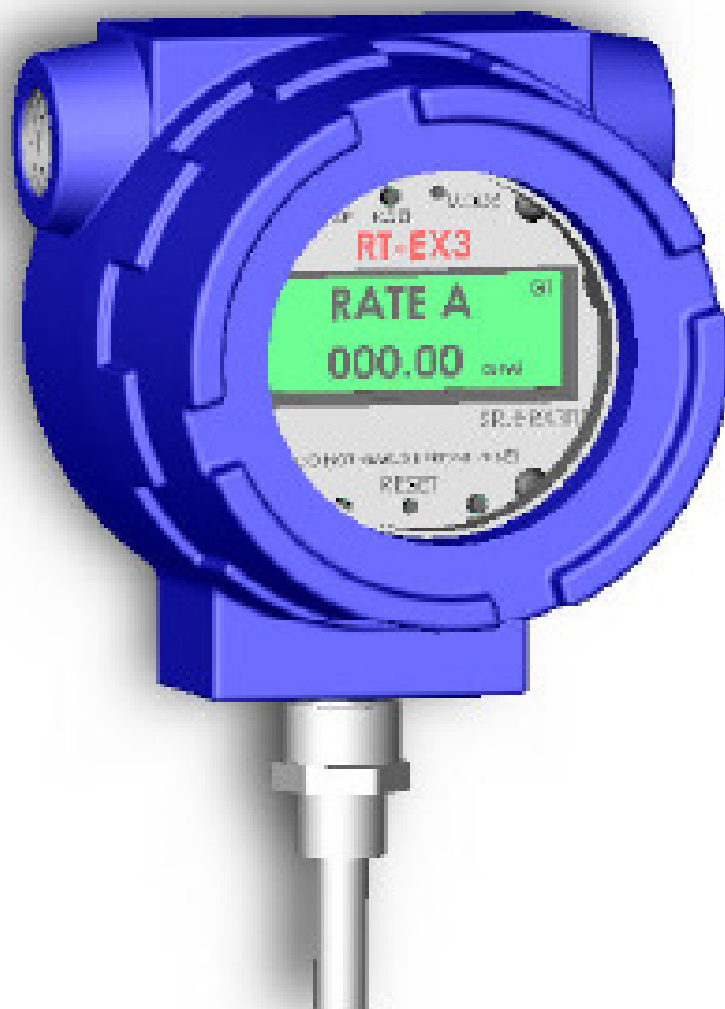


RT-EX3

FLOW MONITOR

Users Manual Rev 2



RT-Ex3H / RT-Ex3C / RT-Ex3T/ RT-Ex3HP FLOW MONITOR

Revision 2.0 for Software Version 1.12 2002

Introduction / Features.....	page 2
Specifications.....	page 2
Dimensional Drawings.....	page 2
Wiring Connections.....	page 3
Connection Diagram.....	page 3
Programming the RT-Ex3.....	page 4
Startup Message.....	page 4
RT-Ex3 Display Modes.....	page 4
LOGO Mode – Turning On/Off Displays.....	page 5
RATE Display Modes.....	page 5
RATE A ^{GT}	page 5
RATE A ^{PL}	page 6
RATE Mode Programming.....	page 6
KFR A VALUE.....	page 7
GATE A B.....	page 8
SAMPLE A.....	page 8
ENG UNITS A.....	page 8
TOTAL Display Modes.....	page 9
TOTAL A Display.....	page 9
GR TOTAL A Display.....	page 9
TOTAL Reset / Rollover.....	page 9
TOTAL Mode Programming.....	page 10
KFT A VALUE.....	page 10
ENG UNITS A.....	page 11
STATUS ONE Display Mode.....	page 11
ANALOG OUT Display Mode.....	page 11
ANALOG OUT Programming.....	page 11
MA OFFSET.....	page 12
ANALOG POINT.....	Page 12
VALUE AT 20 MA.....	Page 12
LIMITS Display Mode.....	page 13
LIMITS Programming.....	Page 13
RATE/TOTAL limits.....	Page 13
CYCLE OUT (Totalizer Pulse Output)....	Page 13
RATE & TOTAL Display Mode	page 14
BATCH TOTAL Display Mode	page 15
BATCH TOTAL Programming.....	page 15
QUICK-GUIDE to the RT-EX3 Variables & Displays....	Page 16
Limited Warranty Statement.....	Page 17

Introduction / Features

The RT-Ex3 is a meter-mounted digital flow monitor housed in a Class I Div. I Rated Enclosure. A large, back-lighted LCD graphic display provides easy to read indication of flow rate or total in user programmable engineering units. Change of display modes or reset of the totalizer is accomplished using an attached magnet without opening the enclosure. An isolated input also allows for remote reset of the totalizer. Programmable opto-isolated NPN open-collector outputs provide flowrate limit indication or a pulsed total output for remote monitoring and recording of totals. A 4-20 mA rate output with user programmable filtering and scaling is also provided for remote indication.

Specifications

Power Requirement:

24 VDC/500mA. (customer supplied)

Sensor/Monitor Frequency Range:

0-4000 PPS

Analog Output 4-20 mA:

12-bit D/A Converter
Internal Powered Loop Output.
Max. Load Impedance 500 Ohm.

