PROTROL

INSTALLATION & OPERATING INSTRUCTIONS

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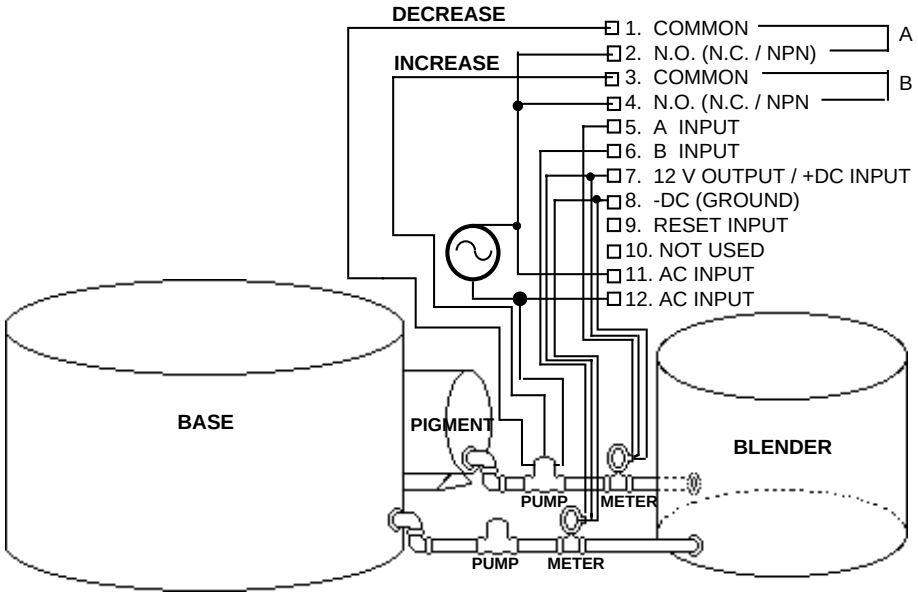
DESCRIPTION

Description:
Featuring 6 digits of bright, 7-segment LED displays, the Protrol is a rate, ratio and draw meter which is field programmable. The two inputs (A & B) have separate scaling factors. The unit can be programmed to display: two separate ratemeters (A & B), the net difference of A & B, and the ratio of A to B (A ÷ B) or the draw [(A - B) ÷ B]. Two assignable set points are standard with a programmable hysteresis (alarm range).

Specifications:
Display:
6 digit, .55" high, 7 segment, red orange, LED.
Rate Display: The ratemeters (A&B) update once per second and are accurate to 4.5 digits. The unit will sample from 2 to 24 seconds and will compute a weighted average (normalization).
Input Power:
110 ± 15% or 12 to 15VDC
220 VAC ± 15% or 12 to 15VDC
24 VAC ± 15% or 12 to 15VDC.
Current::
maximum 250 mA DC or 6.5 VA at rated AC voltage.
Output Power:(AC powered units) + 12VDC @ 50mA
unregulated -10 +50%
Temperature:
Operating:
+32°F (0°C) to +130°F (+54°C).
Storage:
-40°F (-40°C) to +200°F (93°C).
Memory:
EEPROM stores data for ten years if power is lost.
Reset:
Front Panel:
Resets (updates) normalization process.
Remote: Resets control output (if it's in hysteresis and below the preset).
Control Outputs:
2 each N.O. Relay - 10Amp @ 120/240 VAC or 28 VDC. (N.C. Relay contacts or NPN sink from 10VDC to .5V @ 100mA available with solder jumpers).
Input:
High Impedance (STD):
Open or 0 to 1V (low), 3 to 30V (high) 10K Ohm impedance. 10KHz max. input speed.
Mag Pickup (Option M):
30mV input (50 V max. P/P) signals 10 KΩ imp. 5 kHz max.
NOTE:
The Mag. input has filtering as follows: 30mV trigger level up to 300Hz 0.25 V trigger level at 5KHz
Set Points: Two, 5-digit control set points are provided. The outputs have a programmable hysteresis alarm range from 0 to 9999
Programming: Set points, decimal points, Scaling from .0001 to 99999, input type, normalization factor, hysteresis alarm range, and security panel lock code are all programmable from the front panel.
Housing: Standard 1/8 DIN, high impact ABS plastic case (NEMA 4 front panel).
Shipping Weight: 2 lbs.

TYPICAL APPLICATION

This application involves the monitoring and control of a paint mixture. The paint mixture must be a ratio of .2 gallons of pigment to every gallon of base. The flowmeter in the pigment line has a K factor of 50 PPG (pulses per gallon). The K factor for the flowmeter in the base line is 70 PPG. The individual rates must be displayed in GPM (gallons per minute). To yeild a reading in GPM, the K factors have to be divided by 60. K factor A (pigment) = .8333 (50 ÷ 60); K factor B (base) = 1.1667 (70 ÷ 60). By programming a decimal in the third location, Presets A & B can be set at .201 (upper limit) and .199 (lower limit) respectively. With both outputs assigned to display C (net value of A ÷ B), output A will decrease the amount of pigment being added and output B will increase the amount of pigment being added. This will keep the ratio within desired limits.

