

DMC-SX Series

Digital Magnetic Compass
DMC-SX Data Sheet

“Accurate and reliable performance
under harsh environmental conditions”



vectronix 

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1 DMC-SX at a glance

- The DMC-SX series with **varying degrees of accuracy** offers a **superior price/performance ratio**, allowing system integrators to meet their precise needs.
- The DMC-SX has **proven performance under severe and extreme environmental conditions** that ensures mission success. Hundred percent environmental stress testing during production guarantees high shock resistance resulting in unequalled reliability.
- A **unique factory calibration** with quality feedback (Figure of Merit - FOM) combined with **embedded user compensation software** enables **outstanding heading determination** over a wide range of operational conditions.
- **Precision mounting pads** that mechanically align the DMC-SX guarantee repeatability and allow drop in replacement.
- A straightforward **bi-directional RS232 electrical interface** provides needed flexibility during integration efforts, using a high performance communication protocol.
- The DMC-SX can be selected among **72 different configurations** based upon the final application. The customer can define which line of sight (1 to 6) and which mounting option (top, bottom, left or right) best suits their needs.
- A **“plug and play” Starter Kit** enables technology assessment with minimal investment, **reducing risks and cost during integration**.

2 Types and variations

	DMC-SX 5000	DMC-SX 4000	DMC-SX 3000	
Azimuth (heading) accuracy	0.25	0.5	1.0	deg (1 σ)
	0.50	1.0	2.0	deg (2 σ)
Elevation / bank accuracy	0.1	0.25	0.5	deg (1 σ)
	0.2	0.50	1.0	deg (2 σ)
Housing material	Aluminium		Reinforced Plastic	
Operating temperature range	-32 °C...+55 °C		-32 °C...+55 °C	

3 Technical specifications

	DMC-SX 5000	DMC-SX 4000	DMC-SX 3000	
Heading				
Heading accuracy ¹	0.25	0.5	1.0	deg (1 σ)
	0.50	1.0	2.0	deg (2 σ)
Elevation / Bank	-45...+45		-45...+45	deg
Calibrated temperature range	-32...+55		-32...+55	°C
Elevation / Bank (pitch / roll)				
Accuracy	0.1	0.25	0.5	deg (1 σ)
	0.2	0.50	1.0	deg (2 σ)
Calibrated range ²	-45...+45		-45...+45	deg
Functional range	-80...+80		-80...+80	deg
Calibrated temperature range	-32 ...+55		-32 ...+55	°C

¹ relative to local horizontal magnetic field vector, requires successful execution of built-in 12 step magnetic compensation procedure

² extended range on request

Description	Condition / Notes	min	typ	max	unit
Magnetic field					
Resolution			0.01		μT
Noise			0.02		μT
Range			± 100		μT
Electrical properties					
Power supply		4.75		5.25	V
Current consumption	Operation (rms value) Sleep Mode		45 10	50	mA μA
Start up current	current peak during switch-on		250		mA
Current peak duration			2		ms
Power consumption			225		mW
Voltage ripple	maximum allowable			0.02	V
Communication interface					
Serial interface baud rate	RS232, 5V TTL level compatible	300	9600	38400	Baud
TX line 1 (H)	high impedance load		5		V
TX line 0 (L)	high impedance load		0		V
TX line impedance			2150		Ohm
RX line 1 (H)			5		V
RX line 0 (L)		0		0.9	V
RX line impedance			high Z		Ohm
Connector type	number of connector pins pitch pin diameter		4 1.27 0.43		pin mm mm
Output messages					
Data integration time	selectable	0.0067	0.1	24	s
Measurement rate	selectable, single / continuous	0.042	10	50	Hz
Measurement range (full circle)	decimal hexadecimal	2 2		9999 7FFF	units units
Dynamic performance					
Start up time	cold start after shutdown (sensor wake-up delay)			150 50	ms ms
Temperature indicator					
Accuracy			2		°C
Mechanical properties DMC-SX 5000, DMC-SX 4000					
Weight			28		g
Dimensions	L x W x H		33 x 31 x 13		mm
Mechanical interface	3 mounting pads 2 positioning holes, diameter		M2, 4 deep 1.5, 2 deep		mm mm
Mechanical properties DMC-SX 3000					
Weight			25		g
Dimensions	L x W x H		34 x 31 x 13		mm
Mechanical interface	3 mounting pads 2 positioning holes, diameter		1.5, 2 deep		mm

