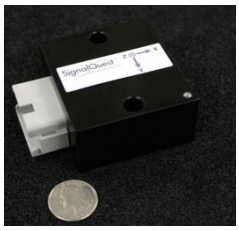
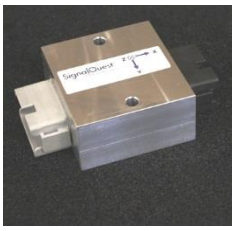
DATASHEET

SQ-RI SERIES

RUGGED PACKAGED INCLINOMETER, CAN2.0B/J1939





FUNCTION

LOW RANGE "RIL" MODEL

- ± 70 º dual axis angle measurement
- 360 º single axis angle measurement

WIDE RANGE "RIW" MODEL

- Wide range 360 º x 180 º dual axis angle measurement

APPLICATIONS

- Platform and vehicle leveling
- Satellite dish and antenna alignment
- Machine control and monitoring
- Angle measurement and recording
- Computer input, head tracking, and mouse pointing

DESCRIPTION

The SQ-RI contains a high accuracy inclinometer, robust power conditioning and a CAN2.0B/J1939 interface controller all potted in an industrial enclosure. A Deutch DTF series connector is standard; M12, flying lead and other connector options are available.

FEATURES

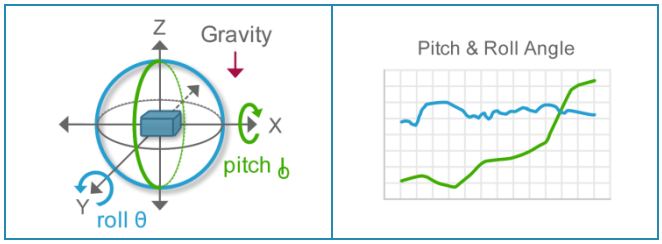
- ± 0.1 º and ± 0.01 º resolution options
- IP65, IP67 and IP68 options
- Low temperature drift
- Factory calibrated angle output
- High reliability solid-state MEMS
- Digital filtering for stable measurement

ALTERNATE HOUSINGS

A variety of enclosures are available. Please consult the factory for different enclosures, connectors and cabling options.

THEORY OF OPERATION

The inclinometer uses two factory calibrated accelerometers to measure and compute angles made between its axes and the gravity vector. The trigonometric conversions between acceleration and angle are made by an onboard processor. Digital filtering reduces the impact of spurious acceleration and vibration on the reported angle.



LOW RANGE "RIL" MODEL

In **Dual-Axis Mode** the RIW sensor measures inclination between the earth and its X and Y axes with a range of ±70 º.

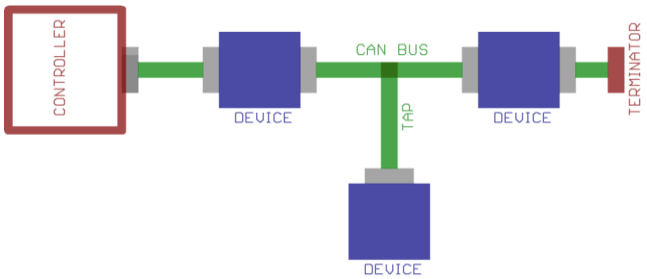
In **Single-Axis Mode** the RIW sensor measures full-scale rotation about the Z axis with a range of 360 º. The sensor must be oriented such that the Z axis is parallel to the ground.

WIDE RANGE "RIW" MODEL

The sensor measures between earth and its X and Y axes with a range of 360 º in one axis and 180 º in the other.

CAN BUSSING OPTIONS

The SQ-RI supports CAN2.0 bus rates up to 1.0 Mbps and can be connected to the bus either in-line or on a tap. The CAN bus is internally terminated in models with a single connector



10 Water St.
Lebanon, NH 03766 USA
Tel: 603.448.6266
Fax 603.218.6426
www.signalquest.com
info@signalquest.com

TABLE OF CONTENTS

10 Water St.
Lebanon, NH 03766 USA
Tel: 603.448.6266
Fax 603.218.6426
www.signalquest.com
info@signalquest.com

PERFORMANCE CHARACTERISTICS

PARAMETER	SPECIFICATION	UNITS
Axes	2	
Case alignment	0.1	º
Accuracy	0.1	º
Zero point temp drift	0.005	º/ºC
Settling time	0.1 / 0.5	s
Update rate	40	Hz
Nonlinearity	< 0.5	% FSR
Operating Temperature	-40 to 85	ºC
Transverse sensitivity	< 1	% at 30ºC
Operating Vibration	1.7	g_n[1]
Shock Survivability	500	g_n
I/O ESD Protection - HBM	16	kV

ABSOLUTE MAXIMUM RATINGS

PARAMETER	MIN	MAX	UNITS
Supply Voltage (-5R model)	-40	24	V_{dc}
Supply Voltage (-36R model)	-40	40	V_{dc}
Voltage on any I/O pin	-0.7	5.8	V_{dc}
CANH/CANL	-4	16	V_{dc}
	-11	11	mA
CANH-CANL Differential	-6	6	V_{dc}

