

3-AXIS INCLINE SENSORS (IP69K)

SINC Incline Sensor *3 axis inclinometer, single module*

- Easy mounting, sense true position regardless orientation
 - 3 axis sensing (X, Y and Z)
- Totally sealed IP69K (*connector dependent*)
- Wide operating temperature range, -40°C to +85°C
- J1939 CAN Bus or varying voltage output
- 'Electronic Bubble' LEDs display level status
- Configuration available through J1939 for sensitivity and angular range settings



STANDARD OPERATING CHARACTERISTICS

ELECTRICAL	Outputs	B - 1939 J1939, Addressable, 3 axis reporting (<i>attached message sheets S4; I2 / 3 - 4</i>)
		B - ANLG Contact Joral to build custom analog signal
	Input Power	6 to 30 VDC (<i>90 mA</i>)
	Electrical Protection	Over-voltage, reserve-voltage, output short-circuit protected
	LED Indicators	Power, J1939 communication status, level status and X/Y level condition
	Connections	M12, M12 Pigtail, Flying Lead Cable, Shielded Flying Lead, or Deutsch - 4 or 6 pin
	Resolution	0.1°
	Absolute Accuracy (at 25°C)	± 0.3°
MECHANICAL	Housing Style	Rectangular tabbed
	Housing Material	Plastic or Anodized Aluminum (<i>high temperature applications</i>)
	Housing Height	Plastic - 1.0"; Aluminum - <i>Contact Joral</i>
	Housing Width	Plastic - 1.5"; Aluminum - <i>Contact Joral</i>
	Housing Length w/ Tabs	Plastic - 3.0"; Aluminum - <i>Contact Joral</i>
	Mounting	Tabs (0.187 diameter holes)
	Weight	3.0 oz
ENVIRONMENTAL	Operating Temperature	-40° to +80° C
	Temperature Drift	± 0.3 degrees across specified operating temperature limits
	Storage Temperature	-40° to +90° C
	Humidity	100%
	Shock	400g/6ms (<i>MIL STD 202</i>)
	Vibration	5 to 3000 Hz, 20g (<i>MIL STD 202</i>)
	Protection Class	IP69K (<i>connection dependent</i>)

