

# TECHNICAL SPECIFICATIONS OF SAGE PRIME THERMAL MASS FLOW METER

GENERAL INFORMATION	
Purpose	Measure Mass Flow Rate and Totalized Flow of Gases
Style	
Integral Insertion	Transmitter housing and the display and Insertion probe integrated
Integral In-Line	Transmitter housing and the display and In-Line Flow Body integrated
Remote Insertion	Transmitter and the display remote from Insertion probe and Junction Box
Remote In-Line	Transmitter and the display remote from In-Line Flow Body and Junction Box
Operating Principle	Constant Temperature Difference Thermal Mass Flow Meter (TMFM). TMFM measures heat transfer as the gas flows past a heated surface. Two platinum RTD sensors are clad in a protective stainless steel sheath. Flow sensor is self-heated; while other sensor (Temperature sensor) measures temperature of gas and provides temperature compensation. Heated Flow sensor maintains a constant temperature above Temperature sensor. As gas flows past heated Flow sensor, the gas molecules carry heat away from surface. The circuit replaces lost energy from the heat transfer to maintain temperature difference. The power (mW) required to maintain temperature difference is proportional to mass flow rate
ENCLOSURE	
Integral Style Enclosure	NEMA 4, powder coated aluminum, dual compartment enclosure, windowed
Remote Style Enclosure	
Transducer Enclosure	Explosion Proof Junction Box, Class 1, Div 2, Groups B, C, D; Class II, Groups E, F, G; Class III; 4X, 7BCD, 9EFG, FM Standard, UL Standard 1203, CSA Standard C22.2 No. 30 and NEMA Compliance. Junction Box has no electronics, thus suitable for harsh environments (extreme temps)
Transmitter Enclosure	NEMA 4, powder coated aluminum, dual compartment enclosure, windowed
Interconnect Cable	6 Conductor shielded color coded wire (Carol C-0783); 25 ft standard length Up to 1000 feet (10 $\Omega$ max loop resistance) can be specified or purchased Lead-length compensated (user can shorten cable, or lengthen without losing accuracy) Note, ground the cable shield in the transmitter housing (to avoid analog noise issues)
ELECTRONICS AND OUTPUTS	
Circuit Description	Hybrid-digitally driven circuit design with 24 bit ADC from Temperature Sensor Eliminates drift associated with traditional Wheatstone bridge
Electronics Temperature Rating	-40°F to 150°F (-40°C to 66°C). Note, no electronics within Junction Box on Remote Style (thus, the Junction Box can have temperatures same as sensor [-40° F to 450°F])
Power Supply	24 VDC (18-28 VDC) or optional 115/230 VAC (12 VDC optional, with less approvals)
Power Consumption	2.4 Watts Maximum
Flow Output	4 – 20 mA proportional to Gas Mass Flow Rate (0-100% Full Scale = 4 – 20 mA) Internally powered; or remove jumper for externally powered isolated 4-20 mA
Totalizer (Pulsed Output)	24 VDC Pulse for Totalized Value Pulse Width (minimum 50 mSec) and Pulse Rate configurable (e.g. 10 SCF/ pulse, etc.)
Relay Output	Available externally (specify DCR-DC): SPDT 10 Amp contacts; activated from Pulse
Communications	Modbus® compliant RS485 RTU (19200 baud [default] or 9600 baud) or optional HART®
Temperature Output	Through Modbus or ADDRESSER software program
mW output (raw calibration data)	Through Modbus or ADDRESSER software program
SENSORS	
General	Two reference grade platinum RTDs clad in a 316 SS sheath (see “Operating Principal”)
Flow Sensor	100 $\Omega$ platinum RTD is heated by a constant temperature above Temperature Sensor
Alternate sensor materials	316 SS is standard; Hastelloy C is optional
Temperature Rating	See “PROCESS” section, below

Temperature Sensor	100Ω platinum RTD temperature reference measures temperature of the process gas. Used to temperature compensate, so Mass Flow accuracy is maintained when the process temperature changes
Sensor Style	
½" standard sensor	½" diameter sensor pair (including protective shroud) supported by ½" support tube on Insertion Style, or inserted within Flow Body on In-Line Style (316 SS)
¾" heavy-duty sensor/probe	¾" diameter heavy-duty sensor/ probe with all welded construction (316 SS) Insertion Style. Sensors are designed for extra durability to operate in harsh industrial environments. Protective shroud not required. Contamination insensitive, and supports very high velocities. Probe has double seal between sensors and electronics enclosure
<b>DISPLAY</b>	
General	High Contrast photo-emissive OLED (Organic LED) graphical display, providing numerical Gas Mass Flow Rate, Totalized Flow (consumption), Temperature, graphical indication of Flow Rate (horizontal bar), and mW reading (raw calibration data). Visible outdoors. Photocell activated screen brightness based on ambient light
Mass Flow Rate	8 digits including decimal point
Decimal Points	Up to 3 decimals
Location & Size	Directly below graphical indication of Flow Rate. Uses the largest font on the display
Engineering Units (common)	SCFM, SCFH, SCFD, NCMH, NCMH, NCMD. LBS/S, LBS/M, LBS/H, LBS/D, KG/S, KG/M, KG/H, MCFM, MCFD, SLPM, NLPS, NLPM, NLPH, SFPM, NMPS, T/H (Therms/Hr)
Maximum Reading	The display reads from 0 to Full Scale (FS) Flow Rate (FS software resettable, if req'd)
Requirement	Least Significant Digit of the Engineering Units must have an S, M, D or H (time value)
Totalized Flow (consumption)	9 digits including decimal pt. Display "rolls over" beyond 9 digits. Software resettable
Decimal Points	Up to 2 decimals
Location & Size	Located on line below Flow Rate. Medium Font (smaller than Flow Rate)
Engineering Units (common)	SCF, NCM, LBS, KG, SL, NL, TNS
Compatibility	Engineering Units must match the units of Flow and have same time value
Temperature	Displays positive or negative (-) temperature in degrees C or F (e.g. 79°F). No decimals
Graphical Indication of Flow Rate	Displays horizontal bar of pctg of range (e.g. no bar at no flow; full bar at FS flow rate)
mW indication (raw calibration)	Displays raw calibration in mW in upper left corner representing energy carried away from the heated flow sensor surface by the molecules of the flowing gas
In-situ calibration check	Used for In-situ calibration check. At no flow (0 SCFM) of process gas, value should match (+/-10 mw) the value stamped on the flow meter label (or Certificate of Conformance). This "mW <sub>0</sub> " (milliwatt 0) diagnostic verifies that the sensor is clean, and that the flow meter hasn't drifted or shifted since the last NIST traceable calibration
Representation of sensitivity	At no flow (0 SCFM), a low mW <sub>0</sub> value (e.g. 50 mW) sets a less sensitive dynamic range allowing for very high velocity applications, whereas a high mW <sub>0</sub> value (e.g. 120 mW) at no flow provides a much more sensitive flow meter for very low velocity applications
Diagnostics	In addition to the In-situ calibration check, the mW value can provide an indication of the flow rate value when the actual flow rate exceeds the Full Scale reading on the meter, since the mW value does not stop at Full Scale (useful if FS was under-specified)
mW non-linearity	The mW is non-linearly proportional to the Mass Flow Rate. The inherently non-linear signal provides excellent low flow sensitivity and high turndown capability. The signal is linearized for the flow rate display and to provide the output signal from the flow meter
Modbus ID, Baud Rate & Parity	At bottom of screen the Modbus ID, baud rate & parity are continuously displayed
Startup Screen	During 5 sec initialization (power up), displays SAGE METERING, INC, Serial # and Rev #
<b>DISPLAY ORIENTATION</b>	
Default (no special PN needed)	Standard: Display on top of pipe, and flow direction from left to right = top (L to R)
Optional orientations	R1:Display on top(R to L); R2:Display on bottom (L to R); R3:Display on bottom(R to L) R4:Display on left(B to T); R5:Display on left(T to B); R6:Display on right(T to B) R7: Display on right(B to T)

