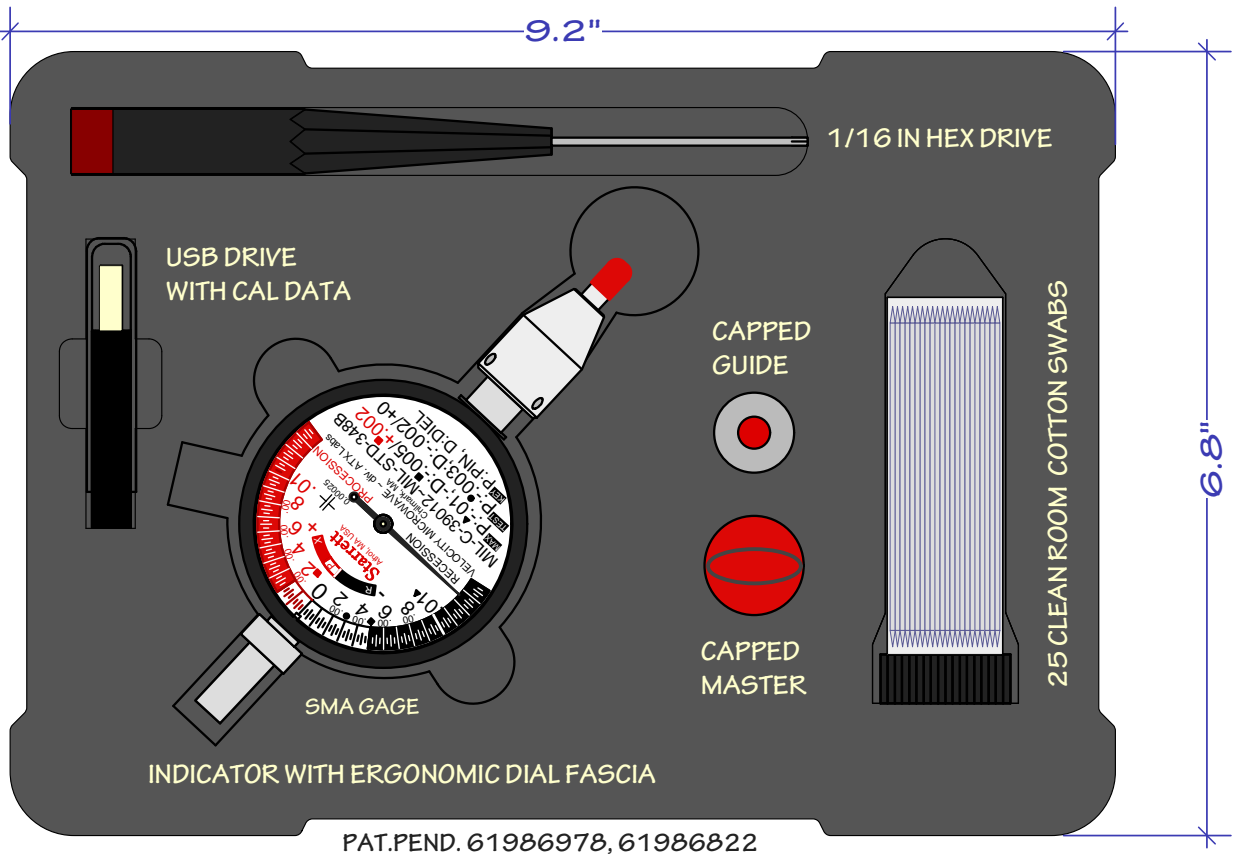


N	
SMA	X
3.5	
K	
2.4	
1.85	

SMA ERGO  
GAGES:  
RESOLUTION  
0.00025  
ACCURACY  
+/-0.0005



PAT.PEND. 61986978, 61986822

**OVERVIEW:** PRECISION SMA GAGE KIT FOR THE DIMENSIONAL GAGING OF MALE AND FEMALE MICROWAVE CONNECTORS. THE KIT EMPLOYS A SINGLE SPINDLE AND DISPLAY WITH AN ERGONOMICALLY ADVANTAGED FASCIA TO SIMPLIFY GAGING. RELEVANT STANDARDS AND STANDARDS BOUNDARIES ARE CLEARLY DELINEATED. THE INSTRUMENT'S DESIGN ELIMINATES THE REQUIREMENT FOR A SECOND GAGE AND/OR BUSHING IN ORDER TO GAGE THE OPPOSITE GENDER, THEREBY REDUCING ACQUISITION AND MAINTENANCE COST WITH NO LOSS IN PRECISION AND ACCURACY. A FLAT SURFACE MASTER GAGE WITHOUT PROUD FEATURES IS EMPLOYED TO SIMPLIFY INSTRUMENT ZEROING . A THREADED GUIDE IS PROVIDED AS AN OPTIONAL FEATURE FOR THE GAGING OF MALE CONNECTORS TO ENHANCE MEASUREMENT STABILITY WITHOUT THE PENALTY OF A TORQUE REQUIREMENT OR TORQUE UNCERTAINTY.

**BENEFITS:**

- ~ SINGLE GAGE FOR MALE AND FEMALE GENDERS WITH ENHANCED HUMAN INTERACE;
