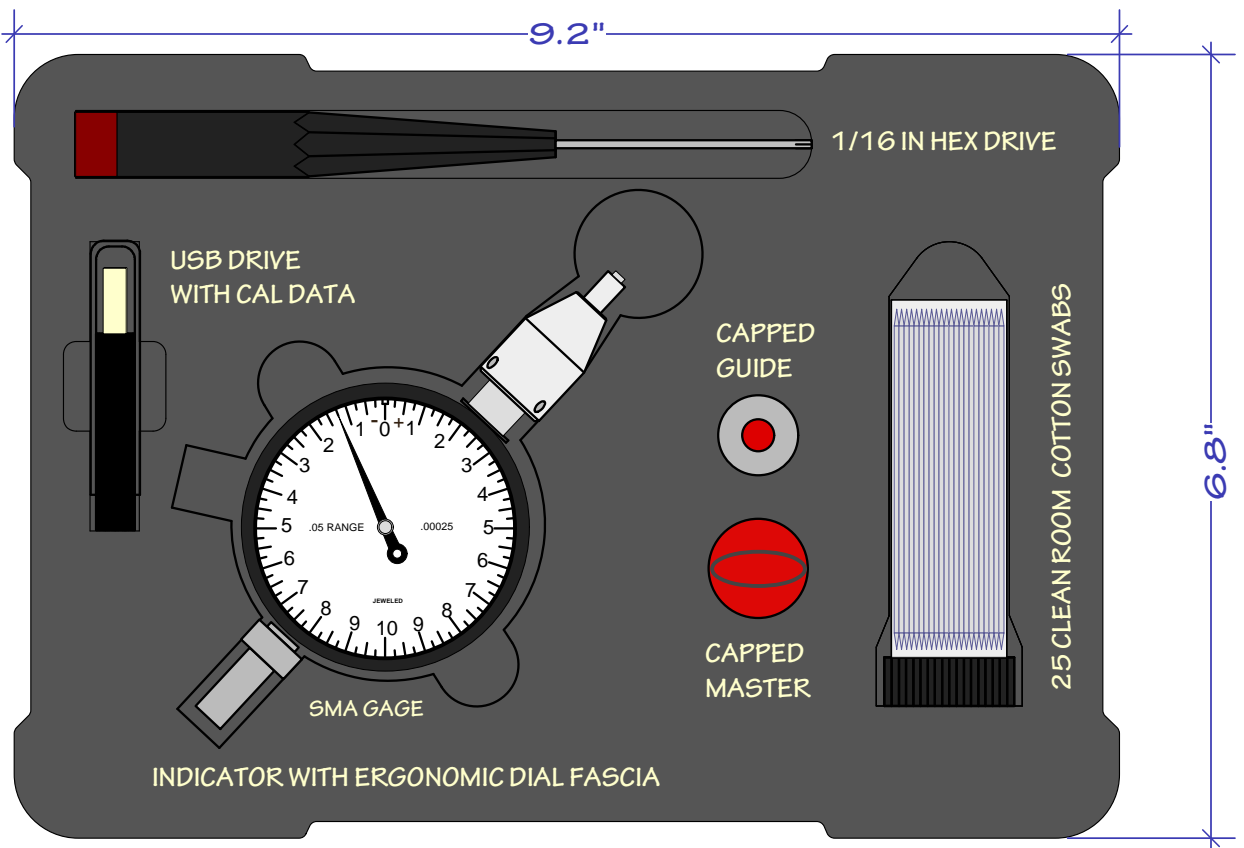


N	
SMA	
3.5	
K	
2.4	X
1.85	X

SMA ERGO GAGES:
RESOLUTION
0.00025
ACCURACY
+/-0.00025



PAT. PEND. 61986978, 61868548, 61986822

OVERVIEW: PRECISION GAGE KIT FOR THE DIMENSIONAL GAGING OF MALE AND FEMALE MICROWAVE COMPONENTS. THE INSTRUMENT'S DESIGN ELIMINATES THE REQUIREMENT FOR A SECOND GAGE AND/OR BUSHING ORDER TO ACCOMMODATE THE OPPOSITE GENDER. ADVANTAGEOUSLY, ONE MASTER GAGE IS USED FOR ALL STANDARDS INCLUDING MIL-STD-348, MIL-C-390 12 AND IEEE287, THEREBY ELIMINATING THE PROCUREMENT REQUIREMENT OF MULTIPLE MASTERS.