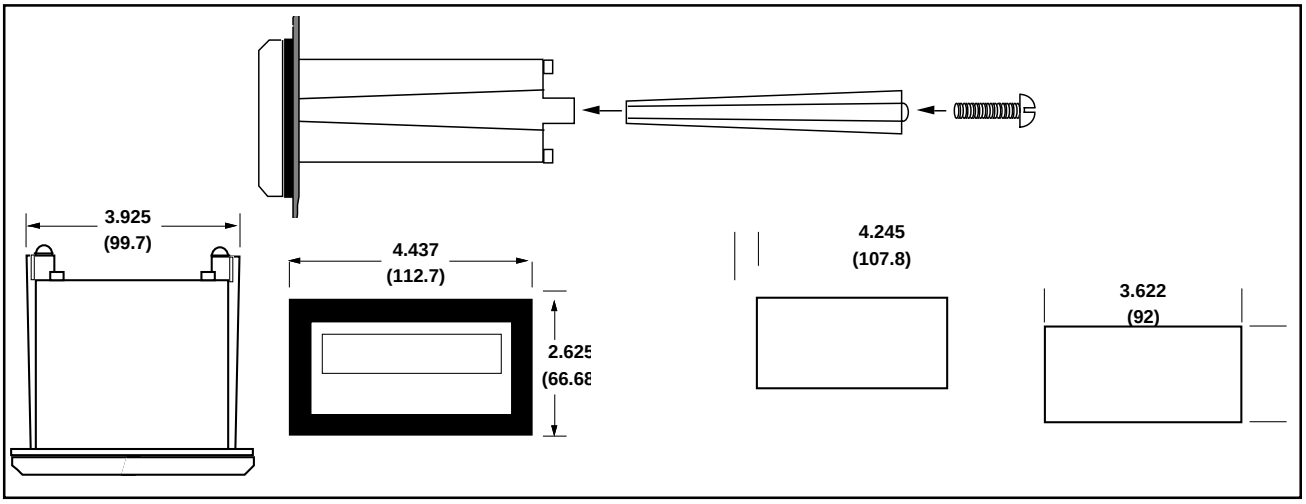


MOUNTING

HOW TO MOUNT:

Slide the body of the unit through the rubber gasket. Insert the unit into the panel. Slide the brackets up the groove to press against the back of the panel, as shown in "FIG. A". Insert the screws into the rear of the brackets.
Tighten the screws evenly and alternately. A panel less than .1" may distort if the clamps are screwed too tightly. Do not over tighten! A normal level of torque is required. Maximum torque should be 3" pounds.

FIG. A



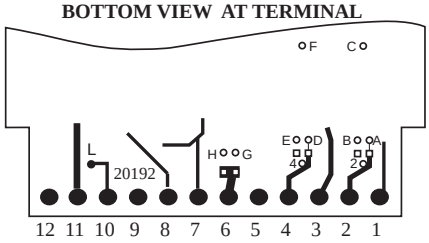
JUMPER OPTIONS

Output Jumper Selections

Before making any board modifications, be sure power is disconnected and locate the plastic extender to the case at the rear of the unit. To remove the extender locate and remove the two screws which hold it in place. After the extender is removed the PC board will be exposed.
The unit must be removed from the case to access jumpers C & F, all other jumbers can be accessed by removing the plastic extender.

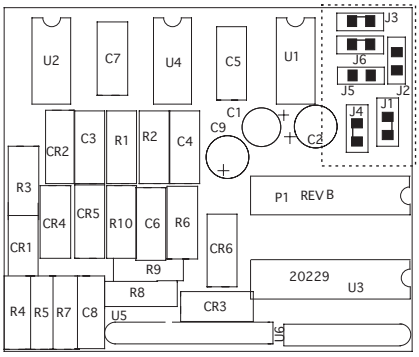
FUNCTION	MODIFICATION	
"A" RELAY N.C. OUTPUT	CUT AT "A"	JUMPER "B" TO "2"
"B" RELAY N.C. OUTPUT	CUT AT "D"	JUMPER "E" TO "4"
"A" PRESET TRANSISTOR (NPN)	CUT AT "A"	JUMPER "C" TO "2"
"B" PRESET TRANSISTOR (NPN)	CUT AT "D"	JUMPER "F" TO "4"

BOTTOM VIEW AT TERMINAL



Mag. Input Jumper Selections

If the unit has the millivolt input bd.# 20229, A & B inputs can be separately solder jumper programmed to accept either a low millivolt or 4-30 V input. Each unit shipped is programmed according to part number. If solder jumpers are made, the part number should be modified to reflect the changes made



C=CLOSE, O=OPEN

	4-30V INPUT	Millivolt INPUT
Input A	J1-O, J2-C, J3-O	J1-C, J2-O, J3-C
InputB	J4-O, J5-C, J6-O	J4-C, J5-O, J6-C

WIRING

AC / DC CONNECTIONS:
NOTE: Connect power only after other connections are finished. Do not touch the live AC power terminals. The unit has been designed with an isolated AC input, therefore polarity is not a concern for the AC power. The chasis is plastic, therefore earth ground is not used. For DC operation, connect +DC to terminal 7 and -DC to terminal 8.

Although the unit is designed to be immune from line or RF interference, the unit is controlled by a microprocessor and an electrically "noisy" environment could cause operating problems. The input power lines should not be common to power lines for motors, pumps, contactors, etc.

