BSM NORTH AMERICA

E-Steer Adapters and Products

BSM North America
11950 12th Avenue
Burnsville, MN
55337-1405 (USA)
www.bsmna.com
+1 (952) 890 8146

TFD Steering Unit Product Portfolio

LORD Corporation has a diverse portfolio of TFD steering units to satisfy a variety of customer requirements. Our portfolio includes devices capable of producing resistive steering torque ranging from 5Nm to 20Nm.

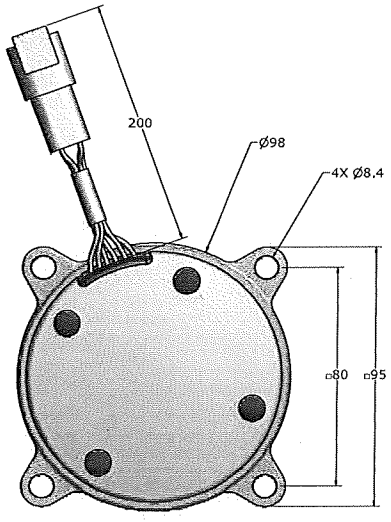
5NM DEVICES

The adoption of smaller steering wheels has increased as many industrial and off-highway Equipment OEMs consider more innovative and flexible steering interfaces. To meet the various needs of these applications, LORD has developed a standard product line of 5Nm devices which include the following features:

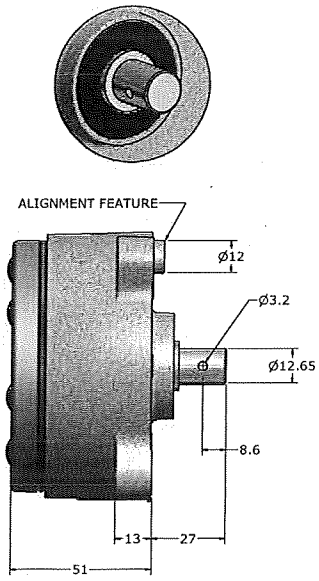
- 2-channel dual-redundant, non-contact, Hall effect steering sensor
- Sensor output (three options)
  - Standard digital (PWM) multi-rotational code
  - Analog code suitable for controllers with limited digital I/O
  - Analog multi-rotational code with no discontinuities in the signal
- Shaft connection (two options)
  - Flat
  - Cross-drilled
- Deutsch DTM04-6P connector
- 20 AWG wire
- 200mm cable length
- 10 Ohm coil

5NM PRODUCT SPECIFICATIONS

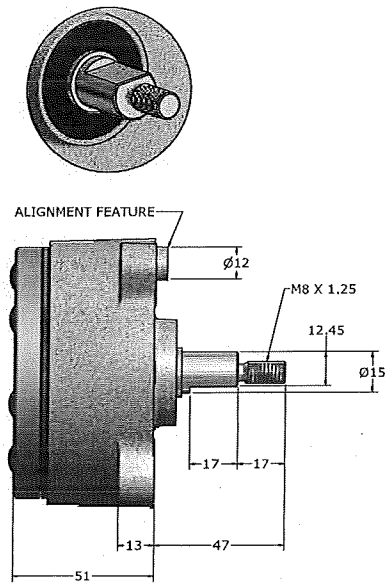
Category	Specification
Product Weight	1.3 kg (2.9 lbs)
Rated Torque @ 1A	5 Nm nominal (3.7 lb-ft)
Off-State Torque @ 0A	<0.5 Nm (<0.4 lb-ft)
Operating Speed	180 rpm max
Operating Temperature	-35 °C to +80 °C (-31 °F to +176 °F)
Axial Force Limit	1500 N max (337 lbf)
Bending Moment Limit	50 Nm max (36.9 lb-ft)
Current Control	12 VDC
Coil Resistance	10 Ω nominal
Current (max)	1.5 A peak
Current (continuous)	1.0 A
Sensor Resolution	12 bit
Sensor Linearity	+/- 1.2% Full Scale
Environmental Protection	IP66