Description	Condition / Notes	min	typ	max	unit
Environmental performance DMC-SX 5000, DMC-SX 4000					
Temperature	Operating	-32		+55	°C
	Functional	-40		+71	°C
	Storage	-55		+85	°C
Shock	half sine	50 g / 11 ms 2000 g / 0.5 ms			
Vibration	random, 5 Hz to 2 000 Hz, 120 min each axis	0.04 g ² / Hz			
Environmental performance DMC-SX 3000					
Temperature	Operating	-32		+55	°C
	Functional	-40		+71	°C
	Storage	-55		+85	°C
Shock	half sine	50 g / 11 ms			
Vibration	random, 5 Hz to 2 000 Hz, 120 min each axis	0.04 g ² / Hz			

4 Magnetic compensation procedures

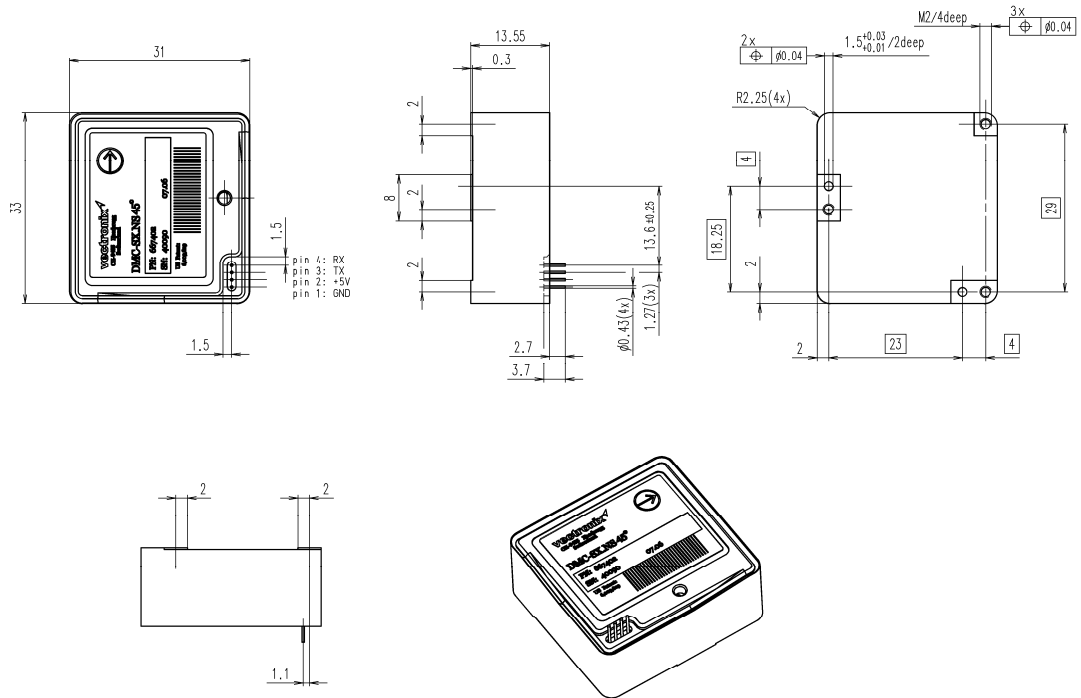
Several built-in procedures enabling the compensation of magnetic disturbances, which are in a mechanically fixed relationship with the compass, can be performed. The choice of the compensation depends on the disturbance to compensate (soft or hard magnetic), on the possible compensation geometry and on the expected accuracy.

Compensation procedure	Accuracy	Procedure complexity	Description
12 step compensation procedure	Highest accuracy	12 defined positions	Compensation of hard magnetic influence (magnetic fields, permanent magnets, magnetic fields derived from constant electric currents)
4 step compensation routine	Highest accuracy	4 defined positions	Compensation of soft magnetic influence (magnetic materials)
2D compensation mode (horizontal)	Less accuracy	Rotation	2D or horizontal compensation for vehicles, where 3D movements are not possible
Easy calibration mode	Less accuracy	Easy figure	Partial compensation of magnetic disturbances, where ease of use is more important than optimal accuracy

Note that tilt sensors are not influenced by magnetic fields.

