circuit or power overload (power supply will be disabled automatically for protection)

Filters

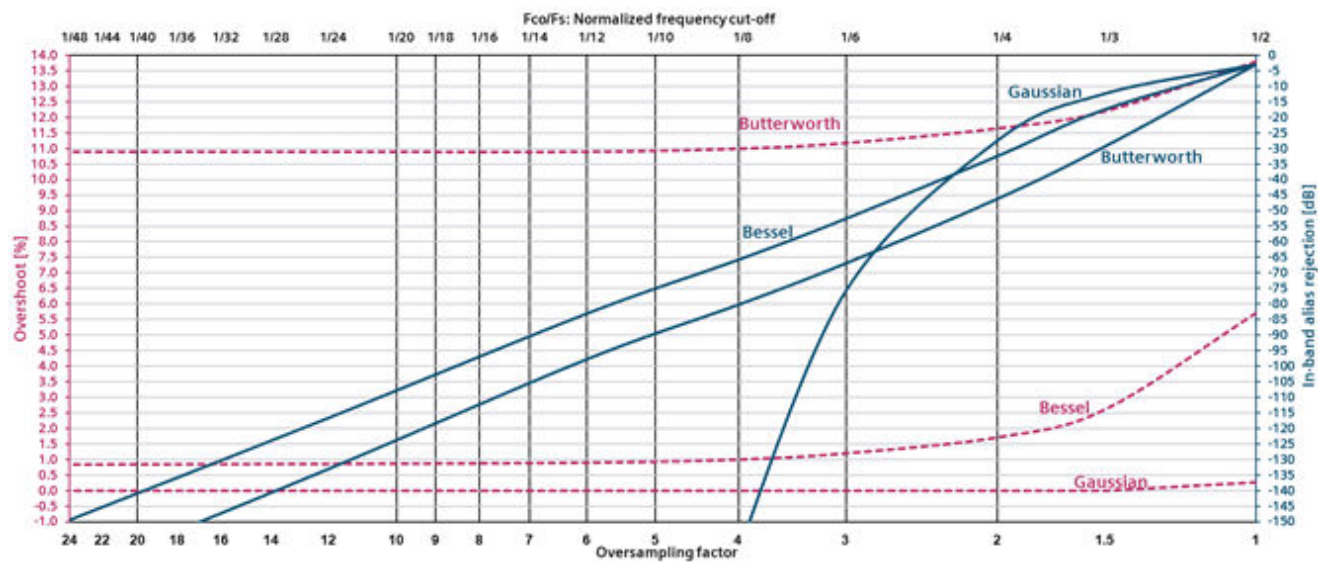


Filters Overview



Sharp FIR Filter

Alias rejection always better than 110 dB.



Shaping Filters

For MAX sample rate, alias rejection is always better than 145 dB.

Voltage

Single-Ended Input (SE)

Supported sensors/signals	- Piezo electric ICP[®] sensors - Voltage inputs up to ±60 V - Sensors with external supply	
Adjustment accuracy	Gain and offset always better than 0.1 % in temperature within the operating temperature range.	
Voltage	Ranges	±60 V, ±10 V, ±3.16 V, ±1 V, ±0.316 V
	Input impedance	10 MΩ ±2 % <100 pF, except for 60 V range: 1 MΩ ±2 % <100 pF
ICP [®]	Ranges	±10 V, ±3.16 V, ±1 V, ±0.316 V
	Input impedance	>200 kΩ <260 pF
Signal to noise ratio (SNR)	Range [V]	Always better than [dB]
	±60	111
	±10	113
	±3.16	112
	±1	110
	±0.316	104
	Method	20 kHz bandwidth, AC RMS value at 22 °C, 1 s, 100 Ω termination.

Spurious Free Floor (SFF)	Always better than -160 dB (± 60 V, ± 10 V). Method: 5x averaged APS (Auto Power Spectrum), 0.05 Hz bin, 20 Hz – 20 kHz, max peak.	
Total Harmonic Distortion (THD)	Range [V]	Always better than [dB]
	± 60	-100
	± 10	-105
	± 3.16	-105
	± 1	-100
	± 0.316	-95
	Method	-3 dB full-scale 1 kHz sine
Crosstalk	Always better than -125 dB, except -90 dB for ± 60 V range. Method: -3 dB full-scale 1 kHz sine from all other channels.	
Slew rate	31 V/ μ s. Linearity is guaranteed at full bandwidth at full scale for all ranges.	
Protection provision	Voltage without damage of ± 65 V between input pins.	

Charge

General

Adjustment accuracy	Gain and offset always better than 0.1 % for drifts in time at 22 °C ambient temperature (between recalibrations). Gain always better than 50 ppm/°C for drifts in temperature within the operating temperature range.
Spurious Free Floor (SFF)	Always better than -160 dB (for highest range). Method: 5x averaged APS (Auto Power Spectrum), 0.05 Hz bin, 20 Hz – 20 kHz, max peak.