Four sources of noise can occur:

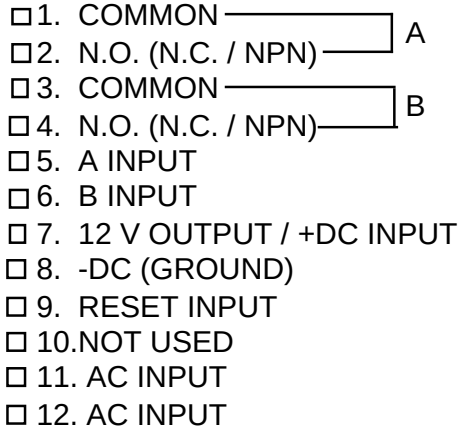
1) AC power line noise- If the unit cannot be connected to an electrically clean power source, an inductive load supressing device (MOV as GE#V130LA1 or Resistor Capacitor as Paktron# .2uf/220 ohm @ 400V) can be installed. Although locating the suppressor across the AC supply at the unit should help, best results are obtained by connecting the suppressor across the leads of the "load" at the device causing the spikes.

2) Input line noise- The noise is carried on the input and DC ground lines. Make sure the input wires are not run into the unit in a bundle with power input lines. We recommend using shielded cable. Connect the shield to DC ground of the unit and "earth" at one point in the circuit preferably at the DC ground terminal of the unit.

3) Output lines- The unit has Two relay outputs. When these outputs are used to run external relays or solenoids, spikes can be generated upon activation. This noise can spread through the instrument causing operating problems. If the source is a D.C. operated device, a general purpose diode (IN4004) placed across the solenoid prevents electrical noise spikes. Connect the cathode (banded side) to the more positive side of the coil. If the source is an A.C. operated device, use a Resistor Capacitor or MOV across the coil.

4) 12 VDC output supply- Noise can be generated on the 12 VDC output supply if it is used to drive inductive loads or if the current draw exceeds 50 mA. Insure that all inductive loads have a diode (such as IN4004) across the coil and that the current does not exceed 50 mA.

WIRING CONNECTIONS



DEFINITIONS

FACtor - SCALING FACTOR; This portion of the programming menu sets up the input scaling factors. Each input has a seperate dividing scale factor.

dP F A - DECIMAL POINT FOR FACTOR A; This sets a decimal for factor A if desired.

dP F b - DECIMAL POINT FOR FACTOR B; This sets a decimal for factor B if desired.

rAtE - RATE; This portion of the programming menu sets up the ratemeter information.

dP LoC - DECIMAL POINT LOCATION; This sets a decimal location for the rate displays (A, B and C). This is a fixed decimal and will effect the rate displays as well as presets A & B.

A-b - A - B; This sets the C display to show the difference of the A & B inputs.

A-b /b - (A-B)÷B; This sets the C display to show the draw (ratio of A - B) of the A & B inputs.

A/b - A ÷ B; This sets the C display to show the ratio of the A & B inputs.

Hi CPS - HIGH COUNTS PER SECOND; This sets the A & B inputs for a high count speed input (0 to 10 KHz).

Lo CPS - LOW COUNTS PER SECOND; This sets the A & B inputs for a low count speed input (0 to 40 Hz).

nor ## - NORMALIZATION FACTOR; This is an averaging factor (00 to 99). Higher settings provide more normalizing (averaging) for a more stable display. Derived from the equation:

$$\frac{\text{(OLD DATA x "NOR" + NEW DATA)}}{\text{("NOR" + 1)}}$$

dLY ## - DELAY FACTOR; The amount of time (02 to 24 sec.) that the unit will "look" for valid input data before the display defaults to zero.

LoC - LOCK; This portion of the programming menu sets the security lock parameters.

LC ALL - LOCK ALL; This sets the unit to lock the program and the presets when the lock is "on". The Presets can be viewed but not changed.

LC Pr9 - LOCK PROGRAM; This sets the unit to lock the program when the lock is "on". The Presets can be viewed and changed.

CodE - CODE; This message flashes for approximately 3 sec. and is followed by the existing lock code.

rELAY - RELAY; This portion of the programming menu sets up the relay output configurations.

A rAtE - A RELAY ASSIGNED TO A RATE; This assigns the A relay to the rate of A (display A). When the rate of the A input equals or exceeds Preset A, relay A will activate.

A nEt - A RELAY ASSIGNED TO NET; This assigns the A relay to the net value of the A & B inputs (display C). When the net value (display C) equals or exceeds Preset A, relay A will activate.

HYS - HYSTERESIS; This sets the hysteresis value for relay A. This prompt is displayed for approximately 3 seconds.

A ##### - This is the existing hysteresis value. This value is the number of units below the preset that the output will remain "on". The hysteresis value will assume the same decimal location as the preset. EXAMPLE: Prest A set at 100, Hys A set at 10. Output A will activate when the display equals 100 and remain activated until the display falls below 90 (10 below preset A).

b rAtE - B RELAY ASSIGNED TO B RATE; This assigns the B relay to the rate of B (display B). When the rate of the B input equals or exceeds Preset B, relay B will activate.

b nEt - B RELAY ASSIGNED TO NET; This assigns the B relay to the net value of the A & B inputs (display C). When the net value (display C) equals or exceeds Preset B, relay B will activate.