MEASURING SPECIFICATIONS	
Flow Accuracy	+/-0.5% of Full Scale +/-1% of Reading over a 100:1 Turndown
Turndown	100:1
Resolution	1000:1
Flow Repeatability	0.2%
Flow Response Time	1 second time constant (e.g. responds to 63% of a step change each second)
Special Accuracy	With limited turndown, custom accuracy available (contact Sage Metering)
Low end sensitivity	5 SFPM
Definition of SFPM	<p>SFPM is Velocity corrected for density = Mass Velocity = <math>\rho V</math> (simplified as V)  <math>V=Q/A</math>  V is Velocity in SFPM (Standard Feet per Minute)  Q is Flow Rate in SCFM (Standard Cubic Feet per Minute)  A is Cross Sectional Area in Square Feet of Process Pipe (e.g., 6" Sch 40 pipe=0.2006 ft<sup>2</sup>)</p>
Standard Reference Conditions	<p>Standard Reference conditions are 70°F and 29.92" Hg for all gases except NG and CH4  Standard Reference conditions are 60°F and 29.92" Hg for NG and CH4  (e.g., 5 SCFM of CH4 is 5 Standard Cubic Feet Minute referenced to 60°F and 29.92"Hg)</p>
Other Common Ref Conditions (customer specified)	<p>0°C and 1.013 Bar Abs  0°C and 100.00 Kpa Abs  0°C and 760mm Hg  15°C and 101.325 kPa  20°C and 1.013 Bar Abs  20°C and 101.325 KPa Abs  21.1°C and 1.013 Bar Abs</p>
Mass Flow Rate (Q)	$Q \text{ (SCFM)} = V \text{ (SFPM)} \times A \text{ (Cross Section Area of Process Pipe in Square Feet)}$
Max Full Scale Flow Rate	<p>Maximum Full Scale (FS) Flow Rate Q (SCFM) depends on pipe size and is based on 35000 SFPM Maximum Velocity (e.g., <math>Q=V \times A</math>; <math>Q_{\max}=35000 \times A</math>)  (e.g., for 6" Sch 40 pipe, <math>Q_{\max}=35000 \times 0.2=7000</math> SCFM [rounded])  Note, in above example, flow meter would be calibrated from 0 – 35000 SCFM</p>
Min Full Scale Flow Rate (to maintain 100:1 turndown)	<p>Minimum Full Scale (FS) Flow Rate Q (SCFM) depends on pipe size and is based on 1750 SFPM Maximum Velocity (e.g., <math>Q=V \times A</math>; <math>Q_{\max}=1750 \times A</math>)  (e.g., for 6" Sch 40 pipe, <math>Q_{\max}=1750 \times 0.2=350</math> SCFM [rounded])  Note, in above example, flow meter would be calibrated from 0 SCFM to 1750 SCFM</p>
Calibration Range	<p>Always starts at 0 (e.g. 0 SCFM)  Data taken up to customer specified Full Scale (FS) Flow Rate  (e.g., if FS = 1000 SCFM, then meter is calibrated from 0 – 1000 SCFM)  Note, in above example, with 100:1 turndown, accuracy applies over 10 – 1000 SCFM</p>
Specified Gas	<p>Specify Gas or Gas Mix upon ordering  Under normal circumstances flow meter will be calibrated with actual gas or gas mix  Note, 100% Methane is used for Natural Gas applications  Surrogate gases (gas relationships) are used for corrosive gases or for Propane  Mixed gas applications will be calibrated with the primary constituents and adjusted mathematically for the low percentage (or trace) constituents</p>
Common Gases Specified (alpha)	Air, Argon, Chlorine, Methane, Natural Gas, Nitrogen, Oxygen, Propane
Common Gas Mixes Specified	Bio Gas (CH4/CO2), Landfill Gas (CH4/CO2), Digester Gas (CH4/CO2), Flare Gas (C1-C5)
Less Common Gases Specified	Ammonia, Butane, Carbon Dioxide, Helium, Hydrogen, Propylene
Less Common Mixes Specified	To be specified
PROCESS	
Gas Temperature Range	
Standard	-40° to 200°F (93°C)
Optional (HTO1)	-40° to 300°F (149°C)
Optional (HTO2)	-40° to 450°F (232°C)

Gas Pressure Range	
Standard	7 psia to 500 psig (vacuum applications are gas dependent)
Optional (HPO)	High Pressure Operation (500 psig to 1000 psig)
Optional (HPO2)	Very High Pressure Operation (500 psig to 1500 psig) includes flanged ends
Ambient Temperature	See "ELECTRONICS" section, above and "Electronics Temperature Rating" topic
<b>FLOW METER STYLES AND DIMENSIONS (INCLUDING MOUNTING HARDWARE)</b>	
Integral Style Enclosure	Height: 5.40"; Width: 4.60"; Depth (DC Powered): 4.35"; Depth (AC Powered): 5.35"
Remote Style Transmitter	Height: 5.40"; Width: 4.60"; Depth (DC Powered): 4.35"; Depth (AC Powered): 5.35"
Remote Style Junction Box	Height: 4.25"; Width: 4.25"; Depth: 2.60"
Standard Probe Lengths (1/2" dia)	Insertion Style Probe Lengths (add Enclosure Height for overall Height): 6", 12", 15", 18", 24", 30", 36" (with 0.5" OD). Part No. Example of 15": 05-15
Standard Probe Lengths (3/4" dia)	Insertion Style Probe Lengths (add Enclosure Height for overall Height): 6", 12", 15", 18", 24", 30", 36", 48" (with 0.75" OD). Part No. Example of 15": 07X-15
In-Line Flow Meter	
Flow Body Dimensions	1/4" x 6"; 3/8" x 6"; 1/2" x 7"; 1" x 8"; 1-1/4" x 10"; 1-1/2" x 12"; 2" x 12"; 2-1/2" x 12"; 3" x 12"; 4" x 12"; 6" x 18" optional; Custom sizes and lengths optional
Stem Height	Height between Enclosure and Flow Body corresponding to flow bodies above: 3.9"; 3.84"; 3.7"; 3.7"; 3.55"; 3.3"; 3.3"; 3.31"; 3.31"; 4.25"; 3.3"; undefined for 6" opt'n
Enclosure Height	5.40" (add Enclosure Height to Flow Body Dimension and Stem Height for overall Height)
Standard End Fittings	NPT Ends
Flanged Ends	Optional: 150#, 300#, 600# (Special) with size specified: (e.g. for 1" 300# flange for 1" flow body, specify 100-S300FLG100; 2" 150# for 2" flow body, specify 200-S150FLG200) Note: Face-to-Face dimensions of flanged flow bodies have same overall length as NPT Style
Remote Cable	Standard Length of interconnect: 25 feet (other lengths available): 50'; 75'; 100'; 125'; 150'; 200'; 250'; 300'; 350'; 500'; 550'; 750'; 1000'; (or specify)
Remote Meter Mounting Hdwr	2 mounting legs, each with a length of 7.38" to bottom mounting plate (from cord grip center). Mounting plates are 2" square with 4 holes, each 0.266" dia. Alternate overhead mounting suitable with customer supplied U-bolts
Isolation Valve Assemblies Hdwr	Suitable for Insertion Style Flow Meters
SVA05 (250 psig max)	11" height Isolation Valve Assembly with safety chain for 1/2" diameter probes (mounts to pipe with 3/4" threadolet).
SVA05LP (50 psig max)	7" height Low Pressure Isolation Valve Assembly, (mounts to pipe with customer supplied threadolet). Note, add 1" to height for threadolet
SVA0707 (250 psig max)	13" height Isolation Valve Assembly with safety chain for 3/4" diameter probes (mounts to pipe with 1" threadolet).
Compression Fitting Mounting	Suitable for Insertion Style Flow Meters
STCF05 (125 psig max)	1/2" tube x 1/2" pipe Teflon Ferrule Compression Fitting, 1.92" Height
SSCF05 (225 psig max)	1/2" tube x 1/2" pipe Stainless Ferrule Compression Fitting, 1.92" Height
STCF07 (125 psig max)	3/4" tube x 3/4" pipe Teflon Ferrule Compression Fitting, 1.92" Height
SSCF05 (225 psig max)	3/4" tube x 3/4" pipe Stainless Ferrule Compression Fitting, 1.92" Height
Flanged Mounting for Insertions	Optional 150#, 300# or 600# Flanges welded to Insertion Meters (Customer to specify Face-to Face dimension)
<b>WETTED MATERIALS</b>	
Sensors	316L Stainless Steel (Hastelloy is optional)
Support Probes	316L Stainless Steel (Hastelloy is optional)
Flow Bodies	316L Stainless Steel (PVC is optional)
Mounting Hardware	316L Stainless Steel on compression fittings and valve assemblies for Insertion Meters, except for SVA05LP which has a brass valve assembly (but 316SS Pipe Nipple)
Compression Fittings on In-Lines	In-Line Style Flow Meters have 316L compression fittings, unless PVC specified
Flow Conditioning	316 SS (see next section)