CROSS DRILLED SHAFT

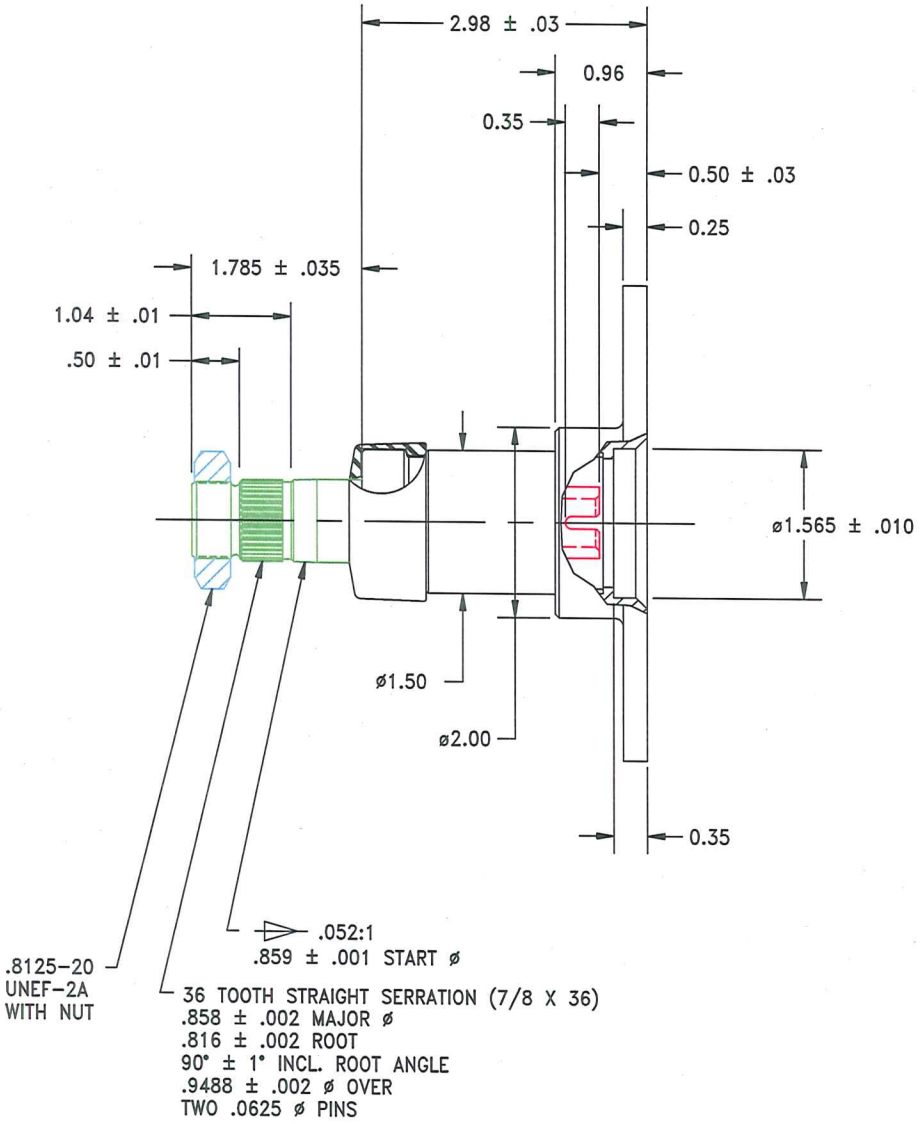


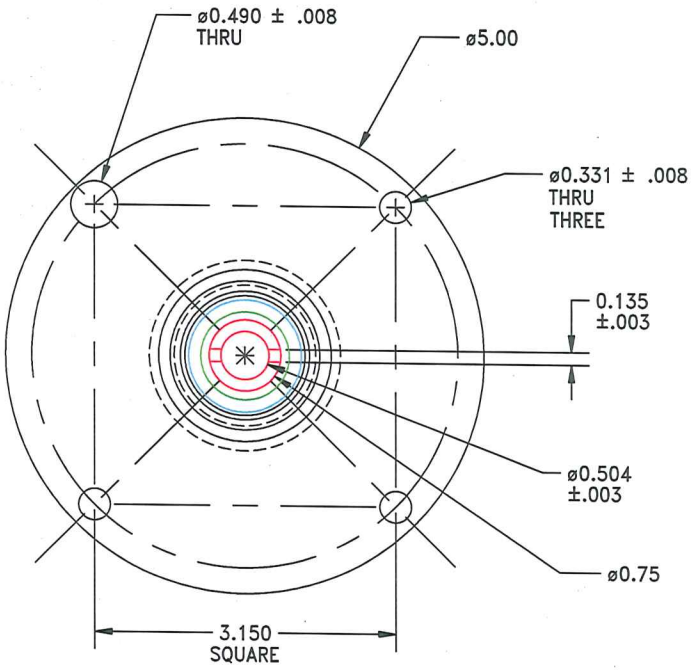
FLAT SHAFT



*DIMENSIONS ARE IN MILLIMETERS

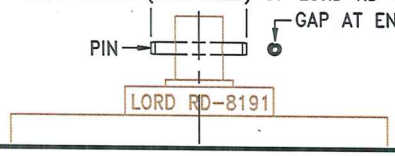
5 Nm





NOTES:

1. .125 ø X 1.0 LONG COILED PIN (SUPPLIED) TO BE INSERTED INTO SHAFT (CENTERED) OF LORD RD-8191 PRIOR TO ASSEMBLY.

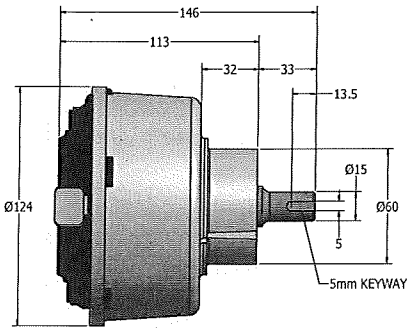


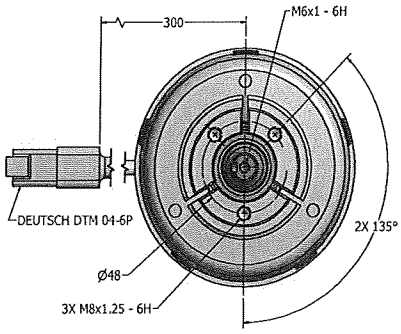
BSM NORTH AMERICA

DRAWN BY/DATE	DRM 08-10-17	INSTALLATION
CHECKED BY/DATE		
ENGRG BY/DATE	DRM 08-10-17	TITLE: STEERING COLUMN ASSEMBLY
DO NOT SCALE DRAWING		
THIRD ANGLE PROJECTION	SURFACE TEXTURE MICRO INCHES 250 ARITHMETICAL AVERAGE	NUMBER: F6746
		SCALE NONE SIZE / SHEET 1 OF 1

12NM DEVICES

For applications with larger steering wheels, LORD has a standard 12Nm TFD steering unit to accomodate the higher steering torque.





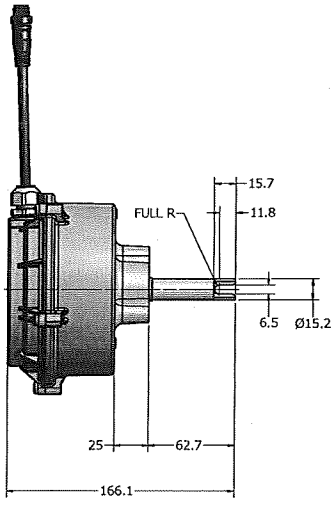
*DIMENSIONS ARE IN MILLIMETERS

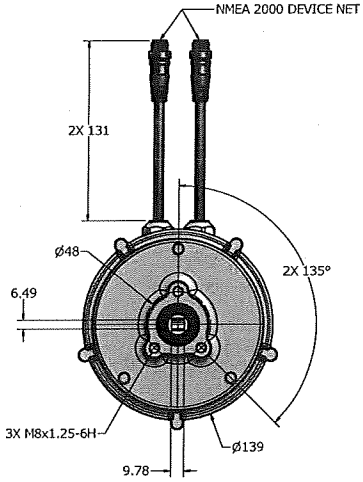
12NM PRODUCT SPECIFICATIONS

Category	Specification
Product Weight	2.7 kg (6.0 lbs)
Rated Torque @ 0.8A	10 Nm nominal (7.4 lb-ft)
Off-State Torque @ 0A	<1.0 Nm (<0.75 lb-ft)
Operating Speed	120 rpm max
Operating Temperature	-35 °C to +80 °C (-31 °F to +176 °F)
Axial Force Limit	1500 N max (337 lbf)
Bending Moment Limit	50 Nm max (36.9 lb-ft)
Current Control	12 VDC
Coil Resistance	11 Ω nominal
Current (max)	1.5 A peak
Current (continuous)	1.0 A
Sensor Resolution	12 bit
Sensor Linearity	+/- 1.2% Full Scale
Environmental Protection	IP66