- ~ THREADED GUIDE FOR ENHANCED STABILITY IN MALE GAGING WITH NO TORQUE ACCURACY PENALTY;
- ~ HIGH PERFORMANCE STARRETT INDICATOR WITH 0.00025 INCH RESOLUTION;
- ~ TRACEABLE ISO-17025 STARRETT CERT WITH SPECIFIED ACCURACY OF +/- 0.0005;
- ~ PRECISION GROUND FLAT SURFACE MASTER FOR BOTH MALE AND FEMALE ZEROING;
- ~ ISO-17025 TRACEABLE STARRETT CALIBRATION AND CERTIFICATION ;
- ~ CRM72 TOOL STEEL HEX DRIVER WITH ROCKWELL 50-61 HARDNESS & CORROSION FREE FINISH.
- ~ ONE MID WARRANTY TRACEABLE CALIBRATION AND CERTIFICATION;
- ~ INSTRUMENT FASCIA WITH TOLERANCE ZONES AND INTERFACE SPECIFICATIONS CLEARLY DEFINED.

**GENERAL SPECIFICATION**

- ~SURFACE FINISH OF Ra8 ON WORKING SLIDABLE SURFACE; Ra16 IN REGIONS OF NON-CONTACT.
- ~PRECISION SWISS TURNED AND MILLED STAINLESS STEEL.
- ~CRITICAL TOLERANCES OF 0.0005.
- ~CERTIFIED DIAL ACCURACY OF +/- 0.00012 TO 0.0005 DEPENDING ON PERFORMANCE GRADE.
- ~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**