BENEFITS:

- ~ GUIDED BUSHING DESIGN ELIMINATES TORQUE REQUIREMENT AND ASSOCIATED TORQUE UNCERTAINTY;
- ~ HIGH PERFORMANCE ANALOG AND DIGITAL STARRETT METERS WITH 0.00005 INCH RESOLUTION;
- ~ CERTIFIED ACCURACY OF 0.00012 INCHES (DIGITAL) AND 0.0001 (ANALOG);
- ~ SINGLE FLAT SURFACE MASTER GAGE FOR THE ELIMINATION OF FEATURE SIZE UNCERTAINTY;
- ~ EXPEDITED GAGING OF BOTH 1.85mm AND 2.4mm MALE AND FEMALE CONNECTORS;
- ~ INCLUDED ISO-17025 TRACEABLE STARRETT CALIBRATION AND CERTIFICATION ;
- ~ INCLUDED USB DRIVE WITH GAGE APPLICATION FOR COMPARING GAGED VALUE TO COMMON STANDARDS;
- ~ INCLUDED 25 SHARP & DENSE POINT, SMALL SIZE, EXTREMELY LOW LINTING, STATIC FREE SWABS;
- ~ INCLUDED CRM72 TOOL STEEL HEX DRIVER WITH ROCKWELL 50-61 HARDNESS & CORROSION FREE FINISH.
- ~ INCLUDED ONE STAINLESS HANDY WRENCH MATCHING COMMON MICROWAVE ADAPTER AF DIMENSIONS;
- ~ INCLUDED ONE MID WARRANTY TRACEABLE CALIBRATION AND CERTIFICATION;
- ~ INSTRUMENT BACKS AND FASCIA WITH STANDARDS REQUIREMENTS AND INTERFACE METRICS.
- ~ INCLUDED ONE WATER PROOF AND CRUSH PROOF NK-7 RESIN CASE WITH STAINLESS STEEL POWER CLAW LATCHING SYSTEM AND VAPOR RELEASE VALVE , 10.2LX7.8WX4.5H INCHES EXTERIOR DIMENSIONS.

GENERAL SPECIFICATION

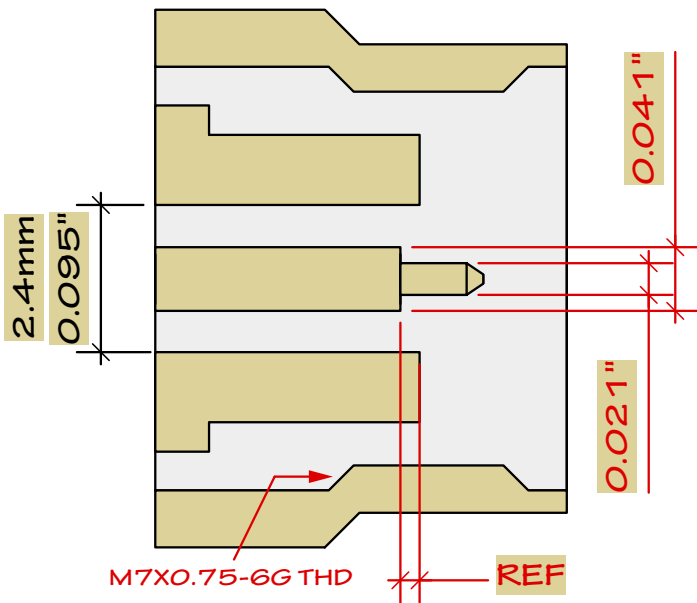
- ~SURFACE FINISH OF Ra4 - Ra16 ON WORKING SLIDABLE SURFACE; BETTER THAN Ra32 IN REGIONS OF NON-CONTACT.
- ~MASTER GAGE FINISH OF Ra 8 OR BETTER.
- ~PRECISION SWISS TURNED AND MILLED STAINLESS STEEL.
- ~CRITICAL TOLERANCES OF 0.0005.
- ~CERTIFIED DIAL ACCURACY OF +/- 0.0001 ANALOG & DIGITAL
- ~ALL STAINLESS COMPONENTS PASSIVATED PER ASTM-A967.
- ~STAINLESS 6-32 SET SCREWS [X3] WITH ASME B18.3 ROCKWELL C28 HARDNESS.
- ~DIAL FASCIA AND DIAL BACKS WITH STANDARDS DELINATION.

WARRANTY: ALL VM MICROWAVE GAGES CARRY A ONE YEAR WARRANTY ON THE INDICATOR AND A 10 YEAR WARRANTY ON ALL STAINLESS COMPONENTS.

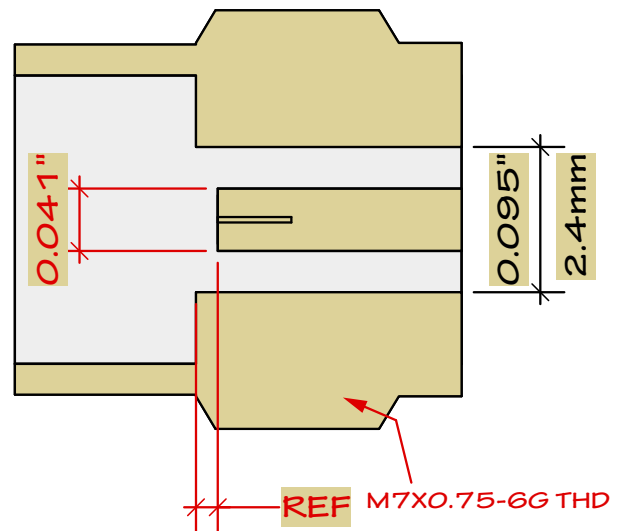
PRECISION GAGE KITS
1.85mm & 2.4mm
MALE & FEMALE
Velocity Microwave ~ div. ATX Labs
www.velocitymicrowave.com