HYS - HYSTERESIS; This sets the hysteresis value for relay B. This prompt is displayed for approximately 3 seconds.

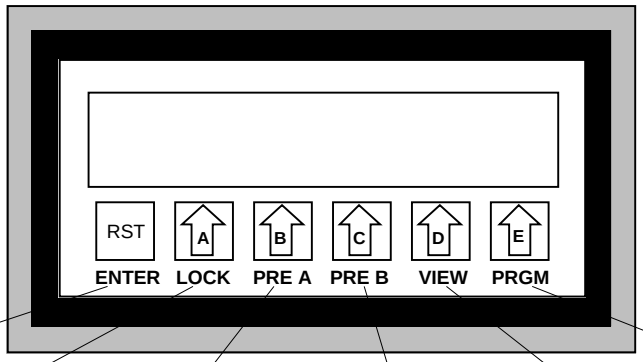
b ##### - This is the existing hysteresis value. This value is the number of units below the preset that the output will remain "on". The hysteresis value will assume the same decimal location as the preset. EXAMPLE: Prest B set at 1000, Hys B set at 100. Output B will activate when the display equals 1000 and remain activated until the display falls below 900 (100 below preset B).

A##### - DISPLAY A; When in the run mode , display A (rate of input A) is displayed with an "A" in the left side of the display.

b##### - DISPLAY B; When in the run mode , display B (rate of input B) is displayed with a "B" in the left side of the display.

C##### - DISPLAY C; When in the run mode , display C (net value of A & B) is displayed with a "C" in the left side of the display.

FRONT PANEL OPERATIONS



Press to RESET in operating mode; Press to "ENTER" in programming mode.

Press to "enter LOCK code for panel lock.

Press to view or change Preset A

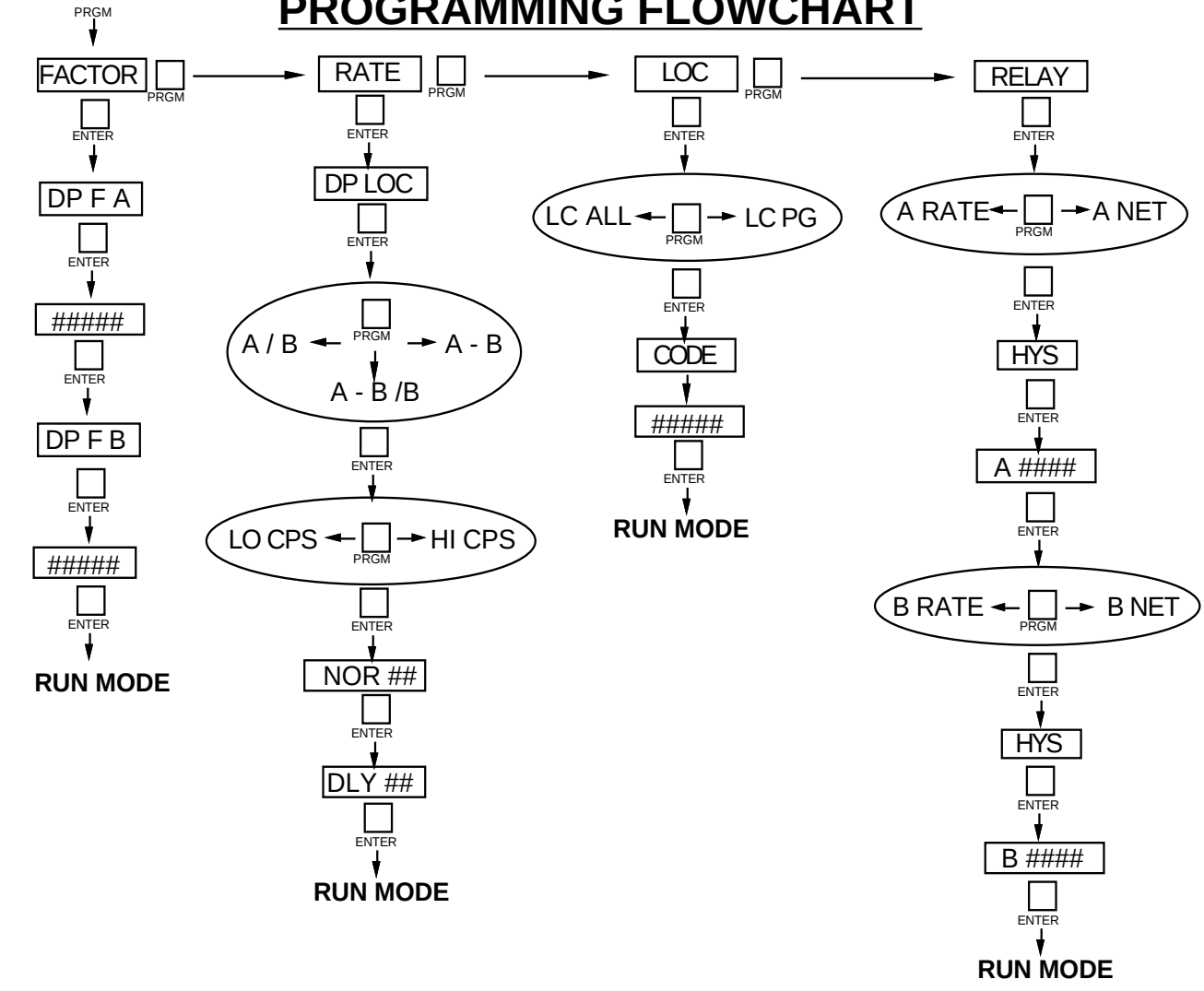
Press to view or change Preset B

Press to alternately view A, B and C dispays.