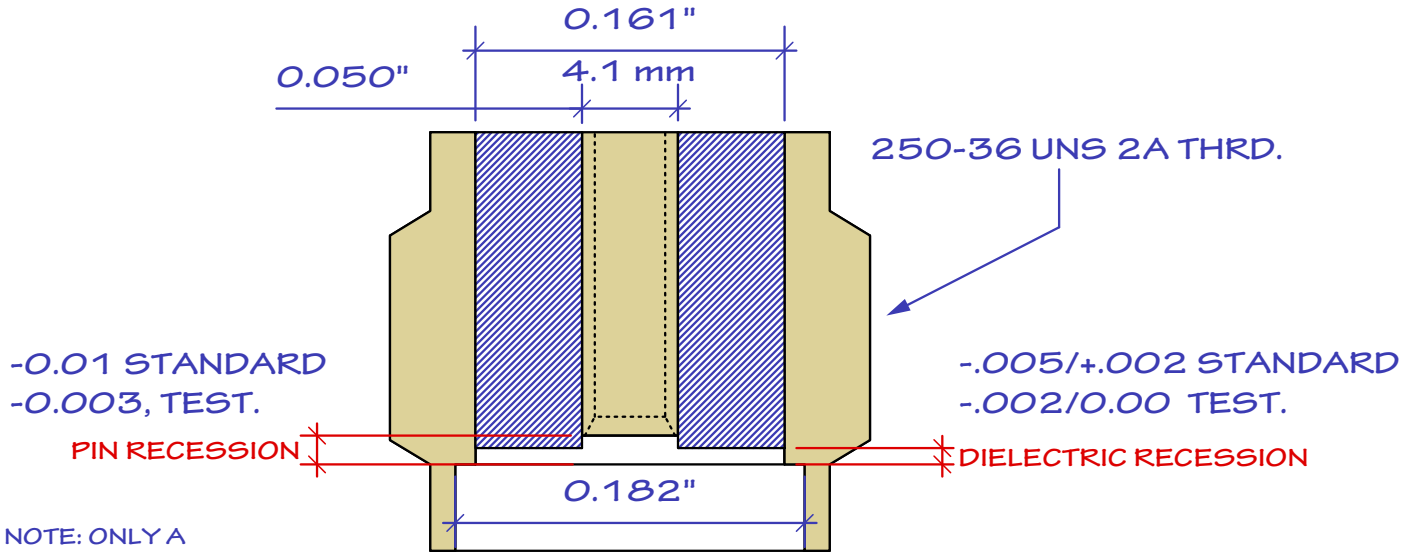
ALL VM MICROWAVE GAGES COME WITH A ONE YEAR WARRANTY AND WITH A TEN YEAR WARRANTY ON STAINLESS COMPONENTS.

