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Rosemount 3095FC User Programs

INTRODUCTION

The Rosemount 3095FC is a multivariable transmitter that measures differential pressure, line pressure, and temperature. These values are used to calculate and log mass flow information for AGA3 orifice plate and AGA8 natural gas installations. The 3095FC can calculate mass flow for additional primary element and fluid types through the use of various Rosemount 3095FC User Programs. When a User Program is installed and enabled, it performs a calculation that overwrites the standard AGA3 or AGA8 calculation.

OPERATION

The User Programs are classified into two types: primary element and fluid density. The primary element User Programs enable mass flow calculation for various primary elements by overwriting the AGA3 orifice calculation that is standard on the Rosemount 3095FC. The fluid density User Programs enable mass flow calculation for various fluids by overwriting the AGA8 density calculation that is standard on the Rosemount 3095FC.

Table S-1 details the primary elements that are supported by the Rosemount 3095FC and the User Program that is required for each:

Table S-1. Primary Elements Supported by Rosemount 3095FC

Primary Element	Required Rosemount User Program
AGA3 Orifice Plate	None (AGA3 calculation standard on all 3095FC orders)
Rosemount 485 Annubar® Primary	3095 FC Annubar Flow 05Q006 1.02
McCrometer V-Cone® Primary	Vcone Calc1 06Q026 1.01

Table S-2 details the fluid types that are supported by the Rosemount 3095FC and the User Program that is required for each:

Table S-2. Fluid Types Supported by Rosemount 3095FC

Fluid Type	Required Rosemount User Program
AGA8 Natural Gas	None (AGA8 calculation standard on all 3095FC orders)
Water & Steam (IAPWS)	3095FC IAPWS Steam 05Q007 1.00

If no User Program is specified during the time of order, the Rosemount 3095FC will be configured to calculate flow for AGA3 orifice plates with AGA8 natural gas.

All User Programs are configured using the Rosemount 3095FC User Interface Software.

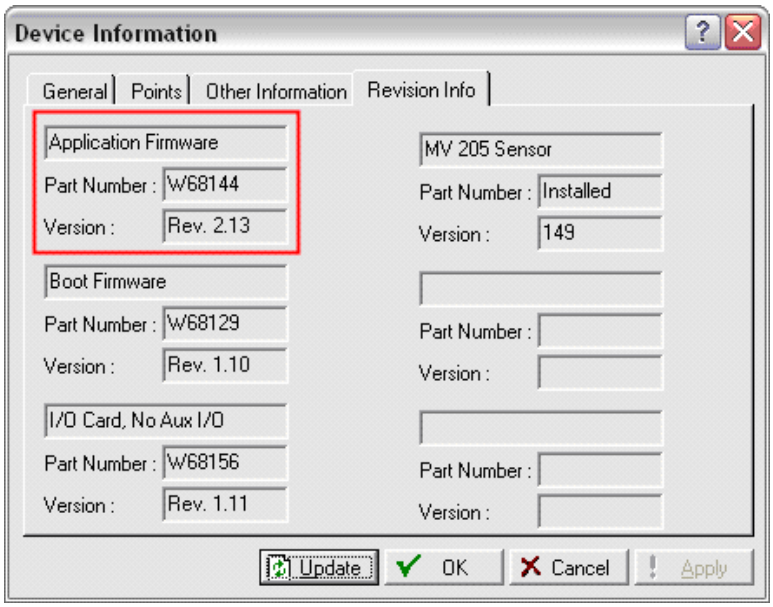
INSTALLATION

If ordered, the User Programs are installed on the 3095FC transmitter by Rosemount. The User Programs can also be installed on existing 3095FCs that have a firmware revision of 2.12 or greater. If an older firmware revision is in use, contact your Emerson Process Management representative.

To check the revision of the firmware for the 3095FC in use:

1. Verify the 3095FC is powered and operational.
2. Using the RS-232 LOI cable, connect the 3095FC to the PC on which the 3095FC User Interface Software is installed.
3. Launch the Rosemount 3095FC User Interface Software. The default log-in name and password are “LOI” and “1000.”
4. Click the **Direct Connect** button to establish communication. Verify you are in “On-line Mode.”
5. Go to **Device > Information** and click on the “Revision Info” tab on the top of the window.
6. Verify the version number that is found under Application Firmware. The 3095FC User Programs are only compatible with firmware revisions 2.12 or higher.

Figure S-1. Firmware Revision Screen



To manually install a User Program on a 3095FC:

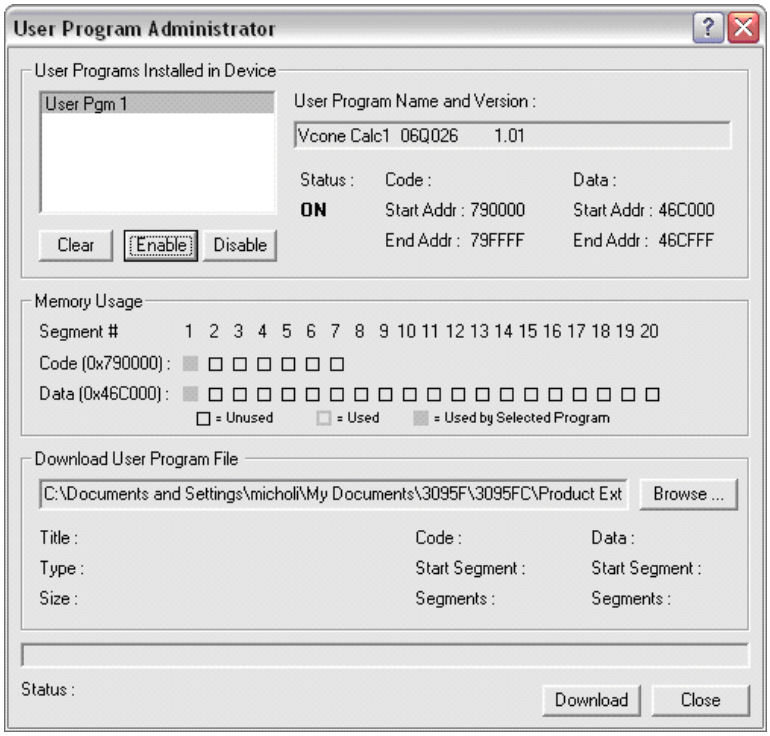
1. Connect to the 3095FC (see steps 1-4 on page S-2).
2. Go to **Utilities > User Program Administrator**. All User Programs that are currently installed are displayed in the window.
3. Click the **Browse…** button and locate the software file for the User Program that is to be installed. The default file names for each program are shown in Table S-3.

