SI-200

Interface for vibrating wire sensor

Description

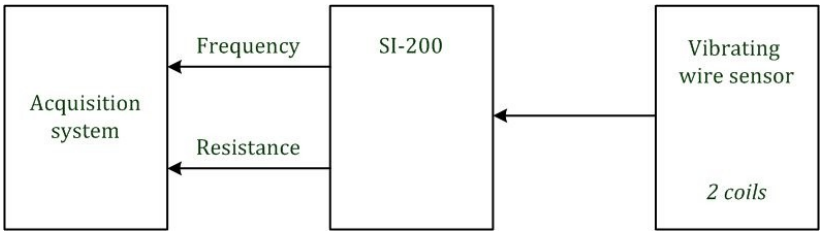
The SI-200 interface for vibrating wire sensor allows to start and maintain the oscillation of a sensor working in a sustained mode.

The fundamental frequency of the sensor is provided as a square wave. This signal can be measured by an acquisition system.

The signals, allowing the measurement of the coil resistance, are also provided to the acquisition system.

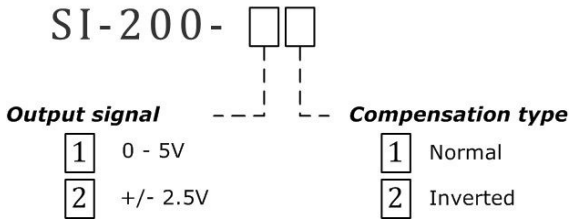
General features	
Dimensions	114 mm x 105 mm
Thickness	22,5 mm
Weight	120 g
Assembly	DIN rail
Connections	screw

Climatic conditions	
Storage temperature	-40°C to +85°C
Operating temperature	-20°C to +70°C



Available references

The product reference is constructed as follows :



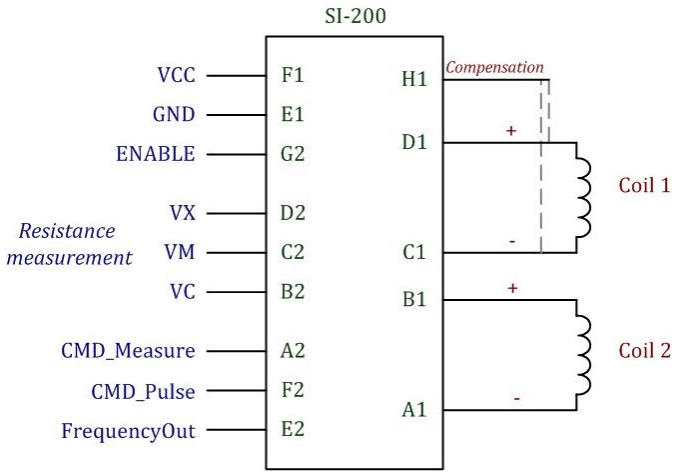
Available references are the followings :

SI-200-11	SI-200-12	SI-200-21	SI-200-22

Interface

Pinout definition on the acquisition side :

VCC	+12VDC power supply
GND	Ground
ENABLE	ON/OFF signal
VX	Resistance measurement - Excitation
VM	Resistance measurement - Measure
VC	Resistance measurement - Compensation
CMD_Measure	0 : frequency measurement 1 : resistance measurement
CMD_Pulse	Sending a pulse to the coil
FrequencyOut	Square wave to the coil resonant frequency