Press to cycle through PROGRAM choices; Press to step through set up choices in program mode.

PROGRAMMING FLOWCHART

START HERE



PROGRAMMING

	PRESS	DISPLAY	REMARKS
STEP 1 **SETTING SCALING FACTORS**	PRGM	FACtor	This section of the menu is used to set the scaling factors for inputs A & B.
	ENTER	dP F A	Key in the desired decimal location for factor A and pressENTER.
	ENTER	#####	Key in the desired scaling factor for input A and press ENTER .
	ENTER	dP F b	Key in the desired decimal location for factor B and press ENTER .
	ENTER	#####	Key in the desired scaling factor for input B and press ENTER .
STEP 2 **SETTING RATE DISPLAY**	PRGM	FACtor	
	PRGM	rAtE	
	ENTER	dP LoC	Key in the desired decimal location and press ENTER.
	ENTER	A/b, A-b or A-b/b	Press the PRGM key to step through choices. Press ENTER to "enter" displayed choice.
	ENTER	Lo CPS or Hi CPS	Press the PRGM key to step through choices. Press ENTER to "enter" displayed choice..
	ENTER	nor ##	Key in the desired normalizing (averaging) factor (00 to 99). Higher settings provide more normalizing (averaging) for a more stable display.
	ENTER	dLY ##	Key in the desired delay (window) value (02 to 24). Press ENTER to "enter" displayed value.

	PRESS	DISPLAY	REMARKS
STEP 3 **SETTING PANEL LOCK**	PRGM PRGM PRGM	FACtor rAtE LoC	
	ENTER	LCALL or LCPr9	Press the PRGM key to step through choices. Press ENTER to "enter" displayed choice.
		CodE flashes followed by... #####	This is the security lock code. To change press the keys under the digits to be canged and press ENTER to "enter" displayed value. **RECORD THIS NUMBER FOR FUTURE USE!!**
STEP 4 **SETTING THE RELAYS**	PRGM PRGM PRGM PRGM	FACtor rAtE LoC rELAY	
	ENTER	ArAtE or AnEt	Press the PRGM key to step through choices. Press ENTER to "enter" displayed choice.
	ENTER	HYS flashes followed by... A####	Key in desired hysteresis value and press ENTER.
	ENTER	brAtE or bnEt	Press the PRGM key to step through choices. Press ENTER to "enter" displayed choice.
	ENTER	HYS flashes followed by... b####	Key in desired hysteresis value and press ENTER.

SETTING THE PRESETS & PANEL LOCK

	PRESS	DISPLAY	REMARKS
SETTING THE PRESETS	 **PRE A**	PrE A Followed by... ##### (Preset A value)	PRE A = Preset A; The set point at which output A will trigger. If the displayed value is not the desired preset, press the key(s) under the digit to be changed.
	 **PRE B**	PrE b Followed by... ##### (Preset B value)	PRE B = Preset B; The set point at which output B will trigger. If the displayed value is not the desired preset, press the key(s) under the digit to be changed.
SETTING THE LOCK STATUS	 **LOCK**	CodE Followed by... 0	Key in the lock code (see programming step 3) by pressing the keys under the digits to be changed. Each time a key is pressed the digit will increment one. Press the ENTER key to enter the displayed code.
	 **ENTER**	LoC or unLoC	After the code is entered the unit will display LOC (unit is locked) or UN LOC (unit is un-locked). This message will be displayed for approximately 3 seconds before the unit returns to the run mode.

CALCULATING THE K FACTORS

Each input (A & B) has a seperate K factor. The K factor (divider) is the number of pulses per the desired unit of measure. The K factor can be any 5 digit number from .0001 to 99999. The K factors for A & B can be easily calculated by following two simple steps.

STEP 1 - Calculate a base K factor:
The base K factor is the number of pulse per the desired unit of measure. Calculate the base K factor using:

$$\frac{\text{Pulses}}{\text{Units value}} = \text{Base K factor}$$

EXAMPLE #1:
An Encoder with 100 pulses per revolution is sensing material. 1 Revolution of the shaft equals 1 foot of material.

$$\text{Base K factor} = \frac{100 \text{ (pulses)}}{1 \text{ (foot)}} = 100$$

EXAMPLE #2:
An inductive proximity sensor is sensing a notch on a paper roll (1 pulse per revolution). Each revolution of the paper roll equals 3 meters of paper.

$$\text{Base K factor} = \frac{1 \text{(pulse)}}{3 \text{ (meters)}} = .3333$$

STEP 2 - Calculate the rate K factor:
The rate K factor is the actual number to be programmed into the unit. Caculate the rate K factor using:

$$\text{Rate K factor} = \frac{\text{Base K factor}}{\text{Time conversion factor}}$$

TIME CONVERSION FACTORS

Desired rate reading	Factor
Rate Per Second	1
Rate Per Minute	60
Rate Per Hour	3600

EXAMPLE #1:
Using the base K factor from example #1 above, the desired rate reading is Feet Per Hour.

$$\text{Rate K factor} = \frac{100 \text{ (base K factor)}}{3600 \text{ (time factor)}} = .0277$$

EXAMPLE #2:
Using the base K factor from example #2 above, the desired rate reading is Meters Per Minute.

$$\text{Rate K factor} = \frac{.3333 \text{ (base K)}}{60 \text{ (time factor)}} = .0055$$

The Rate K factor is the number to enter in the factor section of the program menu (see Programming Step 1).