LEGACY SERIES

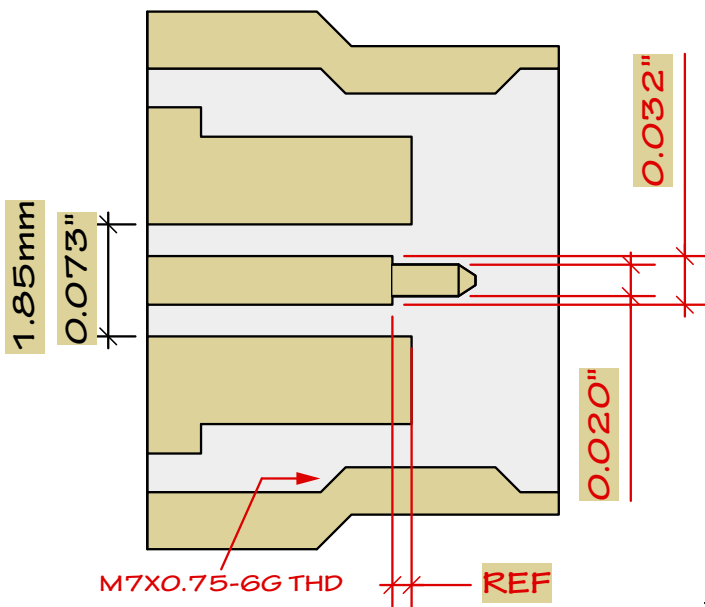
2.4mm MALE



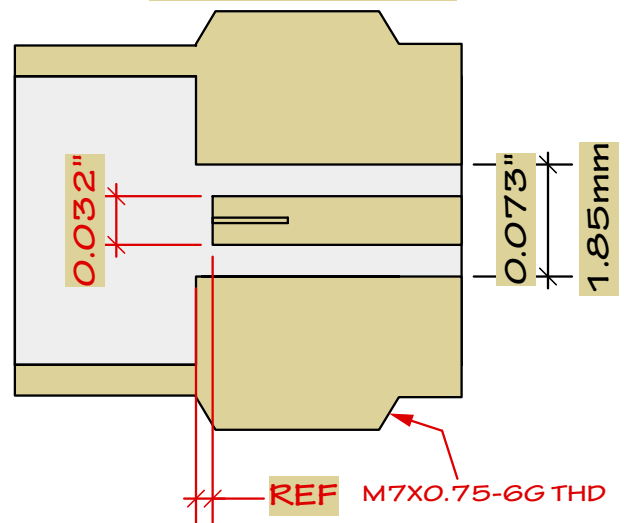
2.4mm FEMALE



1.85mm MALE



1.85mm FEMALE



COMMON PIN TO REFERENCE PLANE RECESSON

IEEE287LPC: -0.0005 MAX
IEEE287GPC: -0.002 MAX
MIL-STD-348B ² : -0.005 MAX
ORDINARY PRECISION: -0.003 MAX

NOTES:

- [1] ALL PIN TO REFERENCE PLANE DIMENSIONS ARE IN RECESSON;
- [2] MIL-STD-348 CROSSES TO MIL-C-39012;
- [3] PROCESSION IS NONCONFORMING RELATIVE TO ALL STANDARDS.

NOTE: ALL OF THE ABOVE DIMENSIONS ARE NOMINAL; AS MACHINED, EACH WILL HAVE A TOLERANCE PER STANDARD.

GENERAL SPECIFICATION

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WARRANTY: ALL VM MICROWAVE GAGES CARRY A TWO YEAR WARRANTY ON THE INDICATOR, A MID WARRANTY TRACEABLE CALIBRATION BY AN A2LA OR ACLASS CORP ACCREDITED LAB, AND A 10 YEAR WARRANTY ON ALL STAINLESS COMPONENTS.

PRECISION GAGE KITS

1.85mm & 2.4mm

LEGACY SERIES

MALE & FEMALE

Velocity Microwave ~ div. ATX Labs
www.velocitymicrowave.com

THE ACT OF "GAGING" A MICROWAVE CONNECTOR IS SIMPLY THE ACT OF DETERMINING THE DIFFERENCE IN GRADE BETWEEN TWO POINTS INSIDE THE CONECTOR: TYPICALLY THE OUTER COAXIAL BODY'S FRONT (MATING) PLANE AND A GEOMETRIC FEATURE ON THE MALE PIN (TYPICALLY SHOULDER) OR FEMALE PIN (TYPICALLY FRONT PLANE). GAGING IS SIMPLE IN BOTH CONCEPT AND EXECUTION.

