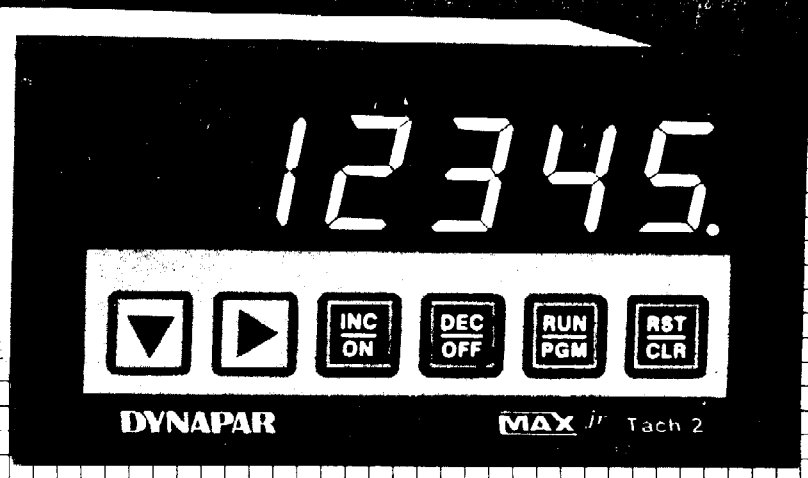
MAX jr Tach

Rate, Ratio, and Time Interval Indicators



MAXjr is a family of powerful tachometers. **MAXjr** features guided programming using English prompts for easy setup and operation. Human engineering, high performance, and advanced packaging make **MAXjr** the best value for rate, ratio, and time interval indicator applications.

MAXjr Family Features:

- Guided programming by English prompts
- Tactile response keyboard
- Large, bright LED display
- Sealed front panel, NEMA 4 rated
- Time interval measurement technique
- Automatic averaging for display stability
- Programmable calibration
- Display Hold and Output Disable control inputs
- Solid State or Contact Closure inputs
- Built-in diagnostics
- Extruded aluminum DIN enclosure

MAXjr Family Models:

MAXjr Tach 1 - Rate Indicator with Alarms
MAXjr Tach 2 - Rate, Ratio, Time Interval Indicator with Alarms

KEY SPECIFICATIONS:

- Five digit display
- Programmable display decimal point
- Dual Alarms, 1 High and 1 Low Alarm
- 0.01% accuracy
- Five digit calibration
- 1 sec or 1 input cycle update time
- 0.02 Hz to 10 kHz input rates
- +12 VDC accessory supply
- Two solid state Alarm outputs
- Following, Pulsed, or Latched Alarms
- 115 VAC operation (230 VAC available)

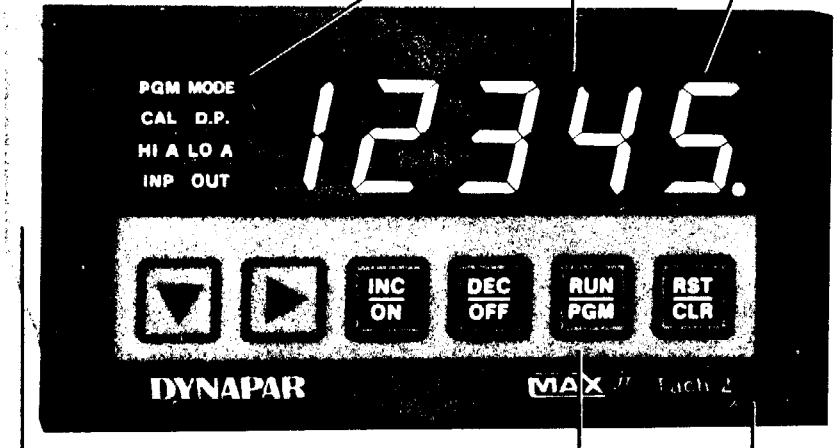
INDEX TO CONTENTS:

OVERVIEW . . .