20NM DEVICES

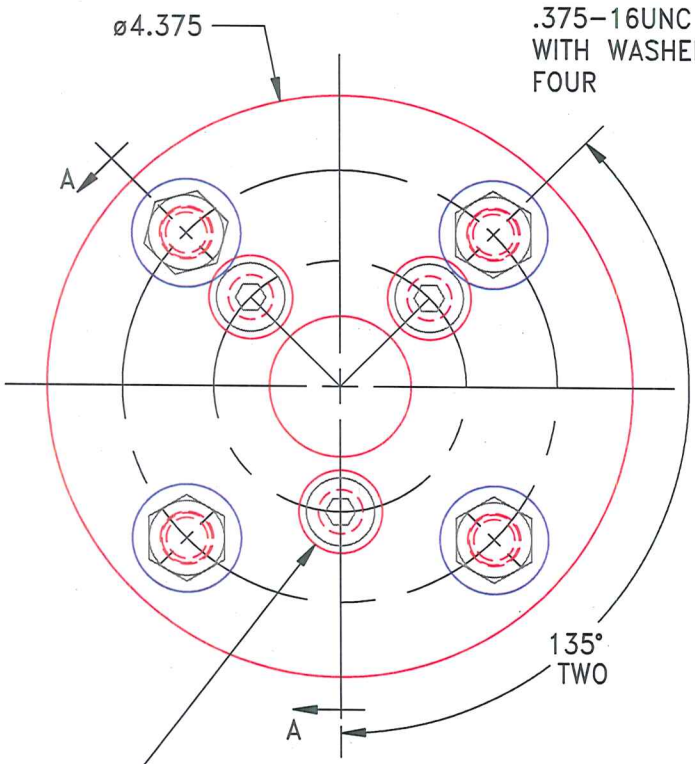
For applications requiring maximum steering torque, LORD offers a 20Nm TFD steering unit. The 20Nm TFD contains an integrated controller which uses inputs from the CAN-bus, allowing for highly tunable steering settings.



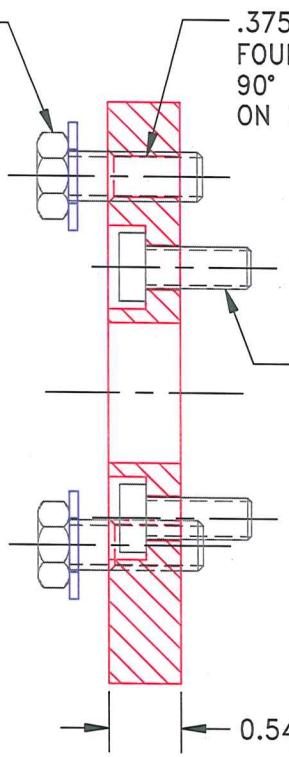


20NM PRODUCT SPECIFICATIONS

Category	Specification
Rated torque at 100% command	20 Nm nominal (14.8 lb-ft)
Off-state torque at 0% command	<1.0 Nm (<0.75 lb-ft)
Operating speed	120 rpm maximum
Product weight	3.3 kg (7.3 lbs)
Supply voltage	9-36 VDC
System power draw (continuous)	2.6 W
System power draw (at 100% current command)	17 W
CAN	Two independent CAN 2.0B transceivers (29-bit identifiers), 250 kBaud
Sensor type	Absolute, non-contact, Hall effect
Sensor resolution	14-bit
Cable connection	Dual NMEA 2000 Devicenet
Shaft connection	Compatible with U-Flex X52 tilt mechanism
Installation orientation	Vertical (shaft up) to horizontal (-10°)
Axial force limit	1500 N max (337 lbf)
Operating temperature	-15 °C to 85 °C (5 °F to 185 °F)
Environmental protection	IP67, 1000-hr salt fog
Safety rating	SIL2 design intent



ø.333 THRU
ø.625 X .282 DEEP
THREE
ON 1.89 [48mm] B.C.
AS SHOWN



SECTION A-A

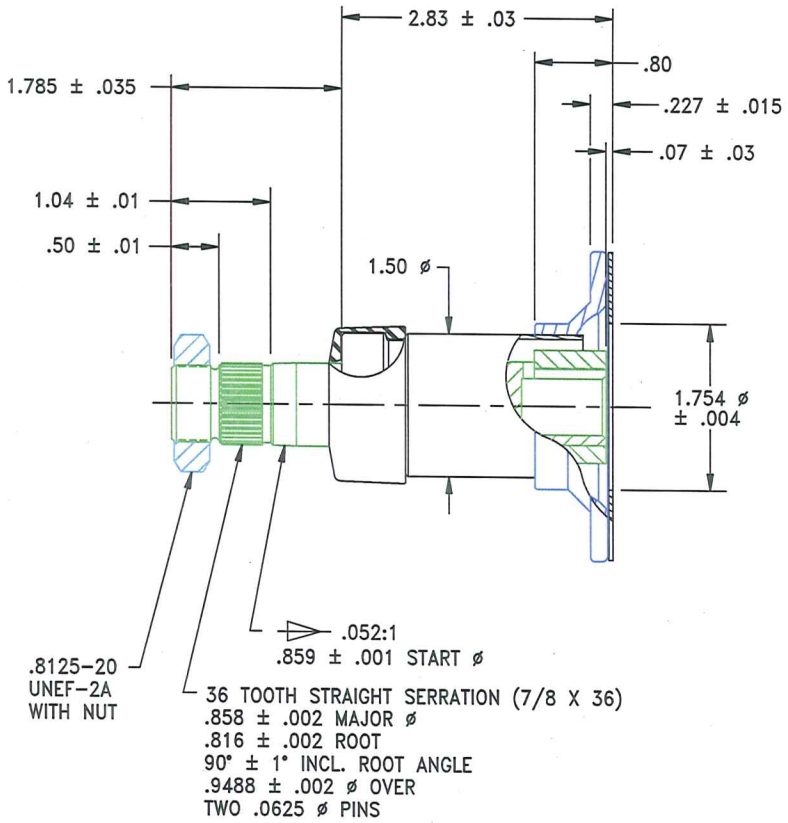
NOTES:

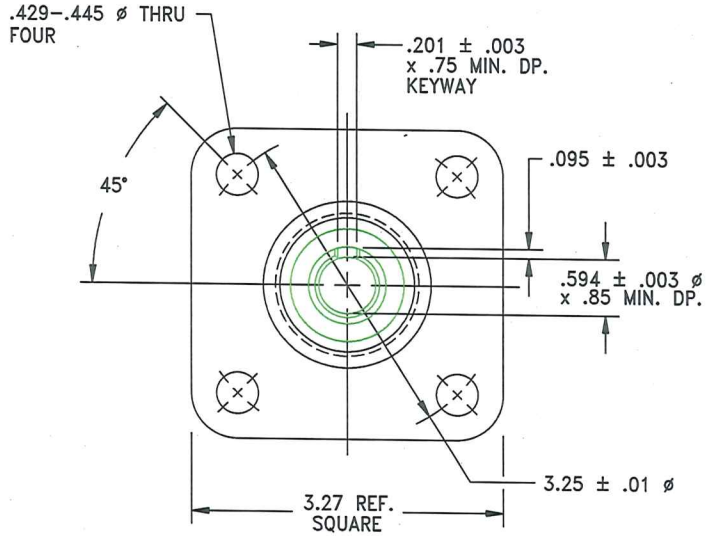
1. USE OF LOCTITE IS RECOMMENDED ON ALL SCREW THREADS.