Temperature Ratings:

-20 to 120°C (-4 to 248°F) Ambient
125°C (257°F) Max. Fluid Temperature

Two Opto-Isolated Open-Collector Outputs:

5-30 VDC Rating, 50 mA Max. (Minimum Load Impedance Required, 600 Ohm @ 30 VDC)

Opto-Isolated Reset Input:

5-30 VDC Input, 3.3Kohm Impedance

Enclosure Certifications:

Class I, Groups B, C, D
Class II, Groups E, F, G
Class III
Cenelec: EEx d IIC, IP66
NEMA 4X, 7BCD, 9EFG
CSA Certified Standard C22.2-30
FM Class No. 3615
INIEX Cert. Rating EX88B103703U
ISSEP CENELEC Standard EN 50014,5001

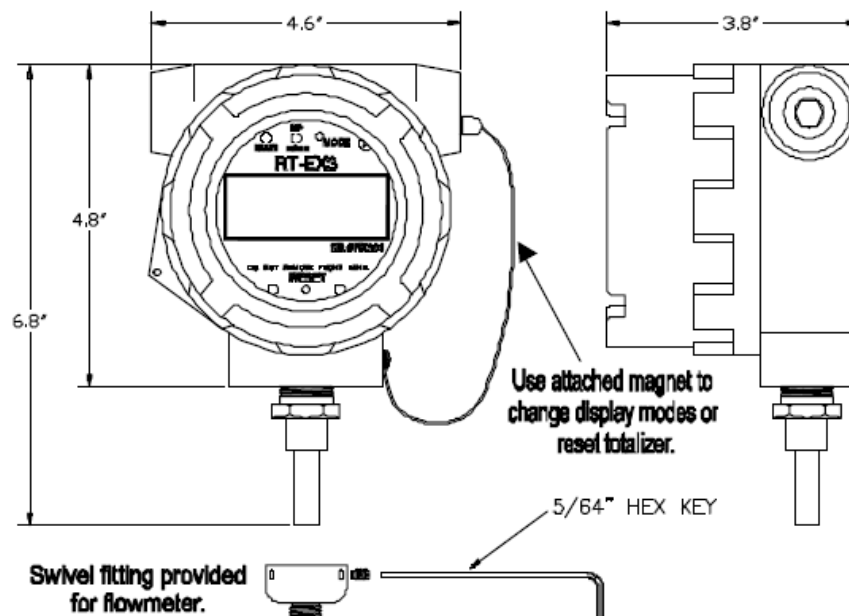
Device Certification:

CENELEC EEx dm IIC T4,
Standard EN 50014,50018, & 50028

Connection:

Labeled Pigtail Leads
½" NPT Conduit Provisions

RT-Ex3H & -Ex3C Dimensions



Wiring Connections

The RT-EX3 provides a ½" NPT port for conduit connection with labeled pigtailed wire leads for electrical connection. Connection to conduit is required to maintain the enclosure's CENELEC, CSA, and FM explosion-proof rating and must be made in accordance with all local and national electrical codes. Conduit runs must have sealing fittings connected within 18" (45cm) of the enclosure. To prevent ignition of hazardous atmospheres, disconnect circuits before removing cover. Keep cover tightly closed while circuits are alive. **The RT-EX3 requires power to be applied and the cover removed during programming and set-up. PROGRAMMING MUST BE DONE OUTSIDE THE HAZARDOUS AREA.** See Programming the RT-EX3 beginning on page 4.

DC Power Connection

The RT-EX3 requires a 15-24 VDC/500mA supply for operation. It is recommended to tie the DC COMMON of the 24 Vdc power supply to earth ground at the source.

Analog Output

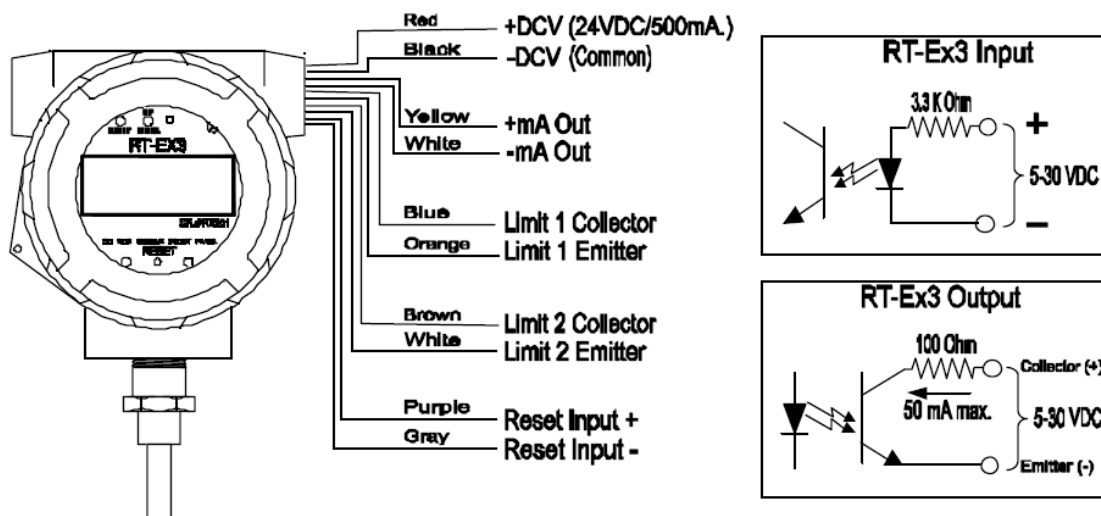
The RT-EX3 provides a 12-bit self-powered loop output capable of driving a 500Ω maximum load. The offset and scaling values for the mA output are programmed from the ANALOG OUT display screen. See ANALOG OUT Programming on page 11 for information regarding set-up of the analog output.