ELECTRICAL CHARACTERISTICS

PARAMETER	MIN	TYP	MAX	UNITS
Supply Voltage (-5R)	4.5		12	V_{dc}
Supply Voltage (-36R)	7		36	V_{dc}
Supply Current		50		mA
CAN Bus Rate		250	1000	kbps

[1] Where 1 g_n is approximately 9.80m/s^2

10 Water St.
Lebanon, NH 03766 USA
Tel: 603.448.6266
Fax 603.218.6426
www.signalquest.com
info@signalquest.com

COMPARISON DATA FOR MODELS AND OPTIONS

RESOLUTION AND REPEATABILITY OPTIONS (P1 & P2)

PARAMETER	P1 OPTION	P2 OPTION (COMING SOON)	UNITS
Resolution	0.1	0.01	º
Null repeatability	0.1	0.05	º

RANGE & TEMPERATURE PERFORMANCE (SQ-RIL)

Based on SignalQuest inclinometer model SQ-SI-360DA

PARAMETER	SPECIFICATION		NOTES			
Angle range - Dual Axis Mode	± 70 º (X and Y tilt)		Dual axis X and Y tilt angle ranges with respect to horizontal.			
Angle range - Single Axis Mode	360 º (Z rotation)		Single axis rotation angle measurement valid while Z axis (vector normal to circuit board) is within ± 45 º of horizontal.*			
Typical angular drift due to temperature. Values represent 1 sigma confidence in tilt mode.			**Angle range**			
			± 10 º	± 45 º	± 70 º **	360 º (single axis)
	Temperature range	15 C to +35 C	± 0.06 º	± 0.06 º	± 0.3 º	± 0.1 º
		0 C to +70 C	± 0.3 º	± 0.3 º	± 1.6 º	± 0.6 º
		-40 C to +85 C	± 0.4 º	± 0.4 º	± 1.7 º	± 0.8 º

*** Note:** Angle ranges measured with respect to deviations from horizontal.
**** Note:** Useable up to +/- 80 º with degraded accuracy.

RANGE & TEMPERATURE PERFORMANCE (SQ-RIW)

Based on SignalQuest inclinometer model SQ-SI2X-360DA

PARAMETER	SPECIFICATION		NOTES	
Angle range - Tilt Mode	360 º x 180 º (X tilt, Y tilt)		Dual axis tilt ranges	
Angle range - Gimbaled Mode	360 º x 90 º (Y rotation, Y tilt)		Y rotation valid while Y tilt is within ± 45 º of horizontal.***	
Typical angular drift due to temperature. Values represent 1 sigma confidence in tilt mode.			**Angle range**	
			± 10 º from any axis	± 45 º from any axis (max error)
	Temperature range	15 C to +35 C	± 0.06 º	± 0.1 º
		0 C to +70 C	± 0.3 º	± 0.6 º
		-40 C to +85 C	± 0.4 º	± 0.8 º

*****Note:** Angle ranges measured with respect to deviations from inertial X,Y, Z reference frame.

DAMPING OPTIONS (F & S)

After warm-up, the sensor continuously streams data on the CAN bus at the Update Rate.

10 Water St.
Lebanon, NH 03766 USA
Tel: 603.448.6266
Fax 603.218.6426
www.signalquest.com
info@signalquest.com

Parameter	F Option	S Option	Notes
Warm up time from power on	0.2 s	1.0 s	Angle jitter and vibration are digitally filtered
Measurement settling time	0.1 s	0.5 s	
Update Rate	40 Hz		Update rate is factory configurable – contact SignalQuest for other options

PIN CONFIGURATION

SINGLE CONNECTOR MODELS & PRIMARY CONNECTOR ON DUAL CONNECTOR MODELS

Pin	Signal Name	Usage
1	SWCLK	Factory Programming Interface
2	ADDR_0	Address I/0 Line
3	V+	Voltage Supply
4	GND	Ground
5	C2CK	Factory Programming Interface
6	C2D	Factory Programming Interface
7	SWDIO	Factory Programming Interface
8	CAN_L	CAN Bus L Signal
9	CAN_H	CAN Bus H Signal
10	CAN_SHLD	CAN Shield
11	RST	Factory Programming Interface
12	ADDR_1	Address I/O Line

***Note:** Grey boxes indicate that a signal is available only on a custom application basis.

SECONDARY CONNECTOR ON DUAL CONNECTOR MODELS

Pin	Signal Name	Usage
1	IO_A	Reserved I/O
2	IO_B	Reserved I/O
3	GND	Ground
4	V+	Voltage Supply
5	IO_C	Reserved I/O
6	C2CK	Factory Programming Interface
7	IO_D	Reserved I/O
8	IO_E	Reserved I/O
9	CAN_SHLD	CAN Shield
10	CAN_H	CAN Bus H Signal
11	CAN_L	CAN Bus L Signal
12	C2D	Factory Programming Interface

10 Water St.
Lebanon, NH 03766 USA
Tel: 603.448.6266
Fax 603.218.6426
www.signalquest.com
info@signalquest.com

ADDRESSING

Device IDs can be factory set or specified using the ADDR_0 and ADDR_1 lines on the primary connector.