FLOW CONDITIONING	
In-Line Flow Meters	All In-Line Flow Meters ½” and up have a built in Flow Conditioning assembly
Insertion Flow Meters	Captive Flow Conditioner Assemblies are offered as an optional assembly for customers to install 1 pipe diameter upstream of flow meter probe location. The larger Flow Conditioner screen needs to be positioned between two flanges and two gaskets for support (the smaller plate slides inside the pipe). Original calibration or recalibration must be done with Flow Conditioners in place
Flow Conditioning Benefits	
90° Elbow upstream	Normally requires 25 pipe diameters of straight run upstream from flow meter, but with Flow Conditioning, only requires 3 pipe diameters upstream of the conditioners
Two 90° Elbows upstream in the same plane	Normally requires 36 pipe diameters of straight run upstream from flow meter, but with Flow Conditioning, only requires 5 pipe diameters upstream of the conditioners
Two 90° Elbows upstream in different planes	Normally requires 62 pipe diameters of straight run upstream from flow meter, but with Flow Conditioning, only requires 9 pipe diameters upstream of the conditioners
4:1 Area Reduction	Normally requires 18 pipe diameters of straight run upstream from flow meter, but with Flow Conditioning, only requires 3 pipe diameters upstream of the conditioners
4:1 Area Expansion	Normally requires 84 pipe diameters of straight run upstream from flow meter, but with Flow Conditioning, only requires 10 pipe diameters upstream of the conditioners
Multiple Disturbance	To be determined
HAZARDOUS APPROVALS	
SIP Series – 24 VDC Powered	
Meter Class	Industrial
Integral Style	Approved
Insertion Meters	Approved
In-Line Meters	Approved
CSA	Certified to CSA, & UL Standards by Met Labs
UL	ANSI/ISA 12.12.01
ATEX	Not approved (Note SIX/ SRX Series does have ATEX Zone 1, and UL Div 1, Grp B,C,D,T6)
CE	Yes
Description	Class 1, Div 2, Groups B, C, D, T4 Rating
CRN	Optional Models available approved in all major Canadian Provinces (contact Factory)
SRP Series – 24 VDC Powered	Same approvals as SIP Series – 24 VDC Powered. Additionally, Junction Box is Expl Proof
SIP Series – AC Powered	
Meter Class	Industrial
Integral Style	Not approved
Insertion Meters	Not approved
In-Line Meters	Not approved
CSA	Not approved
UL	Not approved
ATEX	Not approved (Note SIX/ SRX Series does have ATEX Zone 1, and UL Div 1, Grp B,C,D,T6)
CE	Yes
Description	Not applicable
CRN	Optional Models available approved in all major Canadian Provinces (contact Factory)
SRP Series – AC Powered	Same approvals as SRP Series – 115 VAC Powered. Additionally, Junction Box is Expl Proof
SOFTWARE	
Validation & Configuration Software	Sage INSIGHT is an easy- to- use software program which gives the user testing, diagnostics, performance verification and local configuration capabilities for Sage Prime, as well as providing logging capability. Furnished with RS485 to USB converter. Prints verification report. Optional multiple calibrations on Sage Prime can be uploaded

<b>WARRANTY</b>	
Limited Warranty	Sage Metering's products are warranted against faulty materials or workmanship for one year from the date of shipment from the factory
<b>WEBSITE</b>	
Sage Website	<a href="http://www.sagemetering.com">www.sagemetering.com</a>
<b>GENERAL TERMS AND CONDITIONS</b>	
Sage Website	<a href="http://www.sagemetering.com/general-terms">www.sagemetering.com/general-terms</a>
<b>PRODUCT VIDEOS</b>	
Sage Prime Flow Meter and In-Situ Calibration Verification	<a href="http://www.sagemetering.com/knowledge-base/topics/mass-flow-measurement">www.sagemetering.com/knowledge-base/topics/mass-flow-measurement</a> (or select "Knowledge Base" tab/ "Videos/FAQ")
<b>MAJOR BENEFITS AND FEATURES OF THERMAL MASS FLOW METERS</b>	
Benefits of Thermal Mass Flow	<p>Direct Mass Flow – No need for separate temperature and pressure corrections</p> <p>Turndown of 100 to 1 and resolution up to 1000 to 1</p> <p>Low-End Sensitivity – As low as 5 SFPM (e.g., 1 SCFM in a 6" pipe)</p> <p>Negligible Pressure Drop – Will not impede the flow or waste energy</p> <p>No Moving Parts – Eliminates costly bearing replacements and prevents accuracy shifts</p> <p>Ease of Installation and Convenient Mounting Hardware</p>
<b>MAJOR BENEFITS OF SAGE PRIME</b>	
Features and Benefits of Prime	<p>In-Situ Calibration "Field Calibration Check" – verifies sensor and meter performance</p> <p>Easy-To-Read Bright Graphical Display – High contract LEDs (Flow, Total, Temp, mW)</p> <p>Compact Design – only 4-1/4" diameter x 4-1/4" deep (24 VDC Models)</p> <p>Calibration milliwatts (mw) continuously displayed providing ongoing diagnostics</p> <p>Dirt Insensitive Sensors (½" and especially ¾" probe/sensor style)</p> <p>Excellent Temperature Compensation – over full operating range</p> <p>Field reconfigurability with INSIGHT software (as well as ADDRESSER software)</p> <p>Modbus Compliant RS485 RTU Communications – 19200 or 9600 Baud, Read or Write</p> <p>Low Power Dissipation – under 2.5 watts (e.g., under 100 mA at 24 VDC)</p> <p>Flow Conditioning Standard on In-Line Flow Meters – (½" and up)</p> <p>Captive Flow Conditioners available for Insertion Meters Applications – if required</p> <p>Lead-Length Compensation on Remote Styles Meters (SRP) – up to 1000 feet</p> <p>Remote Style Meters has no Electronics in Junction Box – ideal for harsh environments</p> <p>Rugged User-Friendly Packaging –separate enclosure with labeled easy terminal access</p> <p>Hybrid-Digital Circuitry – eliminates drift, long term stability, high sensitivity, stable zero</p>
<b>CONTACT US</b>	
Phone and Email Address	<p>General: 831-242-2030 (866-677-7243 US/ Canada) or <a href="mailto:info@sagemetering.com">info@sagemetering.com</a></p> <p>Sage Metering, Inc., 8 Harris Court, Building D, Monterey, CA 93940, USA</p>
<b>DIMENSIONAL DRAWINGS</b>	
Dimensional Drawings	[RS: Internal note, we will add this section at a later time]