TIME CONVERSION CHART

To Convert:	Divide By:
Sec. to Min.	60.00
Sec. to Hrs.	3600
Min. to Sec.	.01667
Min. to Hrs.	60.00
Hrs. to Min.	.01667
Hrs. to Sec.	.00028

INTERFACE CARD RS 232/422 OPERATION

RS 232/422 SET-UP:

All serial communication mode changes must be done through serial communications. Mode changes cannot be done through the front panel. To initialize the unit, place a jumper between pin 7(+12V)[bottom board] and pin 1(init) (DB -9 connector) on initial power up. The unit defaults to: 300 baud rate,"MARK" parity and device number 01. To enter the program mode you must set your terminal for 300 baud rate and "MARK" parity. Next, type D1(s), **(s)= space bar**. The unit will echo back "DEVICE #1:". Now type EP (enter program) and a carriage return (enter). The unit will echo back "PROGRAM SETTING". You are now in the programming mode.

SETUP PROCEDURE:

The following sections consists of the communications setup options as they appear in the menu. (If you wish to exit the program mode, at any time you can hit the "escape key" (Hex Code: 1B) and the unit will save the changes made but not effect the remaining data values.) When each section of the setup menu is displayed, the current data will appear in the < > signs. If you wish to change the data, type in the number of the desired choice and press return (enter). If you wish to keep the current data, simply press return.

DEVICE NUMBER:

Each unit in the hook-up must be assigned it's own device number (1 to 99). Zero is reserved for a dedicated hook-up to only one terminal, and it's transmit output line remains in an "on" active state. The device number is entered in the program mode. The unit will prompt you:

DEVICE# <XX>?

If XX is the desired device number press return (enter), If not enter the desired number after the question mark and press return (enter).

BAUD RATE:

The baud rate is the speed at which data is transmitted, expressed in bits per second. Baud rates of 300, 600, 1200, 2400, 4800 or 9600 are available. When in the baud rate section of the menu, the unit will list :

BAUD RATES:

1:300 2:600 3:1200

4:2400 5:4800 6:9600

then prompt you:

BAUD RATE <300>?

Press return (enter) if this is the desired baud rate or enter the assigned number of one of the six possible baud rates. If an invalid baud rate is entered the unit will prompt you to choose another baud rate. This will occur until a valid baud rate is entered or escape is pressed.

PARITY:

Parity is a bit of information that is inserted before the stop bit and is used to help check if the transmission is correct. When setting the parity you may select "ODD" (parity bit is logic 0 if total number of logic 1's in the first seven data bits is odd), "EVEN" (parity bit is logic 0 if total number of logic 1's in the first seven data bits is even), "MARK" (parity bit is always logic 1 - High / Mark) or "SPACE" (parity bit is always logic 0 - Low / Space). If a "MARK" parity is chosen, it will appear that two stop bits are used. Use the "MARK" parity with terminals using parity "OFF" or "NONE". These terminals ignore the parity. The unit does not check the parity but does transmit the parity chosen. When setting the parity, the unit will print:

PARITIES:

MARK-0 SPACE-1 EVEN-2 ODD-3

Then the unit will prompt you:

PARITY<MARK>?

If this is the desired parity press return (enter), if it isn't enter the number of the desired parity then press return (enter).

STROBE LIST:

The serial interface card is also equiped with a strobe line. When the strobe line is triggered, a chosen set of data will be transmitted to be displayed or printed. The selections for the display list are entered in the program mode. Enter "1" to add selections to the list and enter "0" to delete selections from the list. The seven available items for the strobe display list are: (1) Preset A, (2) Preset B, (3) K-Factor A, (4) K-Factor B, (5) Rate of A, (6) Rate of B, (7) Rate of C. When setting the strobe list the unit will print :

ENTER STROBE LIST:
DO NOT DISPLAY-0 DISPLAY-1
The unit will prompt you:
PRESET A<DISPLAY>?
PRESET B<DISPLAY>?
K-FACTOR A<DISPLAY>?
K-FACTOR B<DISPLAY>?
RATE A<DISPLAY>?
RATE B<DISPLAY>?
RATE C<DISPLAY>?

If the above choices are entered, when the strobe line is triggered (3-30V positive pulse) the unit will transmit:

DEVICE# 1:
PA XXXXX
PB XXXXX
KA XXXXX
KB XXXXX
DA XXXXXX
DB XXXXXX
DC XXXXXX

(SEE COMMANDS BELOW FOR DESCRIPTION OF COMMAND CODES).

Each time the strobe line gets triggered the unit will transmit this data unless the program mode is entered and the strobe list altered.