Limits/Pulse Outputs

The RT-EX3 has two opto-isolated NPN open-collector outputs that can sink or source depending on connection. Attention must be paid to polarity of connections, collector (+), emitter (-). See inset below. Output ratings are listed on page 2. Either output can be assigned to a rate limit, total limit for batching or as a totalizer pulsed output. See LIMITS Display Mode and LIMITS Programming on page 12 for information regarding the display and programming of the limit and pulse output.

Reset Input

The RT-EX3 has an opto-isolated input to reset the TOTAL A (Job Total). See TOTAL A RESET on page 8 for information regarding reset of the job totalizer.



Programming the RT-EX3

The RT-EX3 requires power to be applied and the cover removed for programming and set-up. **PROGRAMMING MUST BE DONE OUTSIDE THE HAZARDOUS AREA.** To facilitate the set-up programming, the cover must be removed and power applied in a non-hazardous area.

To scale the rate or total display, output, or limits, the RT-EX3 will require programming of the RATE, TOTAL, ANALOG OUT and LIMIT variables. All RT-EX3 parameters are programmed from the corresponding display screen. For example, to program the rate scaling-factor, decimal resolution and engineering units for display, select the RATE A GT display. This manual will take the user through the various programming steps in order.

After variable programming is completed and the desired display mode is selected disconnect the power and tightly install the RT-EX3 cover before installation in the hazardous area. See Wiring Connections on page 3.

Startup Message

The RT-Ex3 displays an initial window at power up. After a second the following message will be displayed in the window for approximately 2 seconds. After this message, the display will revert to the last active Display Mode selected.

LOAD VARS	RT-EX3
TURN ON 0026.	
MEM LEFT 099.9	
VERSION 112	2002

LOAD VARS – Indicates that the variables are being recalled from EEPROM.

TURN ON – Increments on each power-on cycle of RT-Ex3.

MEM LEFT – Memory life indicator displays % of memory life remaining in .1% increments. The RT-EX3 stores programmed variables and retained totalizer values in EEPROM (electrically erasable memory). The limit on the number of times memory can be re-written results in a minimum EEPROM life of 5 years with continuous use. This memory IC is field replaceable and replacement memory ICs are available. Care must be used to insert the new memory IC in the exact same orientation as the one removed. Program variables require reprogramming after memory IC change.

VERSION – Indicates the software version installed in the RT-EX3.

RT-EX3 Display Modes

The RT-EX3 has ten display/program modes:

LOGO	GR TOTAL A*	RAT A TOT A*
RATE A ^{GT}	STATUS ONE*	BATCH TOTAL
RATE A ^{PL}	ANALOG OUT	
TOTAL A	LIMITS	

*Display only, no programming function

During normal operation with the cover secured, the Display Mode is changed by touching the attached magnet to the glass over the area labeled "MODE". The RT-EX3 will retain the last display mode selected and display it on power up. Seven of the display modes are also used to program the related variables. The MODE-key (UP) is used to change the Display Mode when the RT-Ex3 cover is opened during programming.

LOGO Mode - Turning On/Off Displays

LOGO – Display Mode "RT-EX3" is used during unit programming/set-up to turn-on or turn-off Display Modes. Not every user will require all of the display modes and any of the ten Display Modes can be turned off based on a user's particular needs. To reassign, turn-on, or turn-off a display mode use the MODE-key (UP) to select the LOGO display mode. Press and hold the (ENT)-key. The display will first show a P in the lower left-hand corner and then show DISPLAY 00 and indicate which display mode is assigned to DISPLAY 00. DISPLAY 00 is assigned to the LOGO screen allowing access for display activation/deactivation.

To turn-off a display mode, use the (ENT)-key to scroll through the DISPLAY #s until the appropriate display mode is encountered. Use the RESET-key (DN) to turn the display off. The DISPLAY # assignment will indicate OFF DISPL. Pressing the (ENT)-key will store the current assignment and advance the RT-Ex3 to the next available display number (00-09) or will exit the LOGO display programming procedure.

To change a DISPLAY # assignment to a different mode use the (SEL)-key to select from the available display modes. Any DISPLAY # can be assigned as any display mode. Pressing the (ENT)-key will store the current assignment and advance the RT-Ex3 to the next available display number (00-09) or will exit the LOGO display programming procedure.

To restore a Display Mode that has been turned off, use the (ENT)-key to select a DISPLAY # with a OFF DSPL assignment. Select a display mode assignment using the (SEL)-key. Pressing the (ENT)-key will store the current assignment and advance the RT-Ex3 to the next available display number (00-09) or will exit the LOGO display programming procedure.

NOTE: The LOGO screen can be turned off, but as it will no longer appear there is no way to access screen programming. If the LOGO display is turned off for any reason it can be restored to allow access to screen programming by cycling the power to the RT-Ex3 while pressing and holding the (ENT)-key. This will reactivate the LOGO screen as DISPLAY 00 and restore access to LOGO screen programming.

RATE Display Mode

The RT-Ex3 continuously calculates rate by two methods simultaneously, Gate Time and Pulse Width.

Gate Time - (RATE A ^{GT}) Rate is displayed based on the number of pulses counted during a prescribed time period. RATE A ^{GT} is updated at the programmed interval regardless of the input frequency. Increasing the gate time interval produces a filtering or averaging effect useful for stable display and output of uneven or intermittent flows. The RT-EX3 analog output is assigned to RATE A ^{GT}.