BSM NORTH AMERICA

DRAWN BY/DATE: DRM 06-04-18	INSTALLATION
CHECKED BY/DATE:	
ENGRG BY/DATE: DRM 06-04-18	TITLE: ADAPTER KIT
DO NOT SCALE DRAWING	
THIRD ANGLE PROJECTION	SURFACE TEXTURE MICRO INCHES 250 ARITHMETICAL AVERAGE
NUMBER: F6559	
SCALE NONE SIZE	SHEET 1 OF 1

12 Nm





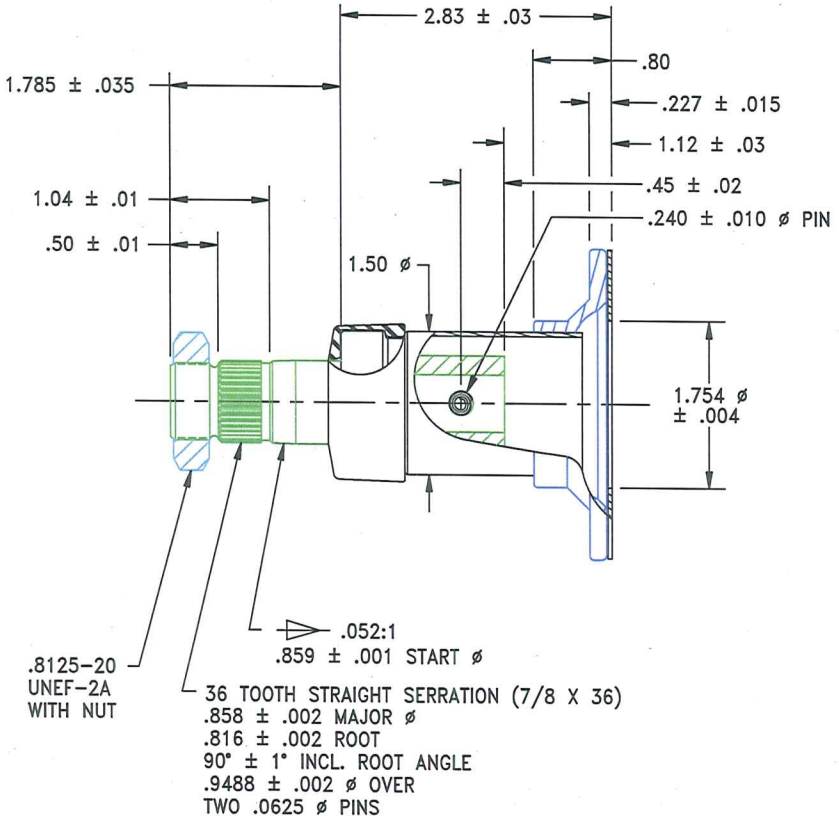
NOTES:

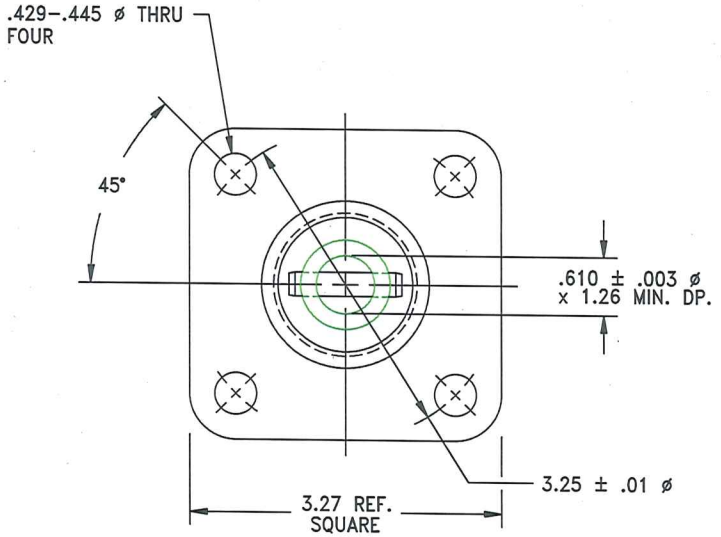
1. 5mm KEY TO BE INSERTED INTO KEYWAY OF SHAFT OF LORD 12 Nm TFD PRIOR TO ASSEMBLY.

BSM NORTH AMERICA

DRAWN BY/DATE	DRM 10-31-17	INSTALLATION
CHECKED BY/DATE		
ENGRG BY/DATE	DRM 10-31-17	TITLE: STEERING COLUMN ASSEMBLY
DO NOT SCALE DRAWING		
THIRD ANGLE PROJECTION	SURFACE TEXTURE MICRO INCHES 250 ARITHMETICAL AVERAGE	NUMBER: F6749
		SCALE NONE SIZE / SHEET 1 OF 1