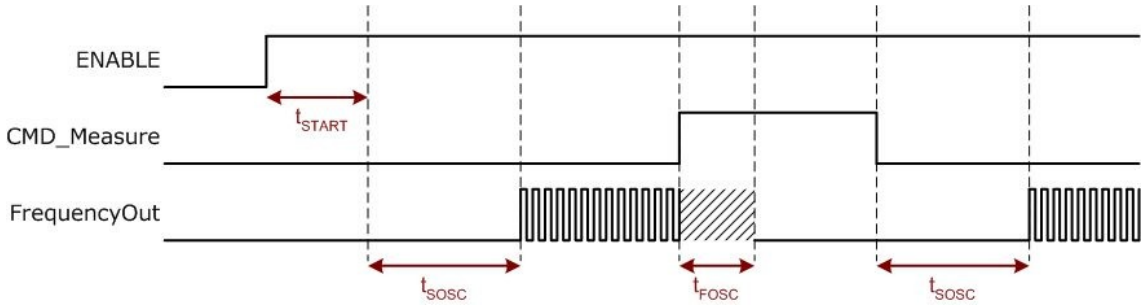
Pinout definition on the sensor side:

Coil1+	Coil 1
Coil1-	Coil 1 return
Compensation	Coil 1 compensation It is connected on either the excitation wire (+) or on the return (-)
Coil2+	Coil 2
Coil2-	Coil 2 return

Frequency measurement

Startup of oscillation

After the module has been enabled and if the command *CMD_Measure* is in low state, the IFCV will try to start the sensor oscillation. Once the oscillation is stabilised, a square wave signal is sent on the output *FrequencyOut*. This signal is the image of the fundamental frequency of the sensor.



If the command *CMD_Measure* is set to the high state, the IFCV doesn't sustain the oscillation any more and the sensor stops vibrating.

Mnemo.	Description	Min	Nom.	Max	Unit
t_{START}	Startup of the CPU and its oscillator	-	100	150	ms
t_{SOSC}	Startup and stabilisation of the oscillation. *FrequencyOut* is active.	-	1000	2000	ms
t_{FOSC}	*FrequencyOut* goes back to tha low state.	-	100	200	ms

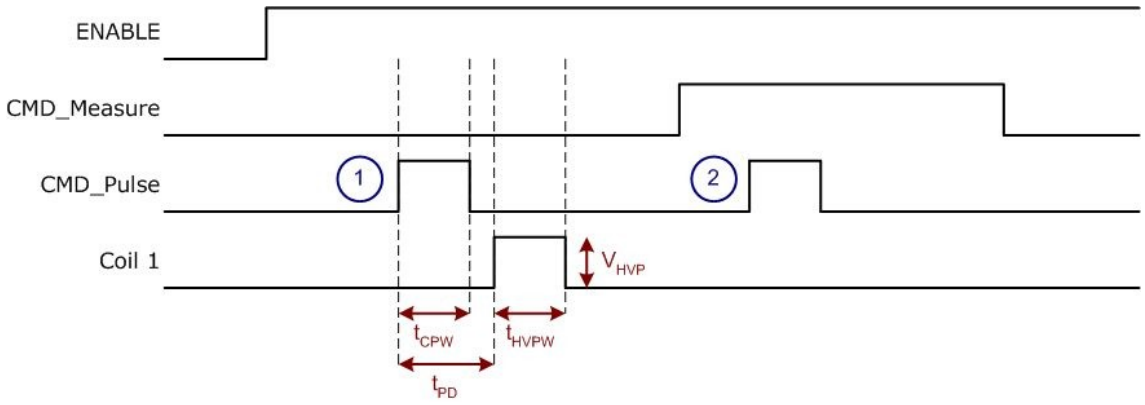
Pulse sending

In some case, the wire of the sensor may have troubles to start his oscillation.

It is possible to send an excitation pulse to try to launch the vibration.

The pulse is sent by setting the command *CMD_Pulse* to the high state. The command *CMD_Measure* shall be in a low state so as the "high voltage" pulse to be really sent to the coil 1 (mark 1).

If the command *CMD_Measure* is in a high state, the command *CMD_Pulse* is ineffective (mark 2). The coil 1 won't receive the excitation.