Pulse Width - (RATE A ^{PL}) Rate is displayed based on the time from pulse edge to pulse edge. The Pulse Width Method is highly responsive updating more frequently at high input frequencies and less frequently at lower input frequencies. RATE A ^{PL} is useful for observing flow variations or peak intermittent flows. A digital filter SAMPLE A can be used to produce a more stable display response.

RATE A ^{GT} – RATE A Gate Time. Displays the rate by the gate time method based on the programmed GATE AB variable and displayed based on the corresponding KFR factors, decimal locations and engineering units. The zero cutoff frequency for display and analog output is .3 Herz. (While the cover is removed the pulse length measurement RATE A ^{PL} can be viewed temporarily by pressing the (SEL)-key while in the RATE A ^{GT} display as illustrated below. The rate display will revert back to RATE A ^{GT} if power is cycled to the RT-EX3). A typical display would be:



RATE A ^{PL} – RATE A Pulse Length. The rate is calculated by the pulse length method based on the SAMPLE A variable and displayed based on the corresponding KFR factor, decimal location and engineering units. (While the cover is removed the gate time measurement RATE A ^{GT} can be viewed temporarily by pressing the (SEL)-key while in the RATE A ^{PL} display as illustrated below. The rate display will revert back to RATE A ^{PL} if power is cycled to the RT-EX3). A typical display would be:



RATE Mode Programming

The Rate parameters are programmed from the RATE A ^{GT} or RATE A ^{PL} display screen. RATE A ^{PL} variables can also be programmed from the RATE A ^{GT} screen or vice versa by toggling to the RATE A ^{PL} mode using the (SEL)-key. Use the MODE-key (UP) to select the RATE ^{GT} display. Press and hold the (ENT)-key. The display will first show a P in the lower left-hand corner and will then display the first program variable for that rate display mode. Three parameters will be accessed for either mode as follows:

<u>RATE A ^{GT}</u>	<u>RATE A ^{PL}</u>
⇒ KFR A VALUE	⇒ KFR A VALUE
⇒ GATE A B	⇒ SAMPLE A
⇒ ENG UNITS A	⇒ ENG UNITS A

KFR A VALUE – Scaling factor to display rate in a desired engineering unit such as GPM. The KFR factor entered here will also determine the decimal resolution of the rate display. The KFR is calculated using the K-factor of the transducer being monitored. The K-factor is the number of impulses per engineering unit established by the transducer manufacturer or by a calibration test. The K-factor and the recommended KFR values are given on the AW Co. Calibration sheet.

Initial default is 100.00 (Displays Hertz w/ two decimal places)

The KFR factor is calculated using the following formula: **KFR= 6000/K-FACTOR**

Where:

- **100** is the time base constant for **eng. units per second**
- **6000** is the time base constant for **eng. units per minute**
- **360000** is the time base constant for **eng. units per hour**
- **8640000** is the time base constant for **eng. units per day**
- **K-FACTOR** is the average number of pulses per desired eng. unit that the transducer produces.

Determine the number of decimal places desired for rate display, round off the result of the formula to the desired accuracy and enter the KFR using only that number of decimal places. Using too few decimal places can cause relatively large display errors up to several percent of actual reading. Using too many decimal places can result in displays with a level of precision exceeding the accuracy of the meter. It is recommended to use no more than four digits regardless of decimal point position! The largest acceptable value for KFR is 65535 with the decimal in any location.

For example:

A flowmeter has a K-factor 2053.57 imp/Gal and the display should read in Gal/Min. with accuracy to three decimal places.

$$\text{KFR} = 6000 / 2053.57 = 2.921741 \text{ for GPM}$$

Round off 2.921741 to three decimal places and enter 2.922 for KFR.

When entering or editing the value, the digit being edited will blink starting with left-most digit. Select the digit to edit using the (SEL)-key. Press and hold the (UP) or (DN)-key to increment or decrement the variable value. When the desired value is displayed, press the (ENT)-key to store the programmed value and advance to the next variable.

GATE A B – Gate time. This variable sets the sample time on the incoming frequency for the RATE A ^{GT} (Gate Time) displays. This variable is programmed in tenths of a second and the allowable range is from .01 to 600 seconds. This variable affects the update of the display and analog output and is useful in stabilizing the display and output when dealing with slight variations in flow.

When entering or editing the value, the digit being edited will blink starting with left-most digit. Select the digit to edit using the (SEL)-key. Press and hold the (UP) or (DN)-key to increment or decrement the variable value. When the desired value is displayed, press the (ENT)-key to store the programmed value and advance to the next variable.

Initial default is 002.00 seconds

SAMPLE A - This variable determines the amount of digital filtering performed on the incoming frequency for the RATE A ^{PL} (Pulse Length) display. The allowable range is from 0 to 253 with 0 providing the least level of filtering and 253 the maximum. This variable affects the

update of the display and analog output and is used as a filter to stabilize the display and output.

Initial default is 010

When entering or editing the value, the digit being edited will blink starting with left-most digit. Select the digit to edit using the (SEL)-key. Press and hold the (UP) or (DN)-key to increment or decrement the variable value. When the desired value is displayed, press the (ENT)-key to store the programmed value and advance to the next variable.

ENG UNITS A - The desired engineering units for display of rate are programmable using up to four letters. Example: GPM_

Initial default is HZ__

The first (left-most) character will be highlighted with the blinking cursor first. The (SEL)-key moves the cursor and the (UP) or (DN)-keys scroll through the alphabet. When the characters are all entered, press the (ENT)-key to store the variable. The RT-Ex3 will exit the variable programming mode and return to the selected display.