**PRECISION GAGE KITS**  
**SMA ERGON SERIES**

**MALE & FEMALE PIN**

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

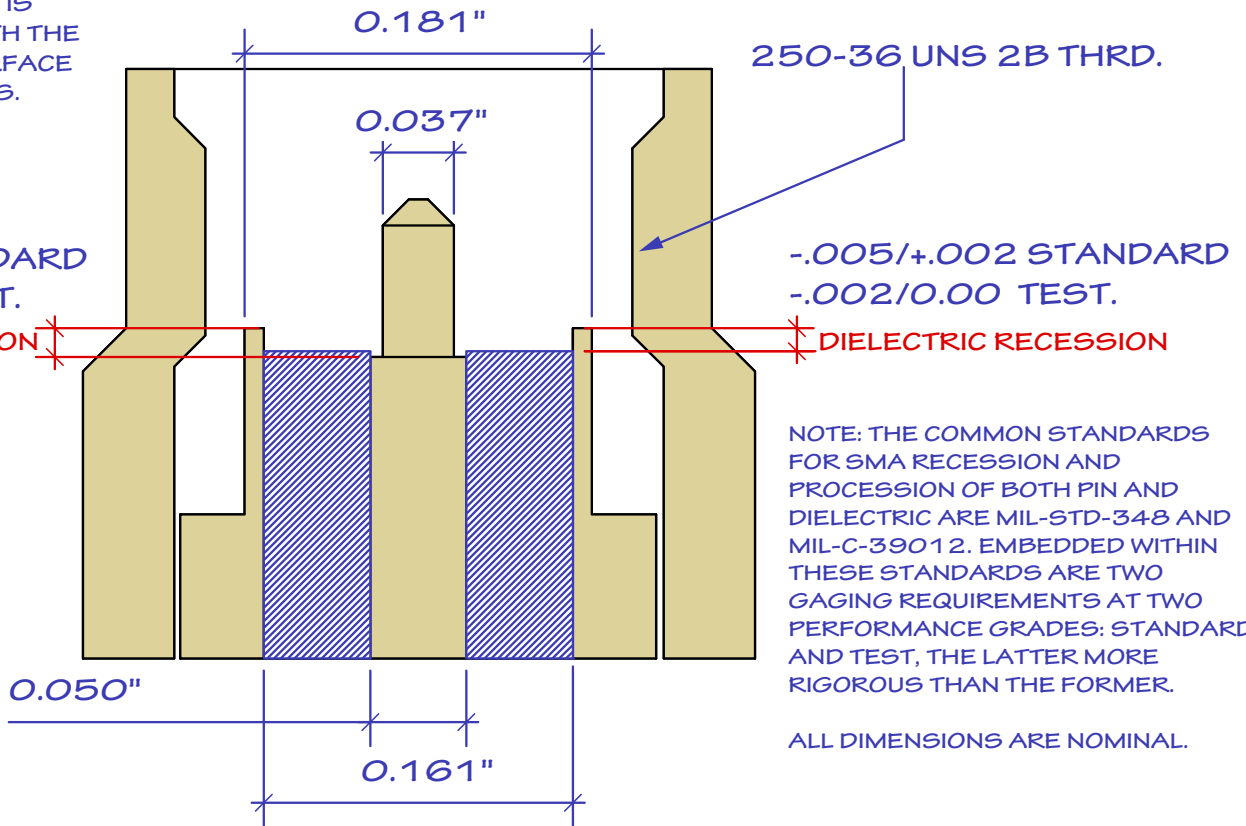
## REFERENCE PLANE GAGING GEOMETRIES



NOTE: ONLY A RECESSION (OF THE FEMALE PIN AND MALE PIN SHOULDER) IS COMPLIANT WITH THE COMMON INTERFACE SPECIFICATIONS.

-0.01 STANDARD  
-0.003, TEST.

PIN RECESSION



NOTE: THE COMMON STANDARDS FOR SMA RECESSION AND PROCESSION OF BOTH PIN AND DIELECTRIC ARE MIL-STD-348 AND MIL-C-39012. EMBEDDED WITHIN THESE STANDARDS ARE TWO GAGING REQUIREMENTS AT TWO PERFORMANCE GRADES: STANDARD AND TEST, THE LATTER MORE RIGOROUS THAN THE FORMER.

ALL DIMENSIONS ARE NOMINAL.

SCALE 10:1

### GENERAL SPECIFICATION

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### WARRANTY

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## PRECISION GAGE KITS

**SMA** ERGON SERIES

MALE & FEMALE PIN

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

THE CONVENTIONAL METHOD FOR DETERMINING A GRADE DIFFERENCE IS TO USE A DIAL INDICATOR WITH A FIXED STEM AND A MOVABLE RACK OR SPINDLE. THE SPINDLE COMMUNICATES ITS MOTION AND POSITION RELATIVE TO A PRESET ZERO CONDITION 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. AND TYPICALLY THIS LEGACY APPROACH REQUIRES TWO GAGES FOR THE MALE AND FEMALE. IN THIS MANNER, THE "RECESSION" (OR "PROCESSION" IN THE CASE OF NON-COMPLIANCE) OF THE MALE PIN'S SHOULDER OR THE FEMALE PIN'S FRONT PLANE RELATIVE TO THE OUTER COAXIAL BODY'S MATING PLANE IS DETERMINED.

**YM'S PATENTED APPROACH**

GAGING THEN, IN THE SIMPLIFIED SECTIONAL IMAGES OF SUBMINIATURE CONNECTORS SHOWN TO THE RIGHT, THE DIFFERENCE R-S WOULD BE COMPARED TO A STANDARD LIKE MIL-STD-348, THAT REPRESENTS THE INTERFACE SPECIFICATION WITH WHICH THE CONNECTOR IS REQUIRED TO COMPLY.

TO THIS END THE MICROWAVE GAGING OF SUBMINIATURE CONNECTORS HAS BY TRADITION EMPLOYED A SEPARATE GAGE FOR EACH CONNECTOR GENDER. 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.

