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RED LION CONTROLS

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DITAK 3D - 5-DIGIT RATE INDICATION, PROGRAMMABLE ADAPTABILITY TO ACCOMMODATE VIRTUALLY ANY RATE MEASURING NEED

- *5-DIGIT, 0.43" (11 mm) LED DISPLAY*
- *CRYSTAL-CONTROLLED TIME-BASE PROGRAMMABLE UP TO 32 SECONDS, PROVIDES DIRECT-READING FOR ANY RATE UNITS*
- *0.01% ACCURACY*
- *PROGRAMMABLE DECIMAL POINTS*
- *SELECTABLE FREQUENCY DOUBLING*
- *PROGRAMMABLE INPUT CIRCUIT ACCEPTS OUTPUTS FROM A WIDE VARIETY OF SENSORS*

DESCRIPTION

The DITAK 3D provides versatility and flexibility. Based on circuit designs and technology, this unit is field-proven for reliability in tens of thousands of actual in-plant installations.

The key to adaptability in rate measurement, lies in the ability to scale for direct readout in terms of the units being measured. Whether a machine produces bottles, cloth, wire, or beverage mix, operation is enhanced when the rate readout is expressed directly in bottles/min, feet/min, gallons/hour, or whatever units are customarily used in plant operation. The DITAK 3D provides this capabilty through its settable time base, programmable decimal points and frequency doubling function.

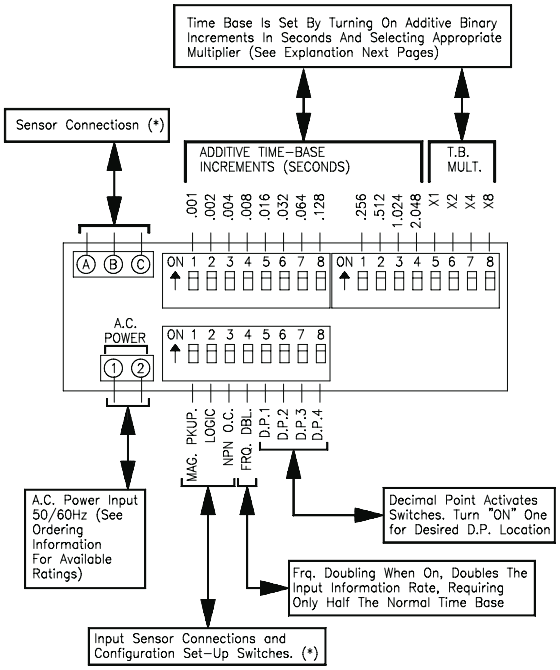
SAFETY SUMMARY

All safety related regulations, local codes and instructions that appear in the manual or on equipment must be observed to ensure personal safety and to prevent damage to either the instrument or equipment connected to it. If equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

SPECIFICATIONS

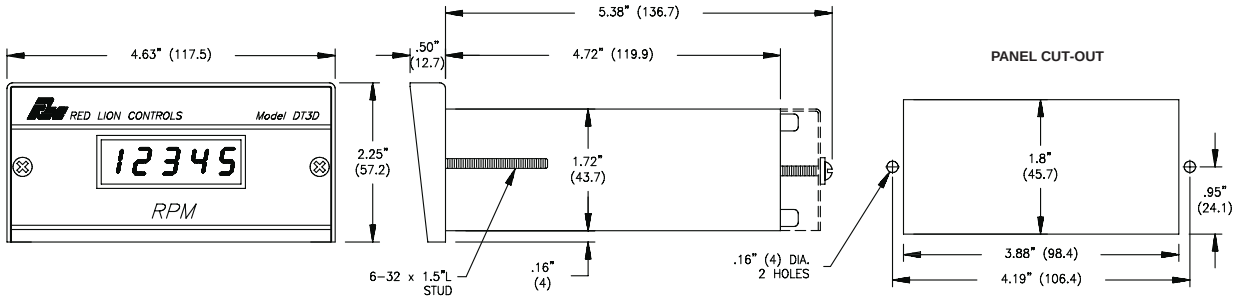
1. **PRIMARY SUPPLY VOLTAGE:** Available in two voltage ratings, 50/60 Hz (See Ordering Information). Allowable supply voltage variation ±10%. Input power 5 VA.
   Note: These units can also be operated from +12 VDC ±15% power supplies or batteries, (+) connected to Term. "A" and (-) to "B". Max. current drain from +12 VDC supply is 350 mA.
2. **SENSOR OUTPUT POWER:** +12 VDC ±15%, 75 mA max.
3. **ENVIRONMENTAL CONDITIONS**:
   Operating Temperature: -20 to 50°C
   Storage Temperature: -40 to 80°C
   Operating and Storage Humidity: 85% max. (non-condensing) from 0°C to 50°C.
   Altitude: Up to 2000 meters
4. **INPUT SENSITIVITY & RATINGS:** (*)
5. **CONSTRUCTION:** Steel Case, Aluminum Bezel, Aluminum Front Panel with Polycarbonate Overlay, Black Epoxy Paint Finish. Connections on rear via screw terminal strips with clamp-type pressure plates that accept stripped wires without lugs.
6. **WEIGHT:** 1.5 lbs. (0.68 Kg)

