

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 (90 mA)
	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	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
DINC Modifier Red Aluminum: DINC - [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; I3/2)
J1939 setting/status message found on pages three and four (S4; I3/3-5)

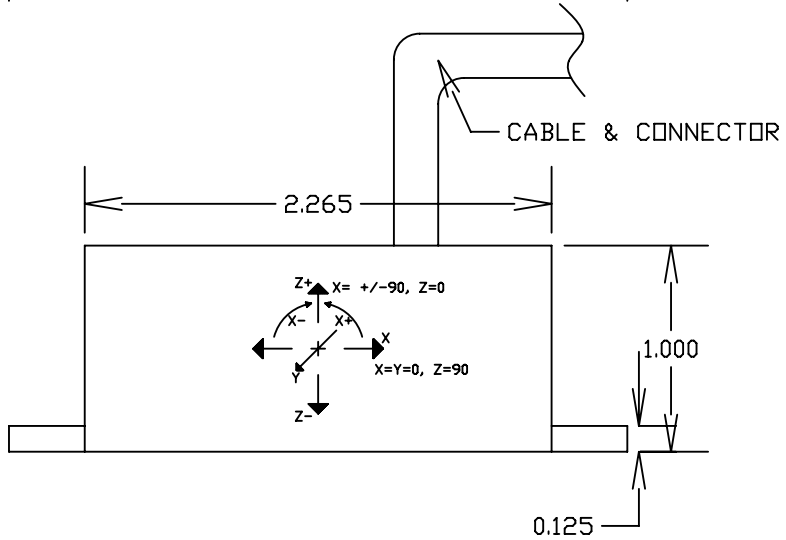
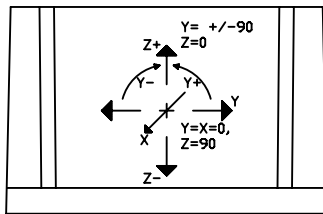
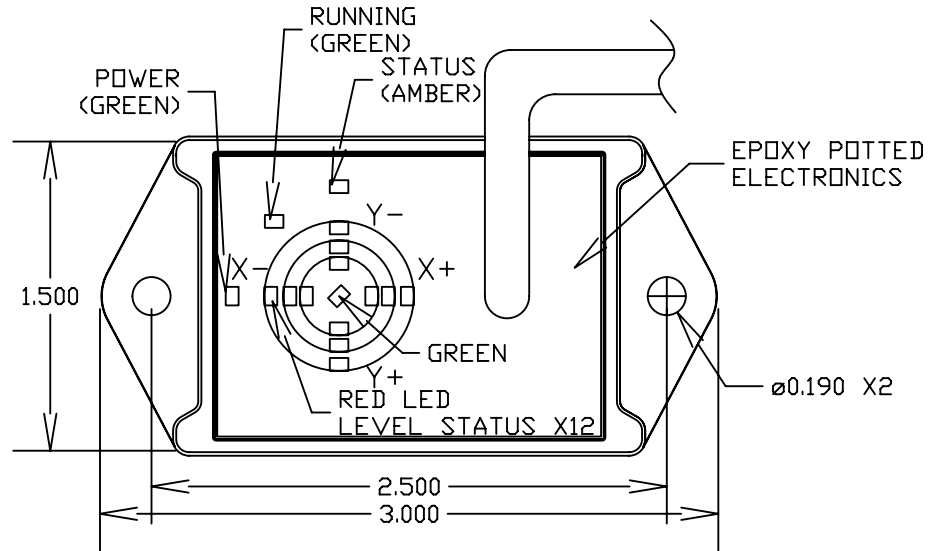


DINC DIMENSIONS & GENERAL PIN OUTS

BOOM ANGLE NOTE:

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

DINC slave can be provided
without LED indicators

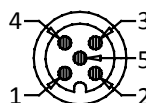


**DT04-4P MALE
FACE VIEW**



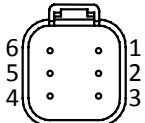
- DT04-4P J1939 OUTPUT**
1 = YEL = CAN HIGH
2 = GRN = CAN LOW
3 = RED = +VDC (VIN)
4 = BLK = COMMON/GROUND

**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 (id-tag 1)	220	65467
976 (id-tag 2)	221	65467
1500 (id-tag 3)	222	65467
2260 (id-tag 4)	223	65467
3400 (id-tag 5)	224	65467
5360 (id-tag 6)	225	65467
9530 (id-tag 7)	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	
15	Y Angle bit0 LSB		
16	Y Angle bit1		
BYTE 3	17	Y Angle bit2	Y ANGLE POS SIGN FLAG (2 bits) 01 = Positive Angle
	18	Y Angle bit3	
	19	Y Angle bit4	
	20	Y Angle bit5	
	21	Y Angle bit6	
	22	Y Angle bit7	
	23	Y Angle bit8	
	24	Y Angle bit9 MSB	
BYTE 4	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	Z ANGLE POS SIGN FLAG (2 bits) 01 = Positive Angle
	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	
	37	Z Angle bit8	
	38	Z Angle bit9 MSB	
BYTE 6	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	used
	42	Z Negative Flag MSB	
BYTE 7	43	unused	used
	44	unused	
	45	unused	
	46	unused	
	47	unused	
	48	unused	
	49	unused	
	50	unused	
BYTE 8	51	unused	SENSITIVITY Setting (3 bits) Field contains value of current setting 0 = most sensitive, 7 = most sluggish (default 4)
	52	unused	
	53	unused	
	54	unused	LED WEIGHT Setting (3 bits) Field contains value of current setting Degrees per LED Indicator, 1 to 7 (default 1)
	55	unused	
	56	unused	
	57	Sensitivity bit0 LSB	used
	58	Sensitivity bit1	
59	Sensitivity bit2 MSB		
60	LED Weight bit0 LSB	used	
61	LED Weight bit1		
62	LED Weight bit2 MSB		
63	unused	used	
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	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	SLAVE 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	SLAVE 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	unused	
	42	Z Negative Flag MSB		
	43	unused		
	44	unused		
45	unused			
46	unused			
47	unused			
48	unused			
BYTE 7	49	unused		
	50	unused		
	51	unused		
	52	unused		
	53	unused		
	54	unused		
	55	unused		
	56	unused		
BYTE 8	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	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 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		
BYTE 3	17	unused		
	18	unused		
	19	unused		
	20	unused		
	21	unused		
	22	unused		
	23	unused		
	24	unused		
BYTE 4	25	unused		
	26	unused		
	27	unused		
	28	unused		
	29	unused		
	30	unused		
	31	unused		
	32	unused		
BYTE 5	33	unused		
	34	unused		
	35	unused		
	36	unused		
	37	unused		
	38	unused		
	39	unused		
	40	unused		
BYTE 6	41	unused		
	42	unused		
	43	unused		
	44	unused		
	45	unused		
	46	unused		
	47	unused		
	48	unused		
BYTE 7	49	unused		
	50	unused		
	51	unused		
	52	unused		
	53	unused		
	54	unused		
	55	unused		
	56	unused		
BYTE 8	57	unused		
	58	unused		
	59	unused		
	60	unused		
	61	unused		
	62	unused		
	63	unused		
	64	unused		