20 Nm



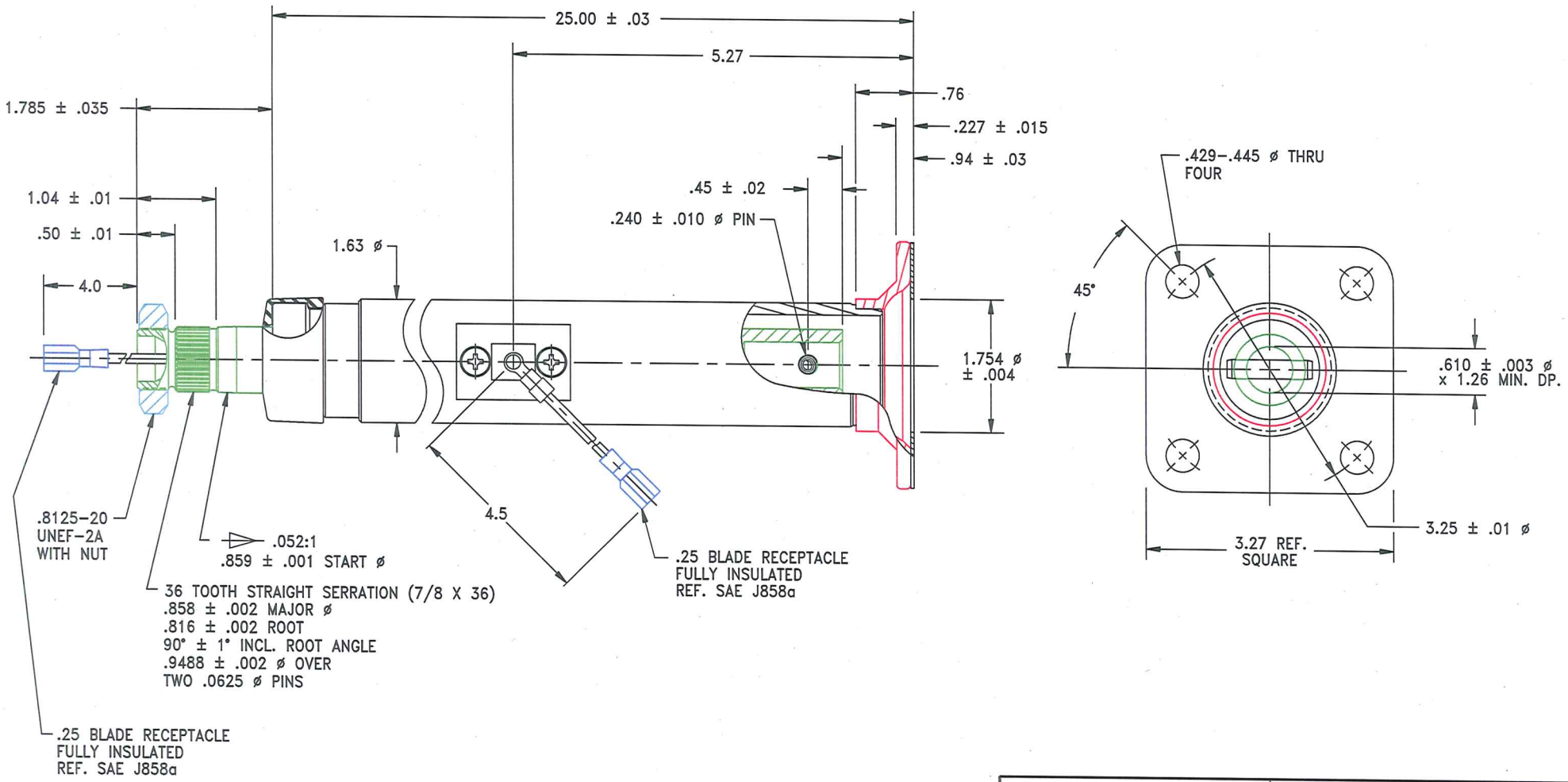


BSM NORTH AMERICA

DRAWN BY/DATE	DRM 01-02-19	INSTALLATION
CHECKED BY/DATE		
ENGRG BY/DATE	DRM 01-02-19	TITLE: STEERING COLUMN ASSEMBLY
DO NOT SCALE DRAWING		
THIRD ANGLE PROJECTION	SURFACE TEXTURE MICRO INCHES 250 ARITHMETICAL AVERAGE	NUMBER: F6766
		SCALE NONE SIZE / SHEET 1 OF 1