SINC GENERAL ORDERING GUIDE

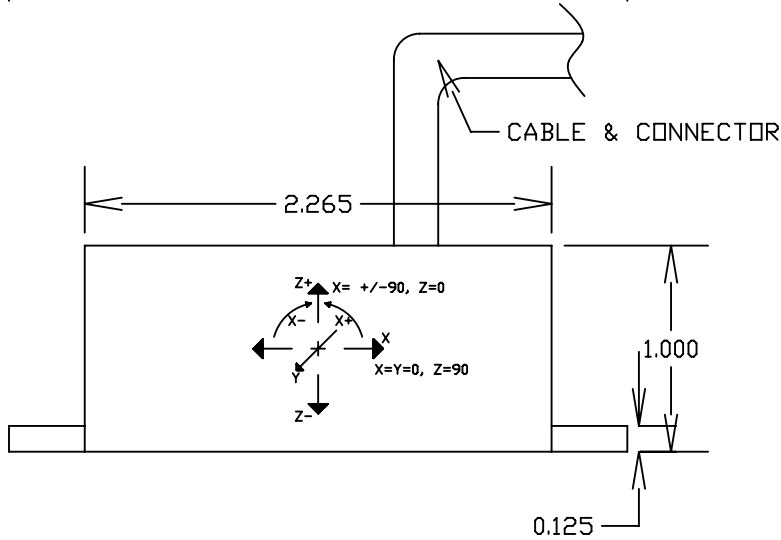
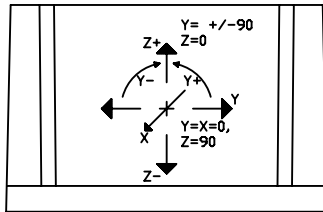
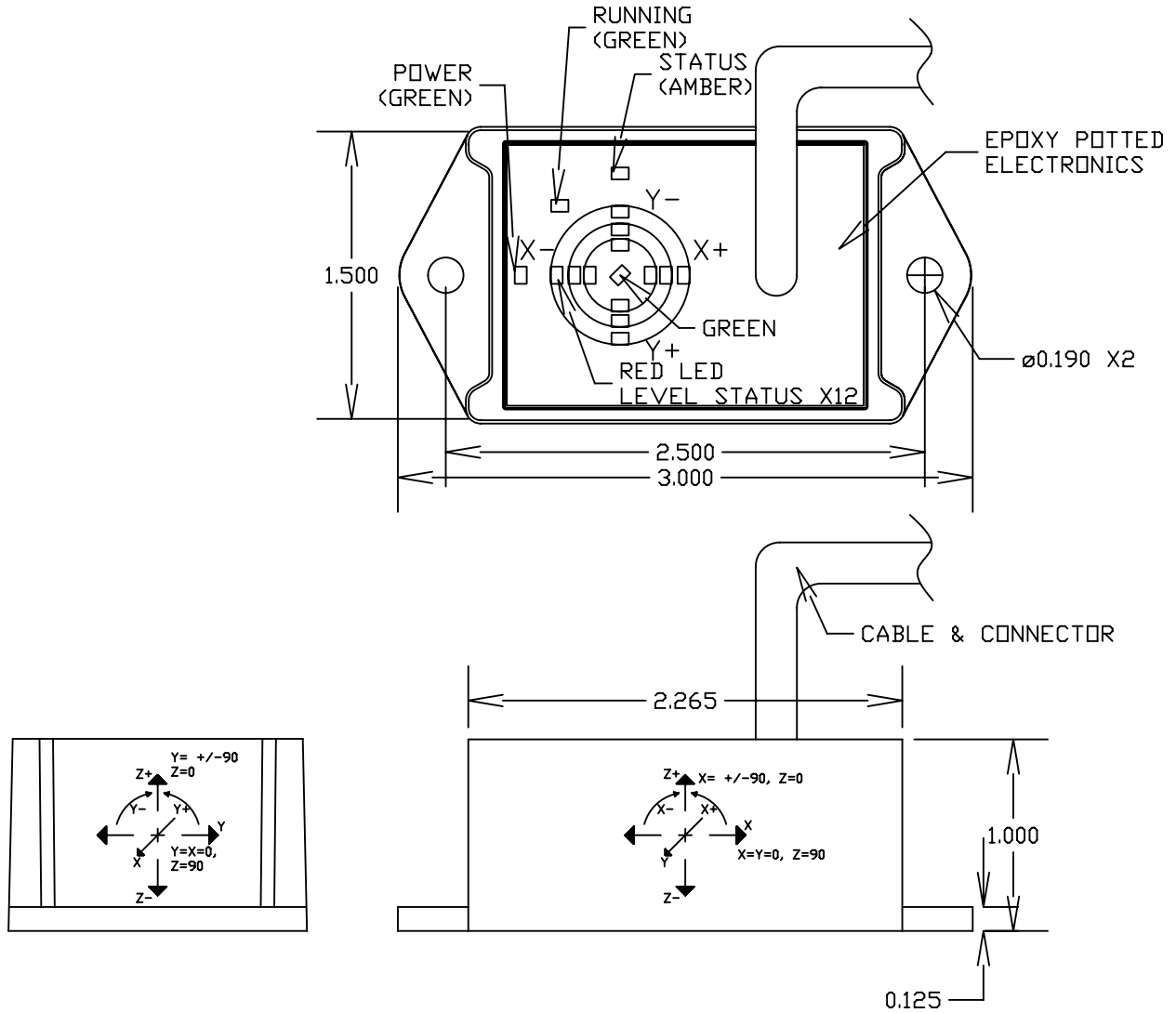
Code 1: Housing Style	Code 2: MagElec (Sensor Output)	Code 3: Connection	Code 4: Special Codes
SINC Black plastic housing standard, not rated for high temp applications	B - 1939 J1939, Addressable, 3 axis position reporting	M12 M12 male	51 Red Aluminum
	B - ANLG Contact Joral to build custom analog signal	M12P M12 male on 18' pigtail	53 Black Aluminum
SINC Modifier Red Aluminum: SINC - [Code 2] - [Code 3] - 51 Special code 51(53) for anodized red (black) aluminum high temp housing	<i>* More outputs and connection options available, contact Joral if desired configuration is not listed</i>	CXX Flying lead cable (enter XX as inches)	
		SCXX Shielded cable (enter XX as inches)	
		DE4 DT04 - 4 pin male Deutsch	
		DE6 DT04 - 6 pin male Deutsch	

General dimensions found on next page (S4; I2 / 2)

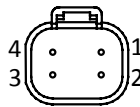
J1939 setting/status message found on pages three and four (S4; I2 / 3 - 4)



