



892/894M DC Output Math Modules

Application Example

A typical application involves calculating the composite flow rate of several flows. The 894M easily sums up to four inputs and provides the total as an output scaled in engineering units.

Configuration Procedures

- 1) Enter optional tag identifiers and other desired application information.
- 2) Select your input ranges from the pull-down menus and identify the sources.
- 3) Select the output range and either normal or reverse acting (proportional/inverse) mode.

IntelliPack Configuration - 894M-0500 - Untitled*

File Module Settings Help

General Xmtr Configuration Test Input 1-2 Calibration Input 3-4 Calibration Output Calibration

Module

Tag: Tank #2A Comment: Flow into Tank #2A

Serial Number: Firmware Number: 9300-016A Last Modified: 10/12/98 3:31 PM

Configured By: RMG Location: Building #2

Input 1 Range: 4-20mA DC ID: H2O

Input 2 Range: 4-20mA DC ID: HCL

Input 3-4 Range: 4-20mA DC ID (3): NaOH ID (4): CO2

Output 1 Range: 0-10V DC Mode: Normal Acting

IntelliPack Configuration - 894M-0500 - Untitled*

File Module Settings Help

General Xmtr Configuration Test Input 1-2 Calibration Input 3-4 Calibration Output Calibration

Scaling:

I/O	Equation Symbol	Zero Signal Value	Zero Engr. Units Value	Full Scale Signal Value	Full Scale Engr. Units Value	Engr. Units
Input 1	A	4.0 mADC	0	20.0 mADC	1000	GPM
Input 2	B	4.0 mADC	0	20.0 mADC	500	GPM
Input 3	C	4.0 mADC	0	20.0 mADC	250	GPM
Input 4	D	4.0 mADC	0	20.0 mADC	100	GPM
Output 1		0.0 VDC	0	10.0 VDC	1850	GPM

Equation: Output 1 = A+B+C+D

Show Simulator

IntelliPack Configuration Software makes it very easy to set up your input and output ranges and other operational parameters.

- 4) Enter the zero/full scale values in engineering units for input variables A, B, C and D.
- 5) Enter the output scaling parameters, also in engineering units.
- 6) Enter your equation (up to 200-characters) in the equation field to define the output.
- 7) Use the I/O equation simulator (shown below) to verify the expected results for various field conditions.

The IntelliPack math module's configuration property sheet simplifies the entry of equations.

Simulator

Simulated Inputs

Min Max

I/O	Signal Value	Engr. Units Value
Input 1 (A)	12.0000 mADC	500 GPM
Input 2 (B)	12.0000 mADC	250 GPM
Input 3 (C)	12.0000 mADC	125 GPM
Input 4 (D)	12.0000 mADC	50 GPM
Output 1	5.0000 VDC	925 GPM

The pop-up simulator sheet helps you test equations in software with slider bars to simulate input conditions.



Real Time Monitoring

892/894M DC Output Math Modules

Models

892M-0500: Two input channels

894M-0500: Four input channels

Input Ranges

0 to 1mA, 0 to 20mA, or 4 to 20mA DC

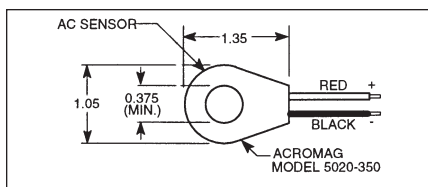
0 to 5V or 0 to 10V DC

0 to 20A AC (with AC current sensor)