DITAK 3D CONNECTIONS & PROGRAMMING SWITCHES



** - See Ditak 3A & 3D Sensor Input Connections & Input Configuration Switch Set-up section.*

DIMENSIONS "In inches (mm)"



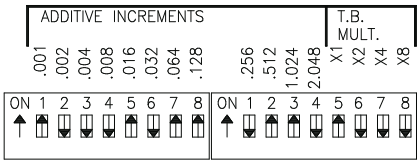
DITAK 3D TIME BASE SETTING PROCEDURE

The Time Base is set by adding 12 binary increments from 0.001 second to 2.048 seconds. This is done by setting the switch for each increment to be added to the "ON" (UP) position. To determine the increments required, use the folowing procedure.

Start by selecting the first increment which is greater than half the desired time base and add subsequent increments that are more than half the difference needed.

EXAMPLE: A Time Base of 1.745 seconds is set as follows.

Start with	1.024		(1.745 - 1.024 = 0.721 sec needed)
Add	0.512		
	Total	1.536	(1.745 - 1.536 = 0.209 sec needed)
Add	0.128		
	Total	1.664	(1.745 - 1.664 = 0.081 sec needed)
Add	0.064		
	Total	1.728	(1.745 - 1.728 = 0.017 sec needed)
Add	0.016		
	Total	1.744	(1.745 - 1.744 = 0.001 sec needed)
Add	0.001		
	Total	1.745	seconds, Desired Time Base



Switches set-up for a 1.745 sec. time-base per example

For Time Bases, greater than 4.095 seconds but less than 8.190 seconds, set up ½ the required Time Base as above and set the X2 multiplier to on. For Time Bases greater than 8.190 seconds but less than 16.380 seconds, set up ¼ the required Time Base and set the X4 multiplier switch on. Use the same procedure to multiply X8 for Time Bases up to 32.76 seconds.

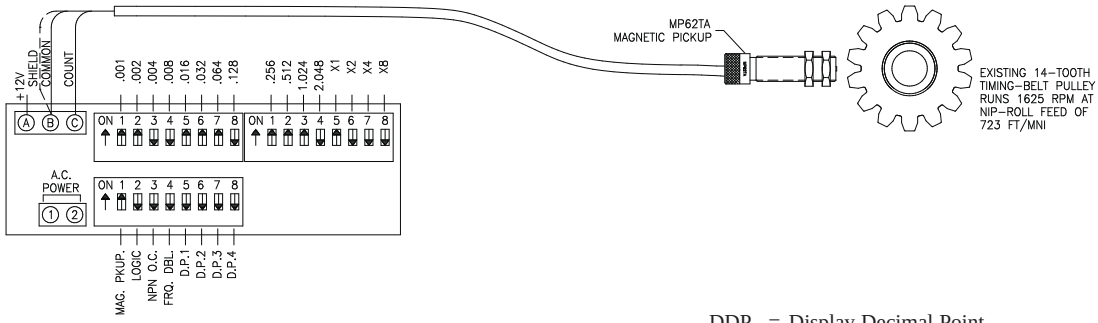
At least one of the four Time Base Multiplier Switches must be "ON" (UP) for operation. If more than one is "ON", the unit will not function properly. When the Time Base is less than 4.095 seconds, X1 multiplier switch must be turned "ON".