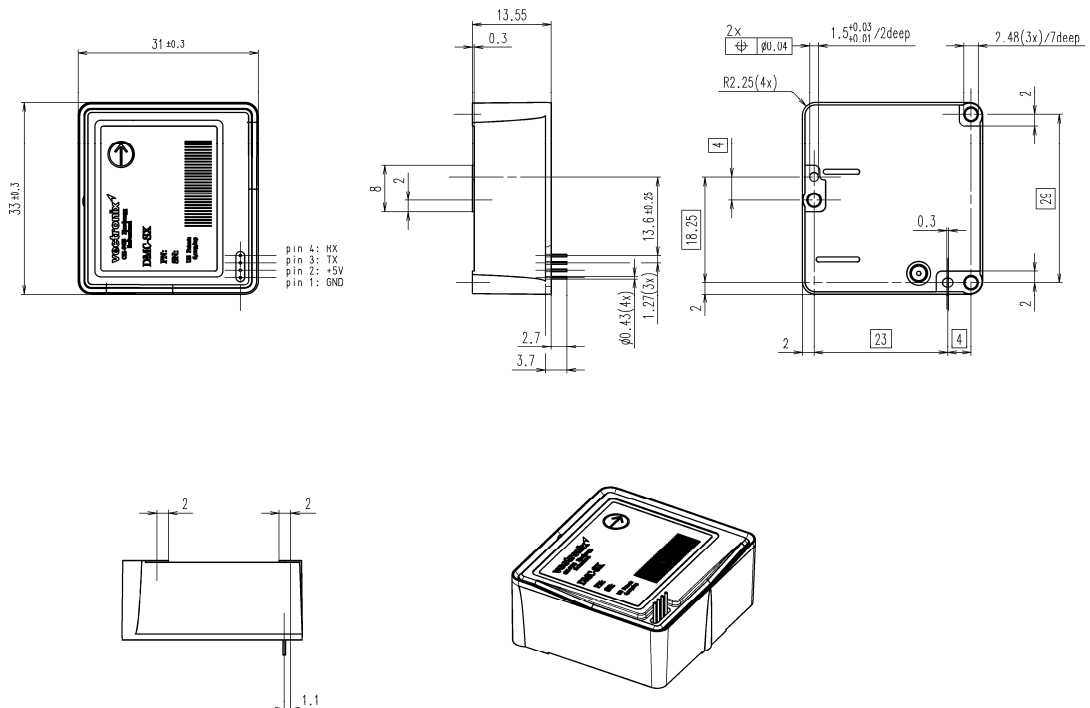
5 Mechanical interface

5.1 Mechanical interface for DMC-SX 4000 and DMC-SX 5000



5.2 Mechanical interface for DMC-SX 3000

Dimensions of DMC-SX 3000 series may differ slightly from DMC-SX 5000 / DMC-SX 4000 series.

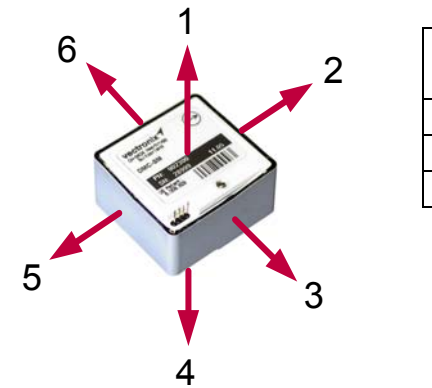


6 Electrical interface

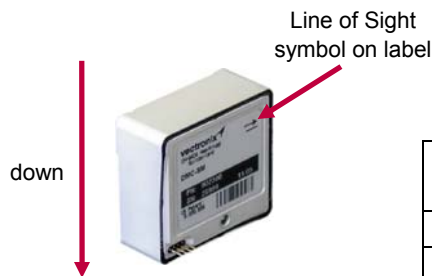
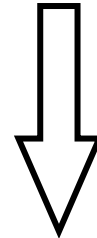
For electrical interfacing, it is strongly recommended to use a standard PCB connector (details are provided in the Operator Manual) secured by gluing. In case a soldering connection cannot be avoided, make sure that the maximum soldering time of 3 seconds is not exceeded.

7 Compass orientation system and ordering code

For easy integration the compass orientation is customized for each customer. To determine your ideal orientation, please use the system below. When ordering a compass, always provide the orientation code as explained below.



Accuracy class		Horizontal orientation (Line Of Sight = LoS)	Vertical orientation (down)
DMC-SX 5000 (0.25° 1σ)			
DMC-SX 4000 (0.5° 1σ)			
DMC-SX 3000 (1.0° 1σ)			



Accuracy class		Horizontal orientation (Line Of Sight = LoS)	Vertical orientation (down)
DMC-SX 5000 (0.25° 1σ)	X	2	3
DMC-SX 4000 (0.5° 1σ)			
DMC-SX 3000 (1.0° 1σ)			

The ordering code in the above example would be **DMC-SX 5000 [2/3]**.

