Operating instruction manual OI/DPM100-EN Rev. D

DPM100
Field Indicator and controller

Digital process monitor
K-TEK Products

Introduction

The operation and instruction manual provides the following information:

Power and productivity
for a better world™

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1.0 SAFETY INSTRUCTIONS

The following instructions must be observed.

- This instrument was designed and is checked in accordance with regulations in force EN 60950 (“Safety of information technology equipment, including electrical business equipment”). A hazardous situation may occur if this instrument is not used for its intended purpose or is used incorrectly. Please note operating instructions provided in this manual.
- The instrument must be installed, operated, and maintained by personnel who have been properly trained. Personnel must read and understand this manual prior to installation and operation of the instrument.
- The use of an external line fuse is recommended. Add or replace the external fuse with the following specified type and rating only:

Input Power	**Recommended Fuse**
115 VAC	100 mA slow blow fuse
230 VAC	50 mA slow blow fuse
12-24 VDC	250 mA slow blow fuse

Disconnect power supply before adding or replacing fuse!

- The manufacturer assumes no liability for damage caused by incorrect use of the instrument or for modifications or changes made to the instrument.

1.1 Symbols Used on Unit

Number	Symbol	Publication	Description
1	⎓	IEC 417, No. 5031	Direct current
2	⧈	IEC 417, No. 5172	Equipment protected throughout by DOUBLE INSULATION or REINFORCED INSULATION (equivalent to Class II of IEC 536 - see annex H)
3	⚠	ISO 3864, No. B.3.1.	Caution (refer to accompanying documents)

1.2 Technical Improvements

- The manufacturer reserves the right to modify technical data without prior notice.

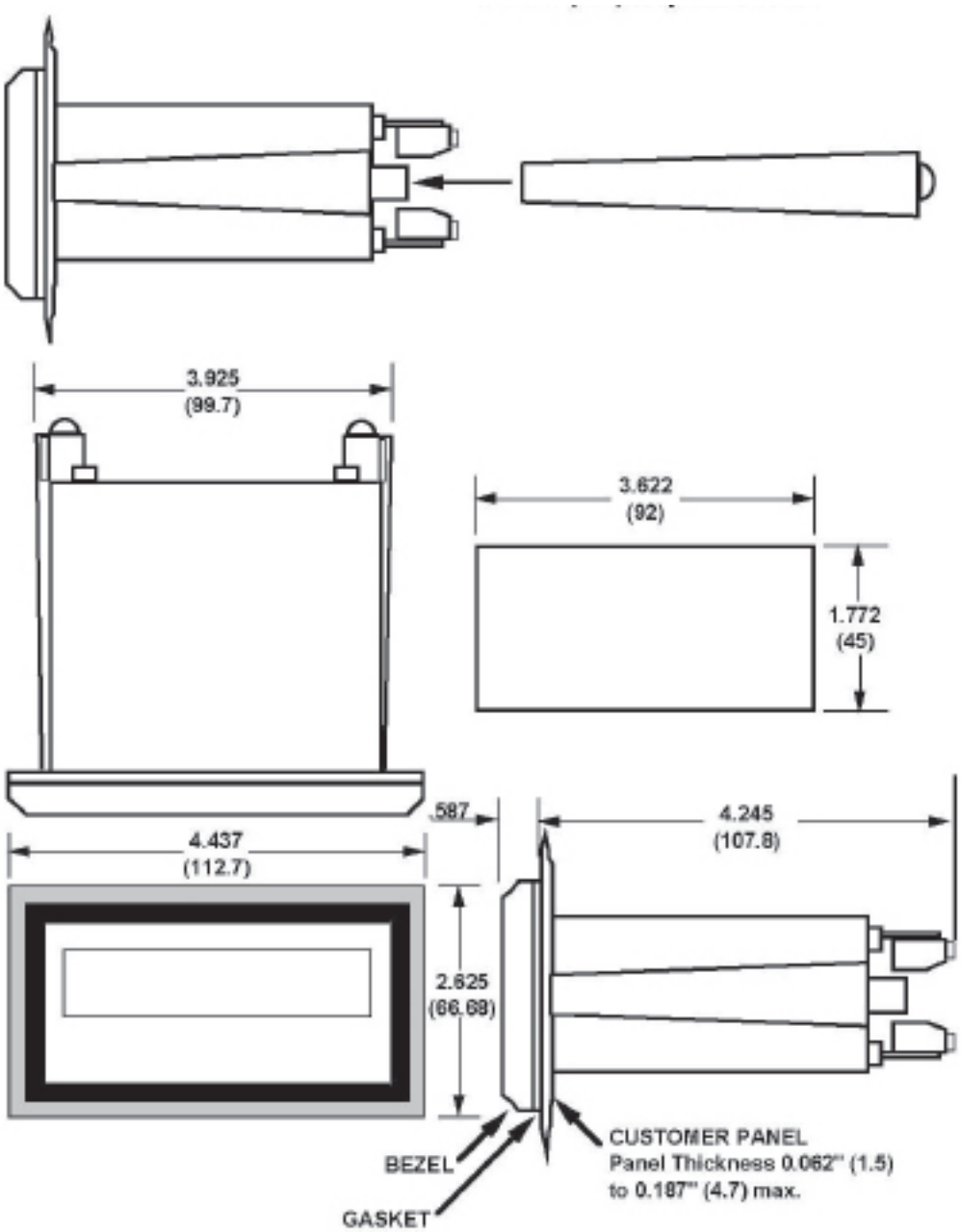
2.0 DESCRIPTION

Featuring 6 digits of bright, 7-segment LED displays, this unit is an integrating totalizer and/or ratemeter which accepts analog signal inputs. The unit can be field programmed to accept 0-20mA, 4-20mA, 0-5V, 0-10V or 1-5V signals. An optional Square Law input is available for inputs that require square root extraction. A 4-20mA output option is available to control strip recorders or other peripherals. Two assignable set points are standard for two alarming. The high and low scaling settings are programmable from the front panel. By pressing the “view” button, the unit will display: integrated total, rate, peak or valley. RS-422 or RS-232 serial communications are available options for data communication with a host computer.

3.0 MOUNTING

How to mount:

1. 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.
2. Tighten the screws evenly and alternately. A panel less than 0.1” 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.
3. The panel must be parallel to the bezel to assure proper seal. Units seals to NEMA 4/IP65 if properly mounted.



4.0 WIRING

AC/DC CONNECTIONS:

NOTE: Connect power only after other connections are finished. Do not touch the live AC power terminals. The unit ahs been designed with and isolated AC input, therefore polarity is not a concern for the AC power. The cassis is plastic, therefore earth ground is not used. For DC operation, connect + DC to terminal 10 and –DC to terminal 3.

This Product complies with requirements of the European Community Directive 89.336/EED (Electromagnetic Compatibility). However, electrical noise or intense electromagnetic fields in the vicinity of the unit may disturb the microprocessor. Users should exercise care and should take proper precautions to avoid microprocessor disturbance.