After these four items have been entered they will remain unaltered unless the program mode is entered again and the values changed. The unit is now set and must be addressed by it's device number to come on line again.

SERIAL INPUT COMMANDS:

To get a unit on line you must address it by it's device number. This is done by typing DXX(S), XX= device number. The unit comes on line and echos back DEVICE# XX. Insure that "DEVICE# XX:" is received before requests are sent. The unit is now ready to receive a command or string of commands seperated by a space. A carriage return (enter) will enter the commands and processing of requests begins. The carriage return (Hex Code "D") puts the unit "off line" after data is processed.

COMMANDS:

EP.....Unit will enter program mode.
DA.....Unit will display (transmit) Rate A.
DB.....Unit will display (transmit) RateB.
DC.....Unit will display (transmit) RateC.
KA.....Unit will display K-factor A.
†*KA(S)XXXXX....Unit will load K-factor A with entered number.
KB.....Unit will display K-factor B
†*KB(S)XXXXX....Unit will load K-factor B with entered number.
PA.....Unit will display Preset A.
†PA(S)XXXXX....Unit will load Preset A with entered number.
PB.....Unit will display Preset B
†PB(S)XXXXX....Unit will load Preset B with entered number.
RR.....Relays will drop out if they are in hysteresis.
RN.....This resets (updates) normalization.

***THE UNIT WILL RECOGNIZE A DECIMAL IF ONE IS PLACED IN ANY OF THESE DATA VALUES.**

†THE UNIT WILL ONLY RECOGNIZE THE LAST FIVE DIGITS ENTERED.

The following is an example of requests and responses:

Transmit from terminal	Receive from unit
(s)=Space	
D5(s) [Unit #5 Activated]	DEVICE# 5:
PA(s)12345(s)PA	PA 12345 PA
KA(s)1576(s)KA	KA 1576 KA
KB(s)6751(s)KB	KB 6751 KB
RR(s)RN [RETURN]	RR RN

(UNIT PRESETS AND A & B K-FACTORS ARE SET AND BOTH THE RELAYS AND THE NORMALIZATION ARE RESET)

12345
1576
6751

SERIAL INTERFACE OPERATION:

Data is received and transmitted over standard EIA RS232 or RS422 levels. Each ten bit character is made up of a start bit, seven bit ASCII code, a parity bit and a stop bit. Device number, baud rate, parity and strobe list are entered in the program setup mode and will remain in memory even if power is lost.

The input impedance of RS232 is 3KΩ to 7KΩ worst case. The terminal addressing the unit must be capable of driving all loads in the loop. The input impedance of RS422 is much higher and there should be no problem driving as many as 99 units. The transmit line remains in a high impedance "off" state until addressed. Only one unit is to be on line at a time!!! More than one unit on line could damage the unit or destroy the transmitted data.

When the unit is active (on line) it will operate in a full duplex, echo back mode, so that data sent from the terminal will be transmitted back for verification. When the unit is "on line", use the proper serial transmit commands to request data or set a new value. Up to 80 characters of data can be linked together and transmitted to the unit in a string as long as there is a space between the commands. If an error is made, a correction can be made by back spacing and retyping correct data before the return (enter) is sent. Once a return (enter) is sent, the unit begins processing the data and will transmit the requested data on a non-priority basis over the data transmit line. A keypad entry or incoming data will halt the data communication cycle. Therefore, there should be a pause after data is requested to insure that all data has been transmitted before making another request or addressing another unit. If the unit is not busy, it should not take longer than 300 msec to process each request. To find the cycle time to process and transmit a request, calculate the bit transmit time by using this formula: [(1÷ baud rate) x (80) + .005] x number of requests made. This time will be extended if the unit must service the front keypad. If transmission has not started within two seconds after data is requested, it can be assumed that there is a problem. The unit transmits a carriage return and line feed after each data value. Any new communication must be started with DXX(S) (device number and space).

RS232/RS422 -PC INTERFACE:

The following BASIC program is for setting up RS232/RS422 on serial port (#1) at 300 baud. Run this program after connecting the serial interface connections.

```
10 SCREEN 0,0:WIDTH 80

20 CLS:CLOSE

30 OPEN "COM1:300,n,7,1,CS,DS,CD" AS #1

40 ON ERROR GOTO 110

50 B$=INKEY$

60 IF B$< >"" THEN PRINT #1,B$;

70 IF EOF (1) THEN 50

80 A$=INPUT$  (LOC(1),#1)

90 PRINT A$;

100 GOTO 50

110 RESUME
```

See the following page for RS232/RS422 serial communication wiring.