ENGLISH PROMPTS
- Easy to read
- Easy to program

METAL ENCLOSURE
- Improves noise immunity
- Eliminates RFI emissions
- High strength aluminum

LARGE LED DISPLAY
- 5 decades
- 0.56" high
- High intensity
- High contrast
- Alpha and numeric



RUGGED PANEL STRAPS
- Won't vibrate loose

SEALED FRONT PANEL
- NEMA 4 rated
- Oil tight
- Water tight
- Chemical resistant
- Clean styling

EASY PROGRAMMING
- Tactile response keyboard
- Menu driven selections
- Automatic key repeat
- Human engineered

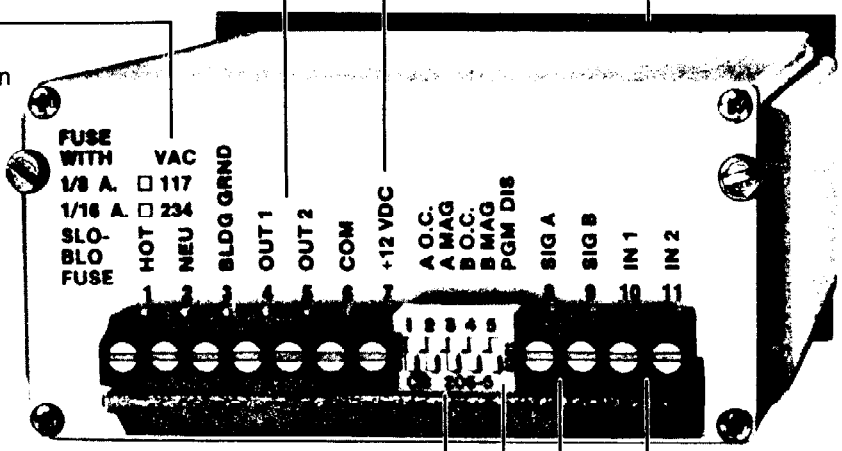
OVERVIEW . . .

ACCESSORY SUPPLY
- +12 volts DC
- 125 milliamps

SOLID STATE OUTPUTS
- Output 1 is High Alarm
- Output 2 is Low Alarm
- Programmable to follow the Alarms, pulse, or latch

NEOPRENE GASKET
- Seals unit to panel

POWER INPUT
- 115 VAC
- 230 VAC for E version
- Memory is retained indefinitely during power outages



RATE INPUT SELECTIONS
- Contact closures
- Open collector devices
- Solid state transducers
- Magnetic pickups
- Logic output sources

CONTROL INPUTS
- Input 1 is Display Hold and is level sensitive
- Input 2 is Output Disable and is level sensitive
- Output Disable resets and disables Alarm outputs

PROGRAM DISABLE SWITCH
- Inhibits RUN/PROGRAM key
- Prevents unauthorized changing of programmed data

RATE INPUTS
- Signal A is used for Rate and Time Interval measurements
- Signals A and B are used for Ratio measurements and for Start/Stop time measurements
- Can be Solid State or Contact driven

SPECIFICATIONS . . .

Input Power: 100 to 125 VAC, 50/60 Hz, 6VA
(200 to 250 VAC for 'E' version)

Accessory Power: 12 VDC ± 25% @ 0 to 125 ma

Tachometer Operation:
- Rate: freq of A in Hz (cycles/sec)
- Ratio: freq of A / freq of B
- Time: period of A in seconds or interval from A (Start) to B (Stop) in seconds

Alarms: (1) High Alarm, (1) Low Alarm

Calibrator Range: 0.0001 to 99999.

Input Frequency:
- High Range: 0.2 Hz to 10 kHz on A or B
- (solid state) 10 kHz max combined on A and B
- Lo Range: 0.02 Hz to 20 Hz on A and B
- (contacts) 0.7 to 50 sec for interval A to B (Start/Stop)

Accuracy:
- Hi Range (solid state): 0.01% initial (Rate/Time)
  0.02% initial (Ratio)
- Lo Range (contacts): 0.1% min
- Drift/Stability: 0.001%

Display Update: < 1 sec typical or 1 input cycle

Controls:
- Input 1: Display Hold (level sensitive)
- Input 2: Output Disable (level sensitive)

Signal Inputs, A and B:

Solid State (current sourcing):
- Input High: 1.7 min. to 20 max VDC
- Input Low: 0 min to 0.8 max VDC
- Input Impedance: 3 kΩ min
- Input Current: 0.6 ma min source
- Input Response: 50 μs min high and low time