THE CONVENTIONAL METHOD FOR DETERMINING A GRADE DIFFERENCE IS TO USE A DIAL INDICATOR THAT HAS A FIXED STEM AND A MOVABLE RACK OR SPINDLE. THE SPINDLE COMMUNICATES ITS MOTION TO THE HAND ON THE INDICATOR'S DIAL FACE. THE TRADITIONAL APPROACH IN MICROWAVE GAGING IS TO ATTACH A FIXED BUSHING TO A CONVENTIONAL DIAL INDICATOR'S STEM AND A CONTACT POINT TO THE DIAL INDICATOR'S MOVABLE SPINDLE. WHEN THE BUSHING IS MADE TO REST ON THE OUTER BODY'S MATING PLANE AND THE CONTACT POINT IS MADE TO REST ON THE FEATURE OF INTEREST, LIKE A PIN'S SHOULDER, THE HAND OF THE DIAL SHOWS THE GRADE DIFFERENCE. WHILE THIS TRADITIONAL APPROACH ADDS A BUSHING AND CONTACT POINT, NO CHANGE IS MADE TO THE DIAL INDICATOR'S INDICIA OR FASCIA. IN THIS MANNER, THE "RECESSION" (OR "PROCESSION" IN THE CASE OF NON-COMPLIANCE) OF THE MALE PIN'S SHOULDER OR THE FEMALE PIN'S FRONTAL PLANE RELATIVE TO THE OUTER COAXIAL BODY'S MATING PLANE WOULD BE DETERMINED.

VM'S PATENTED APPROACH

THUS, IN THE MANNER DISCRIBED ABOVE, AND IN THE SIMPLIFIED SECTIONAL IMAGES OF SUBMINIATURE CONNECTORS SHOWN TO THE RIGHT, THE DIFFERENCE R-S WOULD BE COMPARED TO A STANDARD THAT REPRESENTS THE INTERFACE SPECIFICATION THAT THE CONNECTOR IS REQUIRED TO BE IN COMPLIANCE WITH.

TO THIS END, FOR THE LAST HALF CENTURY THE MICROWAVE GAGING OF SUBMINIATURE CONNECTORS HAS TYPICALLY EMPLOYED A SEPARATE GAGE FOR EACH CONNECTOR GENDER - THEREBY INCREASING THE COST OF OWNERSHIP. WITHIN THIS APPROACH A DISTINCTION WAS MADE BETWEEN FREE HAND GAGING, IN WHICH THE USER PLACES THE WORKING END OF THE GAGE ON THE CONNECTOR'S INTERFACE MANUALLY, AND THREADED ENGAGEMENT, WHEREIN THE USER THREADS THE GAGE ON TO THE CONNECTOR IN THE SAME MANNER AS AN ACTUAL MALE/FEMALE CONNECTOR ENGAGEMENT.

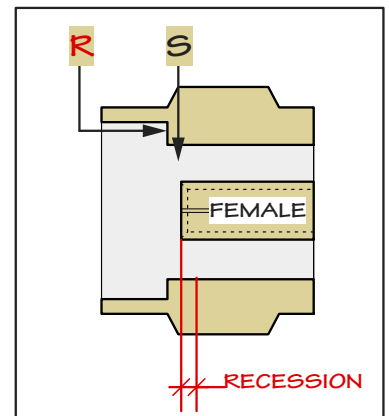
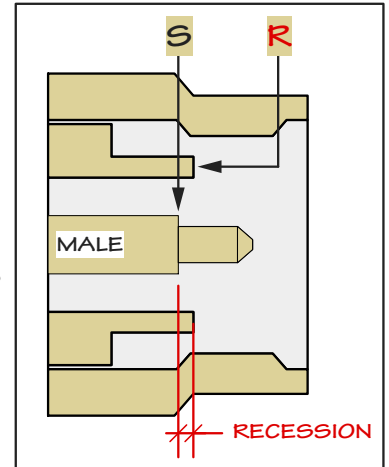
VM'S PATENTED APPROACH TO SUBMINIATURE GAGING IS BASED ON SEVERAL DIFFERENT PRINCIPLES.

[1] A SINGLE GAGE/INDICATOR (AS OPPOSED TO THE CUSTOMARY TWO) IS USED FOR BOTH MALE AND FEMALE GENDERS THEREBY SIMPLIFYING GAGING AND SUBSTANTIALLY REDUCING COST, BUT WITH NO LOSS IN ACCURACY OR PRECISION;

[2] ONLY ONE MASTER GAGE IS USED (AS OPPOSED TO CONVENTIONAL DUAL MASTERS) THAT CONTAINS A PRECISION GROUND, CLOSELY TOLERANCED, *FLAT* STAINLESS STEEL SURFACE - THERBY VIRTUALLY ELIMINATING MASTER GAGE ERROR;

[3] FOR MALE GAGING A SEPARATE THREADED GUIDE IS PROVIDED THAT REQUIRES NO SPECIFIC TORQUE, IS EASIER TO MATE THAN TORQUE SPECIFIC THREADED ENGAGEMENT, AND INTRODUCES NO MEASUREMENT UNCERTAINTY AS A FUNCTION OF AN UNCERTAIN TORQUE WRENCH CALIBRATION OR SETTING;

[4] THE HUMAN INTERFACE IS ENHANCED WITH ADVANCED ERGONOMICS TO PROVIDE INSTANT FEEDBACK RELATIVE TO ALL STANDARDS, AND REAL VALUE INDICIA ARE USED TO SPECIFY TRUE RECESSION AND TRUE PROCESSION - THEREBY SPEEDING GAGING AND ELIMINATING POTENTIAL CONFUSION.