Single-Ended Input (SE)

General

Supported sensors/signals	- Charge coupled sensors (>100 kΩ output resistance) - Piezo electric ICP[®] sensors - Voltage inputs up to ± 10 V - Sensors with external supply
Bandwidth linearity	Full bandwidth linearity is guaranteed at full scale for all ranges, besides: 316000 pC: Up to 16 kHz 100000 pC: Up to 40 kHz
Protection provision	Accidental voltage without damage <12 V RMS.

Regular input

Ranges	316000 pC, 100000 pC, 31600 pC, 10000 pC, 3160 pC, 1000 pC, 316 pC, 100 pC	
AC coupling	At -3 dB: 0.15 Hz ($\pm 6\%$), 0.5 Hz ($\pm 6\%$), 5 Hz ($\pm 2\%$).	
Signal to noise ratio (SNR)	Range [pC]	Always better than [dB]
	316000	111
	10000	110
	31600	108
	10000	101
	3160	110
	1000	108
	316	102
	100	92
	Method	20 kHz bandwidth, AC RMS value at 22 °C, 1 s, 100 Ω termination.

Quasi-Static input (QS)

Ranges	316000 pC, 100000 pC, 31600 pC, 10000 pC, 3160 pC, 1000 pC	
AC coupling	At -3 dB: 0.015 Hz (time constant of 10 s), 0.5 Hz ($\pm 6\%$), 5 Hz ($\pm 2\%$).	
Signal to noise ratio (SNR)	Range [pC]	Always better than [dB]
	316000	111
	10000	110
	31600	108
	10000	101
	3160	107
	1000	100
	Method	20 kHz bandwidth, AC RMS value at 22 °C, 1 s, 100 Ω termination.

Differential Input (DIFF)

This input can be set to single-ended mode via software. Note that this single-ended mode is specific to this input (see specifications below).

General

Supported sensors/signals	• Charge coupled sensors
Ranges	10000 pC, 3160 pC, 1000 pC, 316 pC, 100 pC.
Bandwidth linearity	Full bandwidth linearity is guaranteed at full scale for all ranges.
Offset	No offset (hardware and software filtering).

Protection provision	Charge without damage of < 100 nC RMS.
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Regular mode

AC coupling	0.5 Hz ± 2 % (at -3 dB).
Common Mode Rejection Ratio (CMRR)	For 1 kHz, always better than 60 dB.
Signal to noise ratio (SNR)	(TBC) Method: 20 kHz bandwidth, AC RMS value at 22 °C, 1 s, 100 Ω termination.

Single-Ended mode

AC coupling	0.5 Hz ± 2 % (at -3 dB) (TBC)
Signal to noise ratio (SNR)	(TBC) Method: 20 kHz bandwidth, AC RMS value at 22 °C, 1 s, 100 Ω termination.

Channel supply**General****Protection provision**

Short-circuit protected.

0 V or No Supply conditioning: $V_{\text{supply}+}$ (and $V_{\text{supply}-}$ when applicable) pins become floating (high impedance).

ICP**General**

Low-noise and temperature super-stable supply (Siemens patent).

Modes	ICP [®] modes selectable by software per channel group. Values at 25 °C ambient temperature:	
	ICP [®] 4 mA mode	>4 mA, output voltage >23.6 V >2 mA, output voltage >24.3 V
	ICP [®] 3.5 mA mode*	>3.5 mA, output voltage >23.6 V >2 mA, output voltage >24.2 V
Channel supply specific feedback	Following information is also reported via LED per channel and in the user interface: - Open circuit (detection threshold >20 V) - Supply short (detection threshold <2 V)	

(*) Not available for analog pulse channels.

Voltage/Charge channel

Uses hardware AC coupling.

Analog outputs

General

Coupling	Semi-differential.
	The Semi-differential output supports single-ended inputs (amplifiers), while taking advantage of most differential signaling advantages via a smart low-resistive controlled path between negative output and signal ground.
Range	± 10 V
Drive	20 mA max (output impedance 50 Ω).
	Compatible with some headphone speakers for audio replay: Siemens headset ABH05 (600 Ω), Sennheiser HD600 (300 Ω).
D/A converter	24-bit at 204.8 kHz with interpolation filters: combination of analog reconstruction filters and digital interpolation filters with noise shaping.
Phase match	Inter-channel phase match is $<0.2^\circ$ at 10 kHz and $<0.4^\circ$ at 20 kHz.
Crosstalk	Always better than -106 dB.
	Method: -3 dB full-scale 1kHz sine from all other channels.
Protection provision	Short-circuit protected.
	Max capacitive load: up to 10m cable.