SINC DIMENSIONS & GENERAL PIN OUTS



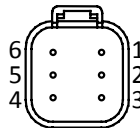
**DT04-4P MALE
FACE VIEW**



DT04-4P J1939 OUTPUT

- 1 = YEL = CAN HIGH
- 2 = GRN = CAN LOW
- 3 = RED = +VDC (VIN)
- 4 = BLK = COMMON/GROUND

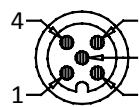
**DT04-6P MALE
FACE VIEW**



DT04-6P J1939 OUTPUT

- 1 = YEL = CAN HIGH
- 2 = GRN = CAN LOW
- 3 = RED = +VDC (VIN)
- 4 = BLK = ADDRESS GROUND
- 5 = WHT = ADDRESS PROG. RESISTOR
- 6 = BLK = COMMON/GROUND

**M12-5P MALE
FACE VIEW**



**M12-5P AND 5 CONDUCTOR
CABLE J1939 OUTPUT**

- 1 = BRN = +VDC (VIN)
- 2 = WHT = CAN HIGH
- 3 = BLUE = COMMON/GROUND
- 4 = BLK = CAN LOW
- 5 = GRY = OPTIONAL ADDRESS PROGRAMMING RESISTOR

*Dimensions informative only
For most recent dimensions please consult factory*



J1939 3 Axis Incline Sensor - STATUS Message 65465 (SINC)

MESSAGE PARAMETERS

This message is transmitted by sensor at REP Rate

PGN: 65465 (FFB9 hex)	
Transmission Repetition Rate	50ms
Data Length	8 bytes
Data Page	0
PDU Format	255 (FF hex)
PDU Specific	185 (B9 hex)
Priority	4
Source Address	220 (DBC hex)
Communication Bit Rate	250 K bits/sec

PART NUMBERS

5 pin M12	SINC-B-1939-M12
4 pin DT04	SINC-B-1939-DE4
6 pin DT04	SINC-B-1939-DE6
Flying Lead	SINC-B-1939-SCXX

For flying lead replace XX with desired length in inches
For high temperature applications use aluminum housing. Add modifier 51 (red) or 53 (black) to end of Joral P/N for aluminum.

CONNECTIONS / WIRING

Signal	M12 5 pin	DE4	DE6
V+	1	3 RED	3 RED
Common	2	4 BLACK	4 BLACK
CANH	3	1 YELLOW	1 YELLOW
CANL	4	2 GREEN	2 GREEN
SA Select	5		5 WHITE
Common			6 BLACK

SOURCE ADDRESS SELECTION

Value (ohms)	Address	PGN
No Resistor	220	65465
590 (id-tag 1)	221	65465
976 (id-tag 2)	222	65465
1500 (id-tag 3)	223	65465
2260 (id-tag 4)	224	65465
3400 (id-tag 5)	225	65465
5360 (id-tag 6)	226	65465
9530 (id-tag 7)	227	65465

8 BYTE / 64 BIT DATA FIELD BIT POSITIONS

BYTE	BIT	BIT FUNCTION	FIELD DESCRIPTION		
BYTE 1	1	X Angle bit0 LSB	X ANGLE (10 bits) 0 to 1000, 0.1° per bit		
	2	X Angle bit1			
	3	X Angle bit2			
	4	X Angle bit3			
	5	X Angle bit4			
	6	X Angle bit5			
	7	X Angle bit6			
	8	X Angle bit7			
BYTE 2	9	X Angle bit8	X ANGLE POS SIGN FLAG (2 bits) 01 = Positive Angle		
	10	X Angle bit9 MSB			
	11	X Positive Flag LSB	X ANGLE NEGATIVE SIGN FLAG (2 bits) 01 = Negative Angle		
	12	X Positive Flag MSB			
	13	X Negative Flag LSB	Y ANGLE (10 bits) 0 to 1000, 0.1° per bit		
	14	X Negative Flag MSB			
	15	Y Angle bit0 LSB			
	16	Y Angle bit1			
17	Y Angle bit2				
18	Y Angle bit3				
BYTE 3	19	Y Angle bit4	Y ANGLE POS SIGN FLAG (2 bits) 01 = Positive Angle		
	20	Y Angle bit5			
	21	Y Angle bit6	Y ANGLE NEGATIVE SIGN FLAG (2 bits) 01 = Negative Angle		
	22	Y Angle bit7			
	23	Y Angle bit8	Z ANGLE (10 bits) 0 to 1000, 0.1° per bit		
	24	Y Angle bit9 MSB			
	25	Y Positive Flag LSB			
	26	Y Positive Flag MSB			
27	Y Negative Flag LSB				
28	Y Negative Flag MSB				
BYTE 4	29	Z Angle bit0 LSB	Z ANGLE POS SIGN FLAG (2 bits) 01 = Positive Angle		
	30	Z Angle bit1			
	31	Z Angle bit2	Z ANGLE NEGATIVE SIGN FLAG (2 bits) 01 = Negative Angle		
	32	Z Angle bit3			
	33	Z Angle bit4	Z ANGLE (10 bits) 0 to 1000, 0.1° per bit		
	34	Z Angle bit5			
	35	Z Angle bit6			
	36	Z Angle bit7			
37	Z Angle bit8				
38	Z Angle bit9 MSB				
BYTE 5	39	Z Positive Flag LSB	Z ANGLE POS SIGN FLAG (2 bits) 01 = Positive Angle		
	40	Z Positive Flag MSB			
	41	Z Negative Flag LSB	Z ANGLE NEGATIVE SIGN FLAG (2 bits) 01 = Negative Angle		
	42	Z Negative Flag MSB			
	43	unused			
	44	unused			
	45	unused			
	46	unused			
47	unused				
48	unused				
49	unused				
50	unused				
BYTE 6	51	unused			
	52	unused			
	53	unused			
	54	unused			
	55	unused			
	56	unused			
	BYTE 7	57		Sensitivity bit0 LSB	SENSITIVITY Setting (3 bits) Field contains value of current setting 0 = most sensitive, 7 = most sluggish (default 4)
		58		Sensitivity bit1	
59		Sensitivity bit2 MSB			
60		LED Weight bit0 LSB	LED WEIGHT Setting (3 bits) Field contains value of current setting Degrees per LED Indicator, 1 to 7 (default 1)		
61		LED Weight bit1			
62		LED Weight bit2 MSB			
63		unused			
64		unused			