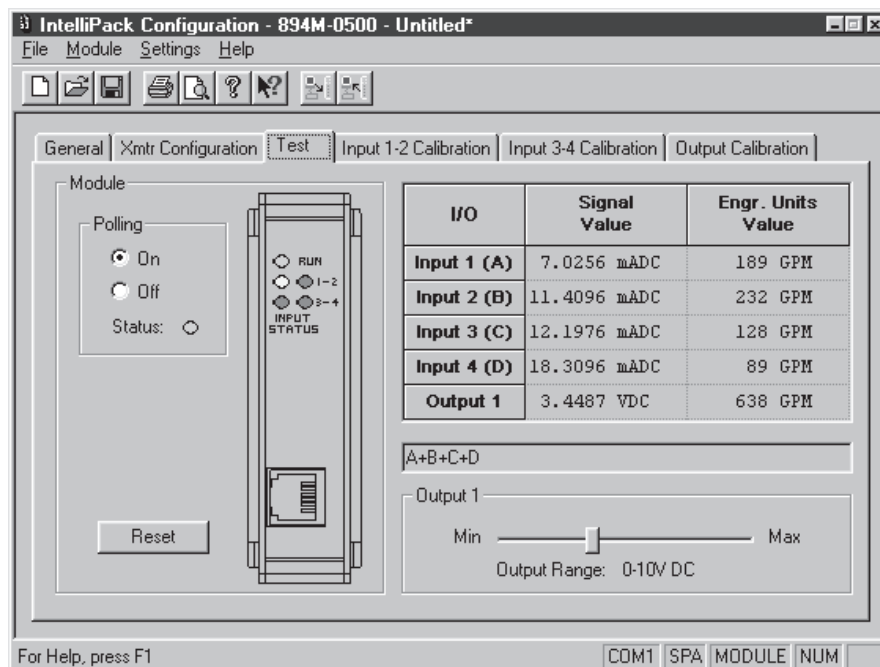
Output Ranges

0 to 1mA, 0 to 20mA, or 4 to 20mA DC,

0 to 5V or 0 to 10V DC



AC Current Sensor Model 5020-350
(ordered separately)



The test property sheet displays run-time input/output values for easy troubleshooting and diagnostics.

Arithmetic Functions

Function	Equation
Addition	$A+B+C+D$
Subtraction	$A - B+C - D$
Multiplication	$4*A - 2*B+3*C - 6*D$
Division	$(A/4+B/2 - 3*C)/8$
Square Root	$\text{SQRT}(A - B+C - D)$
Absolute Value	$\text{ABS}(A - B+C - D)$
Exponential	$\text{EXP}(2*A) = e^{2A}$
Power	$\text{POWER}(A, B) = A^B$
Natural Log	$\text{LN}(A+B)$
Log Base 10	$\text{LOG}_{10}(A/B)$
SIN, COS, TAN, ASIN, ACOS, ATAN	$\text{SIN}(A - B)$ $\text{ACOS}(A*B)$
Minimum	$\text{MIN}(A/2, B/4, 3*C, D)$
Maximum	$\text{MAX}((A - B)/4, C+D)$

Conditional

Function	Equation
If, Then, Else,	$\text{IF}(A>B) \text{ THEN } (2*C)$
And, Or	
>, <, <=	$\text{IF}(\text{OR}(A=B, B>=C))$
=, >=, <=	$\text{THEN } (D)$

Track & Hold Function

A digital input on the math module accepts a logic level signal from PLCs and other devices to hold the output constant at the last known value.



■ 892/894M Performance Specs

■ General

Analog to Digital Converter (ADC)
16-bit Σ - Δ A/D converter.

Ambient Temperature Effect

Better than $\pm 0.005\%$ of input span per $^{\circ}\text{C}$ or $\pm 1\mu\text{V}$, whichever is greater.

Noise Rejection

Normal Mode: 40dB @ 60Hz, 100 ohm unbalance.
Common Mode: 100dB @ 60Hz, 100 ohm unbalance.
(49.9 ohm unbalance for process current inputs).

Response Time (for input step change)

800mS typical to 98% of final output value.

Input Overvoltage Protection

Bipolar Transient Voltage Suppressors (TVS).

■ DC Current Input

DC Current Input Ranges

Input Ranges	Resolution
0 to 1mA DC	0.0370%
0 to 20mA DC	0.0025%
4 to 20mA DC	0.0025%

DC Current Input Impedance

49.9 ohms.

DC Current Input Accuracy

Better than 0.05% of input span, typical.
Better than 0.3% of input span typ. for 0-1mA range.

■ DC Voltage Input

DC Voltage Input Ranges

Input Ranges	Resolution
0 to 5V DC	0.0030%
0 to 10V DC	0.0025%

Input impedance

Greater than 500K ohms.

DC Voltage Input Accuracy

Better than 0.05% of input span, typical.

■ Output (DC V/mA)

D/A Converter

16-bit Σ - Δ .

Current Output

Ranges: 0-1mA, 0-20mA, 4-20mA.
Compliance: 10V minimum (500 Ω load).
Accuracy: 0.025% of span (0-1mA: 0.3% of span).

Voltage Output

Ranges: 0-5V, 0-10V.
Compliance: 10mA maximum with short circuit protection. 1 ohm output impedance.
Accuracy: 0.025% of span.

Accuracy (overall input to output)

Better than 0.075% of span, typical.
Better than 0.5% of span for 0-1mA, typical

■ Environmental

Ambient Temperature

Operating: -25 to 70 $^{\circ}\text{C}$ (-13 to 158 $^{\circ}\text{F}$).
Storage: -40 to 85 $^{\circ}\text{C}$ (-40 to 185 $^{\circ}\text{F}$).

Relative Humidity

5 to 95%.

Power Requirements

10 to 36V DC. 120mA @ 24V. 200mA @ 15V.

Isolation (optical)

3-way (input/output/power).
Input circuits share a common.
1500V AC peak or 250V AC (354V DC) continuous.

Radiated Field Immunity (RFI)

EN61000-4-3, EN50082-1.

Electromagnetic Field Immunity (EMI)

Less than $\pm 0.25\%$ of output span effect under the influence of electromagnetic fields from switching solenoids, commutator motors, and drill motors.