Table S-3. User Program Default File Names

User Program	Default File Name
Rosemount 485 Annubar® Primary	3095FC_annubar.bin
McCrometer V-Cone	3095FC_vcone.bin
Water & Steam Density	3095FC_iapws_steam.bin

4. Click the **Download** button to download the selected User Program to the 3095FC.
5. When the download process is complete, select the **User Program** from the “User Programs Installed in Device” window and click **Enable**.
6. Verify the name of the program in the “User Program Name and Version” window. Verify the status of the program is ON. The User Program is now installed and ready for configuration.

Figure S-2. User Program Administration Screen



NOTE
A maximum of one primary element User Program may be installed with one fluid density User Program. No more than one User Program of the same type may be installed at the same time, such as the Rosemount 485 Annubar Primary User Program and the Rosemount V-Cone User Program.

ROSEMOUNT 485 ANNUBAR PRIMARY USER PROGRAM

The Rosemount 485 Annubar Averaging Pitot Tube User Program enables the 3095FC to calculate mass flow for the Rosemount 485 Annubar primary element. The User Program overwrites the standard AGA3 orifice plate calculation. All calculations are archived in the 3095FC history logs per the API 21.1 standard.

Flow Calculations

The flow calculation implemented by the 3095FC User Program is performed per the Rosemount 485 Annubar Primary Flow Test Data Book (document 00821-0100-4809):

$$Q_m = NKY_aD^2F_{aa}\sqrt{DP(\rho_f)}$$

Where:

- Q_m Mass flow rate in lbm / hour (kg / hour)
- N Units conversion factor
- K Annubar flow coefficient
- Y_a Gas expansion factor
- D Inside pipe diameter in inches (mm)
- F_{aa} Thermal expansion factor
- DP Differential pressure
- ρ_f Fluid density at flowing conditions in lbm / ft3 (kg / mm3)

Configuration

To configure the 3095FC to calculate mass flow with a Rosemount 485 Annubar Primary, follow the outline listed below. More detailed information about each parameter in the Rosemount 485 Annubar Primary User Program can be found in later pages of this manual.

1. Verify the Rosemount 485 Annubar Primary User Program has successfully downloaded and is enabled on the transmitter (see pages S-2 and S-3).
2. Go to **Device > Information**, and configure / verify the following parameters:
   a. Units of Measure (U.S. or Metric)
3. Go to **Meter > Setup**, and configure / verify the following parameters:
   a. General tab:
      i. Pipe diameter
      ii. Low flow cutoff
   b. **Gas Quality** tab (if fluid type is defined per AGA8):
      i. Molar gas composition
   c. **Advanced tab**:
      i. FPV Method
      ii. Base pressure
      iii. Base temperature
      iv. Atmospheric pressure
      v. Orifice material (material of construction for 485 Annubar Primary)
      vi. Pipe material
      vii. Pressure tap type: absolute or gage

4. Go to **Configure > User Data > Annubar Flow Calc**, and configure / verify the following parameters:
   a. “Calc Enable” = 1
   b. “Gas=0, Steam=1, Liq=2”
   c. “Calc (Vol=0, Mass=1)”
   d. “Sensor Model”
   e. “K (0=Calc,1=Enter)”
   f. “Flow Coefficient” (if manual entry)
   g. “Enter Density”
   h. “CalcFa=0, CorrDia=1”
5. Go to **Device > Flags**, and click the **Save Configuration** button.

Device > Information Screen

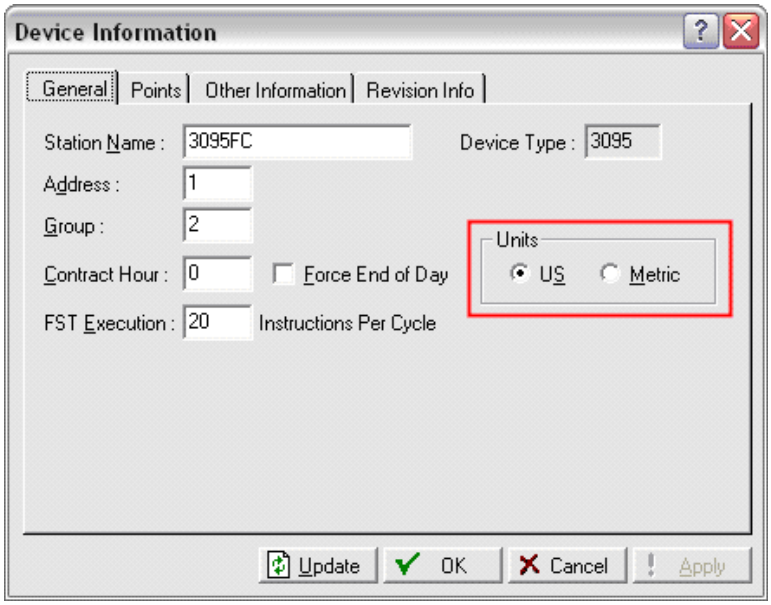
On the device information screen, select whether all of the 3095FC parameters should be in U.S. or metric units. For the 485 Annubar Primary flow calculation, refer to Table 4 for the units of measure for the various calculations performed by the 3095FC.

Table S-4. Units of Measure for Annubar Primary Flow & Energy Calculations

Parameter	U.S.	Metric
Hourly Flow Rate (mass)(1)	lbm /hr.	kg / hr.
Daily Flow Rate (mass)(1)	1000 lbm / day	1000 kg / day
Flow Accumulations (mass)(1)	1000 lbm	1000 kg
Hourly Flow Rate (volumetric)	CF / hour	m^3 / hour
Daily Flow Rate (volumetric)	MCF / day	km^3/ day
Flow Accumulations (volumetric)	MCF	km^3
Hourly Energy Rate (mass & volumetric)(1)	BTU / hour	MJ / hour
Daily Energy Rate (mass & volumetric)(1)	MMBTU / day	GJ / day
Energy Accumulations (mass & volumetric)(1)	MMBTU	GJoules

(1) When the 485 Annubar Primary User Program is configured to calculate flow in mass units (see page S-9), the units of measure are incorrectly be displayed on various screens of the Rosemount 3095FC User Interface Software as CF and MCF (m3 and km3) rather than lbm and 1000 lbm (kg and 1000 kg). The actual values are correctly displayed, but the units of measure are incorrectly displayed in standard volumetric terms.

