DIGITAL INDUSTRIES SOFTWARE

Simcenter SCADAS Mobile and Lab Four-channel differential charge input module

Simcenter/DCH4/2406/20240625

Product Information Sheet

Summary

DCH4 input module

The DCH4 supports four channel signal conditioning and signal processing to measure signals from differential and single-ended piezoelectric sensors in a single Simcenter SCADAS Mobile or Simcenter SCADAS Lab slot.

The DCH4 offers the unique combination of ultra-low power consumption, 204.8 kHz 24-bits analogue to digital conversion, and a spurious free dynamic range of 138 dB.

BENEFITS

- 4 input channels via LEMO connectors
- Ultra low noise differential charge input

FEATURES

- Built-in calibration for improved specifications over a longer period
- Analog anti-alias filter
- Analog and digital overload detection with LED indication on front-panel
- 24-bit analog to digital conversion with 92 kHz bandwidth maximum
- Time domain A-weighting filter

Signal conditioning
Each input channel has a differential and single-ended charge amplifier with an input range from ±10 pC to ±10,000 pC for direct interfacing to piezoelectric sensors.
The DCH4 has a calibration check circuit to test the sensor and sensor cable; charge is injected via the sensor to the input of the amplifier.
The overload LED indicates both analogue overloads (detected at the input amplifier) and digital overloads (detected by the digital signal processor).
The analogue overload detection ensures that overloads are detected before the anti-alias filters obscure them. Built in calibration functions ensure that specifications are maintained over an extended period. A digital high-pass filter can be switched on to eliminate pyroelectric noise.

Analog to digital conversion
The DCH4 uses low-power high performance 204.8 kHz 24-bit sigma-delta analogue to digital converters. A 4-pole analogue anti-alias filter precedes each ADC. A wide range of digital decimation filters reduces the bandwidth in steps of 2 and 2.5.

Signal processing
The DCH4 is equipped with a low-power high-performance for embedded processing, independent from the number of channels.

Specifications DCH4-E
Input function
Differential and single-ended charge input via shielded LEMO 1B connector

(mating connector: LEMO FGG. 1B.302.CALD50)

Product Information Sheet

General information	DCH4 specifications	
Product name	SCM-DCH4-E, SCL-DCH4	
Description	Simcenter SCADAS Mobile and Lab four-channel differential charge input module	
Input ranges differential input	±10 pC, ±31.6 pC, ±100 pC, ±316 pC, ±1000 pC, ±3160 pC and ±10000 pC	
Transducer connector	Four (4) 2 pin LEMO 1B connector for sensor input	
Supported transducers		
	Single ended and differential piezoelectric charge sensors	
A/D Converter		
Max. sampling rate	204.8 kHz, can be down sampled in steps of 2 and 2.5	
Max. bandwidth (filter off, -3 dB)	92 kHz	
ADC Architecture	24 bit Sigma Delta ADC. The DCH4 is equipped with a low-power high-performance DSP for embedded processing, independent from the number of channels.	
Coupling	Charge input in single ended or differential mode	
Filter		
High Pass Filter	The ultra low-noise charge input supports full-scale ranges. A digital high-pass filter eliminates pyroelectric noise.	
AC Coupling	Hardware filter at 0.5 Hz±6%	
Decimation filter	Reduces bandwidth prior to signal processing; bandwidth can be down-sampled in steps of 2 and 2.5.	
Analog anti-alias filter	4-pole Equal Time Delay filter with 164 kHz cut-off frequency and 0.01 dB flatness, 150 dB/oct digital filter with 100 dB alias protection provides an alias free bandwidth of 92 kHz	
Power		
Power consumption/power budget	During normal operation, no overload and ICP supply switched on: 4.5 W	
Power feedback	LED on the module front panel, providing information on connection, power status and any sensor supply overload/underload. During system booting and startup, the LED on channel 1 will be used to indicate module status (active) using a different LED color and/or blinking pattern.	
	LED Modes Charge: Blue	**Alarm** Overload: Red
Signal to noise ratio (SNR)	**Differential input (typical)**	**Single ended input (typical)**
±10000 pC	112 dB	107 dB