Ⓐ ADDED HORN WIRE. 11-14-18

20 Nm



BSM NORTH AMERICA

DRAWN BY/DATE	DRM 10-31-18
CHECKED BY/DATE	
ENGRG BY/DATE	DRM 10-31-18
DO NOT SCALE DRAWING	

INSTALLATION

TITLE: STEERING COLUMN ASSEMBLY

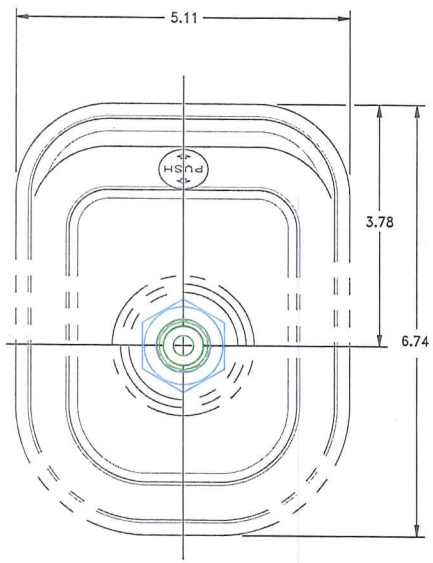
THIRD ANGLE PROJECTION

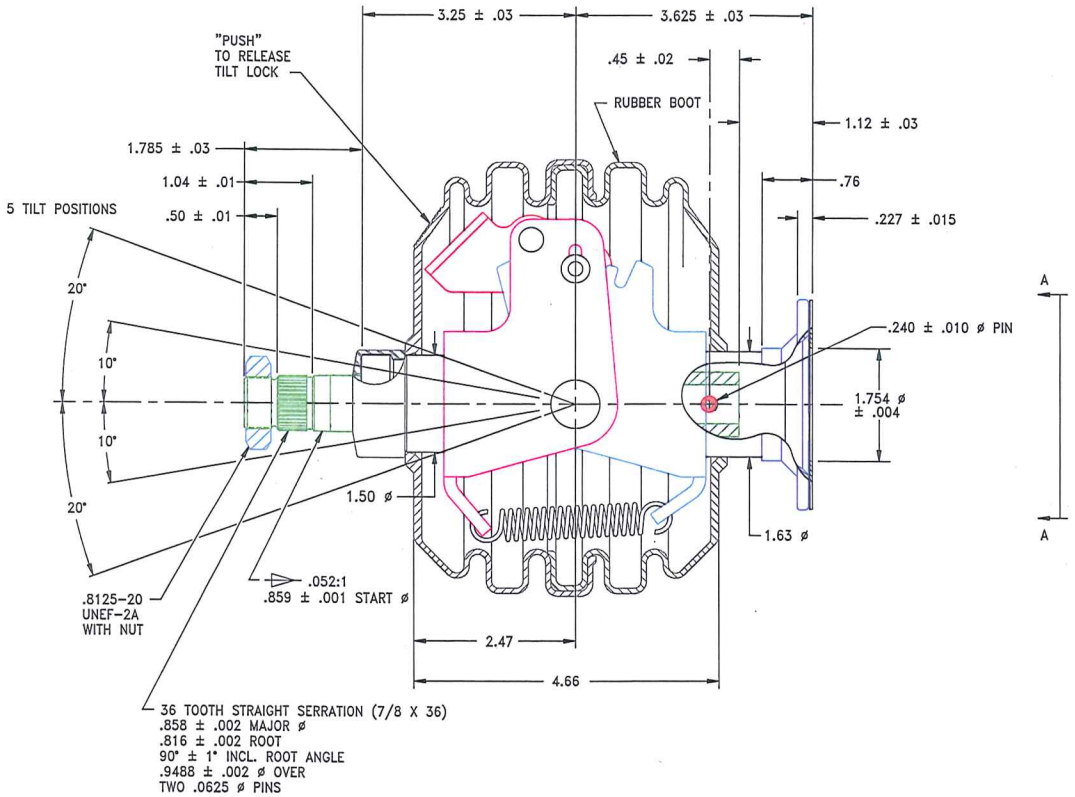
SURFACE TEXTURE MICRO INCHES 250 ARITHMETICAL AVERAGE

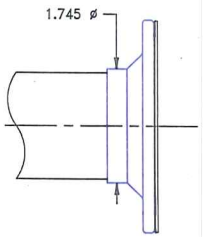
NUMBER: F6764

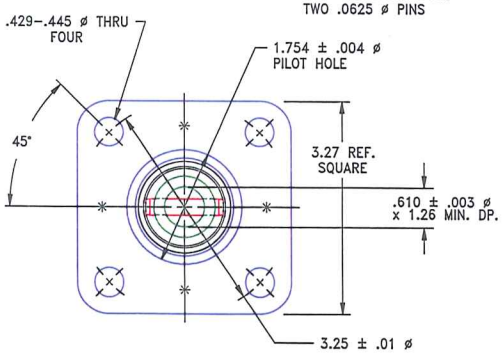
SCALE NONE SIZE | SHEET 1 OF 1

20 Nm







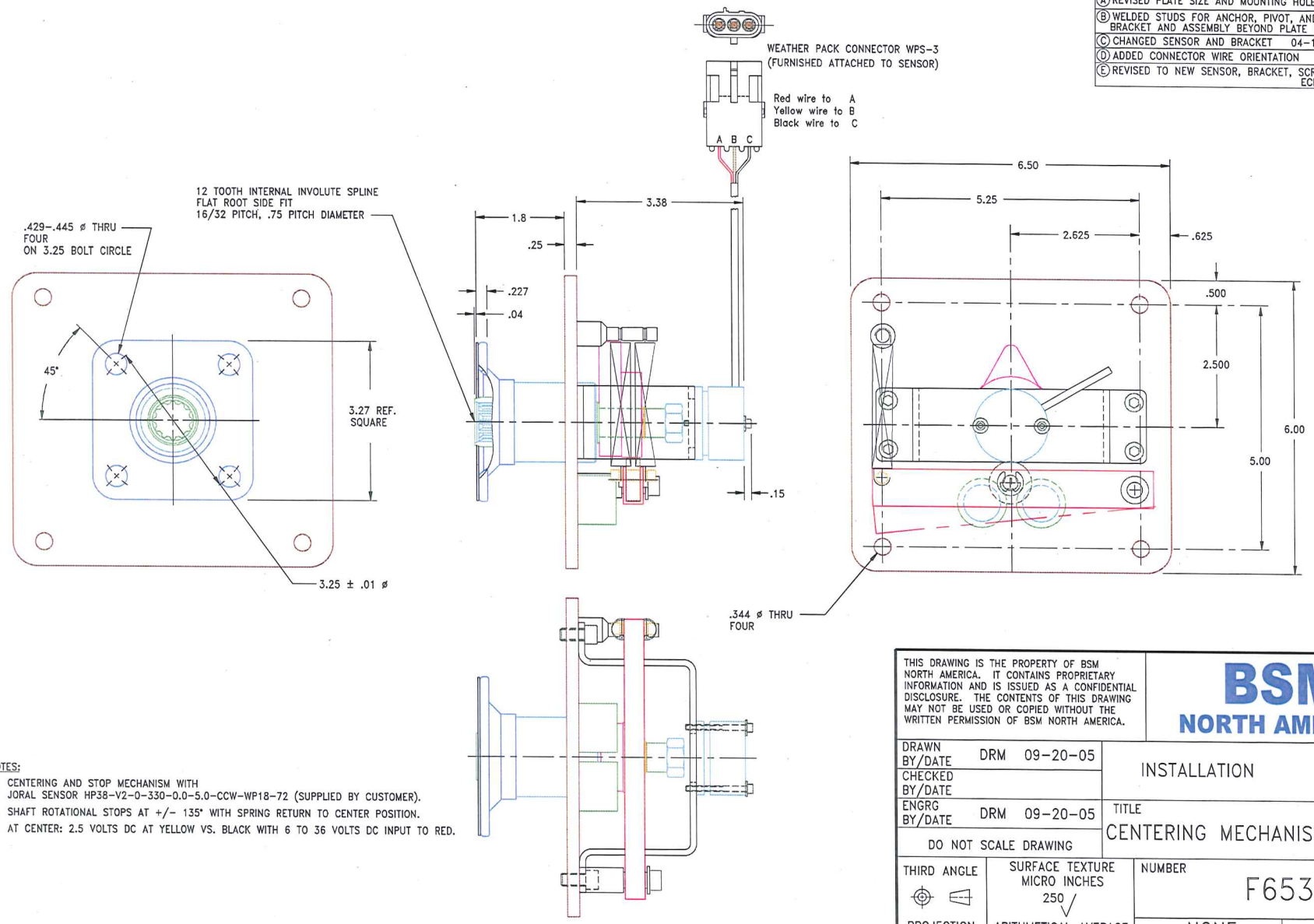


VIEW A–A

BSM NORTH AMERICA

DRAWN BY/DATE	DRM 01–29–20	INSTALLATION
CHECKED BY/DATE		
ENGRG BY/DATE	DRM 01–29–20	TITLE: TILT STEERING COLUMN ASSEMBLY
DO NOT SCALE DRAWING		
THIRD ANGLE PROJECTION	SURFACE TEXTURE MICRO INCHES 250 ARITHMETICAL AVERAGE	NUMBER F7258
		SCALE NONE SIZE — SHEET 1 OF 1

(A)	REVISED PLATE SIZE AND MOUNTING HOLES 9-30-05
(B)	WELDED STUDS FOR ANCHOR, PIVOT, AND STOPS; SHORTENED BRACKET AND ASSEMBLY BEYOND PLATE BY .35". 10-05-05
(C)	CHANGED SENSOR AND BRACKET 04-13-06
(D)	ADDED CONNECTOR WIRE ORIENTATION 10-3-06
(E)	REVISED TO NEW SENSOR, BRACKET, SCREWS, NO GEARS. ECN 1429 07-26-17



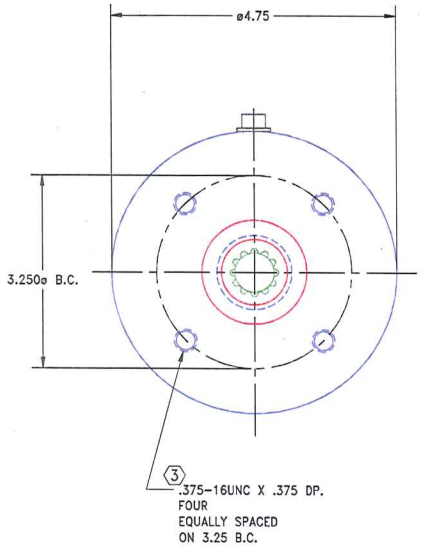
NOTES:

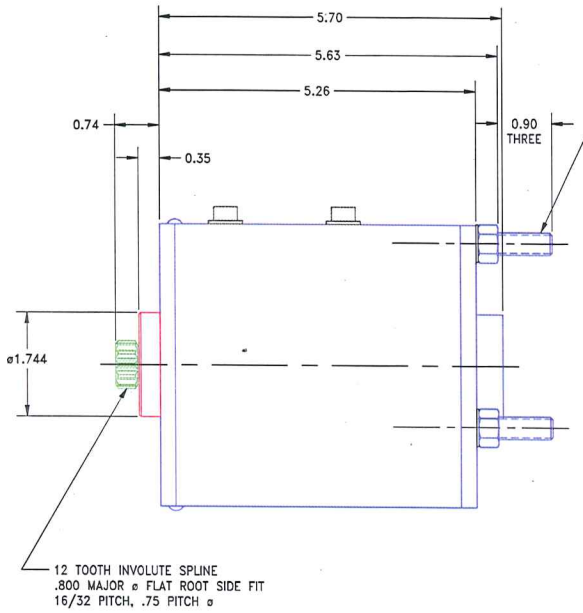
1. CENTERING AND STOP MECHANISM WITH JORAL SENSOR HP38-V2-0-330-0.0-5.0-CCW-WP18-72 (SUPPLIED BY CUSTOMER).
2. SHAFT ROTATIONAL STOPS AT +/- 135° WITH SPRING RETURN TO CENTER POSITION.
3. AT CENTER: 2.5 VOLTS DC AT YELLOW VS. BLACK WITH 6 TO 36 VOLTS DC INPUT TO RED.

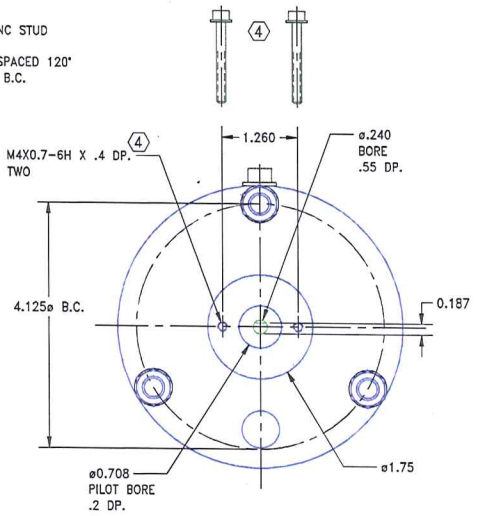
BSM NORTH AMERICA

DRAWN BY/DATE	DRM 09-20-05	INSTALLATION
CHECKED BY/DATE		
ENGRG BY/DATE	DRM 09-20-05	TITLE: CENTERING MECHANISM W/SENS.
DO NOT SCALE DRAWING		
THIRD ANGLE PROJECTION	SURFACE TEXTURE MICRO INCHES 250 ARITHMETICAL AVERAGE	NUMBER: F6537
		SCALE NONE SIZE / SHEET 1 OF 1

Ⓐ ADDED .25 TO SHAFT EXTENSION AND ALIGNMENT BUSHING LENGTHS. 12-12-12
Ⓑ ADDED TWO M4 SCREWS AND WASHERS. 02-04-14







NOTES:

1. SHAFT ROTATIONAL STOPS AT +/- 135° WITH SPRING RETURN TO CENTER POSITION.
2. STOPS WILL WITHSTAND UP TO 220 LB.FT. OF TORQUE ON INPUT SHAFT.
③ .63 MAXIMUM SCREW PENETRATION ALLOWED OR SHAFT ROTATION MAY BE HINDERED.
(.375-16 UNC x 1.0 LONG WITH WASHER RECOMMENDED WITH BSM COLUMN AND .25 MOUNTING PLATE BETWEEN)
④ .52 MAXIMUM SCREW PENETRATION ALLOWED OR SHAFT ROTATION MAY BE HINDERED.
(FOR BEI SERIES 9360 SENSOR MOUNT, M4X0.7 X 35mm LONG SCREWS AND WASHERS PROVIDED)

BSM NORTH AMERICA

DRAWN BY/DATE	DRM 08-28-12	INSTALLATION
CHECKED BY/DATE		
ENGRG BY/DATE	DRM 08-28-12	TITLE: CENTERING STOP MECHANISM
DO NOT SCALE DRAWING		

DIMENSIONS ARE: INCHES UNLESS SPECIFIED OTHERWISE

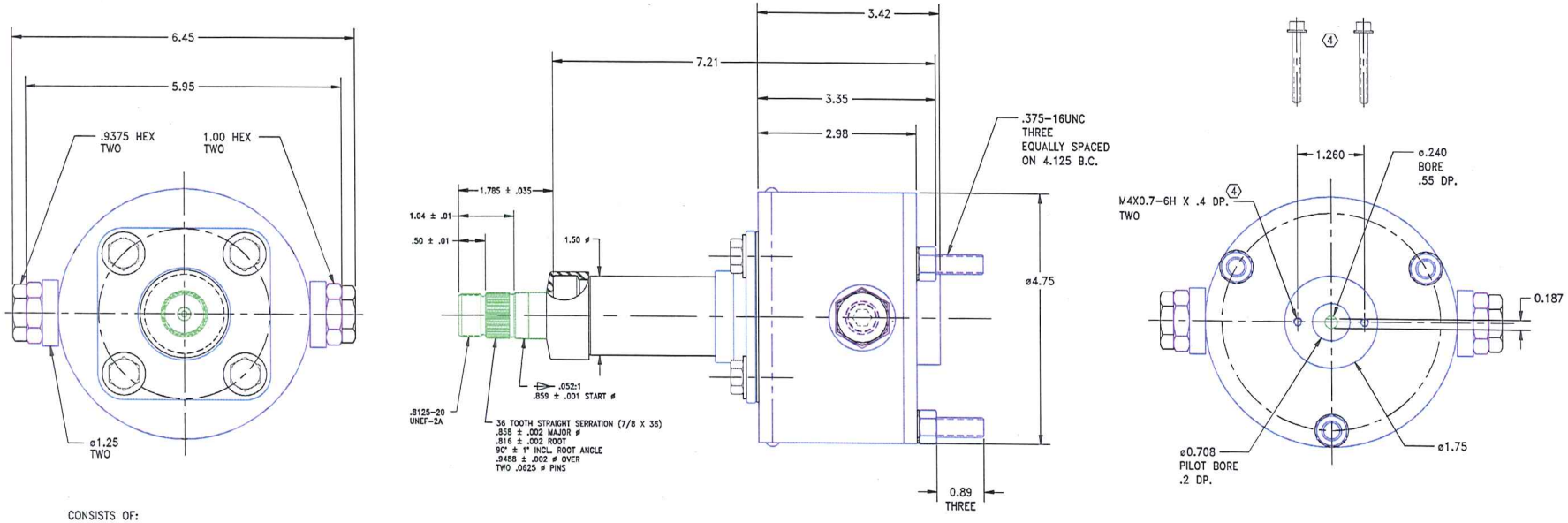
THIRD ANGLE PROJECTION

SURFACE TEXTURE MICRO INCHES 250 ARITHMETICAL AVERAGE

NUMBER: F6557

SCALE NONE SIZE | SHEET 1 OF 1

Ⓐ REMOVED SENSOR, ADDED SENSOR MOUNTING DETAIL.	02-23-12
Ⓑ REVISED FRICTION MECH., DIMS., INCREASED TORQUE.	05-01-12
Ⓒ REDUCED LARGE HEX SIZES AND LENGTHS TO THEM.	01-14-13



CONSISTS OF:
F6555 FRICTION HOLD STOP MECH.
F6467 COLUMN.
ASSEMBLY HARDWARE, AND
INTERFACE TO MOUNT BEI SERIES 9360 SENSOR.