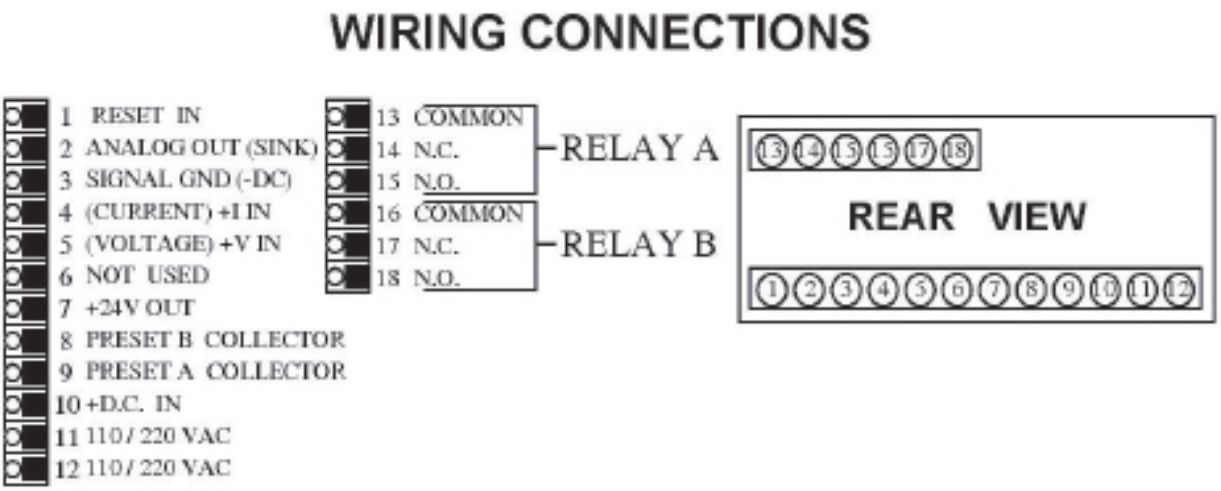
Four common sources of noise are:

1. AC power line noise: The input power lines should not be common to power lines for motors, pumps, contactors, etc. If the unit cannot be connected to an electrically clean power source, and inductive load suppressing device (MOV as GE#V130LA1 or Resistor Capacitor as Paktron# .2uf/220 ohm @400 V) 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.

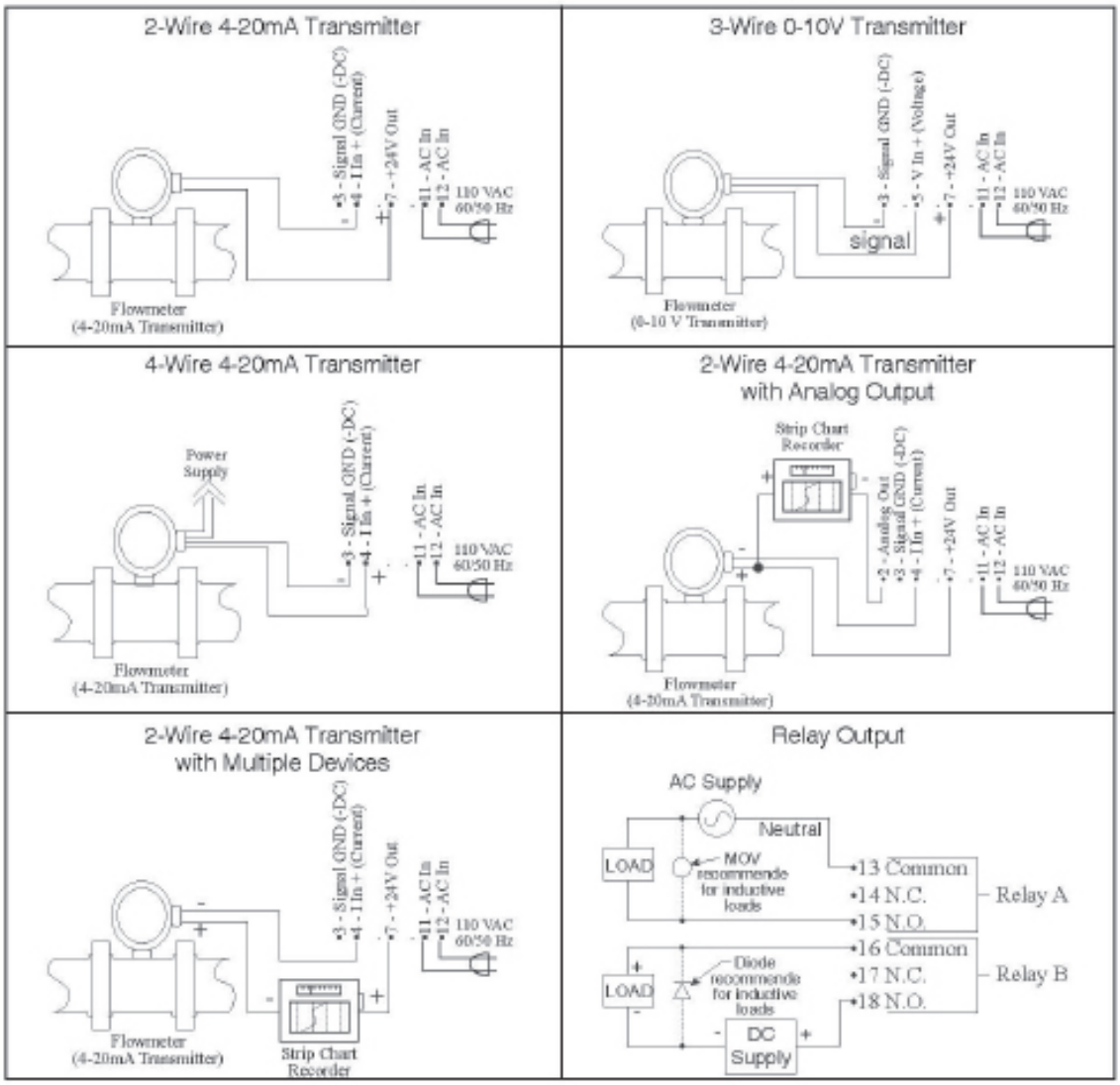
2. Input line noise: The noise is carried on the input and DC ground lines. Make sure the input wires are not run into the unit in a bundle with power input lines. We recommend using shielded cable. Connect the shield to DC ground of the unit and “earth” at one point in the circuit preferably at the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

3. Output lines: The unit has two open collector outputs and two optional relay outputs. When these outputs are used to run external relays or solenoids, spikes can be generated upon activation. This noise can be 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. 24 VDC output supply: Noise can be generated on the 24 VDC output supply if it is used to drive inductive loads or if the current draw exceeds 50mA. Insure that all inductive loads have a diode (such as IN4004) across the coil and that the current does not exceed 50mA.



5.0 TYPICAL WIRING HOOKUPS



6.0 OPEN COLLECTOR & RELAY OPERATION

The open collector and relay outputs trigger when the total or rate (assignable; see programming step 2) is greater than or equal the corresponding Preset (A or B). When the outputs are assigned to the “total”, the operator can assign a duration of time (.01 to 599.99 sec.) that the output will remain energized. If 0.00 is assigned, the output will latch until reset. If output A is set at a duration (other than 0.00), the totalizer will autorecycle when Preset A is reached. At this time, output B will de-energized (if it was energized). Preset A is the final preset and should be set higher than Preset B, when both outputs are assigned to the total. If output A is set at a duration other than 0.00 and Preset A is set less than Preset B, Preset B will be ignored (provided that they are both assigned to total). The totalizer will never autorecycle at Preset B.