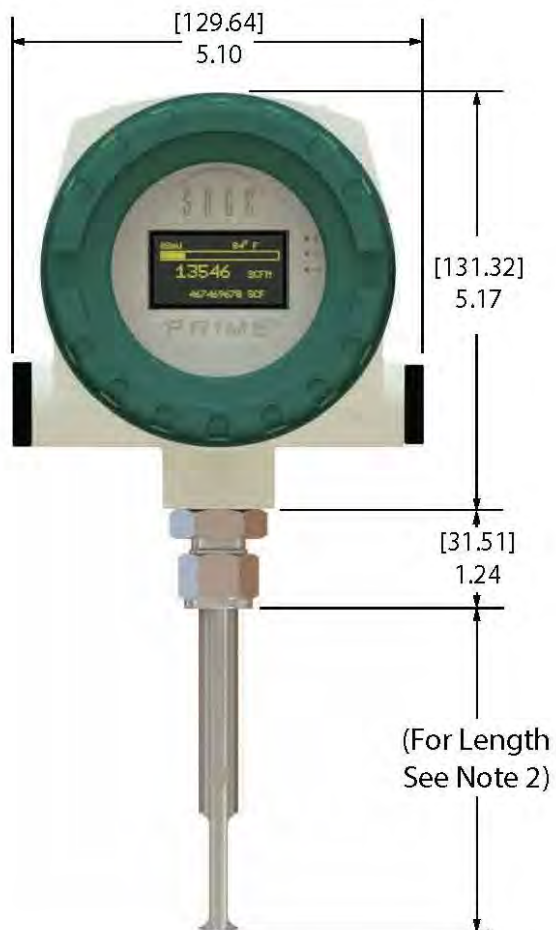
# **Prime, Integral Insertion, DC Dimensional Drawing**

NOTES:

1. DIMENSIONS IN BRACKET ARE IN MILLIMETERS ((mm)).
2. VERSION EXPLANATION:

PROBE LENGTH:  
95-0155-XX

-04 = 4 INCH PROBE  
-06 = 6 INCH PROBE  
-10 = 10 INCH PROBE  
-12 = 12 INCH PROBE  
-15 = 15 INCH PROBE  
-18 = 18 INCH PROBE  
-24 = 24 INCH PROBE  
-30 = 30 INCH PROBE  
-36 = 36 INCH PROBE



95-0155-XX-Rev2

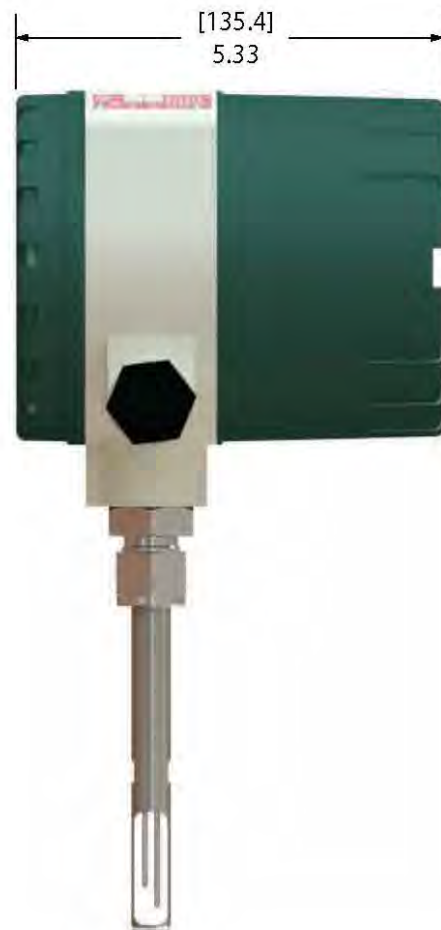
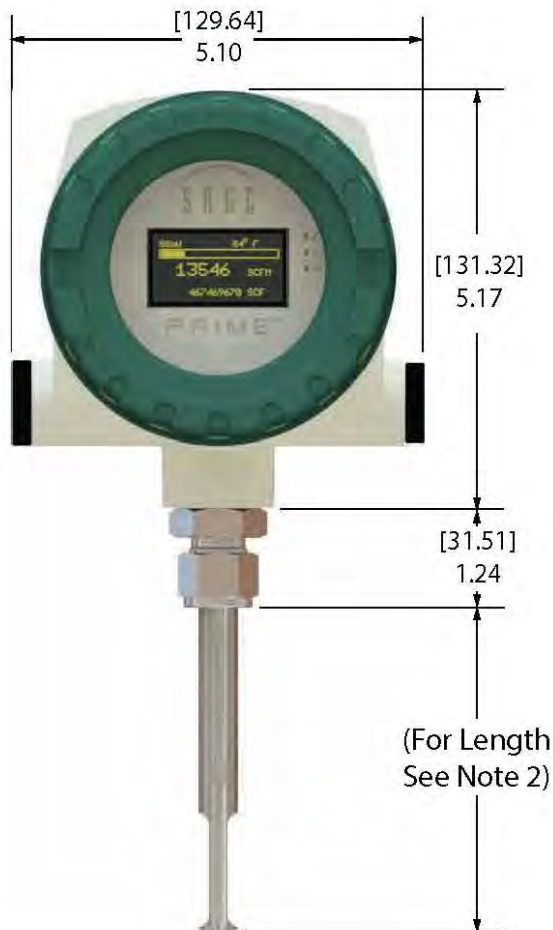
# **Prime, Integral Insertion, AC Dimensional Drawing**

## NOTES:

1. DIMENSIONS IN BRACKET ARE IN MILLIMETERS ((mm));
2. VERSION EXPLANATION:

PROBE LENGTH:  
95-0154-XX

-04 = 4 INCH PROBE  
-06 = 6 INCH PROBE  
-10 = 10 INCH PROBE  
-12 = 12 INCH PROBE  
-15 = 15 INCH PROBE  
-18 = 18 INCH PROBE  
-24 = 24 INCH PROBE  
-30 = 30 INCH PROBE  
-36 = 36 INCH PROBE



95-0154-XX-Rev2



Technical drawing of a pressure transmitter (model 13546) mounted on a pipe. The transmitter has a green circular face with a digital display showing '13546' and '5.17'. The display also shows 'S100' and 'PRIME'. The transmitter is connected to a horizontal pipe via a vertical stem. Dimensions are indicated by arrows and labels:

- $[129.64]$  (5.10): Total width of the transmitter body.
- $[131.32]$  (5.17): Height of the transmitter body from the top of the pipe to the top of the transmitter.
- $H1$ : Height of the transmitter body from the top of the pipe to the top of the transmitter.
- $H2$ : Total height of the transmitter assembly from the top of the pipe to the top of the transmitter.
- $L1$ : Length of the pipe section from the left end to the center of the transmitter.
- $L2$ : Total length of the pipe section from the left end to the right end.

