



## FEATURES

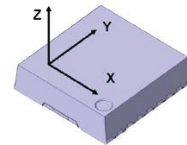
- Easy Mounting
- 3 Axis Sensing (X, Y, Z)
- Configuration available through J1939 for sensitivity and angular range settings
- J1939 Source Address Selectable via standard external resistor
- Completely potted and sealed. Rugged Duty
- Standard connector: M12 or Deutsch DT04-4P
- 'Electronic Bubble' - LEDs display level status.

## DESCRIPTION

The Joral J1939 Inclinometer provides rugged-duty incline sensing that supports the standard and reliable CAN Bus protocol. The solid-state device is fully potted and sealed to operate in harsh environments. Programmable settings available through the CAN Bus make the sensor flexible for various applications. The inclinometer senses angle for 3 axes of position (X, Y, Z) simultaneously so that physical orientation of the device is flexible.

## APPLICATION

**Sensor Data:** The Joral Inclinometer has 3 axis sensing to provide flexibility in mounting and installation. The standard J1939 message contains current angular position for X, Y, and Z axis. Each axis has its own independent current value.



The sensor can be mounted in the best orientation for your mechanical needs and allow the user software to determine true angle for the application. The inclinometer has a **Real Time LED Display**. Current angle for X and Y axis are displayed on LED indicators to show level and varying degrees out of level. Independent LEDs are provided for the X and Y axis.



**Sensor Settings:** Settings are available through the J1939 protocol for configuring the device for your specific needs.

- The Sensitivity setting selects how responsive or sluggish the sensor reacts to changes in incline.
- The LED weight setting allows the sensitivity of the LED indicators to be adjusted.
- A Zero (or calibration) flag can be set to zero the sensor.

# Joral J1939 3-Axis Incline Sensor Status Message 65465

Date : 08 Nov 2011

MESSAGE PARAMETERS	
This message is transmitted by sensor at Rep Rate	
<b>PGN: 65465 (FFB9 hex)</b>	
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

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

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	SINC-1939-5M12-03-0
DT04-4P	SINC-1939-DT04-03-0
DT04-6P	SINC-1939-DT06-03-0
Flying Leads	SINC-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	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	Y ANGLE (10 bits) 0 to 1000, 0.1 deg per bit	
	14	X Negative Flag MSB		
	15	Y Angle bit0 LSB	Y ANGLE POS SIGN FLAG (2 bits) 01 = Positive Angle	
	16	Y Angle bit1		
B y t e 3	17	Y Angle bit2		Y ANGLE NEGATIVE SIGN FLAG (2 bits) 01 = Negative Angle
	18	Y Angle bit3		
	19	Y Angle bit4		Z ANGLE (10 bits) 0 to 1000, 0.1 deg per bit
	20	Y Angle bit5		
	21	Y Angle bit6		Z ANGLE POS SIGN FLAG (2 bits) 01 = Positive Angle
	22	Y Angle bit7		
	23	Y Angle bit8		Z ANGLE NEGATIVE SIGN FLAG (2 bits) 01 = Negative Angle
	24	Y Angle bit9 MSB		
B y t e 4	25	Y Positive Flag LSB	Z ANGLE (10 bits) 0 to 1000, 0.1 deg per bit	
	26	Y Positive Flag MSB		
	27	Y Negative Flag LSB		
	28	Y Negative Flag MSB		
	29	Z Angle bit0 LSB		
	30	Z Angle bit1		
	31	Z Angle bit2		
	32	Z Angle bit3		
B y t e 5	33	Z Angle bit4		Z ANGLE POS SIGN FLAG (2 bits) 01 = Positive Angle
	34	Z Angle bit5		
	35	Z Angle bit6	Z ANGLE NEGATIVE SIGN FLAG (2 bits) 01 = Negative Angle	
	36	Z Angle bit7		
	37	Z Angle bit8	SENSITIVITY Setting (3 bits) Field contains the value of the current setting 0 = most sensitive, 7 = most sluggish (default=4)	
	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 6	41	Z Negative Flag LSB	LED WEIGHT Setting (3 bits) Field contains the value of the current setting Degrees per LED Indicator, 1 to 7 (default=1)	
	42	Z Negative Flag MSB		
	43	unused		
	44	unused		
	45	unused		
	46	unused		
	47	unused		
	48	unused		
B y t e 7	49	unused		SENSITIVITY Setting (3 bits) Field contains the value of the current setting 0 = most sensitive, 7 = most sluggish (default=4)
	50	unused		
	51	unused	LED WEIGHT Setting (3 bits) Field contains the value of the current setting Degrees per LED Indicator, 1 to 7 (default=1)	
	52	unused		
	53	unused		
	54	unused		
	55	unused		
	56	unused		
B y t e 8	57	Sensitivity bit0 LSB	SENSITIVITY Setting (3 bits) Field contains the value of the current setting 0 = most sensitive, 7 = most sluggish (default=4)	
	58	Sensitivity bit1		
	59	Sensitivity bit2 MSB	LED WEIGHT Setting (3 bits) Field contains the value of the current setting Degrees per LED Indicator, 1 to 7 (default=1)	
	60	LED Weight bit0 LSB		
	61	LED Weight bit1		
	62	LED Weight bit2 MSB		
	63	unused		
	64	unused		

# Joral J1939 3-Axis Incline Sensor SETTING Message 65281

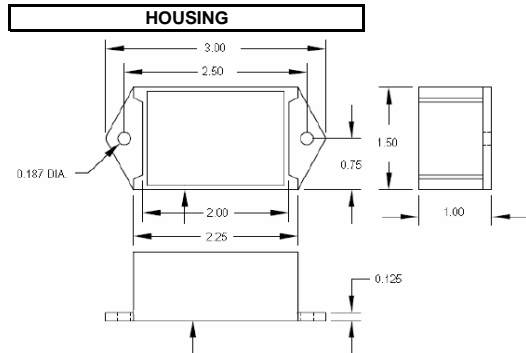
Date : 08 Nov 2011

MESSAGE PARAMETERS	
This message is transmitted by the controller	
<b>PGN: 65281 (FF01 hex)</b>	
Transmission Repetition Rate	n/a
Data Length	n/a
Data Page	0
PDU Format	255 (FF hex)
PDU Specific	1 (01 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	220	65281
590 ohms (Id-tag 1)	221	65282
976 ohms (Id-tag 2)	222	65283
1500 ohms (Id-tag 3)	223	65284
2260 ohms (Id-tag 4)	224	65285
3400 ohms (Id-tag 5)	225	65286
5360 ohms (Id-tag 6)	226	65287
9530 ohms (Id-tag 7)	227	65288

SPECIFICATIONS
Power 6 to 30 VDC (90 milliamps)
Weight 3 oz2 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



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	4	reserved	LED WEIGHT Setting (3 bits) Degrees per LED Indicator, 1 to 7 (default=1)	
		5	reserved		
	6	6	Direction Setting LSB		
		7	Direction Setting LSB		
		8	Direction Setting MSB		
9		9	reserved		
		10	reserved		
B y t e  2		11	unused		
		12	unused		
		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