

**3-AXIS INCLINE
SENSORS (IP69K)**

DINC Boom Angle Sensor *3 axis inclinometer, dual module*

- Two inclinometers which report master and slave position via one J1939 communication line
- Sense true position regardless orientation (X, Y and Z)
 - Easily find change in position between base and boom
- 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; I3 / 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	Master - 3.0 oz; Slave - 2.0 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>)

DINC GENERAL ORDERING GUIDE

Code 1: Housing Style	Code 2: MagElec (Sensor Output)	Code 3: Connection	Code 4: Special Codes
DINC Black plastic housing standard, not rated for high temp applications DINC Modifier Red Aluminum: DINC - [Code 2] - [Code 3] - 51 Special code 51(53) for anodized red (black) aluminum high temp housing	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
		CXX Flying lead cable (enter XX as inches)	
	* More outputs and connection options available, contact Joral if desired configuration is not listed	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; I3/2)
J1939 setting/status message found on pages three and four (S4; I3/3-5)

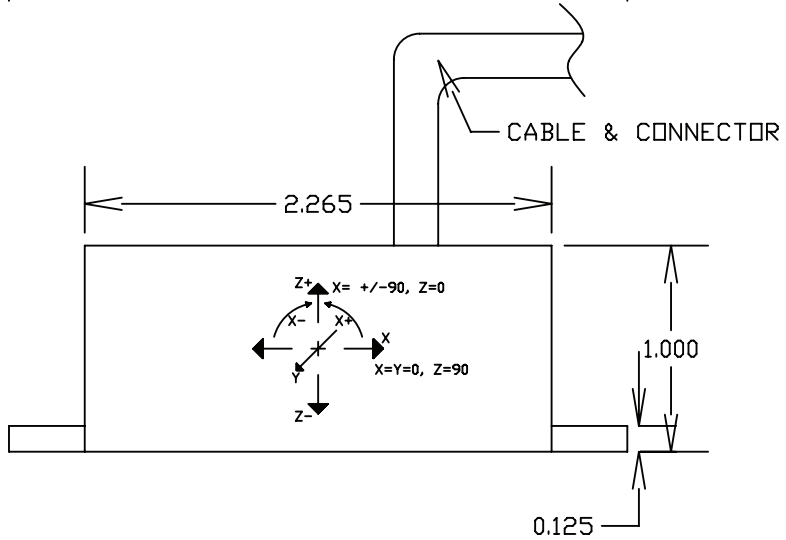
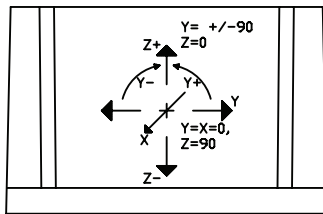
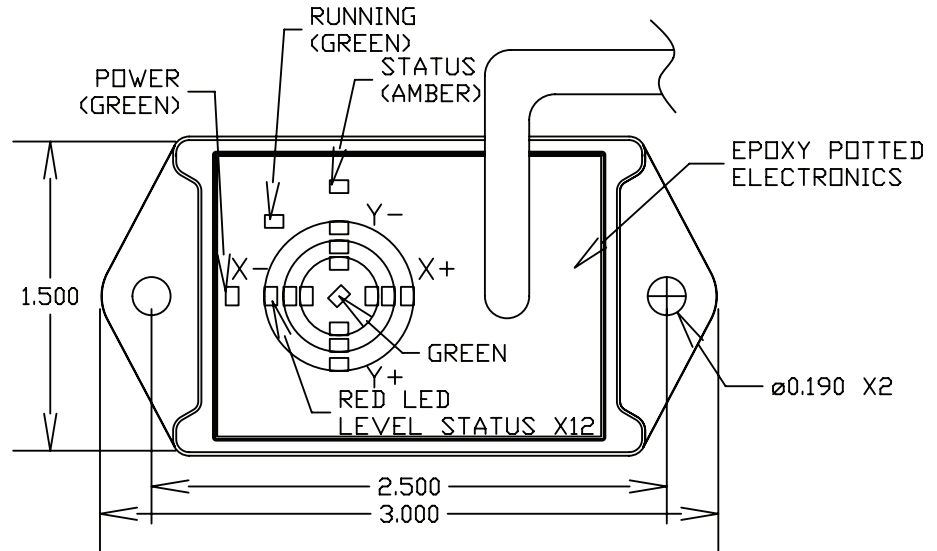


DINC DIMENSIONS & GENERAL PIN OUTS

BOOM ANGLE NOTE:

DINC inclinometer master/
slave module use the
same housing and share
dimensions

DINC slave can be provided
without LED indicators

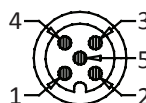


**DT04-4P MALE
FACE VIEW**



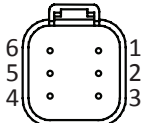
- DT04-4P J1939 OUTPUT**
1 = YEL = CAN HIGH
2 = GRN = CAN LOW
3 = RED = +VDC (VIN)
4 = BLK = COMMON/GROUND

**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

**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

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



J1939 Dual 3 Axis Incline Sensor - Master STATUS Message 65467 (DINC)

MESSAGE PARAMETERS

This message is transmitted by sensor at REP Rate

PGN: 65467 (FFBB hex)	
Transmission Repetition Rate	50ms
Data Length	8 bytes
Data Page	0
PDU Format	255 (FF hex)
PDU Specific	187 (BB hex)
Priority	4
Source Address	219 (DB hex)
Communication Bit Rate	250 K bits/sec

PART NUMBERS

5 pin M12	DINC-B-1939-M12
4 pin DT04	DINC-B-1939-DE4
6 pin DT04	DINC-B-1939-DE6
Flying Lead	DINC-B-1939-SCXX
<i>For flying lead replace XX with desired length in inches</i>	
<i>For high temperature applications use aluminum housing. Add modifier 51 (red) or 53 (black) to end of Joral P/N for aluminum.</i>	

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	219	65467
590 (<i>id-tag 1</i>)	220	65467
976 (<i>id-tag 2</i>)	221	65467
1500 (<i>id-tag 3</i>)	222	65467
2260 (<i>id-tag 4</i>)	223	65467
3400 (<i>id-tag 5</i>)	224	65467
5360 (<i>id-tag 6</i>)	225	65467
9530 (<i>id-tag 7</i>)	226	65467

8 BYTE / 64 BIT DATA FIELD BIT POSITIONS

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



J1939 Dual 3 Axis Incline Sensor - Slave STATUS Message 65466 (DINC)

MESSAGE PARAMETERS

This message is transmitted by sensor at REP Rate	
PGN: 65466 (FFBA hex)	
Transmission Repetition Rate	50ms
Data Length	8 bytes
Data Page	0
PDU Format	255 (FF hex)
PDU Specific	186 (BA hex)
Priority	4
Source Address	219 (DB hex)
Communication Bit Rate	250 K bits/sec

SOURCE ADDRESS SELECTION

Value (ohms)	Address	PGN
No Resistor	219	65466
590 (<i>id-tag 1</i>)	220	65466
976 (<i>id-tag 2</i>)	221	65466
1500 (<i>id-tag 3</i>)	222	65466
2260 (<i>id-tag 4</i>)	223	65466
3400 (<i>id-tag 5</i>)	224	65466
5360 (<i>id-tag 6</i>)	225	65466
9530 (<i>id-tag 7</i>)	226	65466

8 BYTE / 64 BIT DATA FIELD BIT POSITIONS

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



J1939 Dual 3 Axis Incline Sensor - SETTING Message 65290 (DINC)

MESSAGE PARAMETERS

This message is transmitted by the controller

PGN: 65290 (FF0A hex)

Transmission Repetition Rate	n/a
Data Length	n/a
Data Page	0
PDU Format	255 (FF hex)
PDU Specific	10 (0A hex)
Priority	7
Source Address	249 (F9 hex)
Communication Bit Rate	250 K bits/sec

SOURCE ADDRESS SELECTION

Value (ohms)	Address	PGN
No Resistor	219	65290
590 (id-tag 1)	220	65291
976 (id-tag 2)	221	65292
1500 (id-tag 3)	222	65293
2260 (id-tag 4)	223	65294
3400 (id-tag 5)	224	65295
5360 (id-tag 6)	225	65296
9530 (id-tag 7)	226	65297

NOTE: SOURCE ADDRESS AND PRIORITY CHANGED 08 NOV 2011

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	
	5	reserved	
	6	Direction Setting LSB	LED WEIGHT SETTING (3 bits) <i>Field contains value of current setting</i> Degrees per LED indicator, 1 to 7 (default 1)
	7	Direction Setting LSB	
	8	Direction Setting MSB	
BYTE 2	9	CAL Master LSB	CALIBRATE/HOME MASTER FLAG (2 bits) 01 = Calibrate/Home the Master sensor
	10	CAL Master MSB	
	11	CAL Slave LSB	CALIBRATE/HOME SLAVE FLAG (2 bits) 01 = Calibrate/Home the Slave sensor
	12	CAL Slave LSB	
	13	unused	NOTE: Set reserved and unused bits to all 0's or all 1's
	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	