Figure S-3. Device > Information Screen



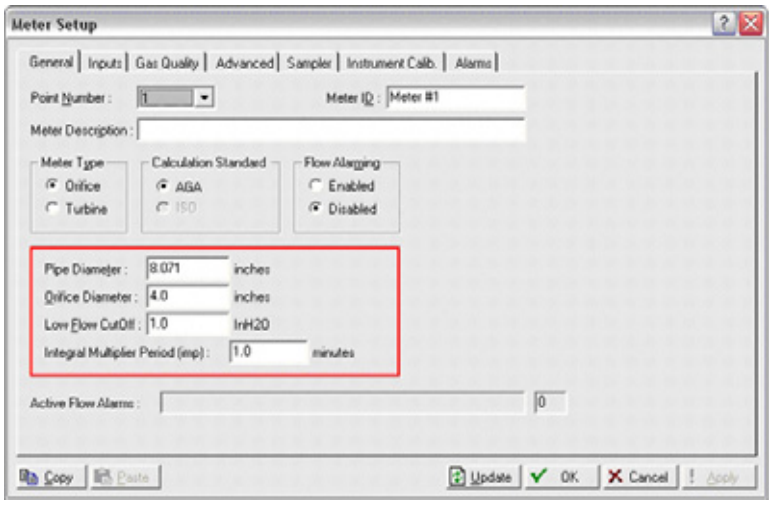
Meter > Setup Screen

The meter setup screen is used to define information regarding the physical installation and base conditions.

General Tab

- **Pipe Diameter** Enter the diameter of the pipe in inches(mm).
- **Orifice Diameter** This parameter is automatically populated by the 485 Annubar Primary User Program.
- **Low Flow Cutoff** Enter in the minimum differential pressure in in.H20 (kPa) at which the 3095FC will calculate flow. Values below the “Low Flow CutOff” will result in a flow and energy values of 0.
- **Integral Multiplier Period (imp):** The frequency in minutes that the 3095FC does a complete recalculation of all of the parameters in the flow equation. The value must be an integer.

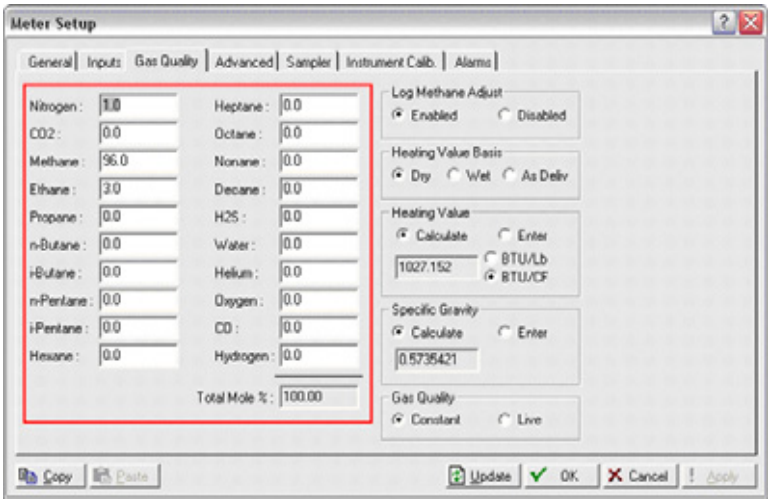
Figure S-4. Meter > Setup Screen: General Tab



Gas Quality Tab

If the fluid type for the application is per AGA8, the molar composition must be defined. The total composition must be exactly 100%. If the fluid type cannot be defined per AGA8, a 3095FC User Program must installed to obtain the proper density values for the application. See Table S-2 for a list of fluid types currently supported by the 3095FC.

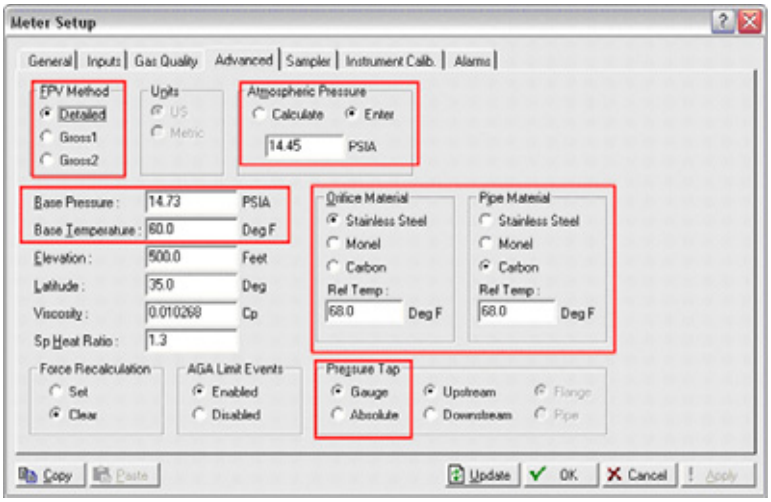
Figure S-5. Meter > Setup Screen: Gas Quality Tab



Advanced Tab

- **FPV Method** — Select between the Detailed, Gross1, or Gross 2 methods of calculating the compressibility of the AGA8-defined gas.
- **Base Pressure** — Enter the base pressure used to define the standard volumetric flow equation.
- **Base Temperature** — Enter the base temperature used to define the standard volumetric flow equation.
- **Atmospheric Pressure** — Enter the current atmospheric pressure.
- **Orifice Material** — Select the material of the 485 Annubar Primary.
- **Pipe Material** — Select the pipe material.
- **Pressure Tap** — Select whether the 3095FC has a gage or absolute sensor.