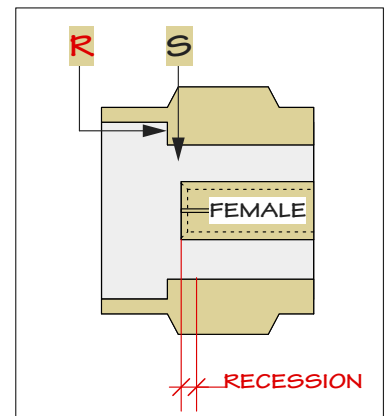
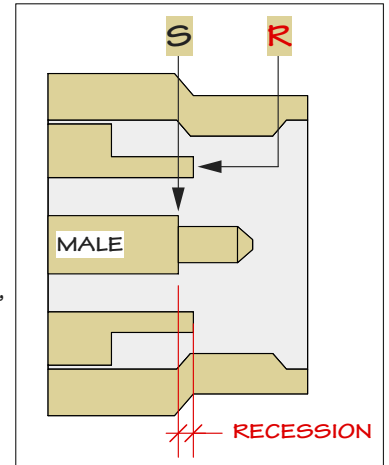
YM'S PATENT PENDING APPROACH TO SUBMINIATURE GAGING IS BASED ON SEVERAL DIFFERENT PRINCIPLES.

[1] A SINGLE GAGE/INDICATOR (AS OPPOSED TO THE CUSTOMARY TWO) IS USED FOR BOTH MALE AND FEMALE GENDERS THEREBY SIMPLIFYING GAGING AND 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 - THEREBY VIRTUALLY ELIMINATING MASTER GAGE ERROR WITH REGARD TO SURFACE ACCURACY;

[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 UNCERTAIN TORQUE 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. THE YM GAGE BACK IS ALSO ENHANCED.



**GENERAL SPECIFICATION**

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- ~CRITICAL TOLERANCES OF 0.0005.
- ~CERTIFIED DIAL ACCURACY OF +/- 0.00012 TO 0.0005 DEPENDING ON PERFORMANCE GRADE.
- ~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.