Open Collector and Contact Closure:
- Input High: open or 1.7 min to 20 max VDC
- Input Low: 0 min to 0.8 max VDC
- Input Impedance: 1.2 kΩ min
- Input Current: 1.0 ma min sink
- Input Response: 50 μs min high and low (OC)
  25 ms min make and break (CC)

Magnetic:
- Input High: +0.5 min to +20 volts peak
- Input Low: -20 min to -0.5 volts peak
- Input Impedance: 3 kΩ min
- Input Current: 0.2 ma min sink and source
- Input Response: 20 μs min high and low time

Control Inputs:
- Input High: open or 1.7 min to 20 max VDC
- Input Low: 0 min to 0.8 max VDC
- Input Impedance: 1.2 kΩ min
- Input Current: 1.0 ma min sink
- Input Response: 25 ms min make and break time

Display:
- Decades: 5 decade, 0.56" red LED plus 8 legends
- Decimal Point: Programmable from X.XXXX to XXXXX.

Keyboard: Sealed, tactile response
6 positions

Program Security: Program Disable switch

Outputs:
- Type: 2 Open Collector
- Sink Current: 100 ma max
- Collector Voltage: 30 VDC max
- Output Voltage: 0.5 VDC typical @ 50 ma
- Programming: Both outputs may follow Alarms pulse (0.1 sec), or latch
- Assignment: Output 1 = Hi Alarm
  Output 2 = Lo Alarm

Diagnostics:
- Signal and Control Inputs Test
- Solid State Outputs Test
- Front Panel Test
- Display Digits Test
- Display Segments Test

Mechanical:
- Enclosure: Extruded aluminum with molded Valox bezel
  1.98"H x 3.78"W x 6.03"D
- Cutout: 1.78" -0/+.03" x 3.58" -0/+.04"
- Panel Thickness: 1/16" to 1/4"
- Depth Behind Bezel: 5.68"
- Weight: 1.4 lbs

Environmental:
- Operating Temp: 0 to 50 °C. (32 to 122 °F.)
- Storage Temp: -18 to 85 °C. (0 to 186 °F.)
- Ambient Humidity: 0 to 90% and noncondensing

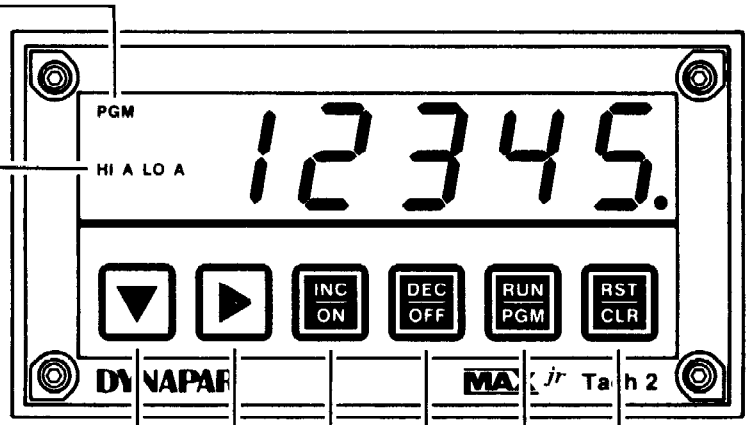
Error Codes: (automatically reset)
2. Low AC line voltage
3. Combined input frequency above 10 kHz
4. Input frequency (A or B) above 10 kHz
5. NonVolatile RAM failure
99. Overrange (Result is too large to display)

PROGRAMMING . . .

MODEL	DESCRIPTION	PROGRAMMABLE FEATURES
MAXjr Tach 1	Rate Indicator with Alarms	• Input Calibration • High and Low Alarms • Decimal Point Position • Solid State or contact closure inputs • Output operation to follow Alarms, pulse once, or latch until reset
MAXjr Tach 2	Rate, Ratio, Time Interval Indicator with Alarms	**all of the above *plus*** • Measurement function is user selectable for Rate, Ratio, or Time Interval

PROGRAM INDICATOR
- Illuminated in Program Mode

ALARM INDICATORS
- Illuminated whenever Alarms are active



DOWN CURSOR
- Brings next line into the display
- Rolls around from last line to first

RESET / CLEAR
- Clears numeric value in the Program Mode

RIGHT CURSOR
- Highlights next digit in numeric data fields
- Selects alternate display in option fields