When addressing is specified by the ADDR_0 and ADDR_1 lines the default (open) state is logic '1'. Connect ADDR_0 and ADDR_1 to ground as appropriate to specify the device address. Device functionality is as follows:

RIL Model:

Device ID	ADDR_1:ADDR_0	Mode	Address	Priority
0	0:0	Single-Axis	0xA2	0
1	0:1	Single-Axis	0xA3	1
2	1:0	Single-Axis	0xA4	2
3	1:1	Dual-Axis	0xA5	3

RIW Model:

Device ID	ADDR_1:ADDR_0	Mode	Address	Priority
0	0:0	Tilt	0xA2	0
1	0:1	Tilt	0xA3	1
2	1:0	Tilt	0xA4	2
3	1:1	Gimballed	0xA5	3

CAN PACKET DATA FORMAT: DUAL-AXIS (RIL), TILT/GIMBALLED MODE (RIW)

PARAMETER DEFINITIONS

P1:

Parameter	Width (bits)	Type	Min Value	Max Value	Units
YTilt	16	Unsigned Integer	0	3599	0.1 degrees
XTilt	16	Unsigned Integer	0	1800	0.1 degrees
Status	8	Bit Vector	0x00	0xFF	n/a

* NOTE: Divide the integer `Y Tilt` and `X Tilt` values by 10 to compute the angle in units of degrees.

P2:

Parameter	Width (bits)	Type	Min Value	Max Value	Units
YTilt	16	Unsigned Integer	0	35999	0.01 degrees
XTilt	16	Unsigned Integer	0	18000	0.01 degrees
Status	8	Bit Vector	0x00	0xFF	n/a

* NOTE: Divide the integer `Y Tilt` and `X Tilt` values by 100 to compute the angle in units of degrees.

DATA FIELD PAYLOAD (5 BYTES)

1	2	3	4	5
YTiltLow	YTiltHigh	XTiltLow	XTiltHigh	Status

Data Field Payload Descriptions

Parameter	Payload	Meaning
YTilt	YTiltLow	Low byte of 16 bit YTilt value
	YTiltHigh	High byte of 16 bit YTilt value
XTilt	XTiltLow	Low byte of 16 bit XTilt value
	XTiltHigh	High byte of 16 bit XTilt value
Status	Status	Status Bit Vector (see table below)

10 Water St.
Lebanon, NH 03766 USA
Tel: 603.448.6266
Fax 603.218.6426
www.signalquest.com
info@signalquest.com

The `Status` bit vector flags the following conditions – note that `Status` = 0 indicates normal operation:

Bit Vector Position	Flag	Meaning
0 (LSB)	0x01	Sensor Warming Up
4	0x10	Sensor Synchronization Lost
6	0x40	Device ID changed after power-on – possible wiring fault
7	0x80	Firmware fault – device restarted by internal watchdog monitor

CAN PACKET DATA FORMAT: SINGLE-AXIS

PARAMETER DEFINITIONS

P1:

Parameter	Width (bits)	Type	Min Value	Max Value*	Units
`ZRotation`	16	Unsigned Integer	0	3599	0.1 degrees
`ZTilt`	16	Unsigned Integer	0	1800	0.1 degrees
`Status`	8	Bit Vector	0x00	0xFF	n/a

* NOTE: Divide the integer `Y Tilt` and `X Tilt` values by 10 to compute the angle in units of degrees.

P2:

Parameter	Width (bits)	Type	Min Value	Max Value*	Units
`ZRotation`	16	Unsigned Integer	0	35999	0.01 degrees
`ZTilt`	16	Unsigned Integer	0	18000	0.01 degrees
`Status`	8	Bit Vector	0x00	0xFF	n/a

* NOTE: Divide the integer `Y Tilt` and `X Tilt` values by 100 to compute the angle in units of degrees.

DATA FIELD PAYLOAD (5 BYTES)

1	2	3	4	5
`ZRotationLow`	`ZRotationHigh`	`ZTiltLow`	`ZTiltHigh`	`Status`

Data Field Payload Descriptions

Parameter	Payload	Meaning
`ZRotation`	`ZRotationLow`	Low byte of 16 bit Rotation value
	`ZRotation High`	High byte of 16 bit Rotation value
`ZTilt`	`ZTiltLow`	Low byte of 16 bit Tilt value
	`ZTiltHigh`	High byte of 16 bit Tilt value
`Status`	`Status`	Status Bit Vector (see table below)

The `Status` bit vector flags the following conditions – note that `Status` = 0 indicates normal operation:

Bit Vector Position	Flag	Meaning
0 (LSB)	0x01	Sensor Warming Up
4	0x10	Sensor Synchronization Lost
6	0x40	Device ID changed after power-on – possible wiring fault
7	0x80	Firmware fault – device restarted by internal watchdog monitor