Figure S-6. Meter > Setup Screen: Advanced Tab

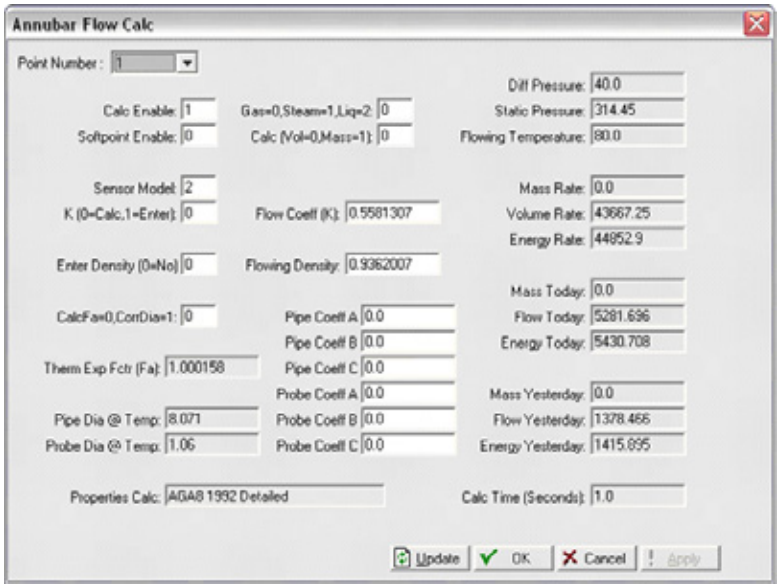


Annubar© Flow Calc Screen

The Annubar Primary flow calc screen is used to define parameters that are unique to the Rosemount 485 Annubar Primary User Program. Configuring the following parameters is required to complete the setup process for the 3095FC.

- **Calc Enable** — Enter a “1” to enable the Rosemount 485 Annubar Primary User Program. Enter a “0” to disable the program and use the standard AGA3 orifice calculation.
- **Gas=0,Steam=1,Liq=2** — Enter a “0” if the fluid type is a gas. Enter a “1” if the fluid type is steam. Enter a “2” if the fluid is a liquid.
- **Calc(Vol=0,Mass=1)** — Enter a “0” to calculate flow in standard volumetric units. Enter a “1” to calculate flow in mass units. See Table S-4 for the list of units of measure.
- **Sensor Model** — Enter the size of the Rosemount 485 Annubar Primary. Valid sizes include “1”, “2”, and “3”.
- **K (0=Calc,1=Enter)** — Enter a “0” to have the Rosemount 485 Annubar Primary User Program automatically calculate the K-coefficient. A value of “1” allows for the manual entry of the K-coefficient. It is generally recommended to use a value of “0.”
- **Flow Coefficient (K)** — Type in a value for the K-coefficient if a “1” was entered for the “K (0=Calc,1=Enter)” parameter. Otherwise, the value calculated by the User Program is displayed.
- **Enter Density (0=No)** — A “0” indicates that the flowing density of the process will be automatically calculated per AGA8 or another User Program. A value of “1” allows for the manual entry of the flowing density.
- **Flowing Density** — Type a value for the density in lbm / ft3 (kg / m3) if a “1” was entered for the “Enter Density (0=No)” parameter. Otherwise, the value calculated by the User Program is displayed.
- **CalcFa=0,CorrDia=1** — A “0” indicates that the Thermal Expansion Factor (Faa) is automatically calculated by the User Program. If a value of “1” is entered, the Thermal Expansion Factor is calculated per GOST 8.563.1. This requires the user to define the values for the Pipe and Probe Coefficients (A-C).

Figure S-7. Annubar Flow Calc Screen



The following parameters shown on the Annubar Primary Flow Calc screen are not required for setup but are available for reference purposes:

- **Softpoint Enable** Enter a value (1-16) to have the all of the parameters in the Rosemount 485 Annubar Primary User Program saved electronically in a 3095FC softpoint. A value of “0” disables the copying of the information to a softpoint.
- **Therm Exp Fctr(Fa)** Displays the calculated Thermal Expansion Factor (Faa)
- **Pipe Dia @ Temp** Displays the pipe diameter in inches (mm), including the expansion / contraction due to temperature effects.
- **Probe Dia @ Temp** Displays the diameter of the 485 Annubar Primary probe in inches (mm) including the expansion / contraction due to temperature effects.
- **Pipe / Probe Coeff (A-C)** If the “CalcFa=0,CorrDia=1” option = 1, enter in values for the pipe and probe coefficients as defined per GOST 8.5631.
- **Properties Calc** Displays the current method used to calculate the fluid density. The calculation can be performed by the default AGA8 method or an alternative fluid density User Program.
- **Diff Pressure** Displays the current differential pressure reading in in.H20 (kPa).
- **Static Pressure** Displays the current static pressure reading in PSI (kPa).
- **Flowing Temperature** Displays the current temperature reading in deg.F (deg.C).

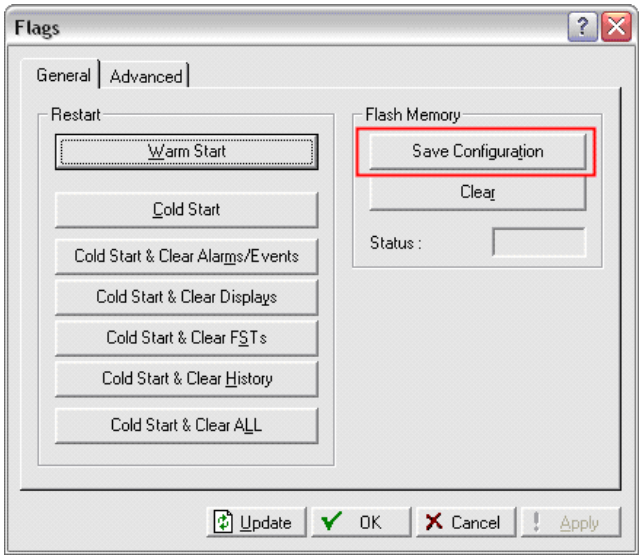
- **Mass Rate** — Displays the current mass flow rate in 1000 lbm / day (1000 kg / day). This parameter will display “0” if the “Calc(Vol=0,Mass=1)” parameter is “0”.
- **Volume Rate** — Displays the current standard volumetric flow rate in MCF / day (km3 / day). This parameter will display “0” if the “Calc(Vol=0,Mass=1)” parameter is “1”.
- **Energy Rate** — Displays the current energy rate in MMBTU / day (G-Joules / day).
- **Mass Today** — Displays the totalized mass flow reading in 1000 lbm (1000 kg) for mass flow or MCF (km3). This parameter will display “0” if the “Calc(Vol=0,Mass=1)” parameter is “0”.
- **Flow Today** — Displays the totalized standard volumetric flow reading in MCF (km3). This parameter will display “0” if the “Calc(Vol=0,Mass=1)” parameter is “1”.
- **Energy Today** — Displays the totalized energy reading in MMBTU (G-Joules).