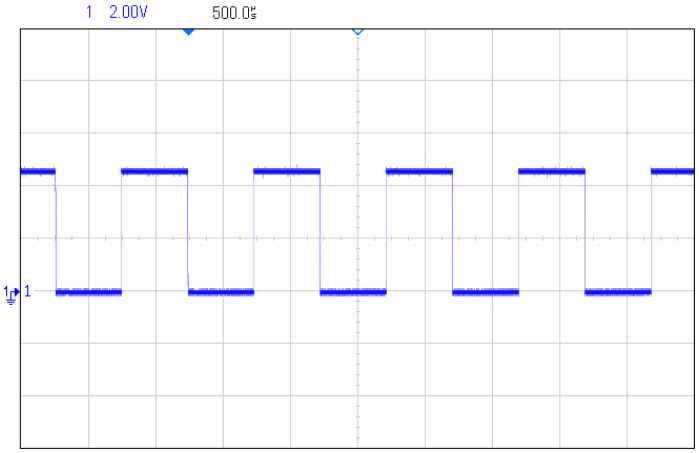


Mnemo.	Description	Min	Nom.	Max	Unit
t_{CPW}	Pulse width of the command	5	10	500	ms
t_{PD}	Pulse delay on the coil 1	-	5	10	ms
t_{HVPW}	Pulse width on the coil 1	-	1	1,5	ms
V_{HVP}	Pulse amplitude on the coil 1	-	15	20	V

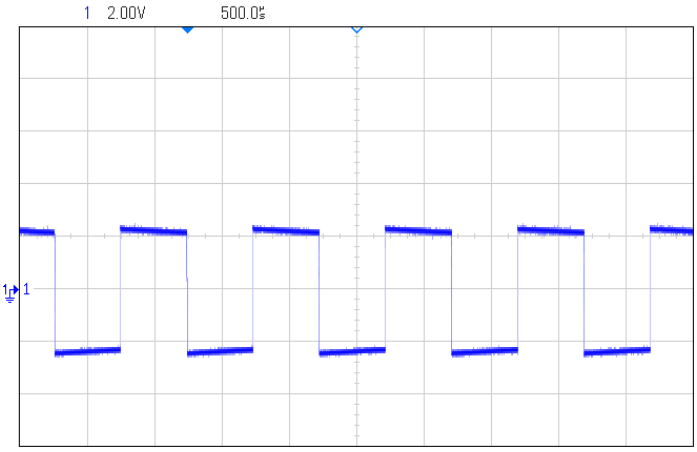
Output signal

To accomodated the greatest number of acquisition systems, two types of outputs are available.

SI-200-1x	*FrequencyOut* is a 0 – 5V signal
SI-200-2x	*FrequencyOut* is a ±2,5V signal



5V output : SI-200-1x



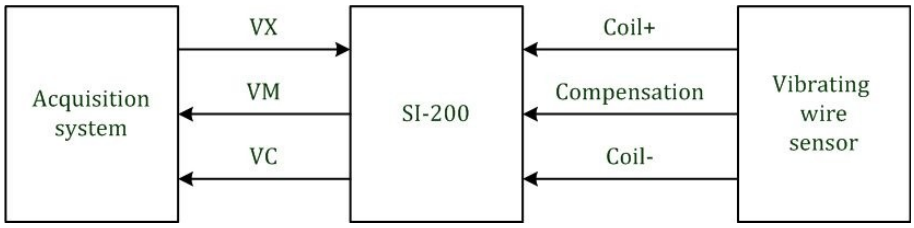
2,5V output : SI-200-2x

Resistance measurement

The signals used for the resistance measurement are sent to the acquisition system when *CMD_Measure* = 1.

Principle

The acquisition system has to perform the resistance measurement in a half-bridge way.