10 Water St.
Lebanon, NH 03766 USA
Tel: 603.448.6266
Fax 603.218.6426
www.signalquest.com
info@signalquest.com

ORIENTATION

TERMINOLOGY

Gravity means a vector pointing from the device toward the center of the earth.
X means a vector parallel to the "X" arrow printed on housing label
Y means a vector parallel to the "Y" arrow printed on the housing label
Z means a vector passing through "Z" arrow printed on the housing label
Horizontal means the arrow is pointing at a right angle to gravity.
Straight Down means the arrow is parallel to gravity.
Straight Up means that the arrow is anti-parallel to gravity (i.e. pointing toward the sky).
Plumb Line is a line with a weight on the end hanging straight down.

SQ-RIL MODEL

DUAL -AXIS MODE

In Dual-Axis Mode the X Tilt and Y Tilt angles are measured between gravity and the arrows printed on the housing label. If you passed a Plumb Line through the sensor's X, Y, Z origin, the X and Y Tilt angles could be measured by placing a protractor's straight edge on the plum line and then reading the angles made with each arrow.

Y Tilt = Pitch (first angle)
X Tilt = Roll (second angle)

Holding Y Horizontal

When X is Horizontal, X Tilt = 90 º.
When X is Straight Up, X Tilt = ~180 º.
When X is Straight Down, X Tilt = ~0 º.

Holding X Horizontal

When Y is Horizontal, Y Tilt = 90 º.
When Y is Straight Up, Y Tilt = ~180 º.
When Y is Straight Down, Y Tilt = ~0 º.

SINGLE -AXIS MODE

In Single-Axis Mode, the Z Rotation angle is defined as a rotation *about* the Z axis of the sensor. For the Z Axis Rotation angle to remain in range, the Z Axis must be near horizontal. The Z axis should be kept to less than ± 45 º of deviation from horizontal. Pitch angle values are factory calibrated to within +/- 0.1º alignment with the sensor enclosure

.
When X is Horizontal, Y is Straight Up, Z Rotation = 0 / 360 º.
When Y is Horizontal, X is Straight Down, Z Rotation = 90 º.
When X is Horizontal, Y is Straight Down, Z Rotation = 180 º.
When Y is Horizontal, X is Straight Up, Z Rotation = 270 º.

IMPORTANT NOTES

- Regardless of the mode, the inclinometer measures angles with respect to gravity. It cannot measure rotation about the gravity vector. All rotations about gravity are *invisible* to the sensor and are considered equivalent.

10 Water St.
Lebanon, NH 03766 USA
Tel: 603.448.6266
Fax 603.218.6426
www.signalquest.com
info@signalquest.com

SQ-RIW MODEL

TILT MODE

In Tilt Mode the X Tilt and Y Tilt angles are measured between gravity and the white silkscreen arrows printed on the main circuit board. If you passed a Plumb Line through the inclinometer's X, Y, Z origin, the X and Y Tilt angles could be measured by placing a protractor's straight edge on the plum line and then reading the angles made with each arrow.

Y Tilt = Pitch (first angle)
X Tilt = Roll (second angle)

Holding Y Horizontal

When X is Horizontal and Z is Straight Up, X Tilt = 90 º.
When X is Horizontal and Z is Straight Down, X Tilt = 270 º.
When X is Straight Up, X Tilt = 180 º.
When X is Straight Down, X Tilt = 0 / 360 º.

Holding X Horizontal

When Y is Horizontal, Y Tilt = 90 º.
When Y is Straight Up, Y Tilt = 0 º.
When Y is Straight Down, Y Tilt = 180 º.

GIMBALED MODE

In both Tilt Mode and Gimbaled Mode, the Y Tilt measurement is identical. However, in Gimbaled Mode, the Y Rotation angle is defined as a rotation *about* the Y axis of the device. You will find that this is similar to X Tilt (in Tilt Mode) when near horizontal, but further from horizontal, the difference between these two measurement methods is quite pronounced.
.
For users familiar with Euler Angles, this measurement mode is equivalent to performing the Euler X-Y transformation on the Tilt Mode coordinates, and then adjusting the quadrants to be continuous. In Gimbaled Mode unlike Tilt Mode, there will be no numerical discontinuities near 0 and 180 degrees for X Tilt, when Y is not Horizontal.

IMPORTANT NOTES

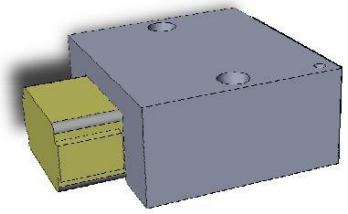
- Tilt Mode angles are not generally equivalent to Gimbaled Mode angles. Tilting X up or down in the Tilt Mode coordinate system is not equivalent to making a rotation about the Y axis unless Y is fixed horizontally. The same is true for the X axis. Consult SignalQuest technical support and reference material on orientation reference frames.
- Users wanting to measure rotations about the inclinometer's Y axes rather than tilt angle with respect to gravity, should use the Gimbaled Mode coordinate system. To convert a dataset from Tilt Mode coordinates (the sensor's native output) to Gimbaled Mode coordinates, contact SignalQuest for application notes and sample software.
- Regardless of the coordinate frame used the inclinometer measures angles with respect to gravity. It cannot measure rotation about the gravity vector. All rotations about gravity are *invisible* to the sensor and are considered equivalent.