When the outputs are assigned to the “rate”, the outputs can be assigned a hysteresis (alarm range). The hysteresis is the number of units below the preset that the output will remain energized. EXAMPLE: Preset set at 100; Hysteresis set at 10. The output will energize when the rate is greater that or equal to 100 and the de-energized when the rate falls below 90. (10 below Preset).

NOTE: If the input scaling is inverted, the control output functions are inverted (LINEAR ONLY).

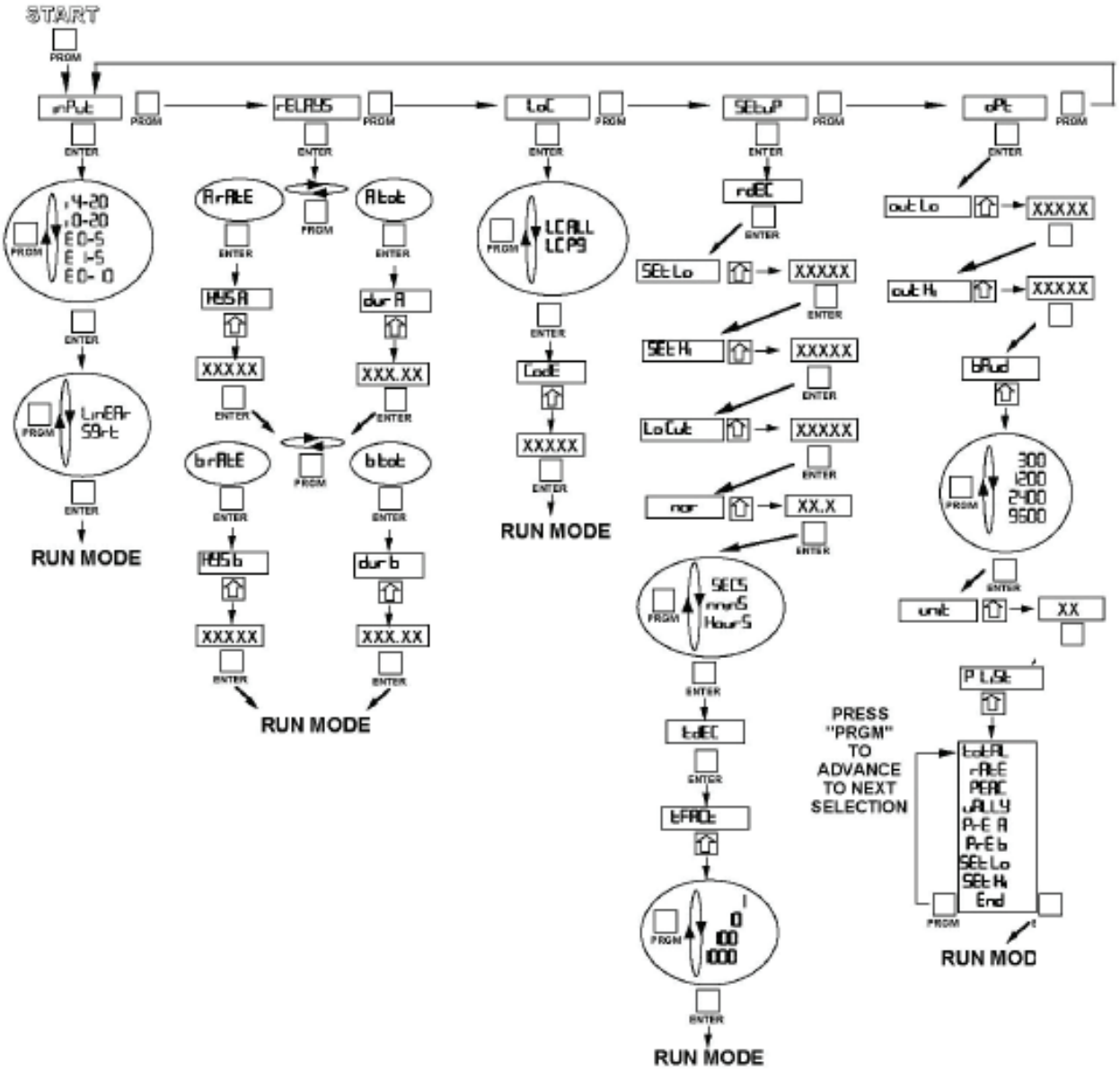
7.0 V21 & V41 PROGRAMMING FLOWCHART

NOTE: SEVERAL PROGRAMMING SELECTIONS WILL NOT APPEAR WITH "RATE ONLY" & "TOTAL ONLY" UNITS. OPTIONS NOT ORDERED WILL NOT APPEAR IN PROGRAM SELECTIONS.

This symbol indicates any key.

PRGM Press this key to step through Menu choices.

ENTER Press this key to enter the displayed value.



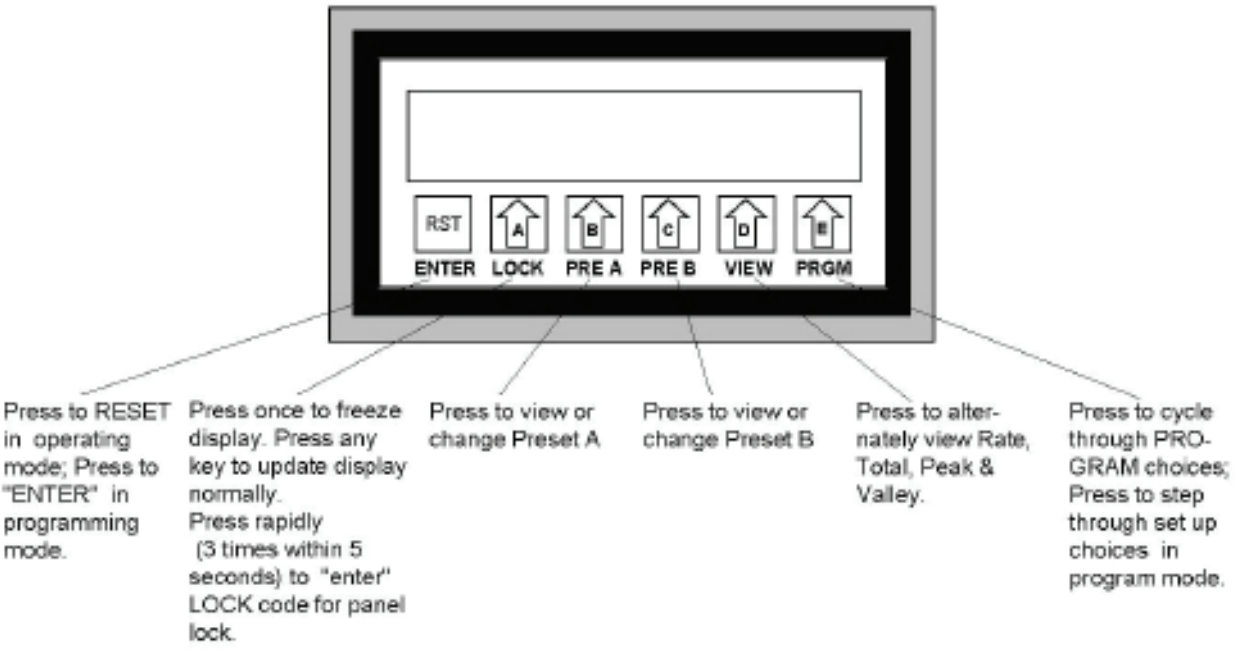
For best results, choose the highest resolution possible when entering the "set lo", "set hi" and "lo cut" values. Enter the proper decimal location at the "rdec"prompt.