RUN / PROGRAM
- Alternate action switch
- Switches unit between Run and Program Modes
- Disabled by rear panel Program Disable switch
- Turns outputs Off

INCREMENT / ON
- Adds one to the value of the highlighted digit

DECREMENT / OFF
- Subtracts one from the value of the highlighted digit

MAX jr

LINE	FUNCTION	DESCRIPTION
	RUN MODE	
	RESULT	Latest calculation Rate = CAL x Frequency (A) Ratio = CAL x Freq (A) / Freq (B) Time = CAL x Period (A) or Interval from A to B
	PROGRAM MODE	
1	**DECIMAL POINT**	Select one-of-four positions or none for Result and Alarms
2	**HIGH ALARM**	Numeric value of High Alarm (active when Result ≥ High Alarm) NOTE: Each alarm may have any value within the range of the instrument. The Low Alarm may be greater than the High Alarm. Disable alarm function by setting value to zero.
3	**LOW ALARM**	Numeric value of Low Alarm (active when Result ≤ Low Alarm)
4	**CAL DEC POINT**	Select one-of-four positions or none for Calibrator
5	**CALIBRATOR**	Numeric constant that converts measurement into engineering units
6	**INPUTS A AND B**	Select High range (0.2 Hz to 10 kHz); Low range (0.02 to 20 Hz) for contact (slow) inputs
7	**OUTPUT MODE**	Select Alarm output operation to Follow Alarms, Pulse once, or Latch
8	**FUNCTION**	Select measurement function as Rate (A), Ratio (A/B), or Time (A or A-to-B) NOTE: This line does not appear in MAXjr Tach 1.
	DIAGNOSTIC MODE	
9	**INPUT TEST**	Shows active signal and control inputs on the display (Sig A = "A", Sig B = "b", In 1 = "1", and In 2 = "2")
10	**OUTPUT TEST**	Allows manual pickup of either output Outputs are dropped out when RUN/PGM is pressed.
11	**PANEL TEST**	Shows active keys on the display (INC/ON = "i", DEC/OFF = "d", RUN/PGM = "P", and RST/CLR = "C")
12	**DIGIT TEST**	Constant pattern on the display
13	**SEGMENT TEST**	Illuminates all legends and digit positions

IMPORTANT

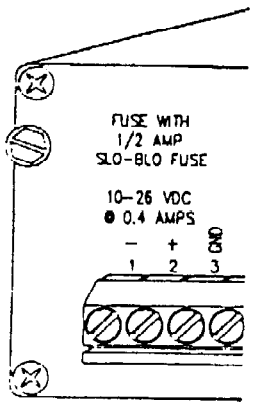
The MAXjr Products have been improved.

Please read the other side of this sheet for the changes to the manual,

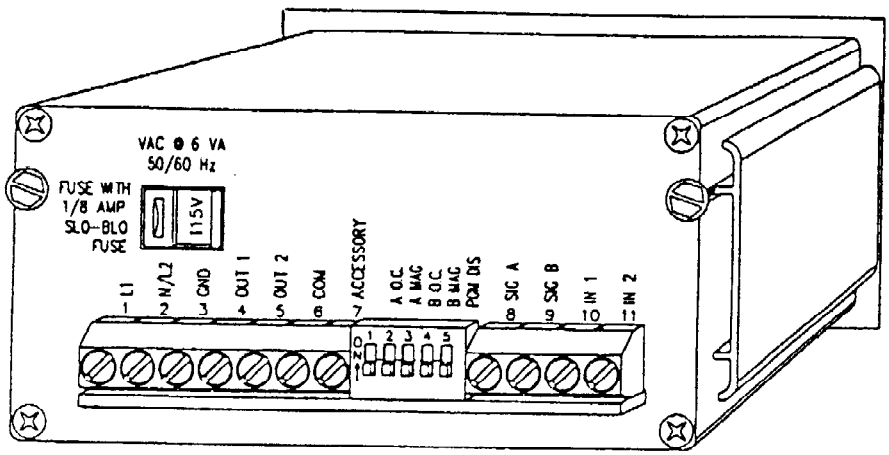
BEFORE YOU INSTALL THE UNIT

MAXjr TACH

MAXjr PRODUCT REAR VIEW



DC MODELS:
MTJR1D00
MTJR2D00



AC MODELS:
MTJR1S00
MTJR2S00

Changes to the SPECIFICATIONS

Input Power:

AC model	Rear panel switch selectable 115/230VAC; 50/60 Hz.; 6VA max. Voltage range: 115V (95-130VAC) 230V (190-260VAC)
DC model	10-26VDC @ 0.2A max. (excluding accessory power)

Control Inputs, IN1 and IN2:

Input High	+3.5 < Vin < +30 VDC.
Input Low	0 < Vin < + 1.5 VDC.
Impedance	> 3K ohm.
Input Response	25mS. min. make and break time.