Device > Flags Screen

Once the entire configuration process has been completed, is recommended to save the entire configuration to the flash memory of the transmitter. This allows the transmitter to retain the configuration if a cold-start is ever performed.

Click the **Save Configuration** button to save the configuration to the internal memory of the transmitter.

Figure S-8. Device > Flags Screen



ROSEMOUNT V-CONE USER PROGRAM

The Rosemount V-Cone User Program enables the 3095FC to calculate mass flow for a McCrometer V-Cone primary element. The User Program overwrites the standard AGA3 orifice plate calculation. All calculations are archived in the 3095FC history logs per the API 21.1 standard.

Flow Calculations

The flow calculation implemented by the 3095FC User Program is performed per the equations outlined by McCrometer:

$$Q_V = N\frac{\pi}{4}\sqrt{\frac{2}{\rho_f}}\frac{D^2\beta^2}{\sqrt{1-\beta^4}}\sqrt{DP}\cdot C_d Y$$

Where:

- Q_V Standard volumetric flow rate in CF / hour (m3 / hour)
- N Units conversion factor
- ρ_f Fluid density at flowing conditions in lbm / ft3 (kg / mm3)
- D Inside pipe diameter in inches (mm)
- β Meter beta ratio
- DP Differential pressure
- C_d Discharge coefficient
- Y Gas expansion factor

CONFIGURATION

To configure the 3095FC to calculate mass flow with a V-Cone, follow the outline listed below. More detailed information about each parameter in the Rosemount V-Cone User Program can be found in later pages of this manual.

1. Verify the Rosemount V-Cone User Program has successfully downloaded and is enabled on the transmitter (see pages S-2 and S-3).
2. Go to **Device > Information**, and configure / verify the following parameters:
   a. Units of Measure (U.S. or Metric)
3. Go to **Meter > Setup**, and configure / verify the following parameters:
   b. **General** tab:
      i. Orifice (cone) diameter
      ii. Pipe diameter
      iii. Low flow cutoff
   c. **Gas Quality** tab (if fluid type is defined per AGA8):
      i. Molar gas composition
   d. **Advanced** tab:
      i. FPV Method
      ii. Base pressure
      iii. Base temperature
      iv. Atmospheric pressure
      v. Orifice material (material of construction for V-Cone)

vi. Pipe material

vii. Pressure tap type: absolute or gage

4. Go to **Configure > User Data > V-Cone 3095**, and configure / verify the following parameters:
   a. “Enable V-Cone Calc” = 1
   b. “Correction Factor”
5. Go to **Device > Flags**, and click the **Save Configuration** button.

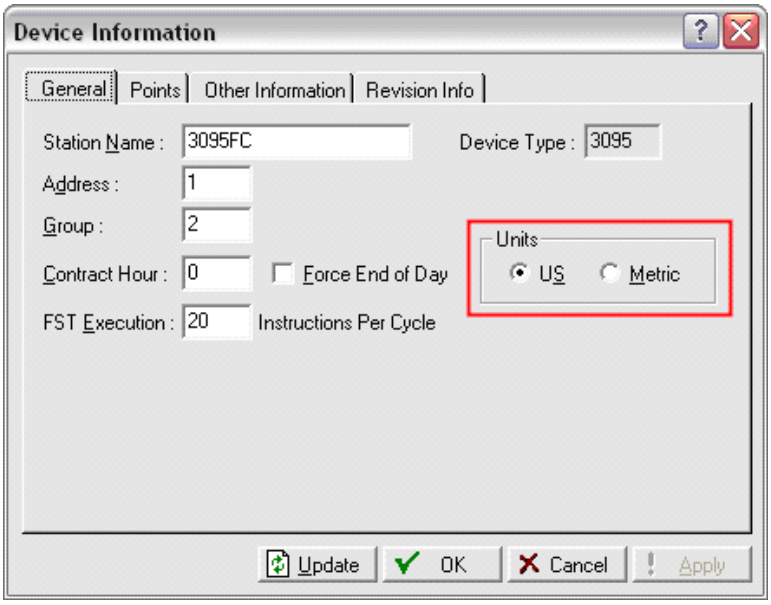
Device > Information Screen

On the device information screen, select whether all of the 3095FC parameters should be in U.S. or metric units. For the V-Cone flow calculation, refer to Table S-5 for the units of measure for the various calculations performed by the 3095FC.

Table S-5. Units of Measure for V-Cone Flow & Energy Calculations

Parameter	U.S.	Metric
Hourly Flow Rate (volumetric)	CF / hour	m^3 / hour
Daily Flow Rate (volumetric)	MCF / day	km^3 / day
Flow Accumulations (volumetric)	MCF	km^3
Hourly Energy Rate (mass & volumetric)	BTU / hour	MJ / hour
Daily Energy Rate (mass & volumetric)	MMBTU / day	GJ / day
Energy Accumulations (mass & volumetric)	MMBTU	GJoules

Figure S-9. Device > Information Screen



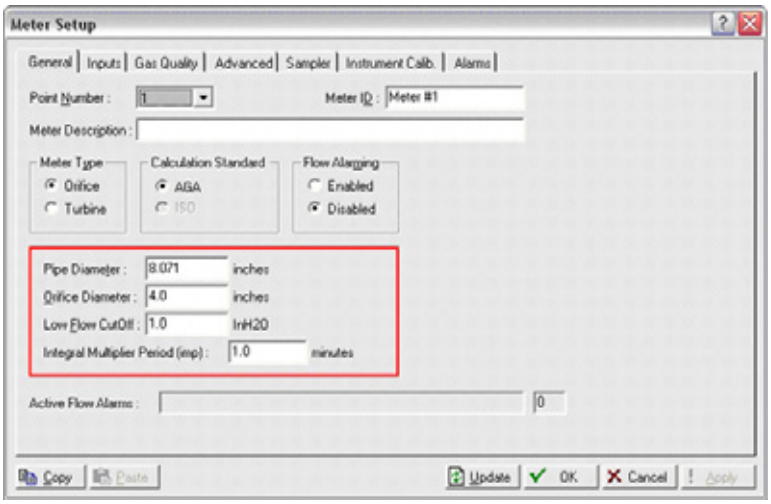
Meter > Setup Screen

The meter setup screen is used to define information regarding the physical installation and base conditions.