7.1 Standard orientations

The following table provides an overview of the standard orientations available. For other orientations please contact the factory. If no orientation is provided with the order the DMC-SX will be calibrated in standard orientation [2/4].

Orientation				
Line of Sight (LoS) Symbol on label				
LoS / down	2 4	6 4	5 4	3 4
DMC-SX 5000 X/X	DMC-SX 5000 2/4	DMC-SX 5000 6/4	DMC-SX 5000 5/4	DMC-SX 5000 3/4
DMC-SX 4000 X/X	DMC-SX 4000 2/4	DMC-SX 4000 6/4	DMC-SX 4000 5/4	DMC-SX 4000 3/4
DMC-SX 3000 X/X	DMC-SX 3000 2/4	DMC-SX 3000 6/4	DMC-SX 3000 5/4	DMC-SX 3000 3/4

Orientation				
Line of Sight (LoS) Symbol on label				
LoS / down	2 1	3 1	5 1	6 1
DMC-SX 5000 X/X	DMC-SX 5000 2/1	DMC-SX 5000 3/1	DMC-SX 5000 5/1	DMC-SX 5000 6/1
DMC-SX 4000 X/X	DMC-SX 4000 2/1	DMC-SX 4000 3/1	DMC-SX 4000 5/1	DMC-SX 4000 6/1
DMC-SX 3000 X/X	DMC-SX 3000 2/1	DMC-SX 3000 3/1	DMC-SX 3000 5/1	DMC-SX 3000 6/1

Orientation				
Line of Sight (LoS) Symbol on label				
LoS / down	2 6	1 6	5 6	4 6
DMC-SX 5000 X/X	DMC-SX 5000 2/6	DMC-SX 5000 1/6	DMC-SX 5000 5/6	DMC-SX 5000 4/6
DMC-SX 4000 X/X	DMC-SX 4000 2/6	DMC-SX 4000 1/6	DMC-SX 4000 5/6	DMC-SX 4000 4/6
DMC-SX 3000 X/X	DMC-SX 3000 2/6	DMC-SX 3000 1/6	DMC-SX 3000 5/6	DMC-SX 3000 4/6

Orientation				
Line of Sight (LoS) Symbol on label				
LoS / down	2 3	4 3	5 3	1 3
DMC-SX 5000 X/X	DMC-SX 5000 2/3	DMC-SX 5000 4/3	DMC-SX 5000 5/3	DMC-SX 5000 1/3
DMC-SX 4000 X/X	DMC-SX 4000 2/3	DMC-SX 4000 4/3	DMC-SX 4000 5/3	DMC-SX 4000 1/3
DMC-SX 3000 X/X	DMC-SX 3000 2/3	DMC-SX 3000 4/3	DMC-SX 3000 5/3	DMC-SX 3000 1/3

7.2 Special orientations

If compasses with orientations different to the ones in the previous table are needed, they can be provided for the DMC-SX 5000 series only. The special orientations will be labelled as follows:

Standard DMC-SX Orientation	Special DMC-SX Orientation
DMC-SX 5000 [x/y]	DMC-SX 5010 [x/y]

7.3 Compass with two implemented orientations

For applications where the compass needs to be used in two different operation orientations, special compasses of the DMC-SX 5000 series can be provided. They will include compensation data for 2 orientation settings that can be changed by a software command to provide higher flexibility and increased user benefits.

Special DMC-SX orientation combinations	
DMC-SX 5010 [6/4 6/2]	DMC-SX 5010 [2/4 1/5]

8 DMC-SX Starter Kit

The DMC-SX Starter Kit provides everything you need to get started with the Vectronix Digital Magnetic Compass. The Starter Kit is perfect for customers who are interested in integrating the DMC-SX into their system, and would like to evaluate the capabilities and accuracy first hand. The DMC-SX Starter Kit can be customized by selecting up to five DMC-SX compasses with the orientation and accuracy desired.

Features:

- Selection of up to 5 DMC-SX compasses
- All relevant materials needed to integrate the DMC-SX is included
- Proprietary DMC integration
- Software and STEP files

The DMC-SX Starter Kit comes complete with:

- Up to 5 DMC-SX digital magnetic compasses of customer's own choice
- USB universal interface with adapter and cables
- USB memory stick with interface software
- DMC-SX mounting kit
- Ruggedized aluminum case with ESD protective insert



vectronix 

Vectronix AG
Max-Schmidheiny-Strasse 202
CH-9435 Heerbrugg
Switzerland
Telephone +41 71 726 72 00
Fax +41 71 726 72 01
www.vectronix.ch