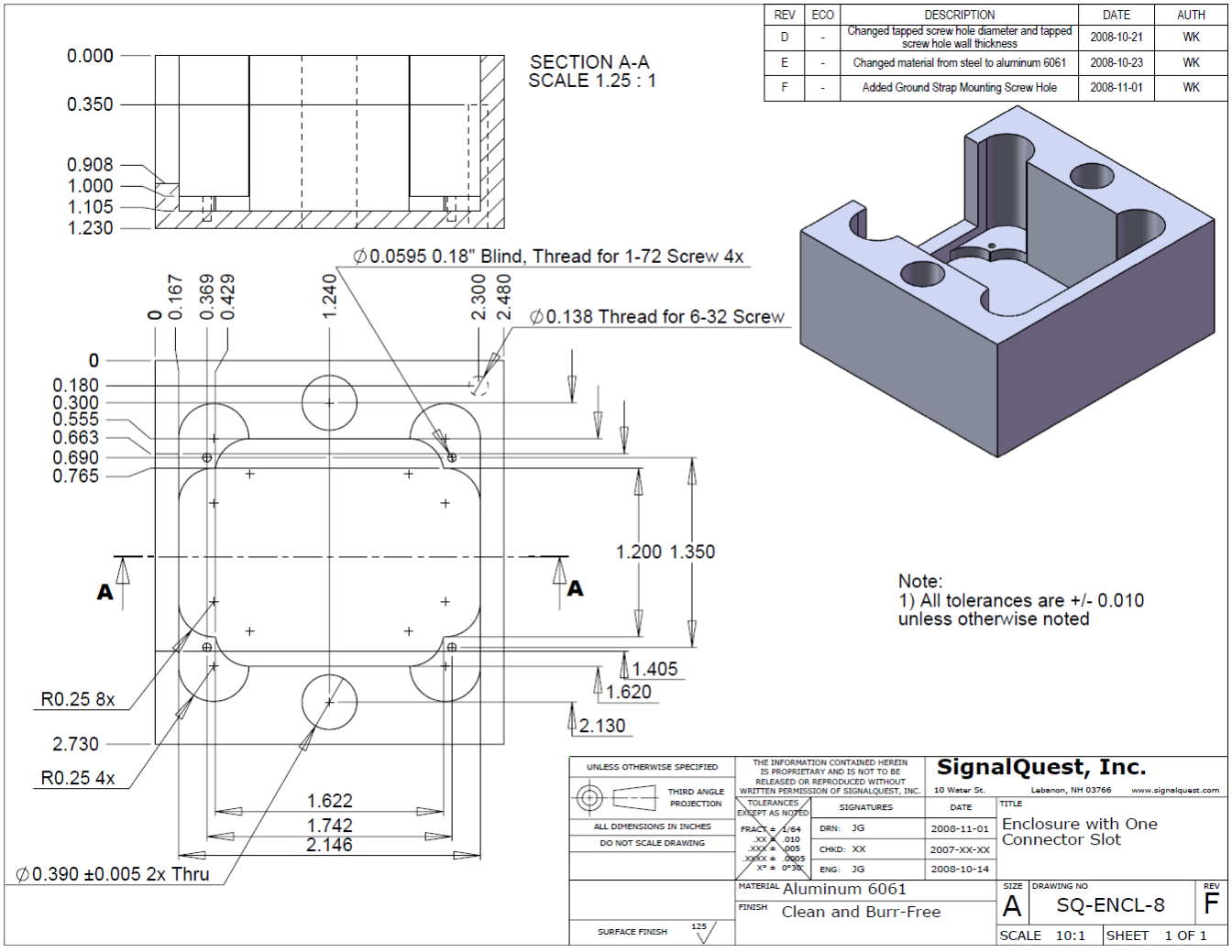
10 Water St.
Lebanon, NH 03766 USA
Tel: 603.448.6266
Fax 603.218.6426
www.signalquest.com
info@signalquest.com

PACKAGING

SINGLE CONNECTOR MODELS (-1C, -1CA)

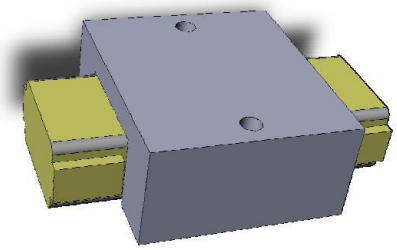
The SQ-RPI sensor uses a Deutsch DTF13-12PA (DTF Series 12 Way Receptacle 90° Flangeless Key Arrangement A) for the primary connector.

