



FEATURES

- Easy to Install
- Environmentally Sealed Package
- J1939 Standard CAN Bus interface
- 'Electronic Bubble' display
- -40 to +85C temperature range
- Configuration settings available through J1939
- Wide Sensing Angles

DESCRIPTION

The Joral J1939 Boom Angle Sensor package is a rugged-duty electronic sensor designed to measure base and boom angle.

The package is provided as a pre-wired set of two calibrated, fully sealed solid-state sensors. The base sensor mounts to the cab or platform and the boom sensor mounts to the boom. The device automatically compensates for changes in base angle to output relative boom angle. Additionally, measured angles for the base 'pitch' and 'roll' are provided.

LED indicators on the base sensor display real-time status for power, CAN and sensor angle. Sensors are packaged in small, lightweight, rugged box with mounting tabs and standard connections.

APPLICATION

The **Joral Boom Angle Sensor** consists of two independent 3-axis incline sensors. Each sensor uses readings to compute an angular position over a wide range, nearly +/- 90 degrees. The base sensor reads the boom sensor and computes the relative boom angle. The base and boom angles are sent on the J1939 CAN bus to the controller or display. These outputs can be used for display, cab leveling, boom control or unique loading algorithms.

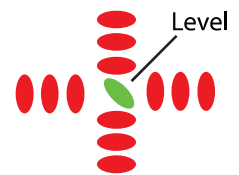


Installation is easy. The base and boom sensors are connected to each other through a flexible, protected 32" long cable. Typically, the base sensor is mounted to the machine cab or platform on a level surface near the boom angle joint. The boom sensor is mounted on the boom. The base sensor has a standard M12 connector. Both sensors are pre-calibrated at the factory, although a post-installation calibration can be performed.

Electronic Bubble

The "Electronic Bubble" provides a handy installation and troubleshooting tool for

a "sanity check" on the base sensor. Red LED indicators display an out of level condition in the X and Y directions and a green LED shows the base sensor is level.



Joral J1939 Dual 3-Axis Incline Sensor MASTER Status Message 65467

Date : 08 Nov 2011

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

Source Address Selection		
Resistor Value (ohms)	Address	PGN
No Resistor Connected	219	65467
590 ohms (Id-tag 1)	220	65467
976 ohms (Id-tag 2)	221	65467
1500 ohms (Id-tag 3)	222	65467
2260 ohms (Id-tag 4)	223	65467
3400 ohms (Id-tag 5)	224	65467
5360 ohms (Id-tag 6)	225	65467
9530 ohms (Id-tag 7)	226	65467

Connections / Wiring			
Signal	M12 Pin#	DT04-4P	DT04-6P
V+	1	3 (RED)	3 (RED)
Common	3	4 (BLACK)	4 (BLACK)
CANH	2	1 (YELLOW)	1 (YELLOW)
CANL	4	2 (GREEN)	2 (GREEN)
SA Select	5		5 (WHITE)
Common			6 (BLACK)

PART NUMBERS	
5 Pin M12	DINC-1939-5M12-03-0
DT04-4P	DINC-1939-DT04-03-0
DT04-6P	DINC-1939-DT06-03-0
Flying Leads	DINC-1939-5C72-03-0

8 Byte / 64 Bit Data Field Bit Positions					
Byte	Bit	Bit Function	Field Description		
B y t e 1	1	X Angle bit0 LSB	MASTER X ANGLE (10 bits) 0 to 1000, 0.1 deg 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			
B y t e 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 deg per bit		
	14	X Negative Flag MSB			
	B y t e 3	15	Y Angle bit0 LSB	Y ANGLE POS SIGN FLAG (2 bits) 01 = Positive Angle	
		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			
23		Y Angle bit8			
24		Y Angle bit9 MSB	Y ANGLE NEGATIVE SIGN FLAG (2 bits) 01 = Negative Angle		
25	Y Positive Flag LSB				
B y t e 4	26	Y Positive Flag MSB	MASTER Z ANGLE (10 bits) 0 to 1000, 0.1 deg per bit		
	27	Y Negative Flag LSB			
	28	Y Negative Flag MSB	Z ANGLE POS SIGN FLAG (2 bits) 01 = Positive Angle		
	29	Z Angle bit0 LSB			
	B y t e 5	30	Z Angle bit1	Z ANGLE NEGATIVE SIGN FLAG (2 bits) 01 = Negative Angle	
		31	Z Angle bit2		
		32	Z Angle bit3		
		B y t e 6	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		
39			Z Positive Flag LSB		LED WEIGHT Setting (3 bits) Field contains the value of the current setting Degrees per LED Indicator, 1 to 7 (default=1)
40	Z Positive Flag MSB				
B y t e 7	41	Z Negative Flag LSB	LED Weight bit0 LSB		
	42	Z Negative Flag MSB			
	43	unused		LED Weight bit1	
	44	unused			
	45	unused		LED Weight bit2 MSB	
	46	unused			
	47	unused		unused	
	48	unused			
B y t e 8	49	unused	unused		
	50	unused			
	51	unused			
	52	unused			
	53	unused			
	54	unused			
	55	unused			
	56	unused			