8.0 DEFINITIONS

Input	INPUT; This section of the program menu assigns the type of input the unit will be using (0-20 mA, 4-20mA, 0-5V, 0-10V, 1-5V, Linear or square root extraction).
4-20	I 4-20; This sets the unit for a current input of 4 to 20 mA.
0-20	I 0-20; This sets the unit for a current input of 0 to 20 mA.
E 1/5	E 1-5; This sets the unit for a voltage input of 1 to 5 volts.
E 0-10	E 0-10; This sets the unit for a voltage input of 0-10 volts.
Linear	LINEAR; This sets the unit for linear input.
59rt	SQUARE ROOT; This sets the unit for square root extraction.
Relays	RELAYS; This section of the program menu sets the control output variables (relays & open collector).
Arate	OUTPUT A FOR RATE; This assigns the A output to the rate.
Hys a	HYSTERESIS FOR OUTPUT A; This value is the number of units below Preset A that the output will remain "ON". EXAMPLE: Preset A set at 100, Hys set at 10. Output A will activate (turn on) when the rate equals 100; Output A will deactivate (turn off) when the rate falls below 90 (10 below Preset A).
Atot	OUTPUT A FOR TOTAL; This assigns the A output to the totalizer.
Dur a	OUTPUT A DURATION; This is the duration of time (0.01 to 599.99 sec) that Output A will remain energized. If 0.00 is entered the output will reset. If a value other than 0.00 is entered the unit will autorecycle at Preset A.
Brate	OUTPUT B FOR RATE; This assigns the B output to the totalizer.
Hys b	HYSTERESIS FOR OUTPUT B; Same as HYS A.
B tot	OUTPUT B FOR TOTAL; This assigns the B output to the totalizer.
Dur b	OUTPUT B DURATION; This is the duration of time (0.01 to 599.99 sec) that Output B will remain energized. If 0.00 is entered the output will latch until reset.
Loc	LOCK; This section of the program menu sets up the lockout type and code.
Lcall	LOCK ALL; When this is selected the lockout will lock the programs as well as the Presets and reset button. The presets can be viewed but not changed.
Lcp9	LOCK PROGRAM; When this is selected the lockout will lock only the program. The Reset can be activated and the presets can be viewed and changed.
Code	CODE; This is a 5-digit code which will be used to lock and unlock the front panel.
Setup	SETUP; This section of the program menu sets up the operating variables.
Rdec	RATE DECIMAL LOCATION; This allows the user to program a decimal point for the rate display.
Set lo	SET LOW; This is the rate value for the lowest input (0 or 1 Volts; 0 or 4mA). (i.e. 4 mA = 0 lbs/hr.)
Set hi	SET HIGH; This is the rate value for the highest input (5 or 10 Volts; 20mA). (i.e. 20mA = 500 lbs/hr.)
LO CUT	LOW CUT-OFF; This is the lowest rate value to be recognized. All rate readings below this value will assume the "set lo" value.
Nor	NORMALIZING FACTOR; This is an averaging factor (00.0 to 99.9). Higher settings provide more normalizing (averaging) for a more stable display. Derived from the equation:$\frac{\text{OLD DATA x "NOR" + NEW DATA)}}{\text{("NOR" + 1)}}$
SECS	SECONDS; This tells the unit that the High/Low input and Low Cut Off values are entered in units per second.
Min 5	MINUTES; This tells the unit that the High/Low input and Low Cut Off values are entered in units per minute.

Hour 5	HOURS; This tells the unit that the High/Low input and Low Cut Off values are entered in units per hours.
tdec	TOTALIZER DECIMAL LOCATION; This allows the user to enter a decimal for the totalizer display. This decimal is not a dummy decimal and will scale the totalizer display accordingly. (i.e. if the tdec is set in the tenths position (#####.#), 100 will be displayed as 100.00)
Tface	TOTALIZER FACTOR; This factor divides the totalizer prior to display by 1,10,100, or 1000.
Opt	OPTIONS; This section of the program menu is for setting up optional features (analog out, RS232/422 serial communications).
Out lo	OUT LO; The displayed rate value at which the unit will output 4 mA (0 lbs./hr = 4 mA out).
Out hi	OUT HIGH; The displayed rate value at which the unit will output 20 mA (2000lbs./hr = 20 mA out).
Baud	BAUD RATE; The displayed rate value art which the unit will ouput 20 mA (2000 lbs./hr = 20 mA out).
9600	9600 BAUD; This sets the communications at 9600 BAUD.
2400	2400 BAUD; This sets the communications at 2400 BAUD.
1200	1200 BAUD; This sets the communications at 1200 BAUD.
300	300 BAUD; This sets the communications at 300 BAUD.
Unit	UNIT NUMBER; this assigns the unit an ID number from 1 to 99. This number is to be addressed when the unit is to be on line. A unit with 0 assigned will never come on line.
Plist	PRINT LIST; This sets a list of data that will be transmitted whenever the strobe is activated.
Total	TOTAL COUNT; When this is added to the print list, the unit will transmit the total when the strobe is activated.
Rate	RATE; When this is added to the print list, the unit will transmit the present rate value when the strobe is activated.
Peak	PEAK; When this is added to the print list, the unit will transmit the present peak value when the strobe is activated.
Valley	VALLEY; When this is added to the print list, the unit will transmit the present valley value when the strobe is activated.
Pre A	PRESET A ; When this is added to the print list, the unit will transmit the Preset A value when the strobe is activated.
Pre b	PRESET B; When this is added to the print list, the unit will transmit the Preset B value when the strobe is activated.
Set lo	SET LOW; When this is added to the print list, the unit will transmit the Set Low value when the strobe is activated.
Set hi	SET HIGH; When this is added to the print list, the unit will transmit the Preset B value when the stove is activated.
End	END; This is the only exit from the P List. If END is not entered the unit will start at the beginning of the P List again.
PXXXXX	P; This will appear in the 6th (furthest to the left) digit when viewing the Peak. The peak value is the highest rate reading that the unit had displayed since the peak had been reset. The peak is not retained in memory when power is lost.
uXXXXX	U; This will appear in the 6th (furthest to the left) digit when viewing the Valley. The valley value is the lowest rate reading that the unit had displayed since the valley had been reset. The valley is not retained in memory when power is lost.
Rxxxxx	R; This will appear in the 6th (furthest to the left) digit when viewing the Rate.