General Tab

- **Pipe Diameter** Enter the diameter of the pipe in inches (mm)
- **Orifice Diameter** Enter the diameter of the cone that for the V-Cone.
- **Low Flow Cutoff** Enter in the minimum differential pressure in in.H20 (kPa) at which the 3095FC will calculate flow. Values below the Low Flow CutOff will result in a flow and energy values of 0.
- **Integral Multiplier Period (imp):** The frequency in minutes that the 3095FC does a complete recalculation of all of the parameters in the flow equation. The value must be an integer.

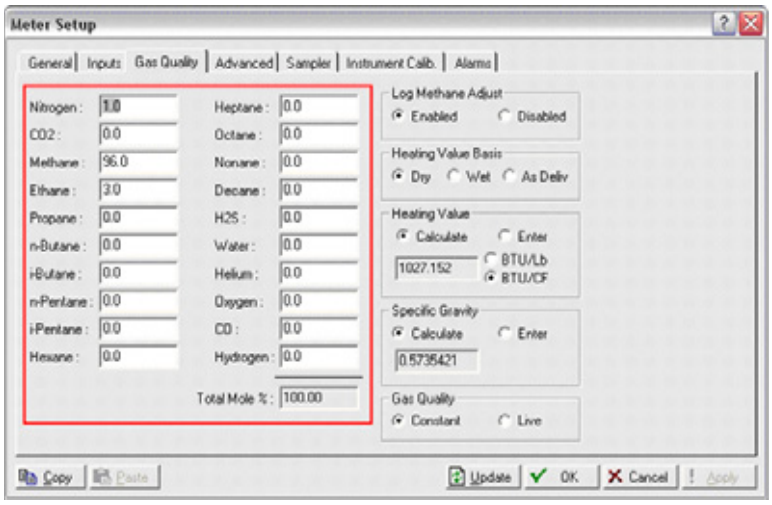
Figure S-10. Meter > Setup Screen: General Tab



Gas Quality Tab

If the fluid type for the application in is per AGA8, the molar composition must be defined. The total composition must be exactly 100%. If the fluid type cannot be defined per AGA8, a 3095FC User Program must installed to obtain the proper density values for the application. See Table S-2 for a list of fluid types currently supported by the 3095FC.

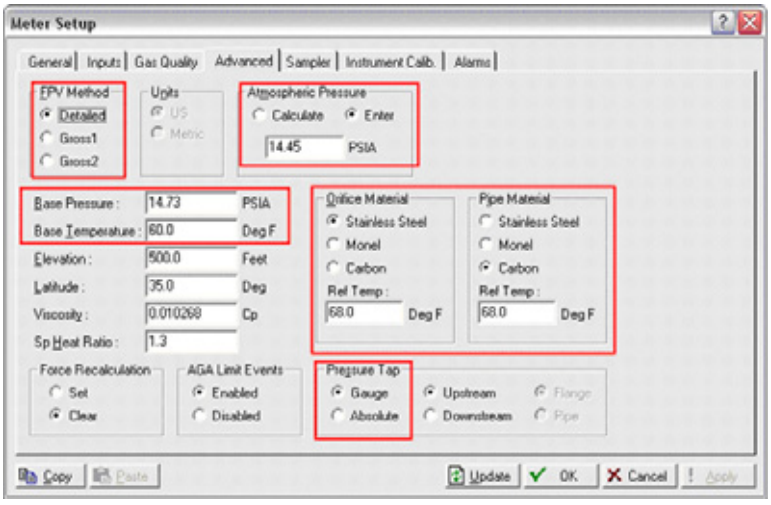
Figure S-11. Meter > Setup Screen: Gas Quality Tab



Advanced Tab

- **FPV Method** — Select between the Detailed, Gross1, or Gross 2 methods of calculating the compressibility of the AGA8-defined gas.
- **Base Pressure** — Enter the base pressure used to define the standard volumetric flow equation.
- **Base Temperature** — Enter the base temperature used to define the standard volumetric flow equation.
- **Atmospheric Pressure** — Enter the current atmospheric pressure.
- **Orifice Material** — Select the material of the V-Cone.
- **Pipe Material** — Select the pipe material.
- **Pressure Tap** — Select whether the 3095FC has a gage or absolute sensor.

Figure S-12. Meter > Setup Screen: Advanced Tab

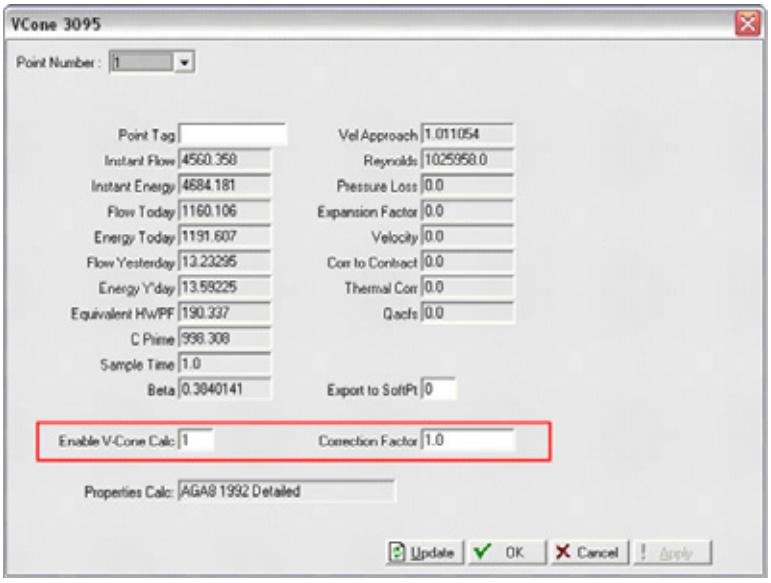


V-Cone Flow Calc Screen

The V-Cone flow calc screen is used to define parameters that are unique to the Rosemount V-Cone User Program. Configuring the following parameters is required to complete the setup process for the 3095FC.