Note: Turning "ON" the FREQUENCY DOUBLING FUNCTION will decrease the required Time Base to ½ the time normally required.

Turning "ON" the Decimal Point switches will increase the required time base by multiples of ten.

DITAK 3D TYPICAL APPLICATIONS

1. USING EXISTING MACHINE GEAR OR SPROCKET FOR SIGNAL GENERATION & CALCULATING TIME BASE FOR DIRECT READOUT



In this example an existing timing belt pulley, in the drive train of a set of nip-rolls, is used to excite an inexpensive magnetic pickup. Direct readout is obtained by setting the time base to a period in which the number of teeth passing the pickup is numerically equal to the desired readout number. This can be worked out in logical steps as shown in the example below, but in this case the formula at right can also be used:

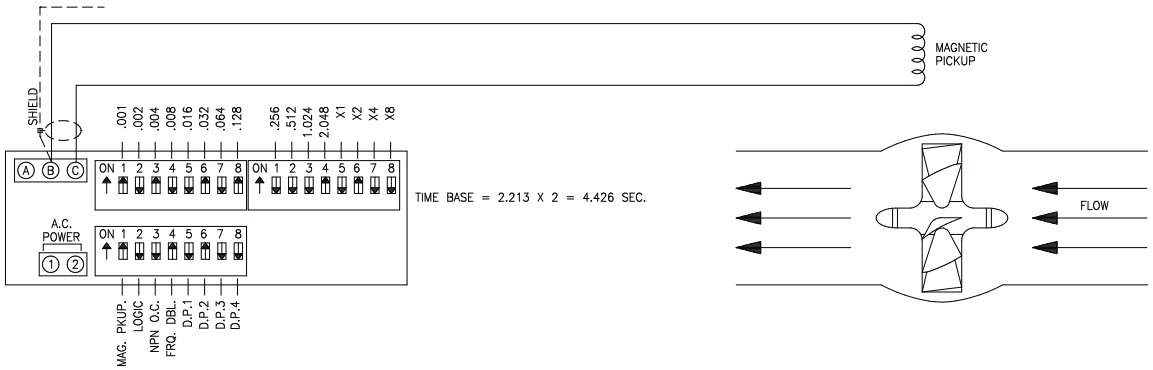
$$\text{Time Base (seconds)} = \frac{60 \times (\text{Numerical Readout Desired}) \times \text{DDP}}{(\text{Pulses per rev.}) \times (\text{RPM of gear})}$$

DDP	= Display Decimal Point		
0	= 1		
0.0	= 10	=	D.P.1 "ON" up
0.00	= 100	=	D.P.2 "ON" up

$$= \frac{60 \times 723 \text{ ft/min} \times 1}{14 \text{ PPR} \times 1625 \text{ RPM}} = 1.907 \text{ sec.}$$

The procedure for setting the additive time increments to obtain this time base is shown above. *Note: The time base can be halved if FREQUENCY DOUBLING is used.*

2. DETERMINING TIME BASE IN A FLOW RATE APPLICATION



A turbine type flow meter uses a magnetic pickup to sense passing turbine blades, and has a calibration factor of 677.8 pulses/gallon of fluid passing through. It is to be used with a DITAK 3D to read directly in gallons/min in 1/100ths at flow rates to 50 GPM. The following logical steps can be used to determine the time base setting required for direct reading:

At 50 GPM, output pulses will be -
50 GPM x 677.8 pulses/gallon = 33890 pulses/min.