GENERAL SPECIFICATION

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- ~MASTER GAGE FINISH OF Ra 8 OR BETTER.
- ~PRECISION SWISS TURNED AND MILLED STAINLESS STEEL.
- ~CRITICAL TOLERANCES OF 0.0005.
- ~CERTIFIED DIAL ACCURACY OF +/- 0.0001 ANALOG & DIGITAL
- ~ALL STAINLESS COMPONENTS PASSIVATED PER ASTM A967.
- ~STAINLESS 6-32 SET SCREWS [X3] WITH ASME B18.3 ROCKWELL C28 HARDNESS.
- ~DIAL FASCIA AND DIAL BACKS WITH STANDARDS DELINATION.

WARRRANTY

WARRANTY: ALL VM MICROWAVE GAGES CARRY A ONE YEAR WARRANTY ON THE INDICATOR AND A 10 YEAR WARRANTY ON ALL STAINLESS COMPONENTS.

PRECISION GAGE KITS

1.85mm & 2.4mm

LEGACY SERIES

MALE & FEMALE

Velocity Microwave ~ div. ATX Labs
www.velocitymicrowave.com

GAGE CALIBRATION AND ACCURACY

ALL VM GAGES COME WITH A NIST TRACEABLE ISO 17025 CALIBRATION PERFORMED BY L. C. STARRETT COMPANY (A2LA CERTIFICATION NO. 760.01).

1. **ACCURACY:** THE TRACEABLE ASSURANCE STANDARDS THE ARE EMPLOYED ARE PROGRESSIVELY MORE ACCURATE IN THE ORDER OF 4:1. FOR MECHANICAL CALIBRATIONS WITH GRADUATIONS OF 0.0001 THE CALIBRATION AND MEASUREMENT CAPABILITY (+/- CMC) IS 26 µin, FOR GRADUATIONS OF 0.0005 THE CMC IS 42 µin, FOR DIGITAL CALIBRATIONS WITH 0.0000R RESOLUTION THE CMC IS 35 µin, AND FOR 0.0001 RESOLUTION THE CMC IS 65 µin. SEE TABLE BELOW FOR FULL CMC FOR DIAL AND DIGITAL INDICATORS CALIBRATED PER ISO 17025 AND ANSI B89.1.10M. .

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005 & ANSI/NC SL Z540-1-1994			
<u>Indicators –</u> Mechanical	0.00005 in	20 µin	ANSI B89.1.10M, manufacturer's specifications. Final CMC's a function of calibration device error, calibration device uncertainty, repeatability, resolution and thermal effects per ANSI B89.1.10M. L.C.Starrett Co. Certification number: 760.01
	0.0001 in	26 µin	
	0.0005 in	42 µin	
	0.001 in	56 µin	
	0.005 in	150 µin	
	0.010 in	250 µin	
Digital	0.00005 in	35 µin	
	0.0001 in	65 µin	
	0.00025 in	150 µin	
	0.0005 in	300 µin	
	0.001 in	600 µin	

NOTE: CERTIFIED ACCURACY IS WITH REFERENCE TO 20 DEGREES C (68F)

2. **CONFIDENCE:** THE ESTIMATED UNCERTAINTY REPORTED ON THE LETTER OF CERTIFICATION WILL SPECIFY THE N.I.S.T. TEST NUMBER, THE RELEVANT SPECIFICATION, THE SERIAL NUMBER OR NUMBERS OF THE INSTRUMENTS, AND THE WARRANTED ACCURACY FOR THE FIRST 2.5 REVOLUTIONS AND FOR THE BALANCE OF THE RANGE OF THE DIAL OR DIGITAL INDICATOR. THE CERTIFIED UNCERTAINTY WILL BE STATED WITH A CONFIDENCE LEVEL OF 95%.

3. **SUPPORT:** VM GAGES ARE WARRANTED FOR A PERIOD OF ONE YEAR. ALL STAINLESS STEEL COMPONENTS, BUSHING AND SPINDLE ATTACHMENTS ARE WARRANTED FOR TEN YEARS.

GENERAL SPECIFICATION

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- ~CERTIFIED DIAL ACCURACY OF +/- 0.0001 ANALOG & DIGITAL
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PRECISION GAGE KITS
LEGACY SERIES
1.85mm & 2.4mm
MALE & FEMALE
 Velocity Microwave ~ div. ATX Labs
www.velocitymicrowave.com