FLOW BODY	1/4"	H1	H2	L1	L2
40-0233	1.4"x6"	3.9"			
40-0235	3/8"x8"	3.84"	3.0"	3.0"	6"
40-0431	1/2"x7"	3.7"			
40-0342	3/4"x7"	3.7"	9.1"	3.5"	7
40-0178	1"x8"	3.55"	9.05"	4"	8"
40-0348	1-1/4"x10"	3.5"	8.98"	5"	10"
40-0252	1-1/2"x12"	3.3"	9.1"		
40-0256	2"x12"	3.31"	9.34"	6"	
40-0260	2-1/2"x12"	3.31"	9.59"		12"
40-0262	3"x12"	4.25"	10.85"	6.25"	
40-0264	3-1/2"x12"	5.25"	10.49"	8.13"	

NOTES:

1. DIMENSIONS IN BRACKET ARE IN MILLIMETERS ([mm]).
2. VERSION EXPLANATION:  
PROBE FLOW BODY SIZE:  
95-0159-0000
  - 0.250 = 1/4" DIA x 6 INCH LONG
  - 0.375 = 3/8" DIA x 6 INCH LONG
  - 0.500 = 1/2" DIA x 7 INCH LONG
  - 0.750 = 3/4" DIA x 7 INCH LONG
  - 1.000 = 1" DIA x 8 INCH LONG
  - 1.500 = 1-1/2" DIA x 10 INCH LONG
  - 2.000 = 2" DIA x 12 INCH LONG
  - 2.500 = 2-1/2" DIA x 12 INCH LONG
  - 3.000 = 3 DIA x 12 INCH LONG
  - 4.000 = 4 DIA x 12 INCH LONG
3. FLANGE ENDS OPTIONALLY AVAILABLE IN LIEU OF NPT FITTINGS.  
FACE TO FACE DIMENSIONS SAME AS COLUMN L2 IN TABLE.

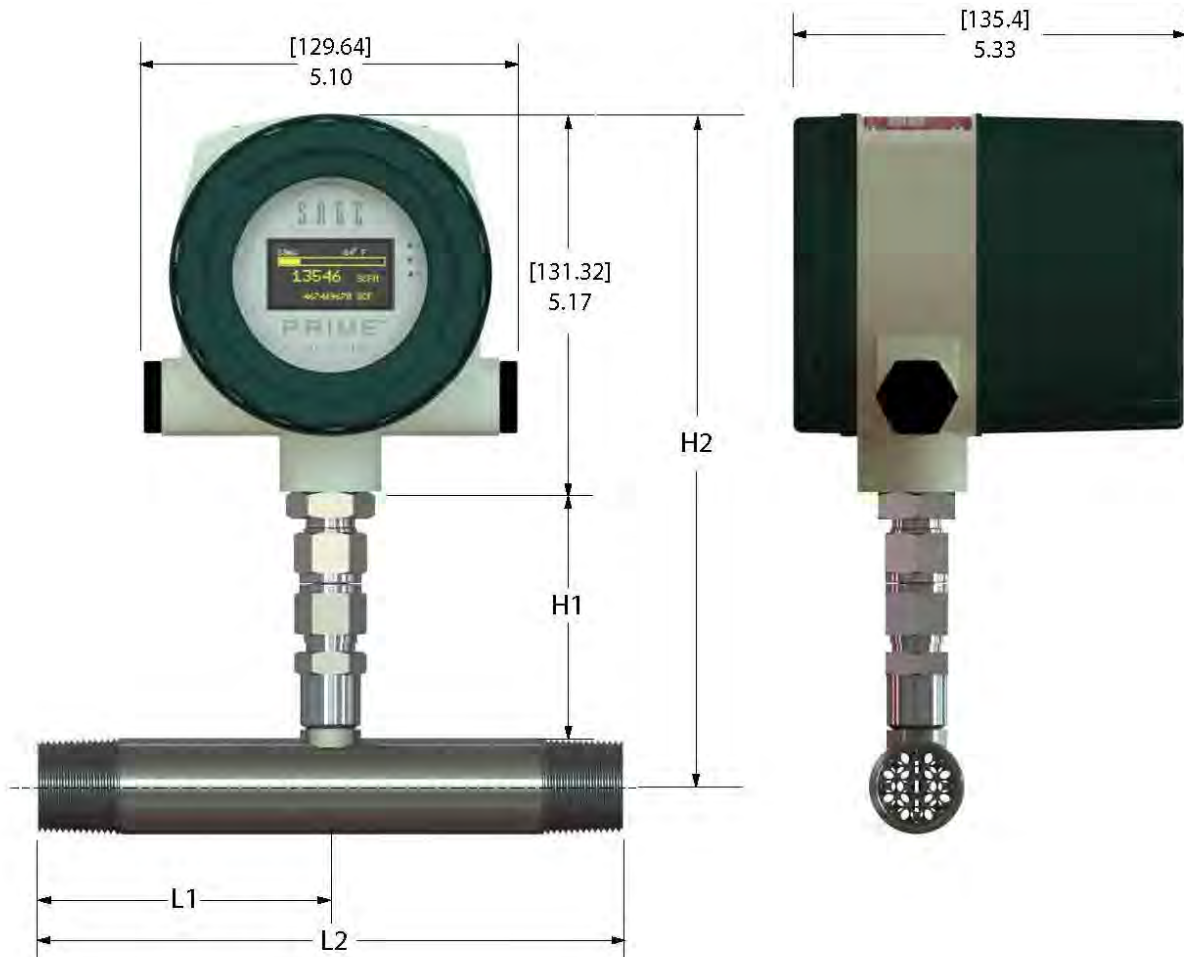


**SAGE**  
METERING, INC.

# Prime, Integral, In-Line AC Dimensional Drawing

## NOTES:

1. DIMENSIONS IN BRACKET ARE IN MILLIMETERS ([mm]).
2. VERSION EXPLANATION:  
PROBE FLOW BODY SIZE:  
95-0158-X300L  
  - 0.250 = 1/4" DIAx6 INCH LONG
  - 0.375 = 3/8" DIAx6 INCH LONG
  - 0.500 = 1/2" DIAx7 INCH LONG
  - 0.750 = 3/4" DIAx7 INCH LONG
  - 1.000 = 1" DIAx8 INCH LONG
  - 1.500 = 1-1/2" DIAx10 INCH LONG
  - 2.000 = 2" DIAx12 INCH LONG
  - 2.500 = 2-1/2" DIAx12 INCH LONG
  - 3.000 = 3 DIAx12 INCH LONG
  - 4.000 = 4 DIAx12 INCH LONG
3. FLANGE ENDS OPTIONALLY AVAILABLE IN LIEU OF NPT FITTINGS.  
FACE TO FACE DIMENSIONS SAME AS COLUMN L2 IN TABLE.



SIZE FOR NPT FLOW BODY (PRIME)					
FLOW BODY	Size	H1	H2	L1	L2
40-0233	1/4"x6"	3.9"	3.0"	3.0"	6"
40-0235	3/8"x6"	3.84"		3.0"	6"
40-0431	1/2"x7"	3.7"	9.1"	3.5"	7"
40-0242	3/4"x7"	3.55"	9.05"	4"	8"
40-0178	1"x8"	3.3"	8.98"	5"	10"
40-0248	1-1/4"x10"	3.31"	9.1"	6"	12"
40-0252	1-1/2"x12"	3.31"	9.34"	6"	12"
40-0256	2"x12"	4.25"	9.59"	6.25"	12"
40-0260	2-1/2"x12"	3.3"	10.85"	8.17"	12"
40-0262	3"x12"	3.3"	10.40"	8.17"	12"
40-0264	4"x12"	3.3"	10.40"	8.17"	12"



95-0158-X-XX-Rev2

# **Prime, Remote Insertion, DC Dimensional Drawing**

## **NOTES:**

1. DIMENSIONS IN BRACKET ARE IN MILLIMETERS ((mm)).
2. VERSION EXPLANATION:

PROBE LENGTH:  
95-0157-XX

-04 = 4 INCH PROBE  
-06 = 6 INCH PROBE  
-10 = 10 INCH PROBE  
-12 = 12 INCH PROBE  
-15 = 15 INCH PROBE  
-18 = 18 INCH PROBE  
-24 = 24 INCH PROBE  
-30 = 30 INCH PROBE  
-36 = 36 INCH PROBE