At this flow rate the desired reading is 50.00 GPM. Set D.P.2 switch "ON" and use Display Decimal Point value of 100.

$$\text{Time Base (seconds)} = \frac{60 \times 50.00 \text{ GPM} \times 100 \text{ (DDP)}}{33{,}890 \text{ pulses per minute}}$$

$$= 8.852 \text{ sec.}$$

If frequency doubling is used, this time base can be further divided by 2, or 8.852/2 = 4.426 seconds.

Since this is a longer time than can be achieved by adding binary increments alone (with X1 multiplier) it will be necessary to set the time base at ½ the desired value and then turn "ON" the X2 multiplier switch.

4.426 = 2.213 (Binary Setting) x 2 (multiplier setting)

ORDERING INFORMATION

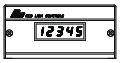
MODEL NO.	DESCRIPTION	PART NUMBERS FOR AVAILABLE SUPPLY VOLTAGES	
		230 VAC	115 VAC
DT3D	5-Digit Programmable Tach.	DT3D0510	DT3D0500
For more information on Pricing, Enclosures & Panel Mount Kits refer to the RLC Catalog or contact your local RLC distributor.			

TROUBLESHOOTING

For further technical assistance, contact technical support at the appropriate company numbers listed.

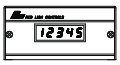
DITAK 3A & 3D - DIGITAL RATE INDICATORS FOR ACCURATE, CONVENIENT & ECONOMICAL SPEED READOUT IN PRODUCTION, LABORATORY, MAINTENANCE, & FIELD APPLICATIONS

RPM

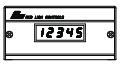


GALLONS/HR

FEET/MIN

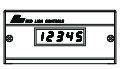


STROKES/MIN



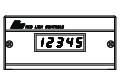
IMPRESSIONS/HR

CFM



BOTTLES/MIN

KHZ



LITRES/MIN

LBS/MIN

INCHES/SEC

MPH

CC/SEC

GPM

Speed is one of the most fundamental measurement parameters in industry today. It is important not only for measuring production rate, but also for optimizing operations, improving efficiency, problem diagnosis, and performance measurement.

RLC's new DITAK 3A and 3D are easily adaptable to virtually any industrial speed measuring application. They provide superior accuracy, direct reading flexibility, and trouble-free reliability at a super-competitive price.

Whether you need rate indication for your own in-plant equipment, or you manufacture equipment that requires rate measuring instrumentation, check out the benefits of the new DITAK 3A and 3D.

HOW DIGITAL RATE MEASUREMENT WORKS!

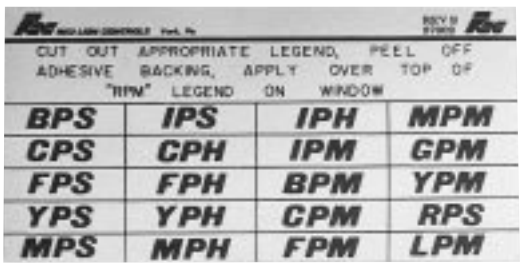
A DITAK Rate Indicator (Tachometer) includes an electronic counter, a precision time-reference circuit, a readout display, a power supply and the necessary coordination circuitry for proper operation. It measures speed by following the same procedure that would be used manually, i.e. it accumulates a count of events for a specified time period. Unlike manual speed measurement however, it is capable of very high speed operation, it automatically takes care of the mathematics, and it operates on a continuous recycle basis, displaying the count it received during the last measuring time interval while it is internally accumulating new counts for the preset interval. At the end of each interval the display is instantly updated with the latest time-interval-count for fast, easy readout.

SCALING FOR DIRECT READING

At first glance, the process of scaling to get direct readout on a rate indicator, may seem a bit involved. But, from the DITAK 3A and 3D examples given on the following pages it is obvious that scaling is nothing more than a simple exercise in elementary logic. With the DITAK 3A, scaling is simply a matter of determining a sensor arrangement to generate the number of counts in one second that is equal to the desired readout.

The DITAK 3D offers another degree of scaling freedom via its precision, adjustable, time-base and by the frequency doubling function. These features facilitate sensing from existing gear or sprocket teeth that move in a fixed but arbitrary relationship to the desired readout.