- **Enable V-Cone Calc** — Enter a “1” to enable the Rosemount V-Cone User Program. Enter a “0” to disable the program and use the standard AGA3 orifice calculation.
- **Correction Factor** — Enter the value of the Flow Coefficient for the V-Cone in use.

Figure S-13. V-Cone User Program Screen



The following parameters shown on the V-Cone Flow Calc screen are not required for setup but are available for reference purposes:

- **Point Tag** — Allows for a user-defined character string to help with the identification of the V-Cone user program.
- **Instant Flow** — Instantaneous flow rate in MCF / Day (mm^3 / Day).
- **Instant Energy** — Calculated instantaneous energy rate in MMBTU / Day (GJoules / Day).
- **Flow Today** — Totalized flow for the current day in MCF (mm^3).
- **Energy Today** — Totalized energy for the current day in MMBTU (GJoules).
- **Flow Yesterday** — Totalized flow for the previous day in MCF (mm^3).
- **Energy Y'day** — Totalized energy for the previous day in MMBTU (GJoules).
- **Equivalent HWPF** — Intermediate calculation in the V-Cone flow equation

  $$Y \times \sqrt{\frac{DP_{psf}}{FlowingDensity}}$$

  where Y = Gas Expansion Factor, DP in pound / square foot.
- **C Prime** — Intermediate calculation in the V-cone flow equation, C' or IMV = C_{acfs} x 86.4, where C_{acfs} is the meter constant in average cubic feet per second.
- **Sample Time** — How often the 3095FC samples the process variables, in seconds.
- **Beta** — Beta ratio of the V-Cone =

  $$\sqrt{1 - \frac{d^2}{D^2}}$$
- **Vel Approach** — Velocity of Approach Factor =

  $$\frac{1}{\sqrt{1 - \beta^4}}$$
- **Reynolds** — Reynolds Number =

  $$\frac{123.9 \times velocity \times D \times Density}{Viscosity}$$

  with velocity in ft / sec, D = outer pipe diameter in inches, Density in lb / ft^3, Viscosity in cP.
- **Pressure Loss** — Permanent pressure loss as a percent of upstream static pressure.
- **Expansion Factor** — Gas expansion factor (Y) =

  $$1 - (0.649 + 0.696 \times \beta^4) \cdot \frac{DP}{k \times SP}$$

  where k = isentropic exponent.

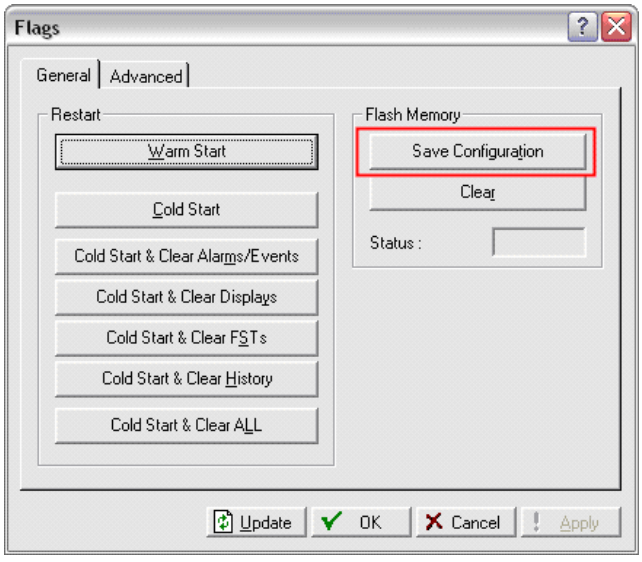
- **Velocity** — Linear gas velocity in ft / sec = $\frac{4 \times Q_{acfs}}{\pi \times D^2}$
  where Q = volumetric flow rate in ft^3 / sec, D = outer pipe diameter in inches.
- **Corr to Contract** — "Correction to Contract" formula = $\left(\frac{P_L}{P_B}\right)\left(\frac{T_B}{T}\right)\left(\frac{Z_B}{Z}\right)$
  where PL = absolute pressure in psi, PB = base pressure in PSIA, TB = base pressure in deg. R, T = flowing temperature in deg. R, ZB = base gas compressibility factor, Z = flowing gas compressibility factor.
- **Thermal Corr** — The thermal correction factor of the V-Cone primary element.
- **Q_{acfs}** — Volumetric flow rate in actual cubic feet per second.
  $Q_{acfs} = \frac{\pi}{4} \cdot \sqrt{\frac{2 \times 32.174}{\rho}} \cdot \frac{D^2\beta^2}{\sqrt{1-\beta^2}} \cdot \sqrt{DP} \times C_f \times Y$
  where ρ = flowing density in lb / ft^3, D = outer pipe diameter in feet, Cf = V-cone correction factor, Y = gas expansion factor.
- **Properties Calc** — Displays the current methodology for computing fluid density.

Device > Flags Screen

Once the entire configuration process has been completed, is recommended to save the entire configuration to the flash memory of the transmitter. This allows the transmitter to retain the configuration if a cold-start is ever performed.

Click the **Save Configuration** button to save the configuration to the internal memory of the transmitter.

Figure S-14. Device > Flags Screen



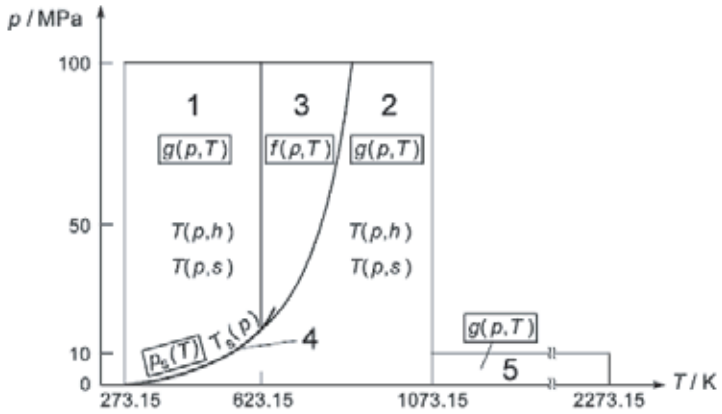
ROSEMOUNT WATER & STEAM DENSITY USER PROGRAM

The Rosemount Water & Steam Density User Program enables the 3095FC to calculate mass flow for water and steam processes. The User Program overwrites the standard AGA-8 natural gas density calculation. All calculations are archived in the 3095FC history logs per the API 21.1 standard.