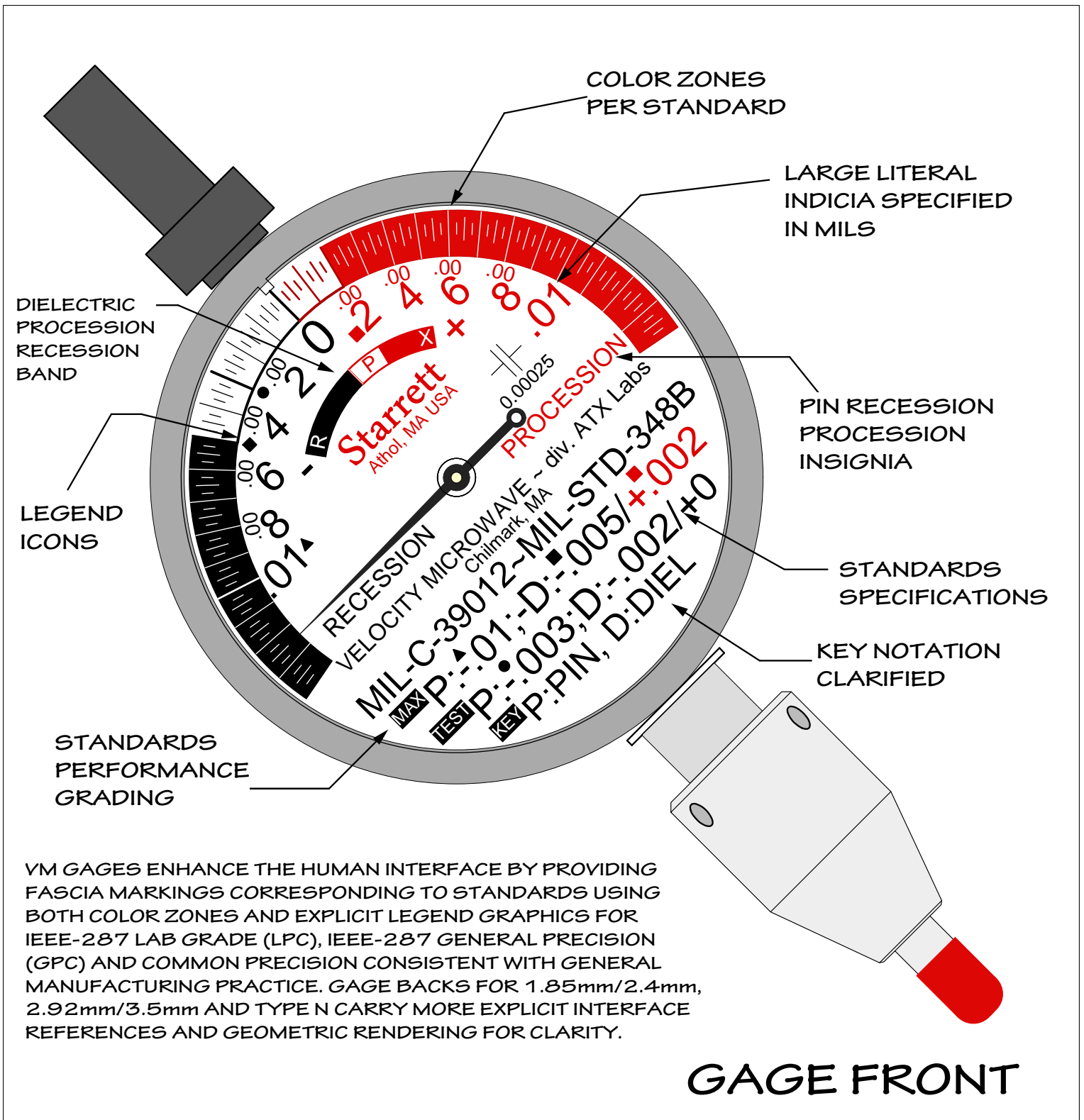
**WARRANTY**

ALL YM MICROWAVE GAGES COME WITH A ONE YEAR WARRANTY AND WITH A TEN YEAR WARRANTY ON STAINLESS COMPONENTS.

**PRECISION GAGE KITS**  
**SMA ERGON SERIES**

**MALE & FEMALE PIN**

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



VM GAGES ENHANCE THE HUMAN INTERFACE BY PROVIDING FASCIA MARKINGS CORRESPONDING TO STANDARDS USING BOTH COLOR ZONES AND EXPLICIT LEGEND GRAPHICS FOR IEEE-287 LAB GRADE (LPC), IEEE-287 GENERAL PRECISION (GPC) AND COMMON PRECISION CONSISTENT WITH GENERAL MANUFACTURING PRACTICE. GAGE BACKS FOR 1.85mm/2.4mm, 2.92mm/3.5mm AND TYPE N CARRY MORE EXPLICIT INTERFACE REFERENCES AND GEOMETRIC RENDERING FOR CLARITY.

## GAGE FRONT

### GENERAL SPECIFICATION

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- ~CERTIFIED DIAL ACCURACY OF +/- 0.00012 TO 0.0005 DEPENDING ON PERFORMANCE GRADE.
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### WARRANTY

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MALE & FEMALE PIN

Mfg: Velocity Microwave ~ div. ATX Labs  
[www.velocitymicrowave.com](http://www.velocitymicrowave.com)

**GAGE CALIBRATION AND ACCURACY**

ALL VM GAGES ARE PROVIDED WITH AN ACCREDITED NIST TRACEABLE ISO 17025 CALIBRATION PERFORMED BY L. C. STARRETT COMPANY.

1. **ACCURACY:** THE TRACEABLE ASSURANCE STANDARDS EMPLOYED IN CALIBRATION ARE PROGRESSIVELY MORE ACCURATE ON THE ORDER OF 4:1. FOR ANALOG CALIBRATIONS WITH INSTRUMENT GRADUATIONS OF 0.0001 THE CALIBRATION AND MEASUREMENT CAPABILITY (+/- CMC) IS 26 µin, AND FOR ANALOG GRADUATIONS WITH INSTRUMENT RESOLUTION OF 0.0005 INCHES THE CMC IS 42 µin. FOR DIGITAL CALIBRATIONS WITH INSTRUMENT RESOLUTION OF 0.00005 INCHES THE CMC IS 35 µin, AND FOR CALIBRATION OF DIGITAL INSTRUMENTS WITH 0.0001 RESOLUTION THE CMC IS 65 µin.