Ideal measuring time intervals (time-base, or up-date times) for the human observer may vary depending on the application. Where the operator is using the rate indicator to set machine speed, the ideal time base is between one and five seconds. Shorter time base can be annoying to the human operator due to the rapid update. Longer time base periods can make it awkward to set machine speed since it takes too long to observe the effect of each new speed-change input. However, for simple monitoring applications a time-base of 20 or 30 seconds may be entirely adequate and in some cases even desirable.



CUSTOMIZED UNITS LABELS

All DITAKS are shipped with a metalized mylar label, containing legends for 20 different rate units. Simply cut-out the desired units legend, remove the backing, and stick over the RPM legend on the DITAK front panel.

DITAK 3A & DITAK 3D

SENSOR INPUT CONNECTIONS & INPUT CONFIGURATION SWITCH SET-UP

Rate indicators frequently use magnetic pickups for input devices, while contact input is never used due to speed and contact bounce limitations. Consequently there are basic differences between counter and rate-indicator input circuits.

DITAK 3A and 3D both use the input circuit shown on the right. Like the SC Counter input circuit, a Schmidt trigger amplifier is also used here. However, in this circuit, the hysteresis level is quite small and the bias levels are significantly different to accomodate both magnetic pickup input as well as the +5 V and higher logic levels.

The individual functions of the input configuration switches are:

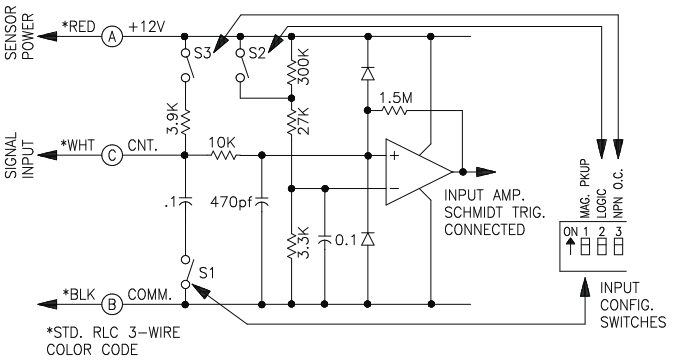
S1 - ON [MAG.PKUP.]: Connects a 0.1 µfd damping input capacitor from input to common. This capacitor is used only with magnetic pickup inputs and serves to filter out high-frequency noise. S1 should be set in the OFF position when using inputs other than magnetic pickups.

S2 - ON [LOGIC]: Sets the bias reference so that input logic signals trigger count pulses as they cross a level of approximately +1.3 V.

OFF: Sets the bias reference so that a signal of 150 mV or more will trigger count pulses. This provides the sensitivity required for low speed magnetic pickup inputs.

Note: Hysteresis for both S2 "ON" and "OFF" conditions is about 25 mV. This means the difference between V_{IL} and V_{IH} with logic inputs (S2) is almost insignificant and only a very small signal swing about the 1.3 V bias level will trigger the input.

S3 - ON [NPN O.C.]: Connects a 3.9 KΩ pull-up load resistor for sensors or circuits with current sink output. Sensor output must sink 4 mA @ V_{OL} of 1 V or less.



OTHER CHARACTERISTICS & SPECIFICATIONS

Maximum Input Voltage & Current: When the input (Term. "C") is driven from external signal voltages, maximum voltage swing is ±50 V peak. Input voltage can be dropped by an external series resistance that limits input current to ±5 mA. (These ratings for S1 & S2 ON/OFF, S3 OFF.)

Maximum Operating Freq.: 10 KHz, with minimum pulse width "ON" and "OFF" times of 50 µsec.

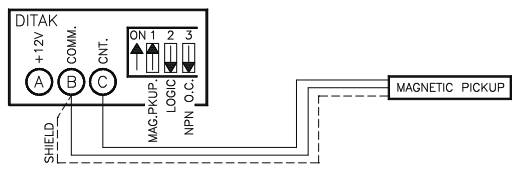
Input Impedance: With S1 and S3 "OFF", the resistive input impedance exceeds 1 Megohm, as long as Terminal "C" input voltage is between zero and +12 VDC. Beyond these levels the high and low clamping diodes come into play.