Electrical Fast Transient (EFT)

EN61000-4-4, EN50082-1.

Surge Withstanding Capability (SWC)

EN61000-4-5, EN50082-1.

Electrostatic Discharge (ESD)

EN61000-4-2, EN50082-1.

Radiated Emissions

EN50081-1 for Class B equipment.

Approvals

CE marked.
UL listed
cUL listed
Hazardous Loc.: Class I; Division 2; Groups A, B, C, D.

■ Configuration

Software Configuration

Units are fully programmable via the Windows XP/Vista/7 IntelliPack Configuration Program. Configuration downloads from PC through EIA232 serial port using Acromag 800C-SIP kit.

LED Indicators

LEDs indicate power and status.

■ Physical

Enclosure

Case: Self-extinguishing NYLON type 6.6 polyamide thermoplastic UL94 V-2 NEMA Type 1 enclosure.

Connectors (Removable Terminal Blocks)

Wire Range: AWG #14-22 (AWG #12 stranded only).

Printed Circuit Boards

Military grade FR-4 epoxy glass circuit board.

Dimensions

1.05W x 4.68H x 4.35D inches.
26.7W x 118.9H x 110.5D millimeters.

Shipping Weight

1 pound (0.45 Kg) packed.

■ Ordering Information

IMPORTANT: All IntelliPack units require initial software configuration (order 800C-SIP). See Note 1 below.

892M-0500

Dual input computation module with single output.

894M-0500

Quad input computation module with single output.

5020-350

AC current sensor. Required for AC inputs.. See Page 205 for more information.

800C-SIP

Software Interface Package.
Only one kit is required for all IntelliPack models. See diagram on Page 83 for included parts.

5034-225

USB-to-RS232 adapter. See page 121 for more info.

PS5R-D24

Power supply (24V DC, 2.1A). See Power Supplies on Page 199.

TBK-B02

Optional terminal block kit, barrier strip style, 4 pcs.

TBK-S02

Optional terminal block kit, spring clamp style, 4 pcs.

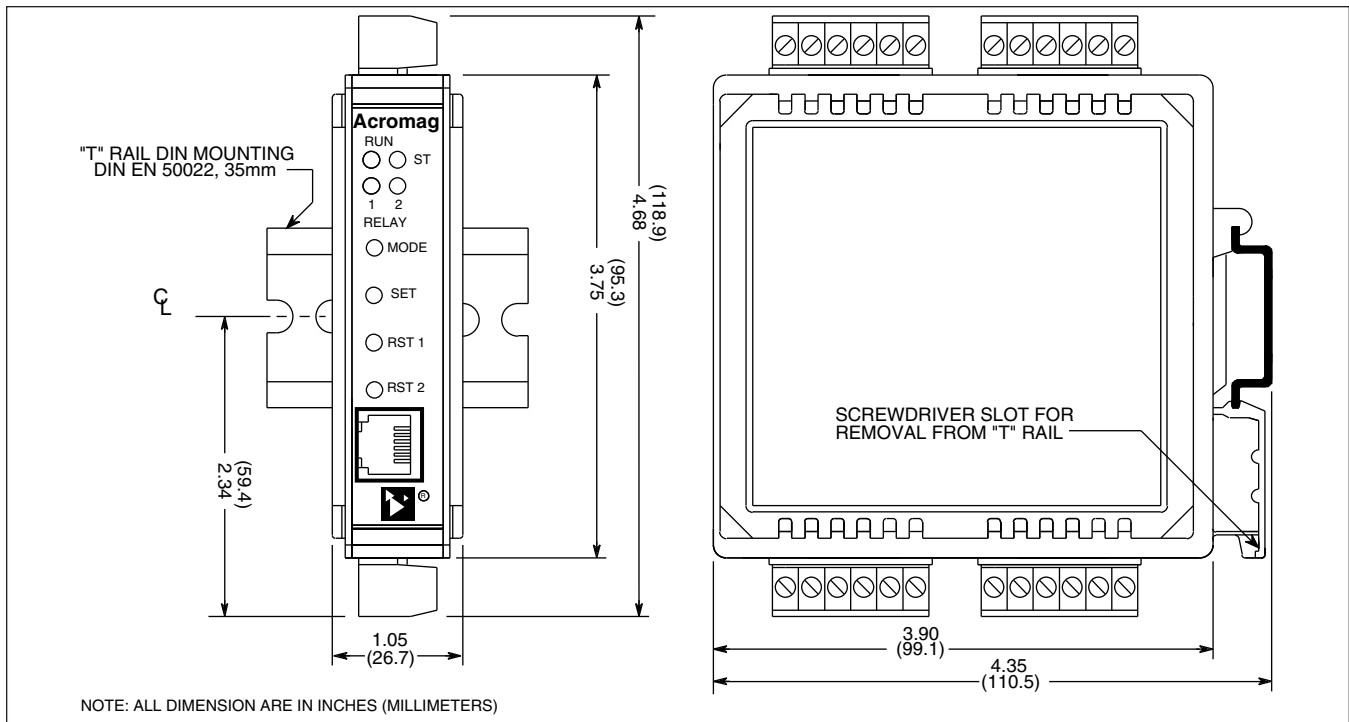
NOTE 1: To order factory configuration, call Acromag for a configuration form which must accompany your order. Also, append "-C" to model number (example: 892M-0500-C). 800C-SIP kit is still recommended.