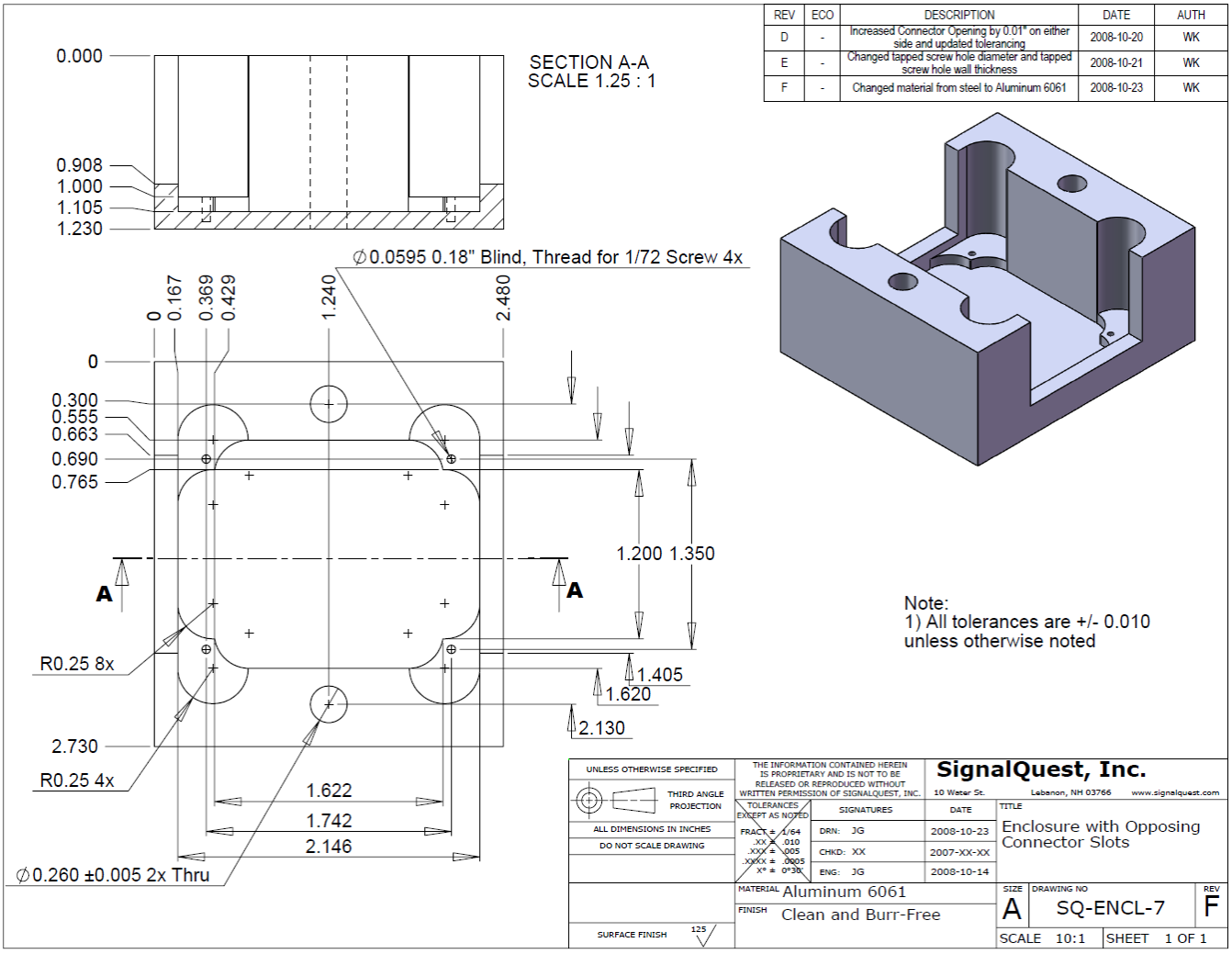




DUAL CONNECTOR MODELS (-2C, -2CA)

The SQ-RPI sensor uses a Deutsch DTF13-12PA (DTF Series 12 Way Receptacle 90° Flangeless Key Arrangement A) for the primary connector. The dual connector models use a Deutsch DTF13-12PB (DTF Series 12 Way Receptacle 90° Flangeless Key Arrangement B) for the secondary connector.