Density Calculations

Density values for water and steam applications are derived from the International Association for Properties of Water and Steam (IAPWS) 1997 standard. The 3095FC supports the IAPWS-IF97 standard in regions 1 and 2, which are based on the Gibbs free energy equation, and region 4. Regions 3 and 5 are not supported (see Figure 15).

Figure S-15. Regions and Equations of IAPWS-IF97(1)



Configuration

To configure the 3095FC to calculate mass flow for water or steam processes, follow the outline below. More detailed information about each parameter in the Rosemount Water and Steam Density User Program can be found in later pages of this manual.

1. Go to **Configure > User Data > Steam Property Calc**, and configure / verify the following parameters:
   a. “Calc Enable” = 1
2. Go to **Configure > User Data > Annubar Flow Calc**, and configure / verify the following parameters:
   a. “Gas=0, Steam=1, Liq=2”
3. Go to **Device > Flags**, and click the **Save Configuration** button.

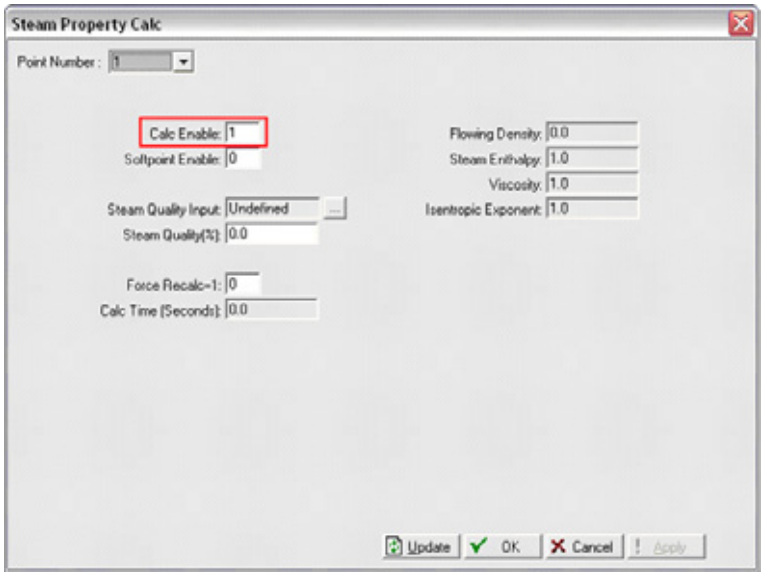
Steam Property Calc Screen

The Steam Property Calc screen is used to define parameters that are unique to the Rosemount Steam and Water Density User Program.

In order for the 3095FC to accurately measure flow for steam or water, make sure the **Calc Enable** parameter has a “1”. A value of “0” will disable the program, and the 3095FC will calculate density for natural gas based on the AGA-8 standard.

(1) International Association for the Properties of Water and Steam. Release on the IAPWS Industrial Formulation 1997 for the Thermodynamic Properties of Water and Steam. 1997.

Figure S-16. Water & Steam Density User Program



The following parameters shown on the Water and Steam Properties Calc screen are not required for setup but are available for reference purposes:

- **Softpoint Enable** — Enter a value (1-16) to have the all of the parameters in the Rosemount Water and Steam Density User Program saved electronically in a 3095FC softpoint. A value of “0” disables the copying of the information to a softpoint.
- **Steam Quality Input** — This parameter is not supported by the Rosemount 3095FC.
- **Steam Quality (%)** — Displays the quality of the steam (100% = superheated, 0% = water) and is automatically determined by the measured pressure and temperature values.
- **Force Recalc=1** — allows for an immediate recalculation of the steam/water properties at current flowing conditions. Writing a “1” to this field forces the program to begin the recalculation. The field will default back to “0” when the recalculation request is recognized by the user program.
- **Calc Time (Seconds)** — Shows the current thermodynamics calculation period in seconds. This value will typically equal the Integral Multiplier Period (IMP) as defined in the **Meter > Setup** screen. The calculation is also triggered by a change in pressure greater than 8 kPa, change in temperature greater than 3 degrees Kelvin, or change in steam quality greater than 0.5%.

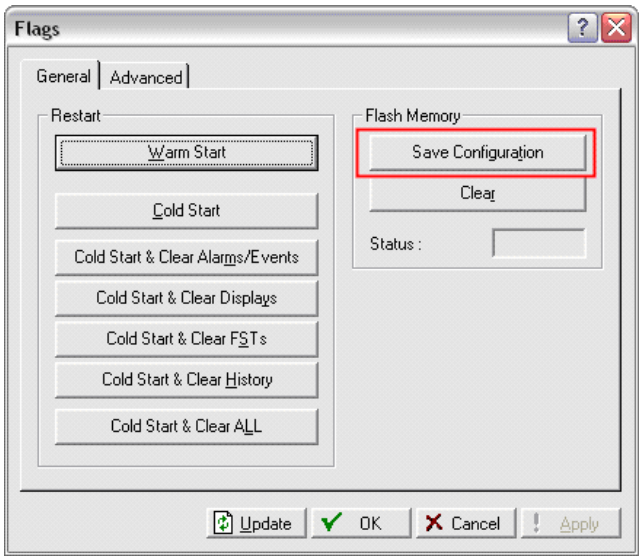
- **Flowing Density** — Displays the calculated density of the steam/water at flowing conditions in lbm / ft^3 (kg / m^3).
- **Steam Enthalpy** — Displays the calculated enthalpy (heating value) of the steam/water at flowing conditions in BTU / lbm (kJoules / kg).
- **Viscosity** — Displays the calculated viscosity of the steam / water at flowing conditions in Centipoise (cP).
- **Isentropic Exponent** — Displays the calculated isentropic exponent (specific heat ratio) of the steam / water at flowing conditions.

Device > Flags Screen

Once the entire configuration process has been completed, is recommended to save the entire configuration to the flash memory of the transmitter. This allows the transmitter to retain the configuration if a cold-start is ever performed.

Click the **Save Configuration** button to save the configuration to the internal memory of the transmitter.

Figure S-17. Device > Flags Screen



Rosemount 3095FC

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