SEE TABLE BELOW FOR FULL THE CMC CAPABILITY FOR DIAL AND DIGITAL INDICATORS CALIBRATED PER ISO 17025 AND ANSI B89.1.10M, AND SEE

<http://www.starrett.com/docs/other-downloadable-resources/a21a-starrett-athol.pdf?sfvrsn=4> FOR SCOPE OF CURRENT ACCREDITATION .

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005 & ANSI/NC SL Z540-1-1994			
Indicators –			ANSI B89.1.10M, manufacturer's specifications.
	Mechanical	0.00005 in 0.0001 in 0.0005 in 0.001 in 0.005 in 0.010 in	
	Digital	0.00005 in 0.0001 in 0.00025 in 0.0005 in 0.001 in	35 µin 65 µin 150 µin 300 µin 600 µin
NOTE: CERTIFIED ACCURACY IS WITH REFERENCE TO 20 DEGREES C (68F)			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

2. **CONFIDENCE:** THE ESTIMATED UNCERTAINTY REPORTED ON THE LETTER OF CERTIFICATION SHALL 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 SHALL BE STATED WITH A CONFIDENCE LEVEL OF 95% AND MAY BE UNDERSTOOD AS THE BOUNDING CONFIDENCE FOR THE END USER'S MEASUREMENTS AT ORDINARY LEVELS OF ART AND SKILL PROVIDED CONDITIONS UNIQUE TO THE USER ARE CONSIDERED.

GENERAL SPECIFICATION	WARRANTY
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	<b>PRECISION GAGE KITS</b> <b>SMA ERGO SERIES</b> <hr/> <b>MALE &amp; FEMALE PIN</b> Mfg: Velocity Microwave ~ div. ATX Labs <a href="http://www.velocitymicrowave.com">www.velocitymicrowave.com</a>

## WHY THE YM PRECISION GAGE IS DIFFERENT

1. TAPERED BUSHING DESIGN FOR GREATER FEEL & VISIBILITY.

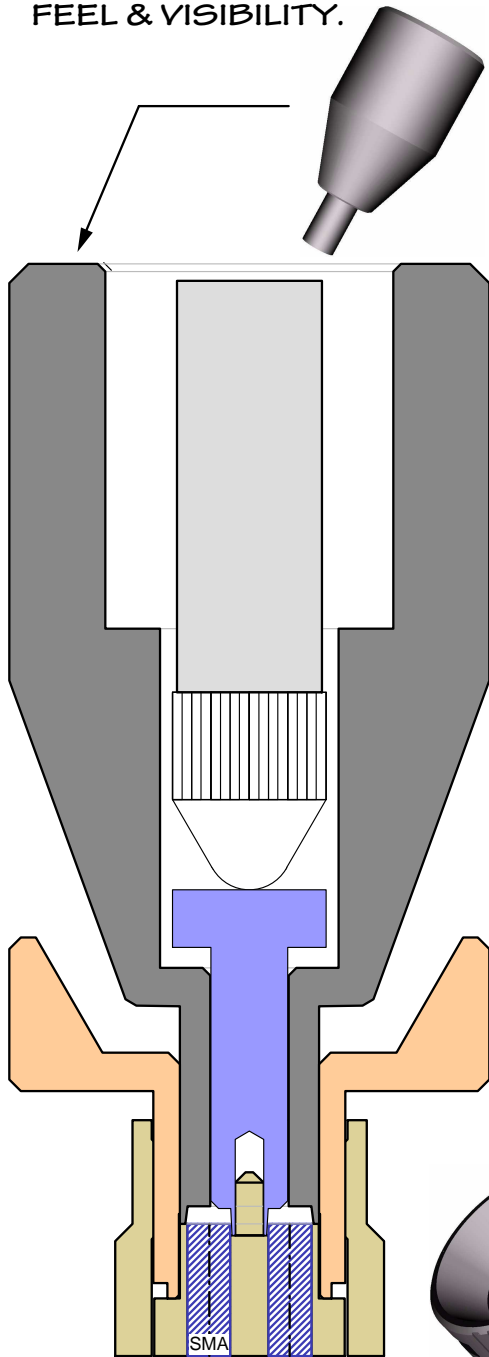
2. ENHANCED ERGONOMIC DIAL FASCIA ON BEST OF BREED INDICATOR FOR FOOLPROOF, PRECISION GAGING.