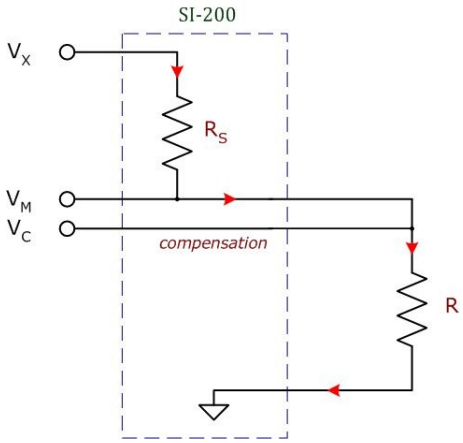


VX is the excitation signal
VM is the measurement signal
VC is the compensation signal

The value of the resistance R_S mounted in the IFCV is 100Ω (tolerance 0,1%).

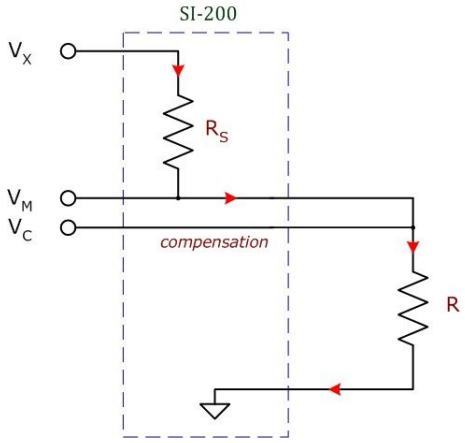
By performing the measurement of the 3 voltages VX, VM and VC, the acquisition system is able of deducting the value of the resistance R of the coil.

This resistance allows to estimate the temperature of the sensor et then the drift of its frequency response.

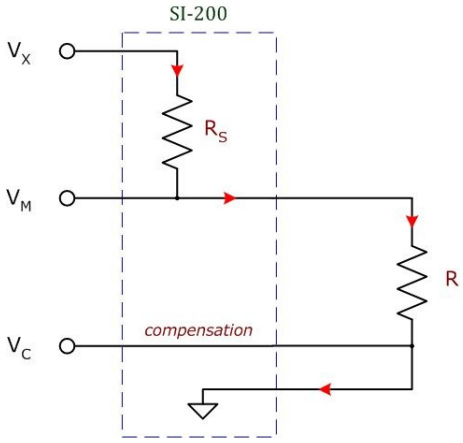


Acquisition system / sensor compatibility

Depending on the sensor assembly, the compensation may be *high* (on the highest voltage) or *low* (on the lowest voltage).