RS232 / RS422 WIRING

COMPUTER HOOKUP:

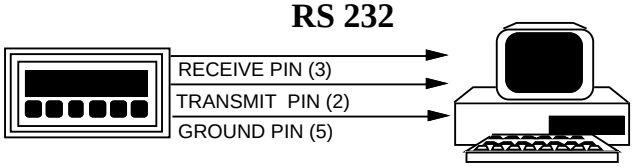
RS 232: When connecting the unit to a computer with RS 232 communication, only three connections are needed. These connections are: Receive data, Transmit data and Ground. The connections should be made as follows:

DP -9 CONNECTOR	COMPUTER
Transmit data (pin 2)	Receive data
Receive data (pin 3)	Transmit data
Ground (pin 5)	Ground

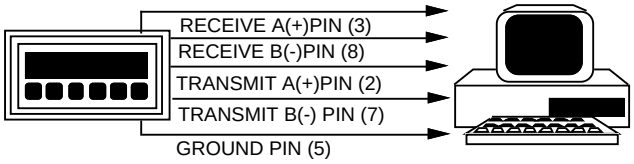
RS 422: When connecting the unit to a computer with RS 422, five connections are needed. These connections are: Receive data A (+), Receive data B (-), Transmit data A (+), Transmit data B (-) and Ground. The connections should be made as follows:

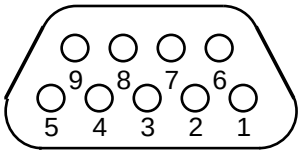
DP -9 CONNECTOR	COMPUTER
Transmit data A(+) (pin 2)	Receive data A(+)
Transmit data B(-) (pin 7)	Receive data B(-)
Receive data A(+) (pin 3)	Transmit data A(+)
Receive data B(-) (pin 8)	Transmit data B(-)
Ground (pin 5)	Ground

RS 232



RS 422



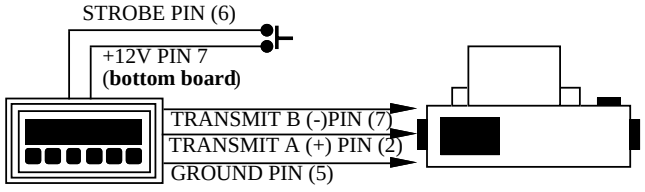


RS 232	RS 422
1. INITIALIZE	1. INITIALIZE
2. TRANSMIT	2. TRANSMIT A (+)
3. RECEIVE	3. RECEIVE A (+)
4. N/C	4. N/C
5. GROUND	5. GROUND
6. STROBE	6. STROBE
7. N/C	7. TRANSMIT B (+)
8. N/C	8. RECEIVE B (+)
9. N/C	9. N/C

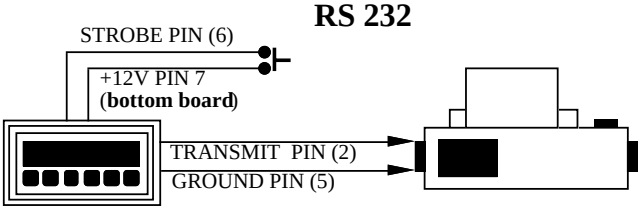
PRINTER HOOKUP:

When connecting the unit to a printer, you must first program the desired baud rate, parity and strobe list with a computer. After the unit is programmed it can be connected to the printer. Connect the transmit line(s) of the unit to the receive line(s) of the printer and be sure that both devices have common grounds. When the strobe line is triggered the unit will transmit the selected strobe list which you had previously programmed.

RS 422



RS 232



TROUBLESHOOTING GUIDE

PROBLEM	POSSIBLE CAUSES	SOLUTIONS
Power is applied to unit but the display does not light.	1. AC or DC power wiring is incorrect.	1. Recheck power wiring.
Unit works but occasionally the display freezes or skips counts.	1. Line noise is effecting the processor due to a current spike or surge.	1. Use a different power supply or install a surge suppressor.
Input signal is connected but the display reading is inaccurate.	1. Input wiring is incorrect 2. Scaling K factors are incorrect. 3. Transmitting device is defective. 4. Unit is defective.	1. Recheck input wiring. 2. Recheck K factor settings. 3. Replace transmitting device. 4.To confirm, set K factors @ 1. Apply a 3-30V signal @ 1Hz to input A (pin 5). When viewing the A display the unit should display the frequency value that is applied. If not call factory for an RMA#.
Any display (A,B or C) reading FFFFF.	1. Display is in overflow condition.	1. Change the decimal point location.
Display C reading 0	1. This will be displayed if: A-B = 0 or when the unit is set for A÷B or A-B÷B where A or B equals 0.	1. Check input wiring. 2. Be sure display C is set at desired reading.

IF YOU HAVE ANY OTHER PROBLEMS, PLEASE CALL THE FACTORY.

We hope you will be pleased with our product. If you have any questions concerning our warranty, repair, modification or returned goods process, please contact your local distributor.

WARRANTY

This product is warrantied against defects in materials and workmanship for a period of two (2) years from the date of shipment to Buyer.

The Warranty is limited to repair or replacement of the defective unit at the option of the manufacturer. This warranty is void if the product has been altered, misused, dismantled, or otherwise abused.

ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, ARE EXCLUDED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

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Fax (732) - 935 - 9344

HOW TO ORDER:

SAMPLE: PR A 1

Series
Protrol= dual ratemeter and net rate (A-B) ratio (A ÷ B) or draw (A-B)÷B

Operating Voltage
A= 110 VAC ± 15% or 12 to 15 VDC
B= 220 VAC ± 15% or 12 to 15 VDC
C= 24 VAC ± 15% or 12 to 15 VDC

Options
1= RS232 communications
2= RS422 communications
M= Mag. Input; 30 mV input for Inputs A & B

Accessories
Separate non keyboard panel order # 34235
Separate keyboard panel order # 34237