1. TAPERED BUSHING DESIGN FOR GREATER FEEL & VISIBILITY.

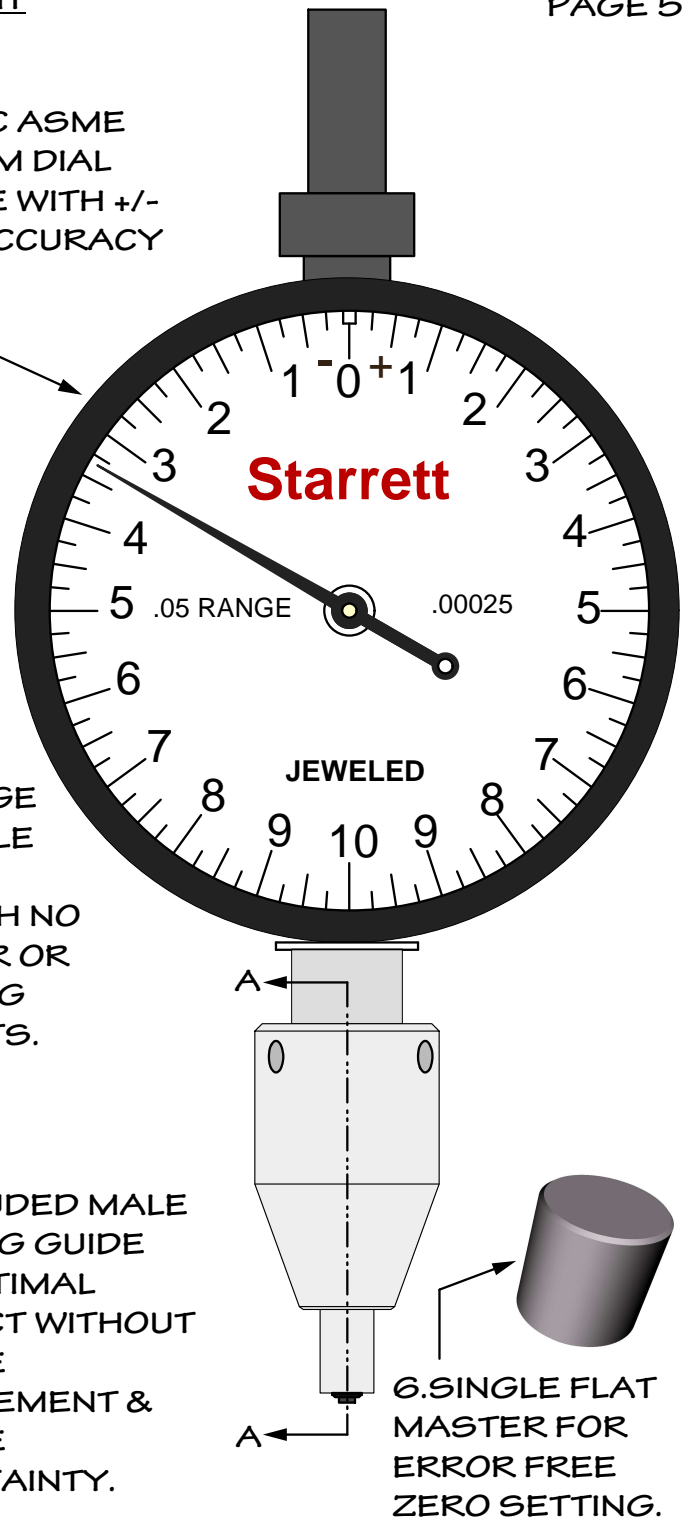
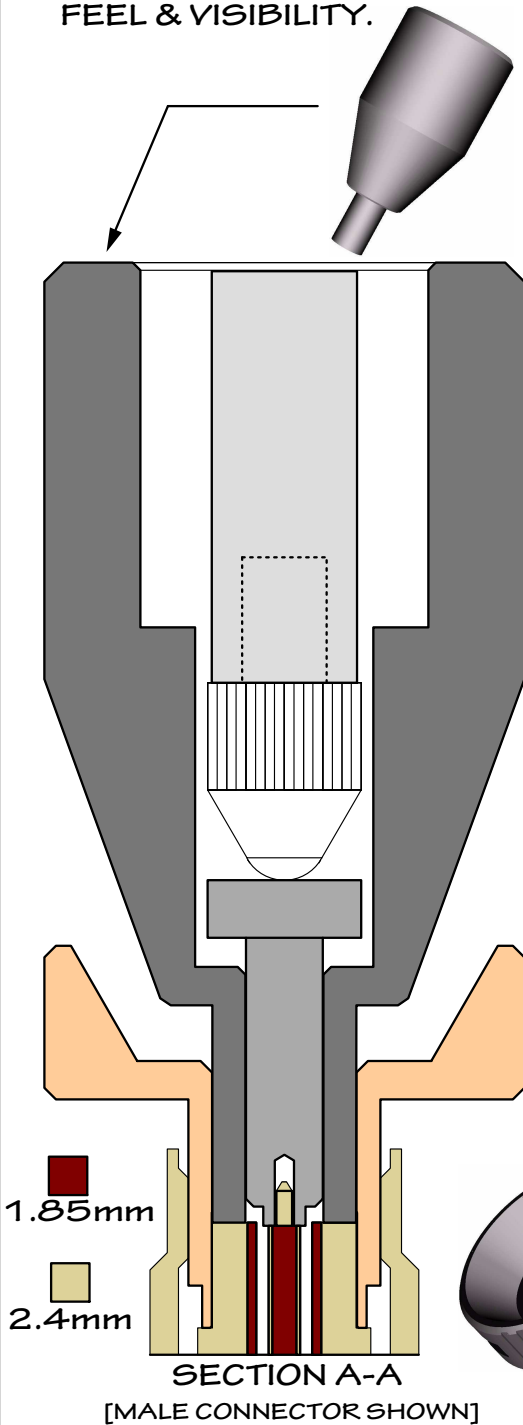
2. CLASSIC ASME B89.1.10M DIAL INTERFACE WITH +/- .00025 ACCURACY