95-0157-XX-Rev2

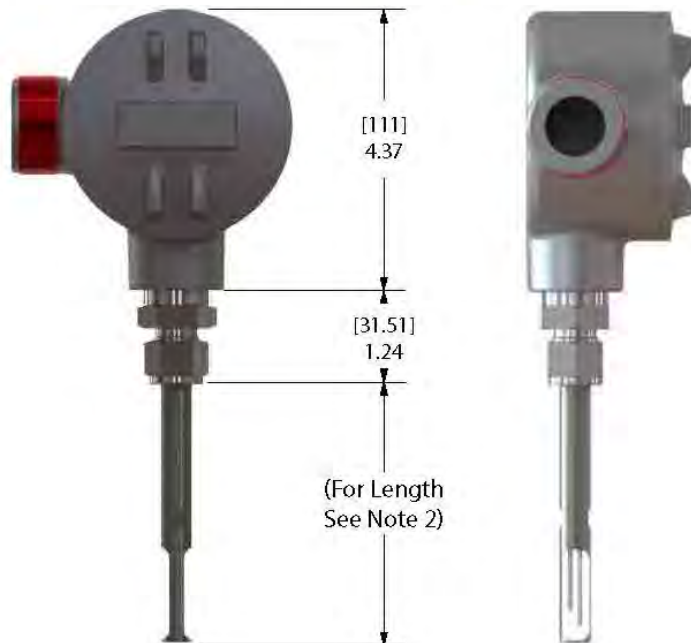
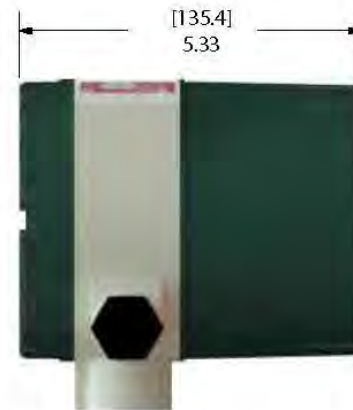
# **Prime, Remote, Insertion, AC Dimensional Drawing**

## NOTES:

1. DIMENSIONS IN BRACKET ARE IN MILLIMETERS ([mm]).
2. VERSION EXPLANATION:

PROBE LENGTH:  
95-0156-XX

-04 = 4 INCH PROBE  
-06 = 6 INCH PROBE  
-10 = 10 INCH PROBE  
-12 = 12 INCH PROBE  
-15 = 15 INCH PROBE  
-18 = 18 INCH PROBE  
-24 = 24 INCH PROBE  
-30 = 30 INCH PROBE  
-36 = 36 INCH PROBE



95-0156-XX-Rev2



# Prime, Remote In-Line, DC Dimensional Drawing

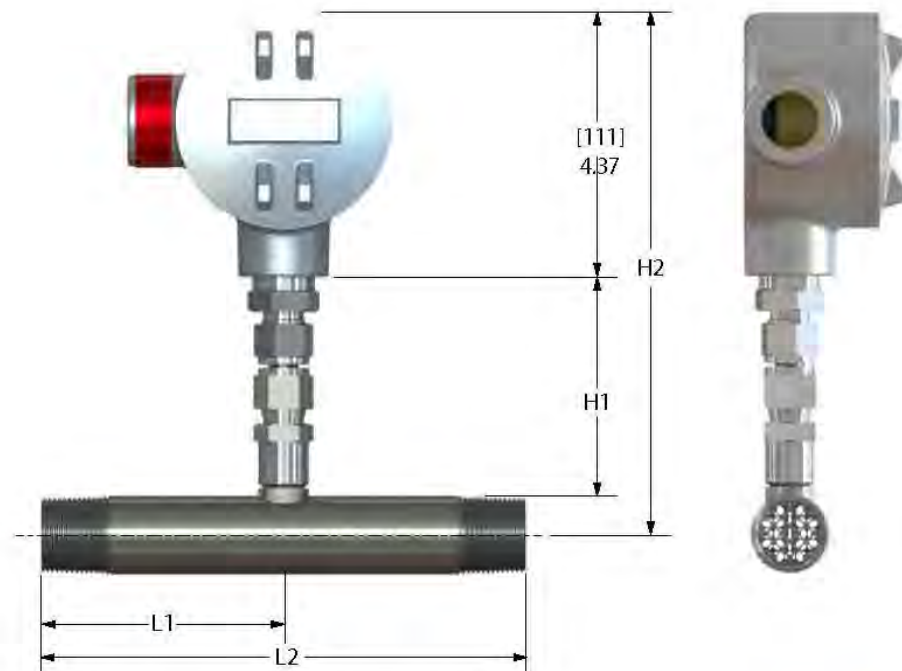


## NOTES:

1. DIMENSIONS IN BRACKET ARE IN MILLIMETERS ((mm)).
3. VERSION EXPLANATION:  
PROBE FLOW BODY SIZE:  
95-0161-X,XXX

-0.250 = 1/4" DIA.x6 INCH LONG  
 -0.375 = 3/8" DIA.x6 INCH LONG  
 -0.500 = 1/2" DIA.x7 INCH LONG  
 -0.750 = 3/4" DIA.x7 INCH LONG  
 -1.000 = 1" DIA.x8 INCH LONG  
 -1.500 = 1-1/2" DIA.x10 INCH LONG  
 -2.000 = 2" DIA.x12 INCH LONG  
 -2.500 = 2-1/2" DIA.x12 INCH LONG  
 -3.000 = 3 DIA.x12 INCH LONG  
 -4.000 = 4 DIA.x12 INCH LONG

3. FLANGE ENDS OPTIONALLY AVAILABLE IN LIEU OF NPT FITTINGS.  
FACE TO FACE DIMENSIONS SAME AS COLUMN L2 IN TABLE.



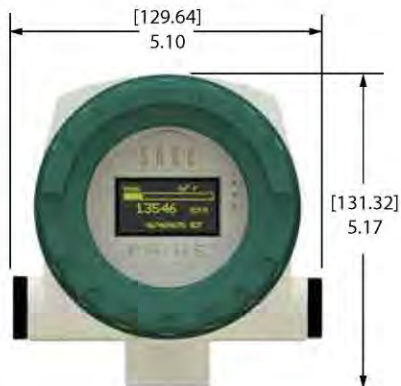
SIZE FOR NPT FLOW BODY (PRIME)					
FLOW BODY	Size	H1	H2	L1	L2
40-0233	1/4"x6"	3.0"	3.0"	3.0"	6"
40-0235	3/8"x6"	3.84"	3.0"	3.0"	6"
40-0431	1/2"x7"	3.7"	9.1"	3.5"	7"
40-0242	3/4"x7"	3.7"	9.1"	3.5"	7"
40-0178	1"x8"	3.55"	9.05"	4"	8"
40-0248	1-1/4"x10"	3.3"	8.98"	5"	10"
40-0252	1-1/2"x12"	3.31"	9.1"	6"	12"
40-0256	2"x12"	3.31"	9.34"	6"	12"
40-0260	2-1/2"x12"	4.25"	9.59"	6.25"	12"
40-0262	3"x12"	4.25"	10.85"	6.25"	12"
40-0264	4"x12"	3.2"	10.40"	8.17"	12"

95-0161-X,XX-Rev2





# Prime, Remote In-Line, AC Dimensional Drawing



## NOTES:

1. DIMENSIONS IN BRACKET ARE IN MILLIMETERS ((mm)).

2. VERSION EXPLANATION:

PROBE FLOW BODY SIZE:

95-0160-XXXX

-0.250 = 1/4" DIA.x6 INCH LONG

-0.375 = 3/8" DIA.x6 INCH LONG

-0.500 = 1/2" DIA.x7 INCH LONG

-0.750 = 3/4" DIA.x7 INCH LONG

-1.000 = 1" DIA.x8 INCH LONG

-1.500 = 1-1/2" DIA.x10 INCH LONG

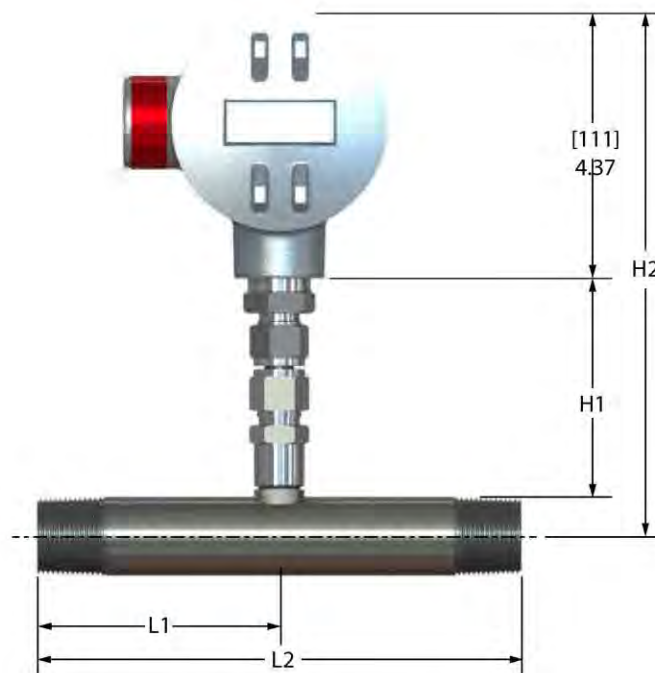
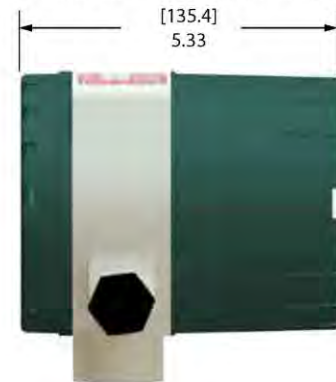
-2.000 = 2" DIA.x12 INCH LONG

-2.500 = 2-1/2" DIA.x12 INCH LONG

-3.000 = 3" DIA.x12 INCH LONG

-4.000 = 4" DIA.x12 INCH LONG

3. FLANGE ENDS OPTIONALLY AVAILABLE IN LIEU OF NPT FITTINGS.  
FACE TO FACE DIMENSIONS SAME AS COLUMN L2 IN TABLE.



SIZE FOR NPT FLOW BODY (PRIME)					
FLOW BODY	Size	H1	H2	L1	L2
40-0233	1/4"x6"	3.9"	3.0"	3.0"	6"
40-0235	3/8"x6"	3.84"			
40-0431	1/2"x7"	3.7"	9.1"	3.5"	7"
40-0242	3/4"x7"				
40-0178	1"x8"	3.55"	9.05"	4"	8"
40-0248	1-1/4"x10"		8.98"	5"	10"
40-0252	1-1/2"x12"	3.3"	9.1"		
40-0256	2"x12"		9.34"	6"	
40-0260	2-1/2"x12"	3.31"	9.59"		12"
40-0262	3"x12"	4.25"	10.85"	6.25"	
40-0264	4"x12"	3.3"	10.40"	8.17"	



95-0160-X.XX-Rev2

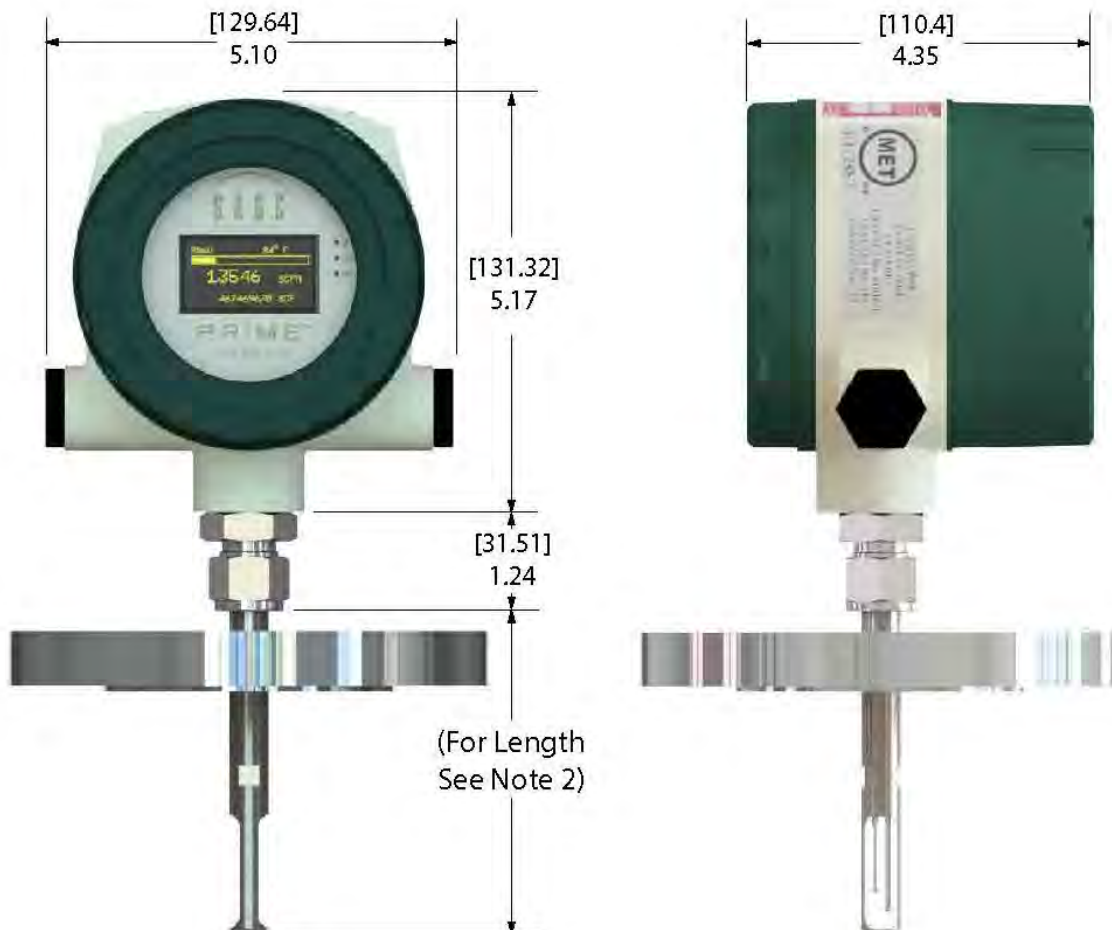
# **Prime, Integral Insertion, DC w/ Mounting Flange Dimensional Drawing**

## NOTES:

1. DIMENSIONS IN BRACKET ARE IN MILLIMETERS ([mm]).
2. VERSION EXPLANATION:

PROBE LENGTH:  
95-0178-XX

-04 = 4 INCH PROBE  
-06 = 6 INCH PROBE  
-10 = 10 INCH PROBE  
-12 = 12 INCH PROBE  
-15 = 15 INCH PROBE  
-18 = 18 INCH PROBE  
-24 = 24 INCH PROBE  
-30 = 30 INCH PROBE  
-36 = 36 INCH PROBE