TOTAL Display Modes

The RT-EX3 displays the JOB or GRAND total based on the programmed KFT, engineering unit, and decimal location. There are two TOTAL displays, TOTAL A (Job Total) and GRAND TOTAL A. The GRAND total is a second totalizer with a secured reset. Both totals are retained by the RT-EX3 when the power is removed. The totals retained at power-down are updated once every 25 seconds. Due to this update interval, the totals retained may not include previous flow for up to 25 seconds if flow was present when the power was removed.

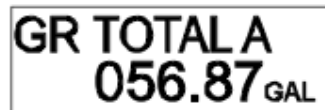
TOTAL A DISPLAY

Displays Job Total A. Also used for programming of total scaling factor KFT and reset of TOTAL A and GR TOTAL A. (While the cover is removed the grand total GR TOTAL A can be viewed temporarily by pressing the (SEL)-key while in the TOTAL A display as illustrated below. The rate display will revert back to RATE A ^{GT} if power is cycled to the RT-EX3).



GR TOTAL A DISPLAY

For display of GR TOTAL A only. No programming or reset functions are associated with this display.



TOTAL A RESET – The Job total can be reset by touching the attached magnet to the glass over the area labeled “RESET” while TOTAL A or RAT A TOT A is displayed (or with the RESET-key (DN) while cover is open). First select a total display by touching the attached magnet to the glass over the area labeled “MODE” and then touch the magnet to the glass over the area labeled “RESET”. TOTAL A will be reset to zero by this operation. TOTAL A can also be reset at anytime using the Reset Input. See page 3 for wiring information.

GR TOTAL A RESET – The Grand total can only be reset with the cover off via the front panel touch-keys using a multiple key entry sequence. To reset GR TOTAL A, select the TOTAL A display mode using the MODE-key (UP). Use the (SEL)-key to change to the GR TOTAL display. Press the RESET-key (DN) and (ENT)-key simultaneously and hold until the RT-EX3 responds. A warning will appear on the screen requesting yes/no verification before resetting the GR TOTAL. The RT-EX3 prompts the user either to press the (ENT)-key to accept the default answer of NO and exit the reset procedure at this point, or to reset the total. To reset, use the (SEL)-key first to toggle the response to YES and then press the (ENT)-key. GR TOTAL A will be reset to zero by this operation.

TOTAL & GR TOTAL Rollover – RT-EX3 JOB totals will rollover to zero when the total reaches a value of 999999 regardless of the decimal location. When a JOB total rolls over or is reset, the contents of the JOB total are then added in memory to the GRAND total. To allow retention of the largest possible GRAND total before data loss, after reaching a value of 999999 regardless of decimal location, a floating decimal feature on GRAND TOTAL rollover automatically reduces decimal resolution up to a maximum of two decimal places before rolling over to zero and losing the total. Example: For a KFT with 4 decimal places the GRAND total will reach 9999.99 instead of 99.9999 before resetting to zero.

Total Mode Programming

The Total parameters are programmed from the TOTAL A display screen. With the cover open, use the MODE-key (UP) to select the TOTAL A display. Press and hold the (ENT)-key. The display will first show a P in the lower left-hand corner and will then display the first program variable for the TOTAL display mode. Two parameters will be accessed from the TOTAL screen as follows:

TOTAL A
⇒KFT A VALUE
⇒ENG UNITS A

KFT A VALUE – Scaling factor to display totals in a desired engineering unit such as Gallons. The KFT value entered here will also determine the decimal resolution of the total display. The KFT is calculated using the K-factor of the transducer being monitored. The K-factor is the number of impulses per engineering unit established by the transducer manufacturer or by a calibration test. The K-factor and recommended KFT value are given on the AW Co. Calibration sheet.

Initial default is 10000. (Displays total pulses w/ no decimals)

The KFT factor is calculated using the following formula:

$$\text{KFT} = 10000 / \text{K-FACTOR}$$

Where:

- **10000** is a constant
- **K-FACTOR** is the average number of pulses per desired eng. unit that the transducer produces.

Determine the number of decimal places desired for total display, round off the result of the formula to the desired accuracy and enter the KFT using only that number of decimal places. Using too few decimal places can cause relatively large display errors up to several percent of actual reading. Using too many decimal places can result in displays with a level of precision exceeding the accuracy of the meter. It is recommended to use no more than four digits regardless of decimal point position! The largest acceptable value for KFT is 65535 with the decimal in any location.

For example:

A flowmeter has a K-factor 2053.57 imp/Gal and the display should read in Gallons with accuracy to three decimal places.

$$\text{KFT} = 10000 / 2053.7 = 4.869568 \text{ for Gallons}$$

Round off 4.869568 to three decimal places and enter 4.870 for KFT.

When entering or editing the value, the digit being edited will blink starting with left-most digit. Select the digit to edit using the (SEL)-key. Press and hold the (UP) or (DN)-key to increment or decrement the variable value. When the desired value is displayed, press the (ENT)-key to store the programmed value and advance to the next variable.

ENG UNITS A - The desired engineering units for display of total are programmable using up to four letters. Example: GALS

Initial default is PULS

The first (left-most) character will be highlighted with the blinking cursor first. The (SEL)-key moves the cursor and the (UP) or (DN)-keys scroll through the alphabet. When the characters are all entered, press the (ENT)-key to store the variable. The RT-Ex3 will exit the variable programming mode and return to the selected Total display.