±3160 pC	111 dB	105 dB
±1000 pC	103 dB	98 dB
±316 pC	109 dB	105 dB
±100 pC	101 dB	97 dB
±31.6 pC	91 dB	87 dB
±10 pC	81 dB	77 dB
	Input noise (without cable) differential mode 100 pC range is <1.4 fCrms, single-ended mode 100 pC range is <2.2 fCrms Measured between 10Hz to 20KHz, with 32k block size, 16 averages	
Common mode rejection (CMMR)	**Differential input (typical)**	**Single ended input (typical)**
±10000 pC ±3160 pC ±1000 pC ±316 pC ±100 pC ±31.6 pC ±10 pC	60 dB	60 dB
Spurious Free Dynamic Range (SFDR)	**Differential input (typical)**	**Single ended input (typical)**
±10000 pC	138 dB	135 dB
±3160 pC	138 dB	105 dB
±1000 pC	137 dB	98 dB
±316 pC	142 dB	105 dB
±100 pC	135 dB	97 dB
±31.6 pC	125 dB	87 dB
±10 pC	115 dB	77 dB
	Measured between 100Hz to 20KHz, with 32k block size, 16 averages	
Crosstalk	**Differential input (typical)**	**Single ended input (typical)**
±10000 pC ±3160 pC ±1000 pC ±316 pC ±100 pC ±31.6 pC ±10 pC	102 dB	

	Tested at 1 kHz frequency	
Total Harmonic Distortion (THD)	**Differential input (typical)**	**Single ended input (typical)**
±10000 pC ±3160 pC ±1000 pC ±316 pC ±100 pC ±31.6 pC ±10 pC	100 dB	
Amplitude accuracy	**Differential input (typical)**	**Single ended input (typical)**
	At 1 kHz better than +/- 1.1 % at 23 °C	
Gain drift	**Differential input (typical)**	**Single ended input (typical)**
	Better than +/- 0.1% between 5 and 40 deg °C	
Offset drift	**Differential input (typical)**	**Single ended input (typical)**
	Residual Offset Virtually zero after AC and digital signal processing	
Phase match between any two channels (at 9.9 kHz)	**Differential input (typical)**	**Single ended input (typical)**
±10000 pC ±3160 pC ±1000 pC ±316 pC ±100 pC ±31.6 pC ±10 pC	Better than 0.3º @ 20 kHz with equal gain settings	
Protection		
Input protection Sensor check	Charge input up to: ±100,000 pC continuously without damage The DCH4 has a calibration check circuit to test the sensor and sensor cable; charge is injected via the sensor to the input of the amplifier. The overload LED indicates both analog overloads (detected at the input amplifier) and digital overloads (detected by the digital signal processor). The analog overload detection ensures that overloads are detected before the anti-alias filters obscure them. Built in calibration functions ensure that specifications are maintained over an ex-tended period. A digital high-pass filter can be switched on to eliminate pyroelectric noise.	

ESD protection	According to EN61000-4-2, level 2 and ISO10605
EMC protection	Comply with CE-EMC directive, when installed in a SCADAS Mobile frame
Overload detection and indication	Analog overload detection at the input is combined with digital overload detection after the ADC; overloads are indicated on the front panel LED and transmitted to the host.
Shock protection	MIL-STD-810G specified in MIL-STD-810G method 516.5, Shock Amplitude: 60 gpk.
Vibration protection	MIL-STD-810G method 514.5, procedure 1, Category 24: RMS 7.694 g
Ambient operating temperature range	-20 ºC to +55 ºC
Storage temperature range	-20 °C to +70 °C
Housing	
Dimensions	One SCADAS slot (Lemo 1B)
Connector and pinning layout	

CONNECTION	DETAILS	REMARKS
2-pin LEMO: DCH4-E - channels 1 to 4  Chassis = Analog Ground	Connector type: LEMO-EHG.1B.302 Pin details: 1) + IN 2) - IN	Mating connector: LEMO-FGG.1B.302.CLADxx

Connector type:

Differential and single-ended charge input via shielded LEMO 1B connector

Mating connector:

LEMO FGG.1B.302.CALD50

SCM-DCH4-E

SCL-DCH4

Ordering information

Support of Simcenter SCADAS Frames and Modules may be restricted in specific Simcenter Testlab application workbooks.

Please check with your local representative for full details.

Note: Product is not supported in Simcenter Testlab Recorder mode

SCM-DCH4-E: Simcenter SCADAS Mobile 4-channel Differential Charge input module

SCL-DCH4: Simcenter SCADAS Lab 4-channel Differential Charge input module