Joral J1939 Dual 3-Axis Incline Sensor SLAVE Status Message 65466

Date : 08 Nov 2011

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

8 Byte / 64 Bit Data Field Bit Positions			
Byte	Bit	Bit Function	Field Description
B y t e 1	1	X Angle bit0 LSB	SLAVE X ANGLE (10 bits) 0 to 1000, 0.1 deg 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	
B y t e 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	
B y t e 3	15	Y Angle bit0 LSB	SLAVE Y ANGLE (10 bits) 0 to 1000, 0.1 deg 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	
	23	Y Angle bit8	
	24	Y Angle bit9 MSB	
B y t e 4	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	
	29	Z Angle bit0 LSB	SLAVE Z ANGLE (10 bits) 0 to 1000, 0.1 deg 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		
B y t e 5	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	
B y t e 6	43	unused	
	44	unused	
	45	unused	
	46	unused	
	47	unused	
	48	unused	
B y t e 7	49	unused	
	50	unused	
	51	unused	
	52	unused	
	53	unused	
	54	unused	
	55	unused	
	56	unused	
B y t e 8	57	unused	
	58	unused	
	59	unused	
	60	unused	
	61	unused	
	62	unused	
	63	unused	
	64	unused	

Joral J1939 Dual 3-Axis Incline Sensor SETTING Message 65290

Date : 08 Nov 2011

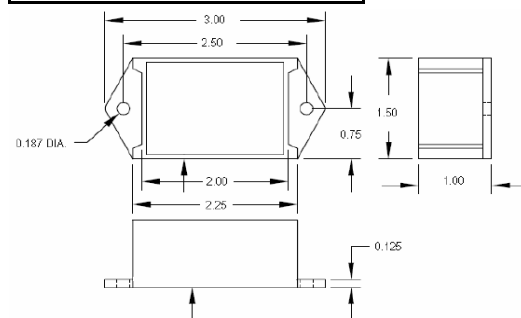
MESSAGE PARAMETERS	
This message is transmitted by the controller	
PGN: 65290 (FF0A hex)	
Transmission Repetition Rate	n/a
Data Length	n/a
Data Page	0
PDU Format	255 (FF hex)
PDU Specific	10 (0A hex)
Priority	7
Source Address	249 (F9 hex)
Communication Bit Rate	250 K bits/sec

NOTE: SOURCE ADDRESS AND PRIORITY CHANGED 08 NOV 2011

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

SPECIFICATIONS
Power 6 to 30 VDC (95 milliamps)
Weight: Master - 3 oz; Slave - 2 oz
Mounting Tabs (0.187 diameter holes)
Resolution 0.1 degrees
Absolute Accuracy (at 25 C) ± 0.3 degrees
Temperature Drift ± 0.3 degrees over range
Operating Temperature -40 C to +85

HOUSING (Master and Slave)



8 Byte / 64 Bit Data Field Bit Positions			
Byte	Bit	Bit Function	Field Description
B y t e 1	1	SENS Setting bit0 LSB	SENSITIVITY Setting (3 bits) 0 = most sensitive, 7 = most sluggish (default=4)
	2	SENS Setting bit1	
	3	SENS Setting bit2 MSB	
	4	reserved	LED WEIGHT Setting (3 bits) Degrees per LED Indicator, 1 to 7 (default=1)
	5	reserved	
	6	Direction Setting LSB	
	7	Direction Setting LSB	
	8	Direction Setting MSB	
B y t e 2	9	reserved	
	10	reserved	
	11	reserved	
	12	reserved	
	13	unused	
	14	unused	
	15	unused	
	16	unused	
B y t e 3	17	unused	
	18	unused	
	19	unused	
	20	unused	
	21	unused	
	22	unused	
	23	unused	
	24	unused	
B y t e 4	25	unused	
	26	unused	
	27	unused	
	28	unused	
	29	unused	
	30	unused	
	31	unused	
	32	unused	
B y t e 5	33	unused	
	34	unused	
	35	unused	
	36	unused	
	37	unused	
	38	unused	
	39	unused	
	40	unused	
B y t e 6	41	unused	
	42	unused	
	43	unused	
	44	unused	
	45	unused	
	46	unused	
	47	unused	
	48	unused	
B y t e 7	49	unused	
	50	unused	
	51	unused	
	52	unused	
	53	unused	
	54	unused	
	55	unused	
	56	unused	
B y t e 8	57	unused	
	58	unused	
	59	unused	
	60	unused	
	61	unused	
	62	unused	
	63	unused	
	64	unused	

NOTE: Set reserved and unused bits to all 0's or all 1's