9.0 FRONT PANEL OPERATIONS



10.0 PROGRAMMING

	PRESS	DISPLAY	REMARKS
STEP 1 SETTING INPUT	PRGM	input	This section of the menu is used to set up the type of signal the unit will be receiving.
	ENTER	4-20,0-20 E 1-5, E 0-5 or E 0-10	Press the PRGM key to step through choices. Press the RST/ENTER key to enter the displayed choice.
	ENTER	Linear or 59rt	This section will only appear on units with the square root extraction option. Press the PRGM key to toggle between the choices and press the RST/ENTER key to enter the desired choice.

	PRESS	DISPLAY	REMARKS
	PRGM PRGM	INPUT RELAYS	This section of the menu sets up the open collector outputs and/or relays.
	ENTER	ARATE or ATOT	Output A assigned to the rate or total. Press the PRGM key to toggle between choices, press the RST/ENTER key to enter the displayed choice.
	ENTER	(IF TOT SELECTED) DUR a (hit any key to view or change existing dur a value xx.x)	Dur A = the duration of time (0.01 to 599.99 sec) that output A will remain on or energized. When dur A is displayed, hit any key to view or change dur A. Press the RST/ENTER key to enter displayed value. When dur A is set at 0.00, output A will latch until reset; when dur A is set other than 0.00 the counter will autorecycle at Preset A.
	ENTER	(IF RATE SLECTED) Hys A (hit any key to view or change existing hyS A value xxxxx)	Hys (hysteresis) = The number of units below the preset that the output will remain “ON”. EXAMPLE: Preset set @ 100; HyS set @ 10. Output will activate (turn on) when rate = 100 and turn off when rate falls below 90 (10 below preset).
	ENTER	BRATE OR BTOT	Follow instructions for A RATE & A TOT.
	ENTER	(IF TOT SELECTED) DUR B	Follow instructions for dur A.
	ENTER	(IF RATE SELECTED) HYS B	Follow instructions for hys A.
	PRGM PRGM PRGM	Input Relays Loc	This section of the menu is used to se t up the lockout type and code.
	ENTER	Lcp9 or lcall	LC PG = Locks program but presets are accessible. LC ALL = Locks program & presets. Press the PRGM button to toggle between choices; Press RST/ENTER to enter displayed choice.
	ENTER	Code Press any key to view or change the lock code	When CODE is displayed, press any key to view existing lock code. To change the code press the key under each digit to be changed. Press RST/ENTER to enter displayed value.

PRESS	DISPLAY	REMARKS
PRGM PRGM PRGM PRGM	Input Relays Loc Setup	This section of the menu is used to set up important operating variables
ENTER	rdec	RDEC = rate decimal location; Press the key under the digit with the desired location. Press the “E” key if a decimal is not desired. Press RST/ENTER to enter the displayed value.
ENTER	Set lo Press any key to view or change existing value	SET LO = Rate value for the lowest input (0 or 1V; 4mA). (i.e. 4mA = 0 lbs/hr.) Key in the desired low value and press RST/ENTER to enter displayed value.
ENTER	Set hi Press any key to view or change existing value	SET HI = Rate value for the highest input (5 or 10V; 20mA). (i.e. 20mA = 500lbs/hr.). Key in the desired high value and press RST/ENTER to enter displayed value.
ENTER	Locut Press any key to view or change existing value	LO CUT = Low cut-off; Lowest rate value to be recognized. All rate readings below the “cutoff” will assume the “set lo” value. Key in the desired value and press RST/ENTER to enter displayed value.
ENTER	Nor Press any key to view or change existing value	NOR = Normalizing (averaging) factor (00.0 to 99.9); Key in the desired value and press RST/ENTER to enter displayed value. Higher settings provide more normalizing (averaging) for a more stable display.
PRGM ENTER	Min5,hour5 or secs	This section tells the unit that the high & low setting are entered in units per Minutes, Hours or Seconds. Press the PRGM key to step through choices. Press RST/ENTER to enter displayed choice.
ENTER	tdec	TDEC = Totalizer Decimal; Press the arrow keys to enter in the desired totalizer decimal. Press RST/ENTER to enter displayed choice. Entering a decimal will add resolution to the total. (i.e. tdec = #####.#; 100 will be displayed as 100.00)
ENTER	Tfact Press any key to view or change existing value	TFACT = Totalizer Factor; This factor allows you to divide the totalizer by 1, 10, 100, 1000 prior to display.
PRGM ENTER	1,10,100 or 1000	Press the PRGM key to step to the desired factor. Press RST/ENTER to enter displayed choice.

	PRESS	DISPLAY	REMARKS
STEP 5 **SETTING OPTIONS**	PRGM PRGM PRGM PRGM PRGM	INPUT RELAYS LOC SETUP OPT	This section of the menu is for setting up the variables for any options which were ordered (Analog out or Serial communications).
	ENTER	Out lo Press any key to view or change existing value	OUT LO = The rate value represented by the 4 mA end of the 4-20 mA output Key in the desired value and press RST/ ENER to enter displayed value.
	ENTER	Out hi Press any key to view or change existing value	OUT HI = The rate value represented by the 20 mA end of the 4-20 mA output. Key in the desired value and press RST/ENTER to enter displayed value.
	ENTER	Baud Press any key to view or change existing value 9600, 1200, 2400 or 300	BAUD = Baud rate for RS 232 or RS 422 communications option. Press any key to view existing value. Press the PRGM key to view available baud rates; Press RST/ENTER to enter displayed value.
	ENTER	Unit Press any key to view or change existing value	UNIT = Unit ID number. Key in the desired unit number (1-99) and press RST/ENTER to enter displayed value.
	ENTER PRGM	P List Press any key to enter Total Rate Peak Valley Pre a Pre b Set lo Set hi end	P LIST = Print list. Press RST/ENTER to add items to list; Press PRGM to remove items from list. Total = Total RATE = Rate PEAC = Peak UALLY = Valley PRE A = Preset A PRE B = Preset B SET LO = Low Input Value SET HI = High Input Value END = Press RST/ENTER to exit (end) print list; Press PRGM to recycle through list choices.

THE PROGRAM SETUP IS COMPLETE! YOU ARE NOW READY TO SET THE PRESETS.

11.0 SETTING THE PRESETS & PANEL LOCK

	PRESS	DISPLAY	REMARKS
SETTING THE PRESETS	PRE A	Pre a Press any key to view or change existing value	PRE A = Preset A (Final Preset); 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 Press any key to view or change existing value	PRE B = Preset B (Prewarn); The set point at which output B will trigger. IF the displayed values is not the desired preset, press the key(s) under the digit to be changed.
	LOCK LOCK LOCK	Code Press any key to enter the 5-digit lock code	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 RST/ENTER key to enter the displayed code.
SETTING THE LOCK STATUS	Press LOCK 3 times within 5 seconds (If LOCK is pressed once, unit freezes display)		
	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. If an invalid code is entered, no message is displayed; try again.

12.0 RS 232/422 OPERATIONS

This section applies to units which have the serial communications interface option. Up to 99 Unit ID numbers can be defined. Unit status can be accessed and many menu items can be entered through the serial port. Data is transmitted at selected baud rates using standard eight bit ASCII characters and one ”stop” bit. The unit does not check or transmit a parity bit.