STATUS ONE Display Mode

The STATUS ONE screen displays the Rate A^{PL}, Total A, and the analog output value in mA. This screen is useful for set-up or troubleshooting. A typical display would be:

STATUS ONE
RTA 02.500
TOA 0035.3
ANO 004.02

ANALOG OUT Display Mode

The ANALOG OUT display mode displays the analog output value in milliamps. The two-digit number shown after ANALOG OUT indicates what the output represents. In this case, "00" indicates that the output represents RATE A^{GT}. See the Analog Point parameter for more information regarding output assignment. A typical display would be:

ANALOG OUT 00
04.02 MAS

ANALOG OUT Programming

The RT-EX3 has a 12-bit analog output with programmable span and scaling. The output span can be configured between 0 to 20mA and 10 to 20mA using the MA OFFSET parameter. The flow rate represented by the maximum output is programmable. The signal assignment, offset and scaling values for the mA output are programmed from the ANALOG OUT display screen. Use the MODE-key (UP) to select the ANALOG OUT display.

Press and hold the (ENT)-key. The display will first show a P in the lower left-hand corner and will then display the first program variable for this mode. Three parameters will be accessed in order as follows:

- ⇒MA OFFSET
- ⇒ANALOG POINT
- ⇒ENTER *VALUE* AT MAX MAs

MA OFFSET – This variable is used to set to lowest value for the mA output span and as a fine offset adjustment in the field if necessary. The low range of the output span is programmable between 0.00 and 10.00 mA. The initial value is set to produce 4.00mA at the output for a zero value.

When entering or editing the value, the digit being edited will blink starting with left-most digit. Select the digit to edit using the (SEL)-key. Press and hold the (UP) or (DN)-key to increment or decrement the variable value. When the desired value is displayed, press the (ENT)-key to store the programmed value and advance to the next variable.

ANALOG POINT – This variable is used to “point” to an output assignment for the analog output. The output can be assigned to represent one of 3 possible functions as follows:

RATE A ^{GT} (#00) RATE A ^{PL} (#01) TOTAL A (#02)

A number corresponding to the output assignment is displayed to indicate the current function of the analog output. The default assignment for the ANALOG POINT is RATE A ^{GT} (#00). RATE or TOTAL assignments will produce an output ranging from the MA OFFSET value (0-10 mA) for a zero value, to 20 mA for the maximum programmed flow rate or total.

Use the (SEL)-key to select the output assignment. Press the (ENT)-key to store the desired output assignment.

ENTER VALUE AT MAX MA'S – This scaling variable is used set the maximum mA output (20mA.) to a corresponding rate value producing an output ranging from the MA OFFSET value (0-10 mA) for a zero value, to 20 mA for the maximum programmed flow rate. The entry will correspond with the KFR, decimal location and engineering units for RATE A ^{GT}. The initial value is a rate of 10 HZ.

When entering or editing the value, the digit being edited will blink starting with left-most digit. Select the digit to edit using the (SEL)-key. Press and hold the (UP) or (DN)-key to increment or decrement the variable value. When the desired value is displayed, press the (ENT)-key to store the programmed value and advance to the next variable.

LIMITS Display Mode

The RT-EX3 has two programmable limit outputs: L1 & L2. The LIMIT display shows the function that each limit is assigned to, the value in engineering units at which each limit will become active or change state, and the current status of the limit outputs. The limit values are displayed using the KFR or KFT, decimal location and engineering units corresponding to the limit assignment. A typical display would be:

L1	RATE A GT			
	003.00	GPD	ON	
L2	CYCLE OUT			
	000.10	GAL	OFF	

LIMITS Programming

The Limits are programmed from the LIMIT display screen. L1 and L2 can be assigned to any of the following functions.

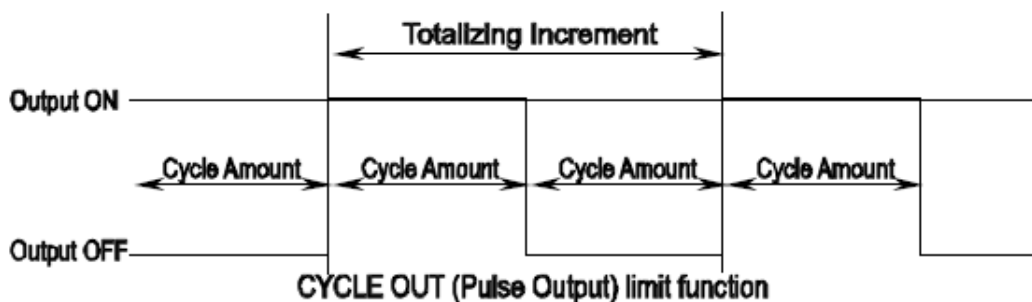
RATE A ^{GT}	TOTAL A
RATE A ^{PL}	CYCLE OUT (Pulse Output)

RATE Limits / Limit MARGIN – To operate a limit based on RATE, select a RATE function based on pulse length or gate time measurement. The MARGIN variable is programmed in engineering units and determines whether the limit functions as an absolute limit or activates within a margin or “window” around the programmed RATE limit. When the MARGIN is programmed as zero, the limit will activate whenever the selected RATE equals or exceeds the programmed value. When a MARGIN value other than zero is entered, the limit will be activated whenever the selected RATE is within the “window” of the programmed RATE limit value plus or minus the MARGIN value.