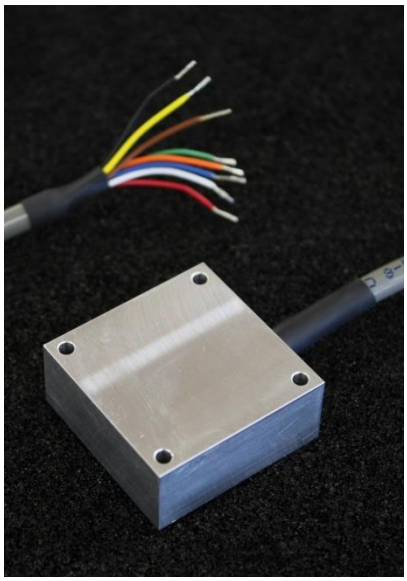




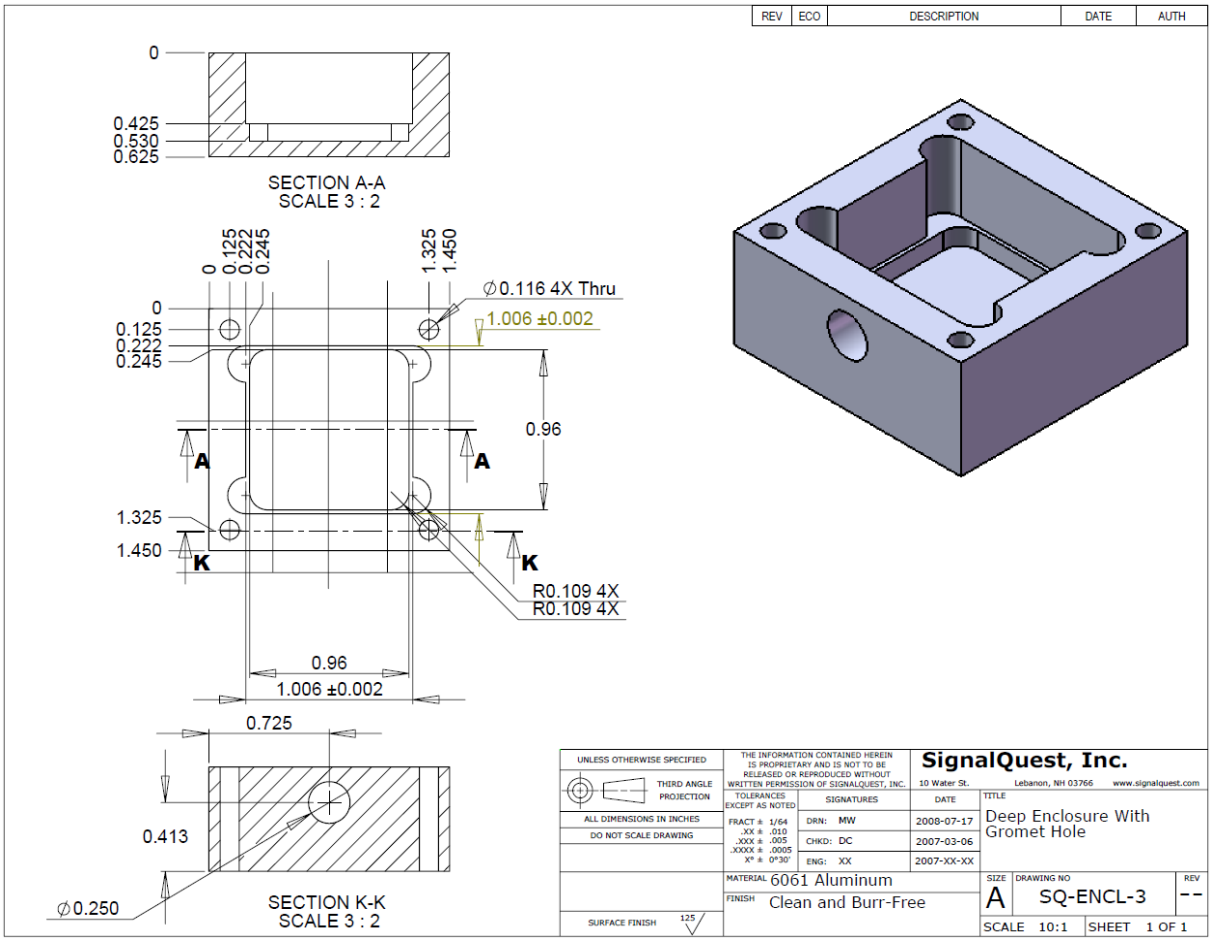
10 Water St.
Lebanon, NH 03766 USA
Tel: 603.448.6266
Fax 603.218.6426
www.signalquest.com
info@signalquest.com

SMALL PACKAGE FLYING LEAD (-3C)

1. IP65 protection rating
2. Flying lead, small form factor
3. 8 conductor, flying lead
4. Only tap bus topology support at this time.



Pin	Signal Name	Color	Usage
1	Factory 1		Factory Programming Interface
2	Factory 2		
3	Factory 3		
4	V+		Voltage Supply
5	GND		Ground
6	CAN_L		CAN Bus L Signal
7	CAN_H		CAN Bus H Signal
8	CAN_SHLD		CAN Shield