UNIT I.D. (DEVICE #):
Each unit in the hookup must be assigned a unit number from 1 to 99. This can be entered through the front panel (see step 5 of the programming section). If “00” is assigned, the unit can not be brought on line through the serial port. The units will remain in an “off” high impedance state until addressed by the assigned unit number. Once a unit is addressed, do not address another unit until the data request has been sent and any data requested has been transmitted back.

BAUD RATE:
The baud rate is the speed at which data is transmitted, expressed in bits per second. Baud rates of 300, 1200, 2400 or 9600 are available. Select the desired baud rate from the menu. (see step 5 of the programming section).

PRINT LIST:
The serial interface card is equipped with a strobe line. When the strobe line is activated a user selectable set of data (print list) is transmitted. This transmission can be sent to a computer or printer. The print list consists of eight selectable items: COUNT, RATE, PEAK, VALLEY, PRE A, PRE B, LOW SET, HIGH SET. The list can be entered through the front panel (see step 5 of the programming section or through the serial port (read on).

HELP:
A help command has been installed for easy access of the command and data variables. When help is need, type a “?” and press return (enter) whenever a unit is on line. The following list will be transmitted:

D#XX:
S Set
E Exam
R Reset
G Lock
L*List
C*Count
R*Rate
P*Peak
V*Valley
A*PreA
B*PreB
L*Lo Set
H*Hi Set
J Lo Out
K Hi Out
N Norm
D Unit
E Input
G Hy/DrA
I Hy/DrB
M Time
T Baud
W Lock
X Meter
Y A Typ
Z B Typ
O Code
F RDec
Q TDec
U TFact

The unit transmits the unit ID (D#XX) as well as the variables for the corresponding commands an data. A “*” indicates that the data is available for the print list.

COMMANDS:
Each command consists of an instruction and an address. Each instruction and address is represented by a letter. The prefix of each command must be an instruction followed by an address (and address variable if applicable).

INSTRUCTIONS (1st letter of command)
[S] Set - Used to set the value or operating parameter of an address. (i.e. “SC 5000” will set the count at 5000)

[E] Examine - Used to examine the value or status of an address. (i.e. “ER” will examine the present rate reading)

[R] Reset - Used to reset the count & control output, peak or valley. (i.e. “RP will reset the peak value)

[G] Lock - Used to lock and unlock the unit. Type “G” followed by the “lock code” to lock and unlock the unit.

[L]*List - Used to set the print list. (i.e. “LCRVA” will set the list for count, rate, valley and preset A. These values will be transmitted whenever the strobe is activated.

ADDRESSES (2nd letter of command):
[C]*Count
[R]*Rate
[P]*Peak
[V]*Valley
[A]*PreA
[B]*PreB
[L]*Lo Set
[H]*Hi Set
[J] Lo Out
[K] Hi Out
[N] Norm

[D] Unit
[E] Input
[G] Dur A
[I] Dur B
[M] Time
[T] Baud
[W] Lock
[X] Meter
[Y] A Type
[Z] B Type
[O] Code
[F] RDec
[Q] TDEc
[U] TFact

POSSIBLE COMMANDS:
Each command must be followed by a carriage return for execution.

DXX: (device "unit ID" #)- Unit XX will come "on line" and stay "on line" until another device is ad dressed.
SD XX: (set device "unit ID" #)- Sets unit ID # at requested value.
ED: (examination device)- Unit will transmit the present device (unit ID) number (i.e. d=000000XX).
SC XXXXXX: (set count)- Sets count at requested value.
EC: (examine count)- Unit will transmit the present count value (i.e. c=00XXXXXX).
RC: (reset count)- Resets the counter and control out put.
ER: (examine rate)- Unit will transmit the present rate value (i.e. p=000XXXXX).
RR: (reset rate)- Resets the normalization.
EP: (examine peak)- Unit will transmit the present peak value (i.e. P= 000XXXXX)
RP: (reset peak)- Unit will reset peak
EV: (examine valley)- Unit will transmit the present valley value (i.e. v=000XXXXX)
RV: (reset valley)- Resets the valley.
SA XXXXX: (set preset A)- Sets preset A at requested value.
EA: (examine preset A)- Unit will transmit present pre set A value (i.e. a=000XXXXX).
SB XXXXX: (set preset B)- Sets preset B at requested value.
EB: (examine B)- Unit well transmit present preset B value (i.e. a=000XXXXX).
SL XXXXX: (set "Low")- Sets "set low" at requested value.
EL: (examine "Low")- Unit will transmit present "set low" value (i.e. l = 000XXXXX).
SH XXXXX: (set "High")- Sets "set High" at requested value.
EH: (examine "High")- Unit well transmit present "set high" value. (i.e. h = 00XXXXX).
SJ XXXXX: (set "low out")- Sets "out low" at requested value. Only available with ANALOG OUT option.
EJ: (examine "low out")- Unit will transmit present "out low" value. (ie. J = 000XXXXX).
SK XXXXX: (set "high out")- Sets "out high" at requested value. Only available with ANALOG OUT option.
EK: (examine "high out")- Unit will transmit present 'out high" value. (i.e k = 000XXXXX).
SN XX.X: (set norm)- Sets "norm" at requested value. Must be a 3-digit number with decimal.
EN: (examine norm)- Unit will transmit present "norm" value (i.e. n = 000XX.X).
SE l 4-20, l 0-20, e 0-5, e 1-5 or e 0-10: (set input)- Sets input to one of the 4 available types. Enter type exactly as it appears on the display.
EE: (examine input)- Unit will transmit input type (i.e. e 0-10).
SG XXXXX: (set dur A or hys A)- Sets dur A or hys A at requested value. (dur A when A is assigned to total; hys A when A assigned to rate).
EG: (examine dur A or hys A)- Unit wil transmit present dur A or hys A value (i.e. g = 000XXXXX).
SI XXXXX: (set dur B or hys B)- Sets dur B or hys B at requested value. (dur B when B is assigned to total; hys B when B assigned to rate).
EI: (examine dur B or hys B)- Unit will transmit present dur B or hys B value (i.e. I = 000XXXXX).
SM secs, mins, or **hours:** (set time base)- Sets time base to desired setting.
EM: (examine time base)- Unit will transmit present time (i.e. secs).
ST XXXX: (set baud)- Sets baud at desired rate (9600, 2400,1200 or 300).
ET: (examine baud)- Unit will transmit present buad rate (i.e. 9600).
EW: (examine lock type)- unit will transmit present lock type (i.e. lc pg).
SX linear or **scrt:** (set meter type)- Sets meter input for linear or square root extraction. Only available with square law option.
EX: (examine meter type)- Unit will transmit present meter type (ie. linear).
SY A tot or A rate: (set A type)- Assigns control output to rate or total.
EY: (examine A type)- Unit will transmit present A type (i.e. a tot).
SZ B tot or B rate: (set B type)- Assigns control output B to rate or total.
EZ: (examine B type)- Unit will transmit present B type (i.e. b tot).
SO XXXXX: (set lock code)- Sets lock code at requested value.
EO: (examine code)-Unit will transmit present code (i.e. o = 000XXXXX).
SF X: (set rate decimal location)- Sets rate decimal at requested location (0 to 4).
EF: (examine rate decimal location)- Unit will transmit the present rate decimal location (i.e. f = 0000000X).
G XXXXXX: (lock unit)- Locks and unlocks unit (XXXXX = code).