3. FULL STANDARDS GUIDE ON REAR OF INDICATOR & STANDARDS LEGEND ON FASCIA.

4. SINGLE GAGE FOR BOTH MALE AND FEMALE GENDERS WITH NO CHANGE-OVER OR RE-MASTERING REQUIREMENTS.

5. INCLUDED MALE BUSHING GUIDE FOR OPTIMAL CONTACT WITHOUT TORQUE REQUIREMENT & TORQUE UNCERTAINTY.

6. SINGLE FLAT MASTER FOR ERROR FREE ZERO SETTING.



GENERAL SPECIFICATION

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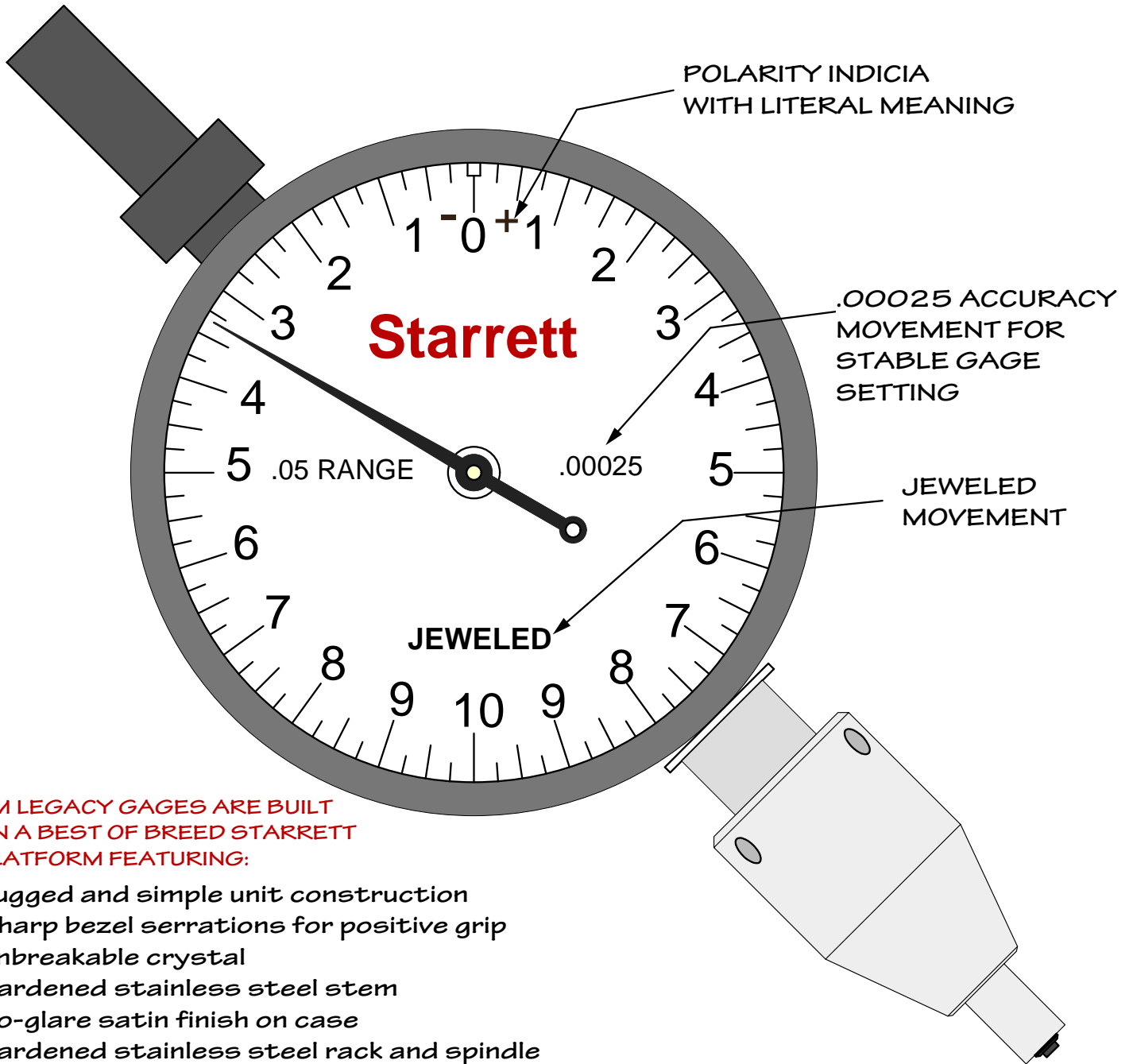
PRECISION GAGE KITS

1.85mm & 2.4mm

LEGACY SERIES

MALE & FEMALE

Velocity Microwave ~ div. ATX Labs
www.velocitymicrowave.com



VM LEGACY GAGES ARE BUILT ON A BEST OF BREED STARRETT PLATFORM FEATURING:

- Rugged and simple unit construction
- Sharp bezel serrations for positive grip
- Unbreakable crystal
- Hardened stainless steel stem
- No-glare satin finish on case
- Hardened stainless steel rack and spindle
- Massive bridge for rigid bearing support
- Hardened stainless steel gears and pinions
- Non-reflecting white eggshell finish on dial

GAGE FRONT

GENERAL SPECIFICATION

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PRECISION GAGE KITS

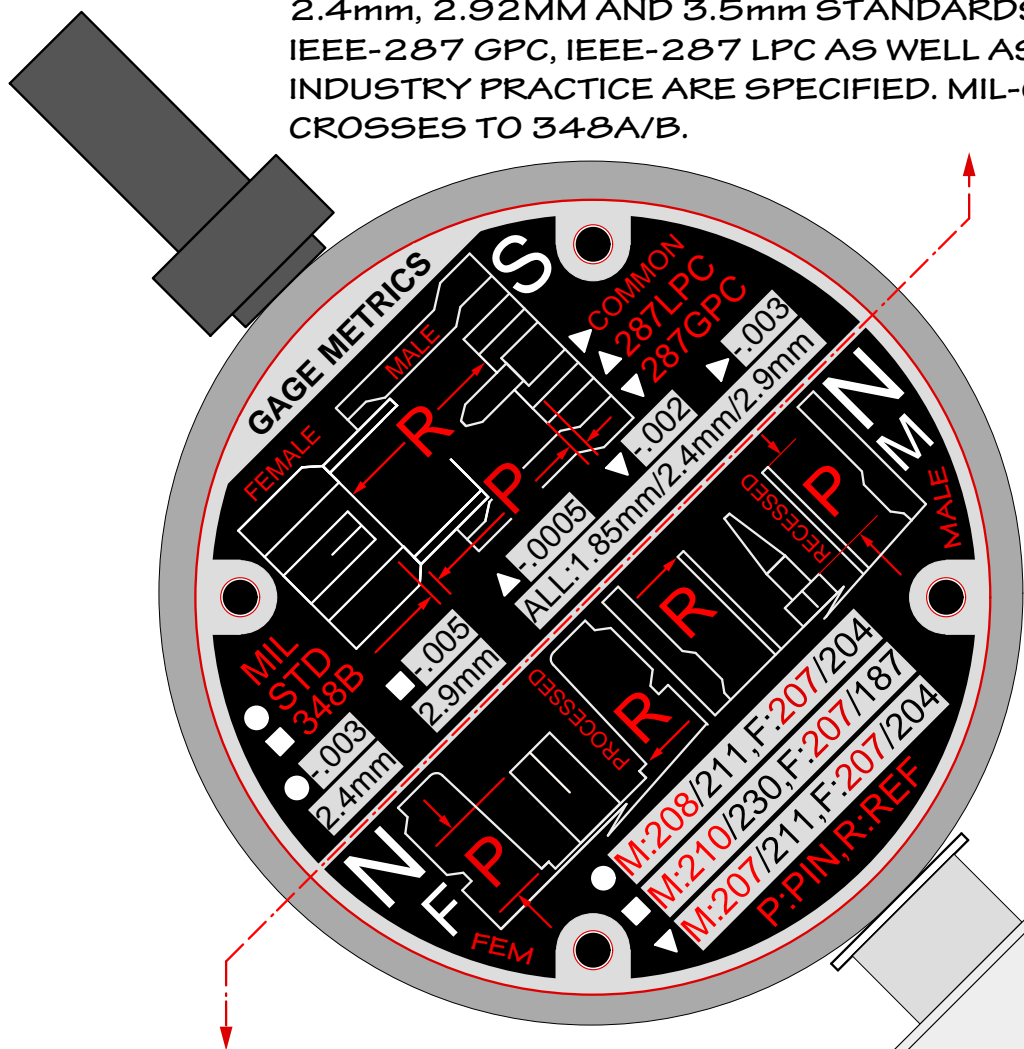
1.85mm & 2.4mm

LEGACY SERIES

MALE & FEMALE

Velocity Microwave ~ div. ATX Labs
www.velocitymicrowave.com

UPPER HEMISPHERE ON GAGE BACK DENOTES 1.85mm, 2.4mm, 2.92mm AND 3.5mm STANDARDS. MIL-STD-348, IEEE-287 GPC, IEEE-287 LPC AS WELL AS COMMON INDUSTRY PRACTICE ARE SPECIFIED. MIL-C-39012 CROSSES TO 348A/B.



INTERFACE GEOMETRY FOR 1.85mm, 2.4mm, 2.92mm, 3.5mm AND TYPE N IS PROVIDED FOR BOTH GENDERS WITH REFERENCE PLANE CRITERIA CLEARLY MARKED

LOWER HEMISPHERE ON GAGE BACK DENOTES TYPE N STANDARDS FOR BOTH MALE AND FEMALE GENDERS. A SIMPLE LEGEND IS USED TO DISTINGUISH STANDARDS CRITERIA.

TYPE N & 1.85mm/2.4mm/2.92mm 3.5mm GAGE BACK

GENERAL SPECIFICATION

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1.85mm & 2.4mm

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