Outputs:

Collector Voltage	+28 VDC max.

Signal Inputs, A and B:

Solid State (current sourcing):

Switch Setting	1,2,3,4 OFF
Input High	+3.5 < Vin < +30 VDC.
Input Low	-30 < Vin < + 1.5 VDC.
Impedance	>3K ohm.
Input Response	50 uS min. high and low time

Open Collector and Contact Closure:

Switch Setting	1 or 3 ON
Input High	+3.5 < Vin < +30 VDC (internal pull-up to +5VDC.)
Input Low	0 < Vin < +1.5 VDC.
Impedance:	> 3K ohm.
Input Current	< 2mA (Vin = 0VDC).
Input Response	50 uS. min. high and low (OC) 25 mS. min. make and break time (CC)

Magnetic:

Switch setting	2 or 4 ON
Input Voltage	> 0.1 Vp-p; < 26 Vrms.
Impedance	> 3K ohm.
Input Response	50 uS. min. high and low time

DYNAPAR CORPORATION

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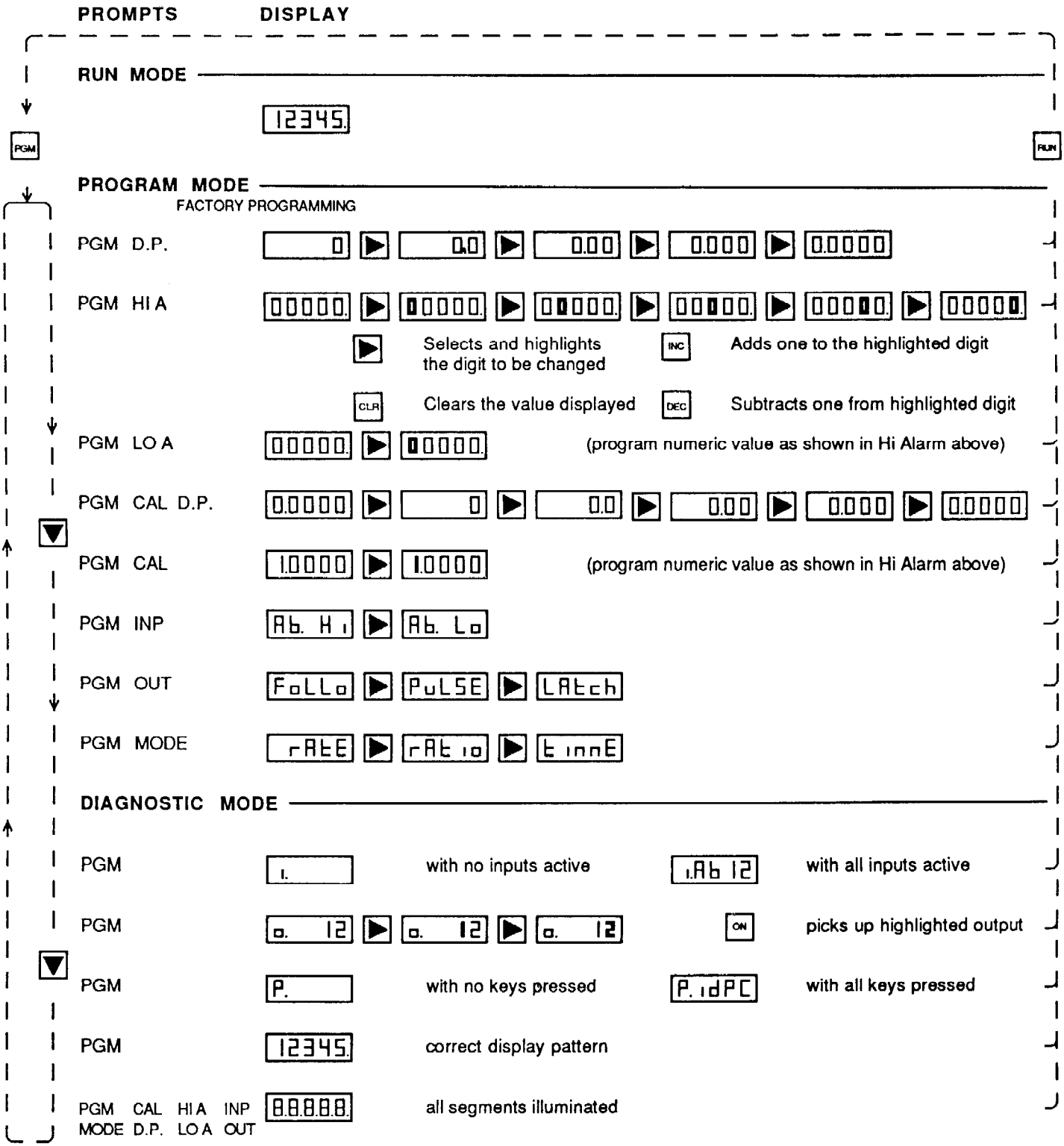
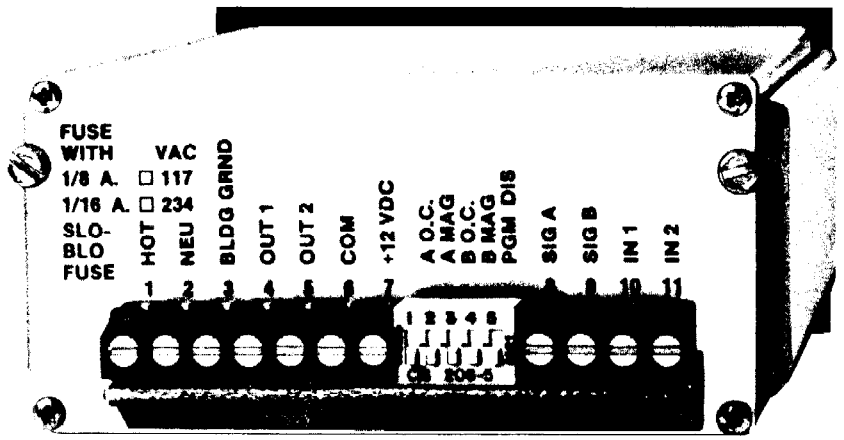