SQ X: (set totalizer decimal location)- Sets totalizer decimal at requested location (0 to 4).
EQ: (examine totalizer decimal location)- Unit will transmit present total decimal location (i.e. Q = 0000000X).
SU XXXX: (set totalizer scale factor)- Sets totalizer scale factor at requested value. This factor divides the totalizer by 1, 10, 100 or 1000. (i.e. SUXXX100 sets the divider at 100 where "X" represents the space characters).
EU: (examine totalizer scale factor)- Unit will transmit present total scale factor (i.e. U = XXX100 where "X" represents the space characters).
L CRPVABLH: (list)- The list can consist of any combination of the eight available options. Any address with a "*" next to it can be listed.

SERIAL INTERFACE OPERATION:

Data is received and transmitted over standard EIA RS 232 or RS422 levels. Each ten bit character is made up of a start bit, eight bit ASCII code and a stop bit.

The input impedance of RS232 is 3KΩ to 7KΩ worst case. The terminal addressing the unit must be capable of driving all load sin 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 corrupt the transmited data.

When the unit is active (on line) it will operate in an 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. Be sure to send only one command at a time foolowed by a carriage return to insure proper operation. 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 processign the data and will transmit the requested data on a non-priiority basis over the data transmit line. The unit will not transmit data if the Printer Busy line is activated (high). When the Printer Bsuy line is activated all transmissions are halted until the line goes low or open. 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 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. The unit will stay "on line" until another unit is addressed.

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.

```
1.0 SCREEN 0,0:WIDTH 80

20 CLS:CLOSE

30 OPEN "COM1:300,n,8,1,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
```

13.0 RS232 / RS422 WIRING

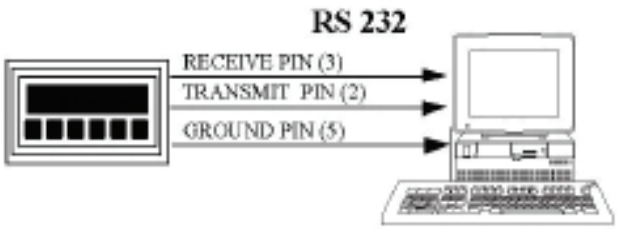
COMPUTER HOOKUP:

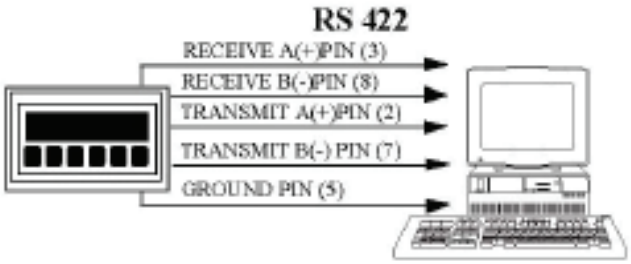
RS 232: When connecting the unit to a computer with RS 232 communication, only three connections are needed. These connections are: Receive data, Transmit data and Ground. The connections should be made as follows:

DB-9 CONNECTOR	COMPUTER
Transmit data (pin 2)	Receive data
Receive data (pin3)	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 B (-), Transmit data A (+), Transmit data B (-) and Ground. The connections should be made as follows:

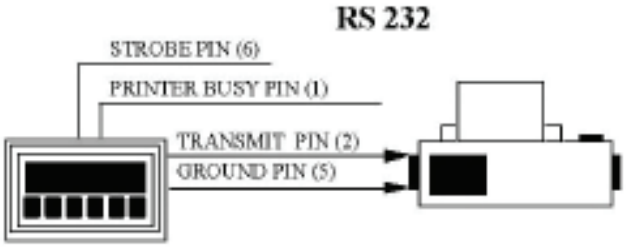
DB-9 CONNECTOR	COMPUTER
Trans. data A(+) (pin 2)	Rec. data A(+)
Trans. data B(-) (pin 7)	Rec. data B(-)
Rec. data A(+) (pin 3)	Trans. data A(+)
Rec. data B(-) (pin 8)	Trans. data B(-)
Ground (pin 5)	Ground

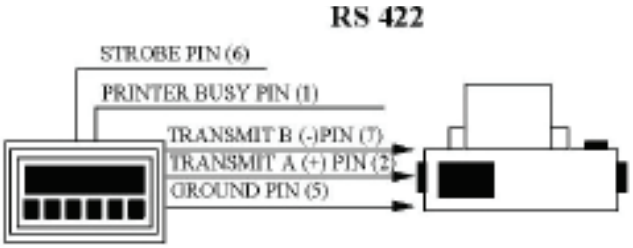


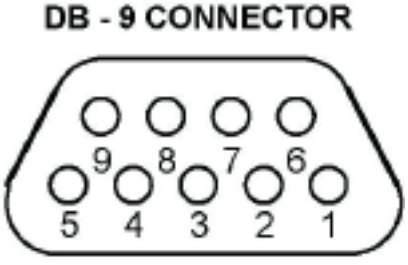


PRINTER HOOKUP:

When connecting the unit to a printer, you must first program the desired baud rate, parity and strobe list. 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.







NOTE: A switch can be connected between DB9 pin 6 and terminal pin 7 to function as a Print Key.

1 - Printer busy: 3 to 30 VDC, Level activated.
2 - Transmit A(+) (RS422); Transmit (RS232)
3 - Receive A(+) (RS422); Receive (RS232)
4 - Not Used
5 - Ground
6 - Strobe: 3 to 30 VDC Positive Edge
7 - Transmit B(-) (RS422 Only)
8 - Receive B(-) (RS422 Only)
9 - Not Used

14.0 TROUBLESHOOTING GUIDE

PROBLEM	POSSIBLE CAUSES	SOLUTIONS
Power is applied to unit but the display does not light.	AC or DC power wiring or voltage is incorrect.	Recheck power wiring.
Unit works but occasionally the display freezes or skips counts.	Line noise is effecting the processor due to a current spike or surge.	Use a different power supply or install a surge suppressor.
Input signal is connected but the unit does not totalize or rate.	Input wiring is incorrect. High/Low scaling or LoCutt settings are incorrect. TFact is set incorrectly. Display set to view Peak or Valley Transmitting device is defective. Unit is defective.	Recheck input wiring. Recheck high and low scaling and low cut off settings. Check TFact setting. Verify display view using “View” key. (See “Operating Front Panel”). Replace Transmitting device. To confirm set meter for 0-1j0V input, low @ 0; high @ 10. Apply a 0-10V signal to the voltage input (pin 5). When viewing the rate the meter should display the voltage value that is applied. If not call factory for an RMA#.
Display reading is inaccurate.	Input wiring is incorrect. Excessive current being drawn. LIN/SQRT selection is incorrect.	Be sure that voltage signals are connected to voltage input (pin 5) and current signals are connected to current input (pin 4). Check input and output wiring. Check LIN and SQRT programming.
Ratemeter works properly but totalizer is incorrect.	Time base is incorrect TFact is set incorrectly.	Recheck time base setting in setup section of the program menu. Check TFact setting.