Monitor

Bandwidth	100 kHz (-0.1 dB)
AC coupling	0.05 Hz
Gain	Compensated digitally to fit range.
Residual Offset	Always better than $\pm 0.1\%$
Latency	Absolute latency (delay between analog input and analog output) is less than 10 ms.
Signal to noise ratio (SNR)	Always better than 100 dB (TBC)
	Method: 20 kHz bandwidth, AC RMS value at 22 °C, 1 s, 100 Ω termination.
Total Harmonic Distortion (THD)	Always better than -96 dB (TBC)
	Method: -3 dB full-scale 1kHz sine.
Specific protection provision	Maximum accidental voltage without damage: ± 10 V. (TBC)

Environmental

Temperature range	- Operating: -20 °C to +55 °C (40 °F to 149 °F) - Storage: -40 °C to +85 °C (40 °F to 185 °F)
Ambient pressure	0.5 bar to 1.3 bar (50 kPa to 130 kPa) according to IEC 60068-2-13. Altitude: –2000 m (mining) to 5000 m (mountains).
Water and dust protection	IP20
Humidity	Resistant to humidity according to IEC 60068-2-30 (cyclic damp heat 12 h + 12 h).
Vibration	MIL-STD-810H, Method 514.8, category 24, 7.7 gRMS, 20-2000 Hz, 1 h per axis.
Shock	MIL-STD-810H, Method 516.8, Procedure I, Operational, Half-Sine pulse, 50 g, 11 ms.
Drop	MIL-STD-810H, Method 516.8 - Procedure IV: Transit Drop. Non-operational, Free fall from 122 cm height, unpackaged.
ESD	- EN61000-4-2 level 4 - ISO 10605
EMC requirements	IEC 61326-1
Calibration	Compliant with ISO 17025. Factory calibration of equipment with voltage channels in our ISO/IEC 17025 accredited calibration laboratory provides formal recognition to competent laboratories and provides a guaranteed & validated calibration method for Siemens SCADAS systems. Siemens will present a full ISO 17025 compliant report according to the accredited published scope and with the official RvA (registration number K159) & ILAC labels.
Certifications	CE, FCC

Connectors and Pinout

General

All connectors support at least 2500 mating cycles, unless specifically indicated.

Measurement

UNC10-32 (Microdot®)

Unit product codes	Connector	Pin function
SCES-VC9 SCES-VC9QS SCES-VC9MO	 UNC10-32 (10-32 Microdot® Simcenter SCADAS Mobile/Lab VC8 compatible) Socket : 031-0002-0001	Inner: SE/ICP®/Charge(SE) Outer: GND

Unit product codes	Connector	Pin function
	NOTE: Supports at least 500 mating cycles	

2-pin Lemo

Unit product codes	Connector	Pin function
SCES-DC6	 2-pin LEMO (Simcenter SCADAS Mobile/Lab DCH4 compatible) Socket : EHG.1B.302.CLL Plug : YCP-BPR12ACX-02MSKFX-0xxX YCP-ABR12BT0xxX bend relief	1.Charge+/Charge(SE) 2.Charge- Shielding: Unit chassis ground and signal ground (GND)

Camac

Unit product codes	Connector	Pin function
SCES-V9-B SCES-VSD9-B SCES-PD4-B SCES-V9-C SCES-VSD9-C SCES-V27-C SCES-VSD27-C SCES-VC9MO SCES-V6-SP2-C SCES-V6-PD2-B	 Camac Camac Socket : YCP-SWI06XNX-01F0EZ-000X Camac Plug : YCP-SPR06XCX-01M0EEX-035X (for RG174) YCP-ABR06BT030X bend relief	Inner: -As input: Vin+(SD)/SE/TEDS/ICP® -As output: DAC+/Monitor+ Outer: -As input: Vin-(SD)/GND(SE) -As output: DAC-/Monitor-

On-board Simcenter SCADAS Go Configuration / Recorder

General

License-free embedded software on the Simcenter SCADAS ES PNI and PNU units. If a Recorder is present in the stack, the application becomes Simcenter SCADAS Go Recorder.

Provides a multi-user parallel web user interface, accessible through any web browser, wired or wireless (PNU) connection.

Instrumentation

- Single channel setup
- Channel list (grid and card views)
- Persist settings on each connected unit
- Calculated channels setup
- Template management

Calibration & checks

- DC calibration
- Shunt calibration
- Offset balancing
- Verification checks

Monitoring

- Status info: health status, warnings and alarms
- Statistics: overall and instantaneous
- Time data
- Frequency data (FFT)
- Variety of customizable displays: digital, analog, strip chart, XY, 2D

Detailed info

See Simcenter SCADAS Go Configuration / Recorder Manual within the application.

Accessories

Product Codes and Channel Availability

Product code	Product name	SCES-DC6	SCES-VC9MO
SCESA-CAS24	Yamaichi diff-charge (2-pin) connectors (6x)	6	
SCX-CAS05*	SCx spare CAMAC-BNC adaptor for Vx & DAC		9

(*) Compatible with Simcenter SCADAS Mobile/Recorder/Lab modules.