PROMPTS
DISPLAY
RUN MODE
12345.
PGM
RUN
PROGRAM MODE
FACTORY PROGRAMMING
PGM D.P.
0
0.0
0.00
0.000
0.0000
PGM HI A
00000.
PGM LO A
00000.
PGM CAL D.P.
0.0000
PGM CAL
1.0000
PGM INP
Ab. Hi
Ab. Lo
PGM OUT
FoLLo
PuLSE
LAtch
PGM MODE
rAtE
rAt io
t innE
Selects and highlights the digit to be changed
INC
Adds one to the highlighted digit
CLR
Clears the value displayed
DEC
Subtracts one from highlighted digit
(program numeric value as shown in Hi Alarm above)
DIAGNOSTIC MODE
PGM
1.
with no inputs active
1.Ab 12
with all inputs active
PGM
o. 12
ON
picks up highlighted output
PGM
P.
with no keys pressed
P. idPC
with all keys pressed
PGM
12345.
correct display pattern
PGM CAL HI A INP
MODE D.P. LO A OUT
8.8.8.8.8.
all segments illuminated



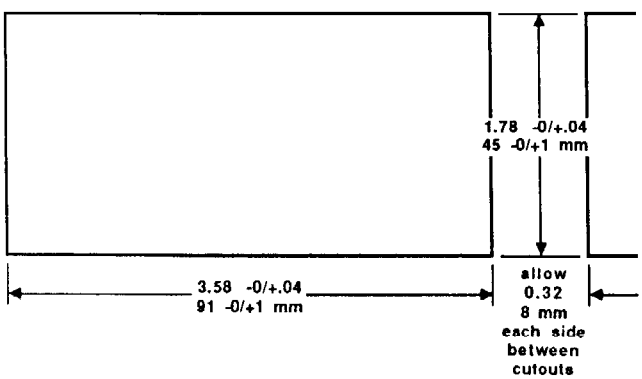
SWITCH PROGRAMMING

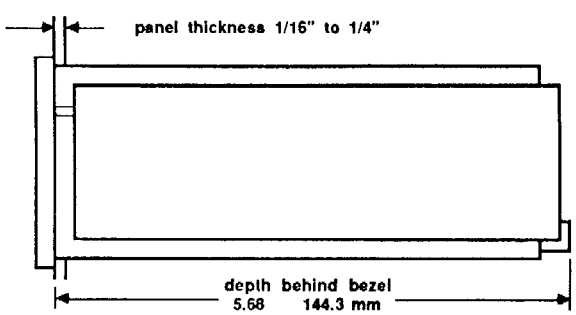
HANDLE is UP
Switch is ON

HANDLE is DOWN
Switch is OFF

A. PANEL MOUNTING

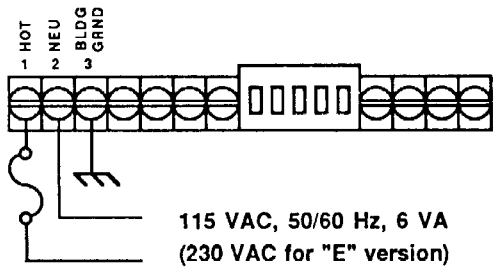
Make a panel cutout as shown below. If the installation requires sealing, the adhesive gasket (supplied) may be applied to the (bezel side of the) panel. Next, slide the unit through the cutout. Insert the panel mounting straps into the slotted guides in the enclosure. Tap the 5/8" long hex washer head screws into the enclosure and then tighten securely using a 3/16" hex driver.





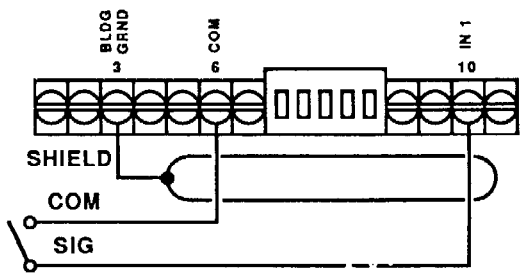
B. AC LINE CONNECTIONS

Connect AC power as shown below. Unit requires external fuse. Use slow response type; 1/8 Amp for 115 VAC, and 1/16 Amp for 230 VAC. Connect terminal #3 to building ground. Route the AC wiring away from the signal inputs.



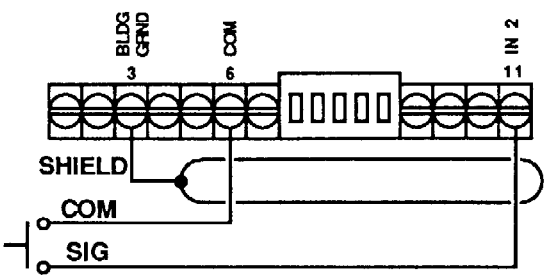
C. DISPLAY HOLD INPUT

The display updating is stopped for as long as the switch closure is maintained.



D. OUTPUT DISABLE INPUT

Output Disable will reset the latched Alarm outputs and disable the outputs while active.

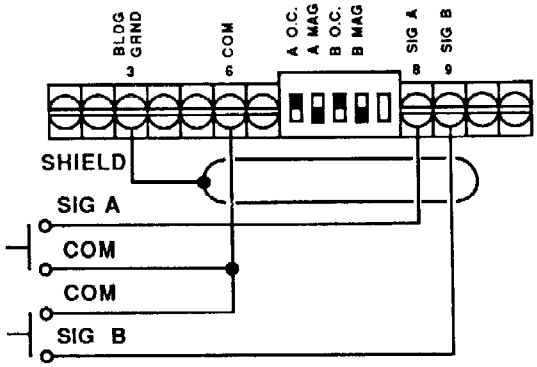


E. RATE INPUTS

NOTE: For Ratio applications, use high resolution transducers for best results.