NOTE:

1. SHAFT IS HELD BY FRICTION REQUIRING 10 LB.IN. TO ROTATE.
2. THERE ARE 334° OF SHAFT ROTATION BETWEEN STOPS.
3. STOPS WILL WITHSTAND UP TO 220 LB.FT. OF TORQUE ON INPUT SHAFT.
④ .52 MAXIMUM SCREW PENETRATION ALLOWED OR SHAFT ROTATION MAY BE HINDERED. (FOR BEI SERIES 9360 SENSOR MOUNT, TWO M4X0.7 X 35mm LONG SHCS'S AND WASHERS PROVIDED)

BSM NORTH AMERICA

DRAWN BY/DATE	DRM 02-22-12	INSTALLATION
CHECKED BY/DATE		
ENGRG BY/DATE	DRM 02-22-12	TITLE: COLUMN AND STOP ASSEMBLY
DO NOT SCALE DRAWING		

DIMENSIONS ARE: INCHES UNLESS SPECIFIED OTHERWISE

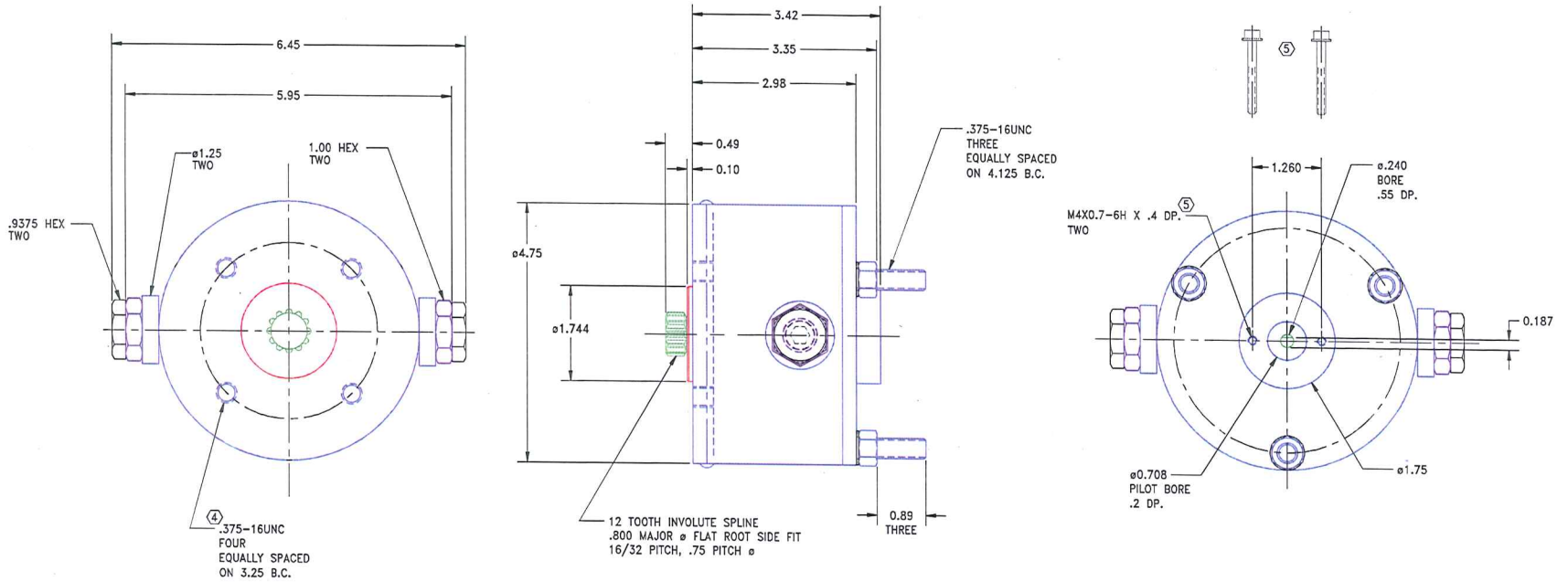
THIRD ANGLE PROJECTION

SURFACE TEXTURE MICRO INCHES 250 ARITHMETICAL AVERAGE

NUMBER F8013

SCALE NONE SIZE | SHEET 1 OF 1

Ⓐ	REMOVED SENSOR, ADDED SENSOR MOUNTING DETAIL. 02-23-12
Ⓑ	REVISED FRICTION MECH., DIMS., INCREASED TORQUE. 05-01-12
Ⓒ	PICTORIALLY ADDED PLUGS ITEM 12 AND NOTE 5. 06-18-12
Ⓓ	REDUCED LARGE HEX SIZES AND LENGTHS TO THEM. 01-14-13



NOTE:

1. SHAFT IS HELD BY FRICTION REQUIRING 10 LB.IN. TO ROTATE.
2. THERE ARE 334° OF SHAFT ROTATION BETWEEN STOPS.
3. STOPS WILL WITHSTAND UP TO 220 LB.FT. OF TORQUE ON INPUT SHAFT.

④ .72 MAXIMUM SCREW PENETRATION ALLOWED OR SHAFT ROTATION MAY BE HINDERED. (.375-16 UNC x .75 LONG WITH WASHER RECOMMENDED WITH BSM COLUMN)

⑤ .52 MAXIMUM SCREW PENETRATION ALLOWED OR SHAFT ROTATION MAY BE HINDERED. (FOR BEI SERIES 9360 SENSOR MOUNT, TWO M4X0.7 X 35mm LONG SHCS'S AND WASHERS PROVIDED)

BSM NORTH AMERICA

DRAWN BY/DATE	DRM 02-22-12	INSTALLATION
CHECKED BY/DATE		
ENGRG BY/DATE	DRM 02-22-12	TITLE: FRICTION HOLD, 334° RANGE
DO NOT SCALE DRAWING		

DIMENSIONS ARE: INCHES UNLESS SPECIFIED OTHERWISE

THIRD ANGLE PROJECTION

SURFACE TEXTURE MICRO INCHES 250 ARITHMETICAL AVERAGE

NUMBER: F6555

SCALE NONE SIZE | SHEET 1 OF 1