High compensation



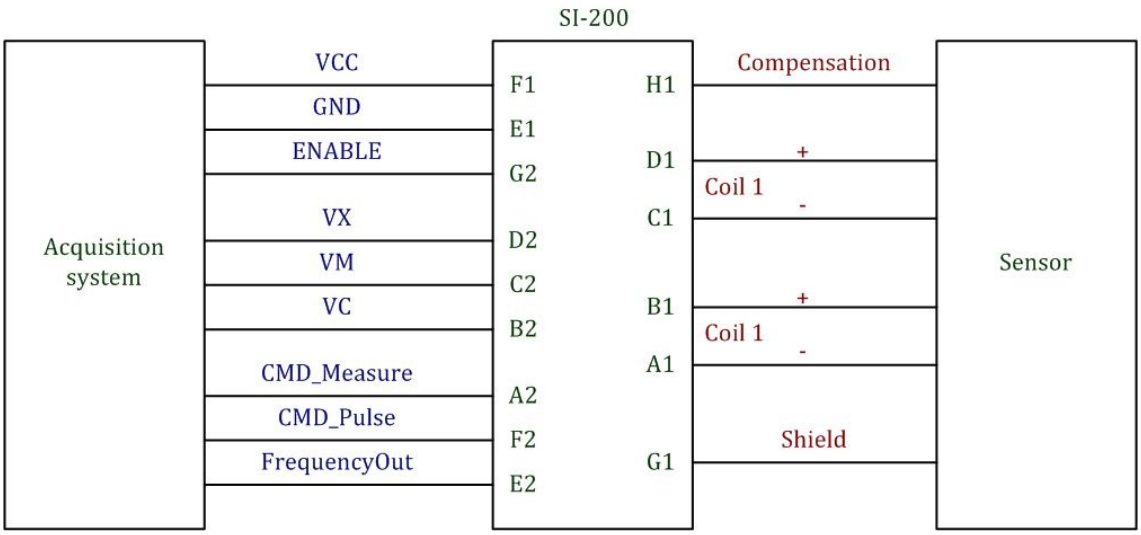
Low compensation

Depending on the compensation type expected by the acquisition system and the compensation effectively wired on the sensor, the IFCV may have to invert the polarity of the measurement coil.

SI-200-x1	Normal compensation
SI-200-x2	Inverted compensation

	Sensor compensation	
Expected compensation	**High**	**Low**
High	SI-200-x1	SI-200-x2
Low	SI-200-x2	SI-200-x1

Connection



Electrical features

Power supply

Mnemo.	Description	Min	Nom.	Max	Unit
VCC_N	Working supply voltage	11,5	12,0	13,5	V
VCC_P	Supply protection voltage (SI-200 not working)	-	-	36,0	V
I_N	Current consumption	-	40	60	mA

Acquisition system commands

Mnemo.	Description	Min	Nom.	Max	Unit
V_{IH1}	High state of inputs *CMD_Measure* and *CMD_Pulse*	3,0	-	8,0	V
V_{IL1}	Low state of inputs *CMD_Measure* et *CMD_Pulse*	-0,6	-	0,6	V
V_{IH2}	High state of input *ENABLE*	4,5	-	13,0	V
V_{IL2}	Low state of input *ENABLE*	-0,6	-	1,0	V
V_{XH}	*VX* voltage	-6,0	-	6,0	V

SI-200 outputs

Mnemo.	Description	Min	Nom.	Max	Unit
V_{H_FOUT1}	High state of the frequency output (SI-200-1x)	4,2	-	5,0	V
V_{L_FOUT1}	Low state of the frequency output (SI-200-1x)	-0,3	-	0,6	V
V_{H_FOUT2}	High state of the frequency output (SI-200-2x)	2,1		2,5	V
V_{L_FOUT2}	Low state of the frequency output (SI-200-2x)	-2,5		-2,1	V
	Precision of the frequency output	-0,3	-	+0,3	Hz
	Half-bridge resistance	99,9	100,0	100,1	Ω
	Precision of the half-bridge resistance	-0,1	-	+0,1	%

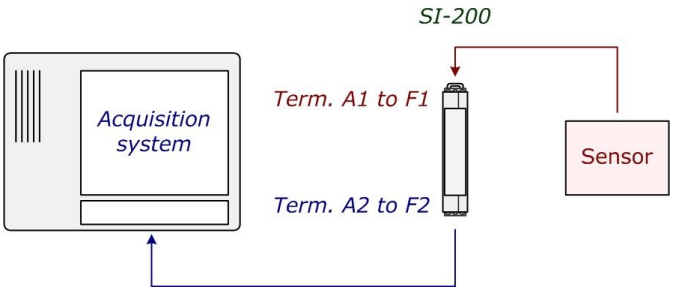
Sensor

Mnemo.	Description	Min	Nom.	Max	Unit
	Resonant frequency	700	-	1200	Hz
	Coil resistance	60	-	120	Ω

Connecting the SI-200

Terminals A1 to D1, G1 and H1 are connected to the sensor.

Terminals A2 to F2 are connected to the acquisition system.



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Pinout

Signal	Terminal
VCC	F1
GND	E1
ENABLE	G2
CMD_Measure	A2
CMD_Pulse	F2
FrequencyOut	E2
VX	D2
VM	C2
VC	B2
Coil1 +	D1
Coil1 -	C1
Compensation	H1
Coil2 +	B1
Coil2 -	A1
Shield	G1