Paralleling With SC Counter Inputs: DITAKS may be parallel connected with SC Counters to operate from a common Current Sink or Source Sensor, by connecting "A", "B" and "C" terminals in common. S3 (NPN O.C.) on the DITAK should be turned "OFF" since pull-up or pull-down resistors are already present in the counter. The DITAK will not add appreciable sensor loads with this arrangement.

Note: DITAKS cannot be operated in parallel with SC Counters when count-switch or 2-wire proximity sensors are used.

CONNECTIONS & CONFIGURATION SWITCH SET-UPS FOR VARIOUS SENSOR OUTPUTS

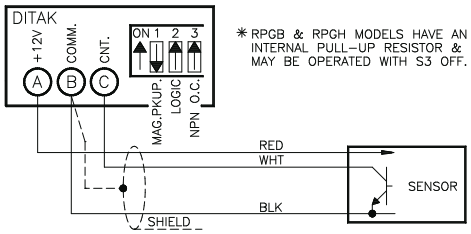
MAGNETIC PICKUPS



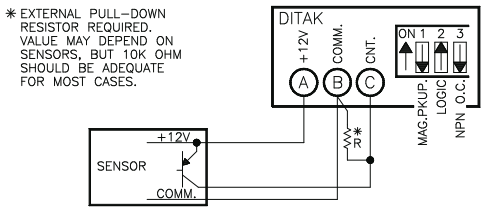
RECOMMENDED RULES FOR MAGNETIC PICKUP CONNECTIONS

1. *Use 2-wire shielded cable for magnetic pickup signal leads.*
2. *Never run signal cable in conduit, troughs, or cable bundles with power carrying conductors.*
3. *Connect the shield to the common terminal "B" at the input of the instrument. DO NOT connect the shield at the pickup end, leave it "open" and insulate the exposed shield to prevent electrical contact with the frame or case.*
4. *The DITAK 3A should be mounted in a panel that is electrically grounded through the machine frame to the magnetic pickup housing.*

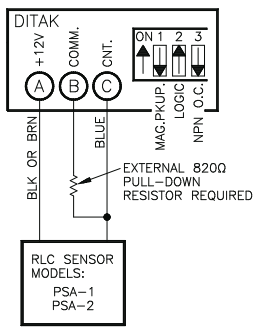
SENSORS WITH CURRENT SINK OUTPUT (NPN O.C.)
(INCLUDES ASTC, LMPC, PSAC,*RPGB,*RPGH, LSC)



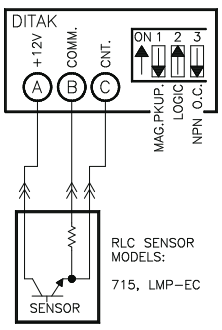
SENSORS WITH CURRENT SOURCE OUTPUT (PNP O.C.)



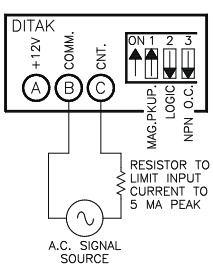
2-WIRE PROXIMITY SENSORS



OLDER STYLE SENSORS WITH-EF OUTPUT

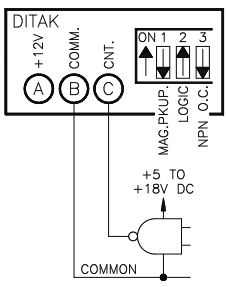


A.C. INPUTS FROM TACH. GENERATORS, INVERTERS, ETC.



A.C. POWER SOURCE SUCH AS INVERTERS WITH MORE THAN 50V OUTPUT, SHOULD BE COUPLED WITH A STEP-DOWN ISOLATION TRANSFORMER.

INPUT FROM CMOS & OTER BI-POLAR OUTPUTS



INPUT FROM TTL