J1939 3 Axis Incline Sensor - SETTING Message 65281 (SINC)

MESSAGE PARAMETERS

This message is transmitted by the controller

PGN: 65281 (FF01 hex)

Transmission Repetition Rate	n/a
Data Length	n/a
Data Page	0
PDU Format	255 (FF hex)
PDU Specific	1 (01 hex)
Priority	x
Source Address	39 (27 hex)
Communication Bit Rate	250 K bits/sec

CONNECTIONS / WIRING

Signal	M12 5 pin	DE4	DE6
V+	1	3 RED	3 RED
Common	2	4 BLACK	4 BLACK
CANH	3	1 YELLOW	1 YELLOW
CANL	4	2 GREEN	2 GREEN
SA Select	5		5 WHITE
Common			6 BLACK

SOURCE ADDRESS SELECTION

Value (ohms)	Address	PGN
No Resistor	220	65281
590 (id-tag 1)	221	65282
976 (id-tag 2)	222	65283
1500 (id-tag 3)	223	65284
2260 (id-tag 4)	224	65285
3400 (id-tag 5)	225	65286
5360 (id-tag 6)	226	65287
9530 (id-tag 7)	227	65288

8 BYTE / 64 BIT DATA FIELD BIT POSITIONS

BYTE	BIT	BIT FUNCTION	FIELD DESCRIPTION	
BYTE 1	1	SENS Setting bit0 LSB	SENSITIVITY SETTING (3 bits) <i>Field contains value of current setting</i> 0 = most sensitive, 7 = most sluggish (default 4)	
	2	SENS Setting bit1		
	3	SENS Setting bit2 MSB		
	4	reserved	LED WEIGHT SETTING (3 bits) <i>Field contains value of current setting</i> Degrees per LED indicator, 1 to 7 (default 1)	
	5	reserved		
	6	Direction Setting LSB		
	7	Direction Setting LSB		
	8	Direction Setting MSB		
BYTE 2	9	CAL LSB		CALIBRATE/HOME FLAG (2 bits) 01 = Calibrate / Home the sensor
	10	CAL MSB		
	11	unused		NOTE: Set reserved and unused bits to all 0's or all 1's
	12	unused		
	13	unused		
	14	unused		
	15	unused		
	16	unused		
17	unused			
BYTE 3	18	unused		
	19	unused		
	20	unused		
	21	unused		
	22	unused		
	23	unused		
	24	unused		
	25	unused		
BYTE 4	26	unused		
	27	unused		
	28	unused		
	29	unused		
	30	unused		
	31	unused		
	32	unused		
	33	unused		
BYTE 5	34	unused		
	35	unused		
	36	unused		
	37	unused		
	38	unused		
	39	unused		
	40	unused		
	41	unused		
BYTE 6	42	unused		
	43	unused		
	44	unused		
	45	unused		
	46	unused		
	47	unused		
	48	unused		
	49	unused		
BYTE 7	50	unused		
	51	unused		
	52	unused		
	53	unused		
	54	unused		
	55	unused		
	56	unused		
	57	unused		
BYTE 8	58	unused		
	59	unused		
	60	unused		
	61	unused		
	62	unused		
	63	unused		
	64	unused		