TOTAL Limits – To operate a limit based on the JOB TOTAL, select TOTAL A for the Limit function. The limit will activate whenever the selected TOTAL equals or exceeds the programmed value. See BATCH TOTAL Display Mode on page 14 for alternate set-up of total limits.

CYCLE OUT (Pulse Output) – The CYCLE OUT limit function provides an increment output signal for a remote totalizer typically at a lower resolution and frequency. Either or both limits can be assigned to a CYCLE OUT function. Assigning a limit to the CYCLE OUT function will toggle the state of the limit output whenever Job TOTAL A has incremented by the programmed cycle amount. The output will remain on until the cycle amount has accumulated and turn off until the cycle amount has accumulated again as represented in the following diagram. The total accumulated between a rising and falling edge is the cycle value. The totalizing increment (total accumulated between any two rising edges) is twice the cycle value. you will program a CYCLE amount that is ½ of the desired totalizing increment. The cycle value is entered in engineering units corresponding to the programmed KFT and decimal location. The frequency produced (in Hz.) is the actual flow rate in Engineering Units per Minute divided by 120, divided by the CYCLE AMOUNT.

NOTE: An external totalizer can miss up to at least one cycle amount of accumulation each time that power is cycled to the RT-EX3.



To program limit functions, use the MODE-key (UP) to select the LIMIT display. Press and hold the (ENT)-key. The display will first show a P in the lower left-hand corner and will then highlight the L1 indication with a blinking cursor. Use the (SEL)-key to select the function of the limit assignment. Press the (ENT)-key when the desired mode is displayed for L1. The cursor will now highlight the numeric value to be entered for L1. Entries correspond with the scaling factor, decimal location and engineering units for the function selected. The left-most digit will highlight with a blinking cursor. Move the cursor left to right using the (SEL)-key. Use the (UP) or (DN)-key to increment or decrement each digit's value. When editing is complete and the desired value is displayed, press the (ENT)-key to store the programmed value for L1. If a RATE assignment has been made, the RT-EX3 will next prompt the user to enter the RATE LIMIT MARGIN in percent. The left-most digit will be highlighted with the blinking cursor. Move the cursor using the (SEL)-key. Use the (UP) or (DN)-key to increment or decrement each digit's value. When editing is complete and the desired value is displayed, press the (ENT)-key to store the programmed RATE LIMIT MARGIN. The RT-EX3 will then highlight the L2 indication with a blinking cursor. Repeat the procedures used for L1. When the L2 programming is complete, press the (ENT)-key to store the programmed values and exit LIMITS programming. NOTE: See Wiring Connections and Connection Diagram on page 3 for information regarding connection to limit outputs.

RATE A / TOTAL A Display Mode

RATE A ^{GT} and TOTAL A (Job Total) are viewed on the same screen using the RATE A_TOT A display. Rates and totals are displayed in the corresponding engineering units based on the programmed KFR and KFT factors and decimal locations. (While the RT-EX3 cover is open the GR TOTAL can be viewed using the (SEL)-key to switch between TOTAL A (TA) display and GR TOTAL A (GA) display as illustrated below. After a power cycle, the RT-EX3 will revert to the Job Total (TA) display). Typical displays would be:



The RATE A TOT A display is only for viewing the rate and total simultaneously and has no programming function. Rate and Total variables are programmed from the RATE A ^{GT} or RATE A ^{PL} and TOTAL A screens respectively.

BATCH TOTAL Display Mode

The BATCH TOTAL displays the JOB A total and the S1 & S2 total limit activation levels. When the RT-Ex3 is programmed for BATCH TOTAL operation, both limits are assigned as TOTAL A limits based on the KFT, decimal point, and engineering units. The TOTAL limit activation levels are displayed unless assigned to another function. If so, the S1 or S2 display would read as XXXX to indicate that it is not assigned to JOB A TOTAL function. A typical display would be:

BATCH TOTAL	
0020.5 GAL	
S1 0040.0	S2 0045.0

BATCH TOTAL Programming

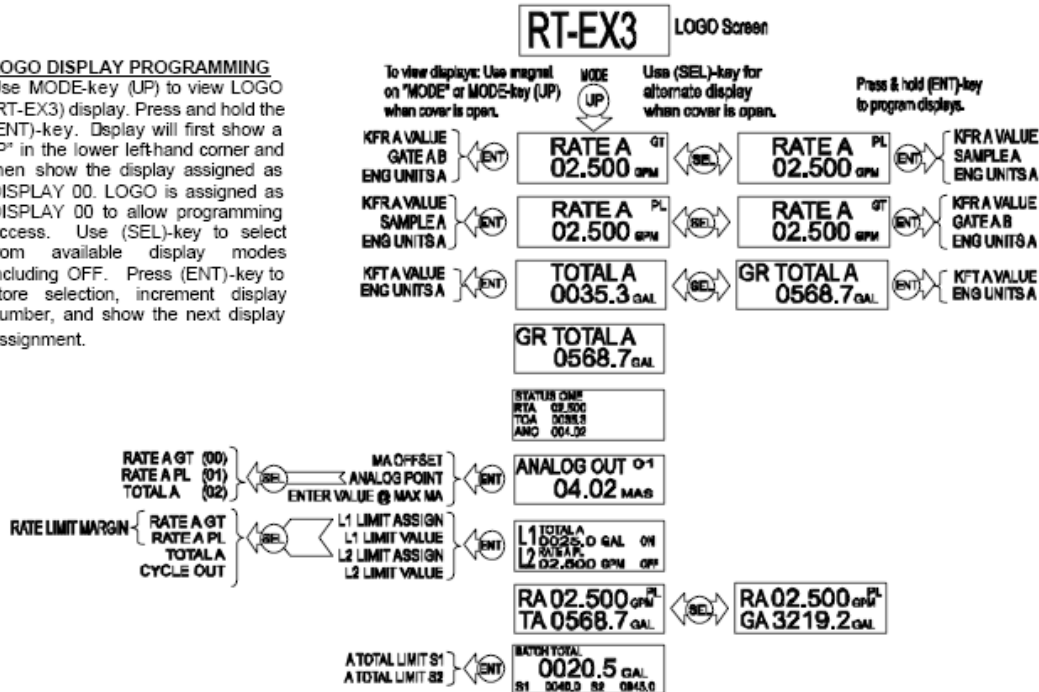
The BATCH TOTAL program mode is used to quickly dedicate both limits as total limits and program the values at which the limits (labeled S1 & S2) will activate. The BATCH TOTAL display must be viewed to program the BATCH TOTAL limits. Use the MODE-key (UP) to select the BATCH TOTAL display. Press and hold the (ENT)-key. The display will first show a P in the lower left-hand corner and will then highlight the first limit assignment S1 indicated with a blinking cursor. Entering a value will assign the limit as a total limit based on the KFT, decimal location and KFT engineering units. Select the digit to edit using the (SEL)-key. Use the (UP) or (DN)-key to increment or decrement the variable value. When the desired value is displayed, press the (ENT)-key to store the programmed value and move the cursor to S2. Select the digit to edit using the (SEL)-key. Use the (UP) or (DN)-key to increment or decrement the variable value. When the desired value is displayed, press the (ENT)-key to store the programmed value and exit the BATCH TOTAL program mode.

If either limit has been previously assigned to a function other than TOTAL A, the RT-Ex3 will respond by asking "Limit mode different, want to change it?" Use the (SEL)-key to toggle a "N" or "Y" response and use the (ENT)-key to answer. A "Y" response will reset any previous limit assignment to Total A and zero the limit value. A "N" response will leave the limit assigned to the previous function and the S1 or S2 display will read as XXXX to indicate that it has no function in this mode.

Quick-Guide to the RT-EX3

LOGO DISPLAY PROGRAMMING

Use MODE-key (UP) to view LOGO (RT-EX3) display. Press and hold the (ENT)-key. Display will first show a "P" in the lower left-hand corner and then show the display assigned as DISPLAY 00. LOGO is assigned as DISPLAY 00 to allow programming access. Use (SEL)-key to select from available display modes including OFF. Press (ENT)-key to store selection, increment display number, and show the next display assignment.



TO PROGRAM RT-EX3 PARAMETERS

With the cover removed and outside of the hazardous area, use the MODE-key(UP) to select the display to program. Press and hold the (ENT)-key. The display will first show a "P" in the lower left-hand corner and will then display the first program variable for that display mode. The RT-Ex3 will prompt for a variable selection or numeric entry.

When entering or editing numeric values or engineering units, the digit or character to enter or edit will blink starting with left-most position. Use the (UP)-key or (DN)-key to increment or decrement the variable value or character. Use the (SEL)-key to move the blinking cursor to the next digit or character. When the entire value has been entered, press the (ENT)-key to store the programmed value and advance to the next program variable.

Select LIMIT and ANALOG OUT assignments using the (SEL)-key. Press the (ENT)-key to store the assignment and advance to the next program variable. The (ENT)-key will exit programming after the last variable has been programmed.

KFR – Scaling for display of rate in specific engineering units. Determines display decimal resolution.

Initial value = 100.00 (Hz. w/2 decimals)

KFR = 6000/K-FACTOR

Using: 100 for eng. units per second
6000 for eng. units per minute
360000 for eng. units per hour
8640000 for eng. units per day

Where K-FACTOR is the avg. number of pulses/ eng. unit of the transducer.

Round result to desired decimal accuracy and enter KFR using only that number of decimal places. Use no more than four digits regardless of decimal position! Maximum is 65535 with the decimal in any location.

GATE AB – Gate time, .01 to 600 seconds. Display and analog output update time interval. Initial value is 002.00 seconds

SAMPLE A & B - Digital filter on RATE PL, 0 to 253 (0 min., 253 max.) affecting the update of the display and analog output. Initial value is 010.

ENG UNITS - The desired engineering units for display of rate are programmable using up to four letters. Example: GPM_

KFT – Scaling for display of total in specific engineering units. Determines display decimal resolution.

Initial value = 10000. (Pulses w/ no decimals)

KFT = 10000/K-FACTOR

Where K-FACTOR is the avg. number of pulses/ eng. unit of the transducer.

Round result to desired decimal accuracy and enter KFT using only that number of decimal places. Use no more than four digits regardless of decimal point position! Maximum = 65535 with the decimal in any location.

ENG UNITS - The desired engineering units for display of total are programmable using up to four letters. Example: GAL_

TOTAL RESET – Touch magnet to glass over "MODE" to view TOTAL, then touch "RESET" with magnet. With cover open, use MODE-key(UP) to view TOTAL, touch RESET-key(DN) to reset.

GR TOTAL RESET – With cover open only! Use MODE-key(UP) and (SEL)-key to view GR TOTAL, press RESET-key(DN) plus (ENT)-key. Use (SEL)-key for "Y", and (ENT)-key to reset and exit.