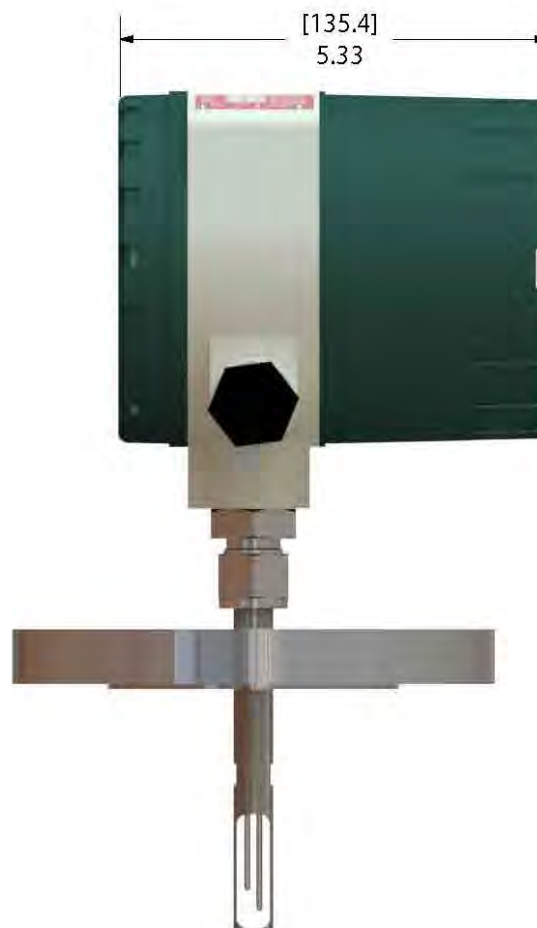
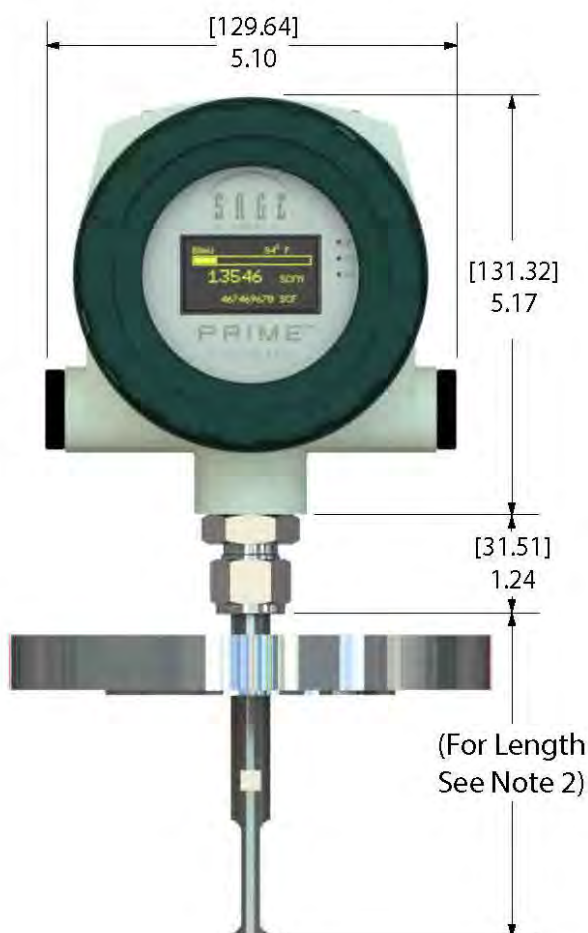
95-0178-XX-Rev2

# **Prime, Integral Insertion, AC w/ Mounting Flange Dimensional Drawing**

- NOTES:  
1. DIMENSIONS IN BRACKET ARE IN MILLIMETERS ((mm))  
2. VERSION EXPLANATION:

PROBE LENGTH:  
95-0177-XX

-04 = 4 INCH PROBE  
-06 = 6 INCH PROBE  
-10 = 10 INCH PROBE  
-12 = 12 INCH PROBE  
-15 = 15 INCH PROBE  
-18 = 18 INCH PROBE  
-24 = 24 INCH PROBE  
-30 = 30 INCH PROBE  
-36 = 36 INCH PROBE



95-0177-XX-Rev2

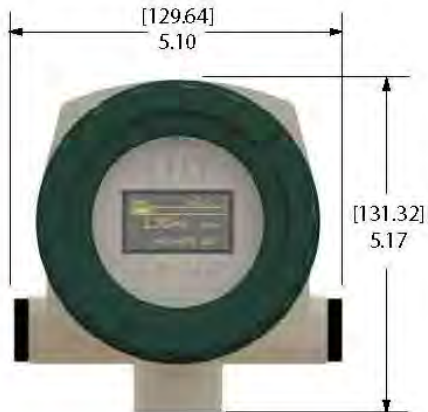
# **Prime, Remote Insertion, DC w/ Mounting Flange Dimensional Drawing**

## **NOTES:**

1. DIMENSIONS IN BRACKET ARE IN MILLIMETERS ((mm)).
2. VERSION EXPLANATION:

PROBE LENGTH:  
95-0180-XX

-04 = 4 INCH PROBE  
-06 = 6 INCH PROBE  
-10 = 10 INCH PROBE  
-12 = 12 INCH PROBE  
-15 = 15 INCH PROBE  
-18 = 18 INCH PROBE  
-24 = 24 INCH PROBE  
-30 = 30 INCH PROBE  
-36 = 36 INCH PROBE



95-0180-XX-Rev2



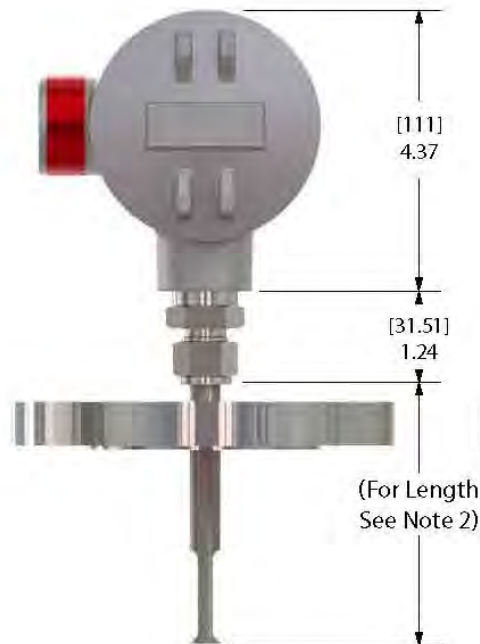
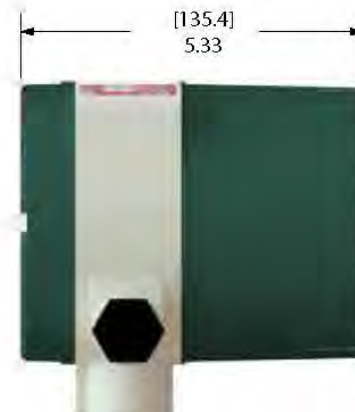
# **Prime, Remote Insertion, AC w/ Mounting Flange Dimensional Drawing**

## NOTES:

1. DIMENSIONS IN BRACKET ARE IN MILLIMETERS ((mm)).
2. VERSION EXPLANATION:

PROBE LENGTH:  
95-0179-XX

-04 = 4 INCH PROBE  
-06 = 6 INCH PROBE  
-10 = 10 INCH PROBE  
-12 = 12 INCH PROBE  
-15 = 15 INCH PROBE  
-18 = 18 INCH PROBE  
-24 = 24 INCH PROBE  
-30 = 30 INCH PROBE  
-36 = 36 INCH PROBE



95-0179-XX-Rev2