For advanced troubleshooting contact the ABB Factory:

ABB
Attn: Service Department
18321 Swamp Road
Prairieville, Louisiana 70769 USA

Tel: (1) 225-673-6100
Fax: (1) 225-673-2525
Email: service@ktekcorp.com

15.0 WARRANTY

5 YEAR WARRANTY FOR:
KM26 Magnetic Liquid Level Gauges; MagWave Dual Chamber System; LS Series Mechanical Level Switches (LS500, LS550, LS600, LS700, LS800 & LS900); EC External Chambers, STW Stilling Wells and ST95 Seal Pots.

3 YEAR WARRANTY FOR:
KCAP300 & KCAP400 capacitance switches. BETA Pressure and Temperature Switches have a limited factory guarantee, excluding wetted parts & consumables.

2 YEAR WARRANTY FOR:
AT100, AT100S and AT200 series transmitters; RS80 and RS85 liquid vibrating fork switches; RLT100 and RLT200 reed switch level transmitters; TX, TS, TQ, IX and IM thermal dispersion switches; IR10 and PP10 External Relays; MT2000, MT5000, MT5100 and MT5200 radar level transmitters; RI100 Repeat Indicators; KP paddle switches; A02, A75 & A77 RF capacitance level switches and A38 RF capacitance level transmitters; Buoyancy Level Switches (MS50, MS10, MS8D & MS8F); Magnetic Level Switches (MS30, MS40, MS41, PS35 & PS45).

1 YEAR WARRANTY FOR:
KM50 gauging device; AT500 and AT600 series transmitters; LaserMeter and SureShot series laser transmitters; LPM200 digital indicator; DPM100 digital indicators; APM100 analog indicators; KVIEW series digital indicators and controllers; SF50 and SF60 vibrating fork switches, KB Electro-Mechanical Continuous Measuring Devices, KSONIK ultrasonic level switches, transmitters & transducers, ChuteMaster Microwave Transmitter / Receiver and TiltMaster Switches.

SPECIAL WARRANTY CONSIDERATIONS:
ABB does not honor OEM warranties for items not manufactured by ABB (i.e. Palm Pilots). These claims should be handled directly with the OEM.

ABB will repair or replace, at ABB's election, defective items which are returned to ABB by the original purchaser within the period specified above from the shipment date of the item and which is found, upon examination by ABB, to its satisfaction, to contain defects in materials or workmanship which arose only under normal use and service and which were not the result of either alterations, misuse, abuse, improper or inadequate adjustments, applications or servicing of the product. ABB's warranty does not include onsite repair or services. Field service rates can be supplied on request.

If a product is believed to be defective, the original purchaser shall notify ABB and request a Returned Material Authorization before returning the material to ABB, with transportation prepaid by the purchaser. (To expedite all returns/repairs from outside of the United States, consult ABB's customer service team (service@ktekcorp.com) to determine an optimal solution for shipping method and turnaround time.) The product, with repaired or replaced parts, shall be returned to the purchaser at any point in the world with transportation prepaid by ABB for best-way transportation only. ABB is not responsible for expedited shipping charges. If the product is shipped to ABB freight collect, then it will be returned to the customer freight collect.

If inspection by ABB does not disclose any defects in material or workmanship, ABB's normal charges for repair and shipment shall apply (minimum 250.00 USD).

The materials of construction for all ABB products are clearly specified and it is the responsibility of the purchaser to determine the compatibility of the materials for the application.

THE FOREGOING WARRANTY IS ABB'S SOLE WARRANTY AND ALL OTHER WARRANTIES EXPRESSED, IMPLIED, OR STATUTORY, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OF FITNESS FOR A PARTICULAR PURPOSE, ARE EXCLUDED AND NEGATED TO THE MAXIMUM EXTENT PERMITTED BY LAW. NO PERSON OR REPRESENTATIVE IS AUTHORIZED TO EXTEND ANY OTHER WARRANTY OR CREATE FOR ABB ANY OTHER LIABILITY IN CONNECTION WITH THE SALE OF ABB'S PRODUCTS. THE REMEDIES SET FORTH IN THIS WARRANTY ARE EXCLUSIVE OF ALL OTHER REMEDIES AGAINST ABB. ABB SHALL NOT BE LIABLE FOR ANY CONSEQUENTIAL, INCIDENTAL, OR SPECIAL DAMAGES OF ANY KIND. ABB'S SOLE OBLIGATION SHALL BE TO REPAIR OR REPLACE PARTS (FOUND TO BE DEFECTIVE IN MATERIALS OR WORKMANSHIP) WHICH ARE RETURNED BY THE PURCHASER TO ABB.

16.0 CUSTOMER SUPPORT

ABB (USA, Canada, International)
18321 Swamp Road
Prairieville, LA 70769 USA
Tel: (1) 225.673.6100
Fax: (1) 225.673.2525
Email: service@ktekcorp.com
Website: abb.com/level

16.1 ABB RMA Form

ABB
18321 Swamp Road
Prairieville, LA 70769
Phone: +1 (225) 673-6100
Fax: +1 (225) 673-2525
Email: service@ktekcorp.com
Toll Free: (800) 735-5835

***** IMPORTANT CUSTOMER NOTICE: PLEASE READ PRIOR TO RETURNING PRODUCTS TO ABB*****

Be sure to include the Return Authorization (RA) number on the shipping label or package to the attention: Customer Service. A copy of this document should also be included with the packing list. ABB wants to maintain a safe work environment for its employees. In the event, the returned product or material has been in contact with a potentially hazardous chemical, per federal regulations, the customer must provide evidence of decontamination and the related chemical composition and characteristics. In order to expedite your return, please include the applicable Material Safety Data Sheets (MSDS) and decontamination tags by affixing these documents in close proximity to the shipment label for identification purposes. (January 18, 2006)

Return Authorization Form	
Customer:	Date:
Contact Name:	Product:
Contact Email:	Serial No:
Contact Phone:	Job No:
Contact Fax:	Service Rep:

Completed by Customer

Reason:

Problem Found: None

Action Requested: None

Is expedited return shipping requested? ☐ Yes

If yes, please provide a purchase order or your shipper's account number (ex FedEx or UPS).
ABB pays return transport via standard ground shipments only.

Account #:

If purchase order is issued, a copy of purchase order must be included with return authorization documentation.

Is ABB authorized to repair items determined to be non-warranty? ☐ Yes

If yes, a copy of purchase order must be included with return authorization documentation.

Customer PO#:		Date:	

Has product been in contact with any potentially hazardous chemical? ☐ Yes

If yes, documentation product and forward MSDS to ABB. "ATTN: Customer Service"

Return Repaired Product to Address	
Shipping Address:	Billing Address:
	Ship Via:

Contact us

ABB Inc.
18321 Swamp Road
Prairieville, LA 70769 USA
Phone: +1 225 673 6100
Service: +1 225 677 5836
Fax: +1 225 673 2525
Service e-mail: service@us.abb.com

www.abb.com/level

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