3. STANDARDS GUIDE FOR MIL-STD-348 & MIL-C-39012 ON FASCIA.

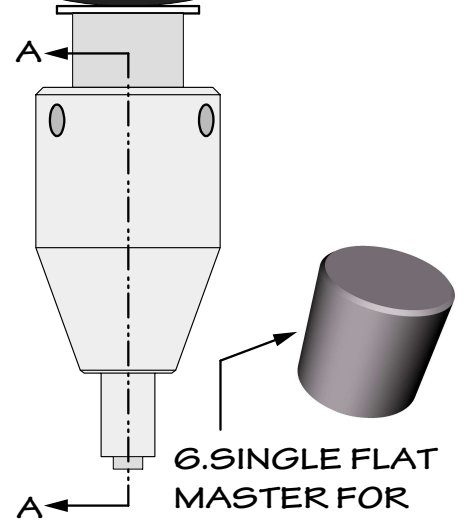
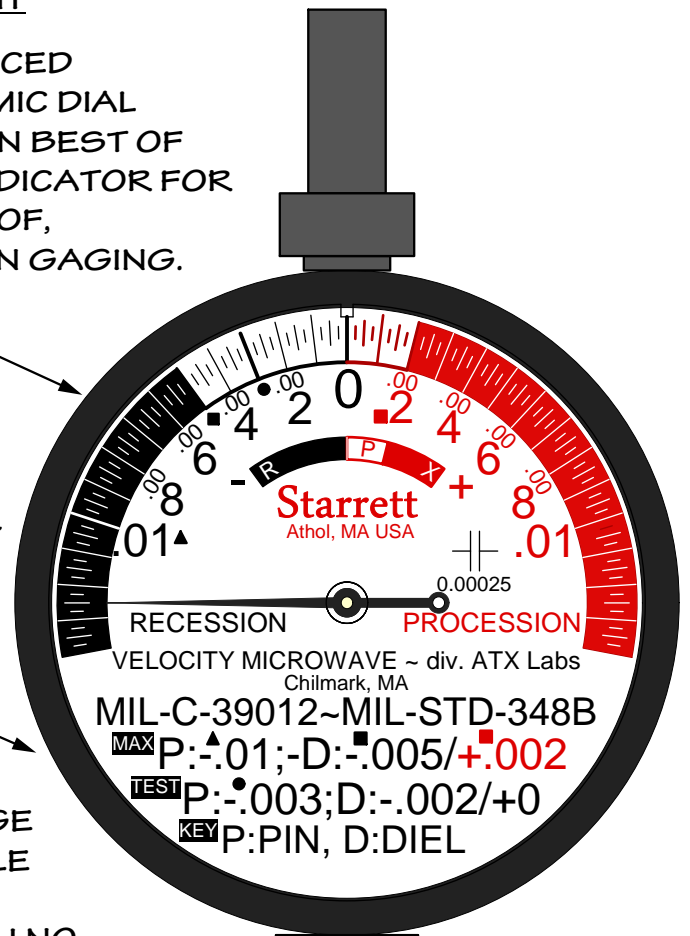
4. SINGLE GAGE FOR BOTH MALE AND FEMALE GENDERS WITH NO CHANGE-OVER OR RE-MASTERING REQUIREMENTS.

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

6. SINGLE FLAT MASTER FOR ERROR FREE ZERO SETTING.



SECTION A-A  
[MALE CONNECTOR SHOWN]



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