10 Water St.
Lebanon, NH 03766 USA
Tel: 603.448.6266
Fax 603.218.6426
www.signalquest.com
info@signalquest.com

ORDERING OPTIONS

OPTIONS	CODE	OPTION	NOTES			
Model	SQ-RIL	Dual-Axis: ± 70° dual Single-Axis: 360°	Low range			
	SQ-RIW	Dual-Axis: 360° x 180°	Wide range			
Power regulator option	-12R	5 – 15 V supply				
	-36R	7 – 36 V supply	Standard version (stock)			
		CONNECTOR TYPE	**PACKAGE TYPE**	**PROTECTION RATING**	**BUS TOPOLOGY**	**NOTES**
Package option	-1C	1 Deutsch, 12 pin	SQ-ENCL-8	IP67	Tap bus (internal CAN terminator)	
	-1CA	1 Deutsch, 12 pin, black anodized	SQ-ENCL-8	IP67	Tap bus (internal CAN terminator)	
	-2C	2 Deutsch, 12 pin	SQ-ENCL-7	IP67	In-line bus	
	-2CA	2Deutsch, 12 pin, black anodized	SQ-ENCL-7	IP67	In-line bus	
	-3C	Flying lead	SQ-ENCL-3	IP65	Tap bus (internal CAN terminator)	
	-4C	1 circular connector	SQ-ENCL-9	IP68	Tap bus (internal CAN terminator)	
	-5C	2 circular connectors	SQ-ENCL-10	IP68	In-line bus	
	-7C	1 connector, low cost	SQ-ENCL-11	IP67	Tap bus (internal CAN terminator)	
	-8C	2 connector, low cost	SQ-ENCL-11	IP67	In-line bus	
Performance option	-P1	Standard performance	Standard accuracy and resolution			
	-P2	High performance	Higher accuracy and resolution			
Damping option	-S	500 mS settling time	Better noise rejection, slower response time – This model uses a 0.5 second moving average filter to provide digital damping. This reduces the impact that spurious accelerations and vibrations have on the angle reading. This model will reject noise better than the "F" model, but with the tradeoff of a slower response time.			
	-F	100 mS settling time	Faster response time, poorer noise rejection – This model uses a 0.1 second moving average filter to provide digital damping. This model will respond more quickly to changes in angle than the "S" model, but with the trade off of poorer noise rejection.			
Addressing option	ID0	ID0 (Address 0xA2)				
	ID1	ID1 (Address 0xA3)				
	ID2	ID2 (Address 0xA4)				
	ID3	ID3 (Address 0xA5)				
	IDX	Hardware Addressable				
	IDS	Software Addressable	Coming soon			

10 Water St.
Lebanon, NH 03766 USA
Tel: 603.448.6266
Fax 603.218.6426
www.signalquest.com
info@signalquest.com

Other option	-Custom	Customer-specific requirements	Please contact SignalQuest if you require an option not listed in this table. For example, various baud rates, setting times, update rates and voltage regulator options may be available on request.

All SQ-RI devices are based on the SQ-SI or SI2X base inclinometer. For more information about inclinometer specifications not listed here, please refer to http://www.signalquest.com/sq-si.htm

Example part numbers: SQ-RIL-12R-1C-P1-S-IDX

LIMITATIONS AND WARNINGS

LIFE SAFETY

This product is not designed for use in life support and/or safety equipment where malfunction of the product can reasonably be expected to result in personal injury or death. Buyer uses this product in such applications at Buyer's own risk and agrees to defend, indemnify, and hold harmless SignalQuest, LLC from any and all damages, claims, suits, or expenses resulting from such misuse.

DYNAMIC ENVIRONMENTS

The device is designed to be used to measure angles in a quasi-static environment where external vibrations and accelerations are kept to a minimum. Digital and analog signal processing methods are employed to reduce the effects of transient acceleration and small vibrations on the angle reading; however, under dynamic conditions where external accelerations or vibrations are present, the sensor's performance may be degraded.

VARIATIONS IN EARTH'S GRAVITY

This device is designed to be used near the earth's surface only. Substantial changes in gravity will degrade the performance of the sensor. This device is not intended or qualified to be used in aviation.

TESTING

The performance of each system is verified through build-time testing. Each system is tested before and after factory calibration to ensure reliable performance.

SYSTEM INTEGRATION TESTING

Thorough testing should be carried out prior to product release to ensure system integration has not introduced unforeseen problems. The system integrator assumes the ultimate responsibility for the safety of the target application.

NOTICE

Information furnished by SignalQuest, Inc is believed to be accurate and reliable. However, this document may contain ERRORS and OMMISIONS. Accordingly, the design engineer should use this document as a reference rather than a strict design guideline and should perform thorough testing of any product that incorporates this or any other SignalQuest product. No responsibility is assumed by SignalQuest, LLC for this use of this information, or for any infringements of patents or other rights of third parties that may result from its use. Specifications are subject to change without notice. No license is granted by implication or otherwise under any patent or patent rights of SignalQuest, LLC Trademarks and registered trademarks are the property of their respective companies.

10 Water St.
Lebanon, NH 03766 USA
Tel: 603.448.6266
Fax 603.218.6426
www.signalquest.com
info@signalquest.com

FURTHER INFORMATION

For pricing, delivery, and ordering information, please contact SignalQuest at (603) 448-6266
For updates on this and other documents, visit our website at www.signalquest.com

10 Water St.
Lebanon, NH 03766 USA
Tel: 603.448.6266
Fax 603.218.6426
www.signalquest.com
info@signalquest.com