Optional terminal blocks: barrier strip (left) and spring clamp (right). Cage clamp terminal is standard.



Dimensions





Accessories

Terminal Blocks

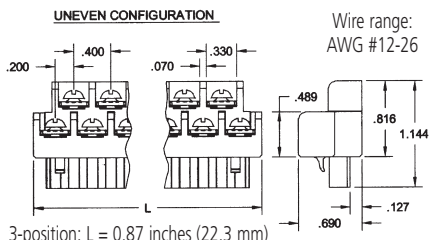
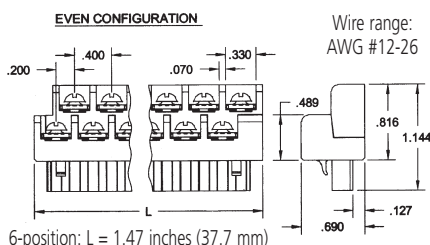


Barrier strip (left) and spring clamp (right).

Ordering Information

See individual I/O modules for compatibility.

Barrier Strip Terminal Blocks

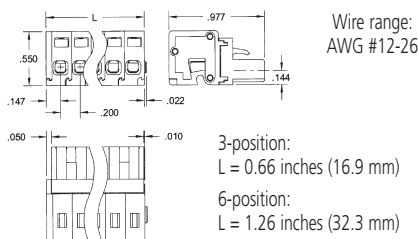


TBK-B01
Terminal block kit,
two 6-position pieces

TBK-B02
Terminal block kit,
four 6-position pieces

TBK-B03
Terminal block kit,
one 3-position and
three 6-position pieces

Spring Clamp Terminal Blocks



TBK-S01
Terminal block kit,
two 6-position pieces

TBK-S02
Terminal block kit,
four 6-position pieces

TBK-S03
Terminal block kit,
one 3-position and
three 6-position pieces

Mounting Hardware



DIN-Rail Mounting

For your convenience, Acromag offers several mounting accessories to simplify your system installation. Our 19" rack-mount kit provides a clean solution for mounting your I/O modules and a power supply. Or you can buy precut DIN rail strips for mounting on any flat surface.

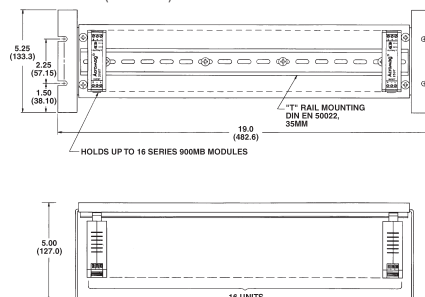
Ordering Information

20RM-16-DIN
19" rack-mount kit with DIN rail.

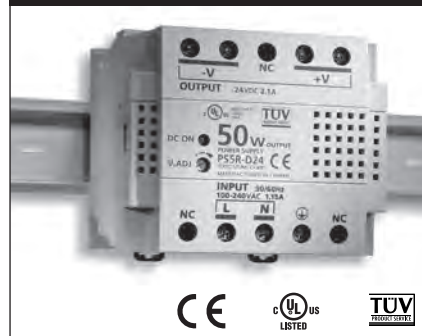
DIN RAIL 3.0

DIN RAIL 16.7

DIN rail strip, Type T, 3 inches (75mm) or 16.7 inches (425mm)



Power Supplies



50W Supply

Input Power Requirement
85 to 264V AC or 105 to 370V DC

Output
24V DC, 2.1A (50W)

Ordering Information

P55R-D24
Universal 50W power supply

See Power Supplies on Page 199 for other models and more information.

USB / RS232 Adapter

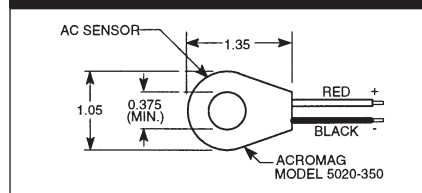


Length: 3.15 in (8.0 cm)
Height: 0.80 in (2.03 cm)
Width: 1.75 in (4.44 cm)
Weight: 1.6 oz (45.36 g)

Ordering Information

5034-225
USB-to-RS232 adapter

AC Current Sensor



Ordering Information

5020-350
AC current sensor (See page 205)