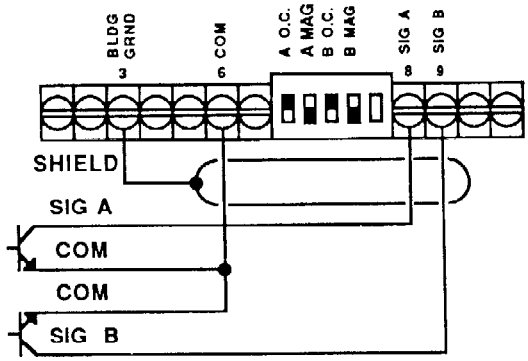
CONTACT CLOSURES

Set switches as shown below. Program Inputs A and B for Lo Range operation.



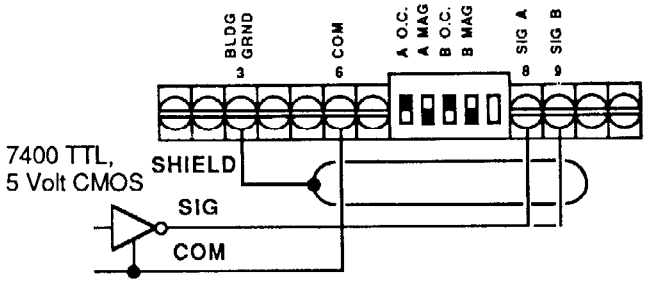
OPEN COLLECTOR DEVICES

Set switches as shown below.



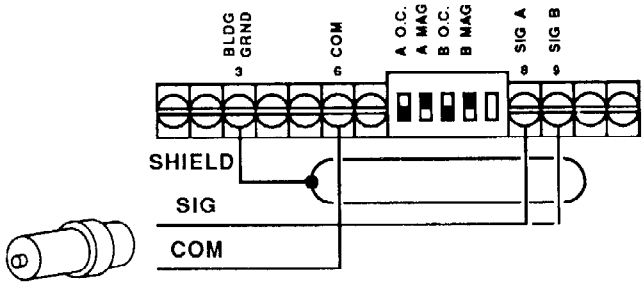
LOGIC OUTPUT DEVICES

Set switches as shown below.



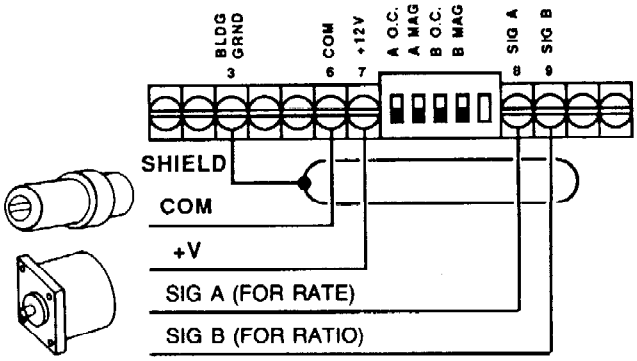
MAGNETIC PICKUPS

Set switches as shown below.



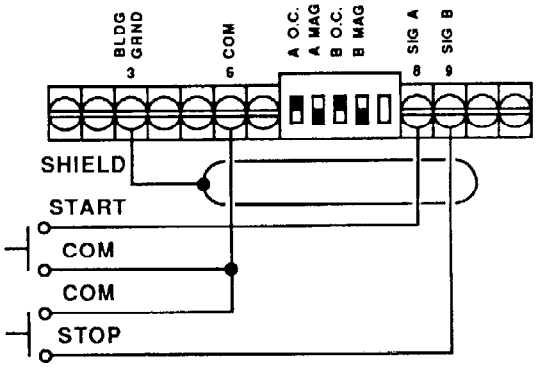
UNIDIRECTIONAL TRANSDUCERS

Set switches as shown below.



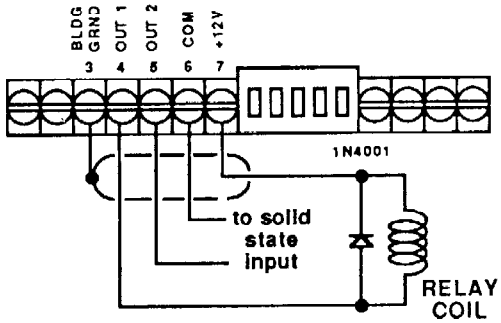
START / STOP SWITCH INPUTS

Set switches as shown below. Program Inputs A and B for Lo Range operation.



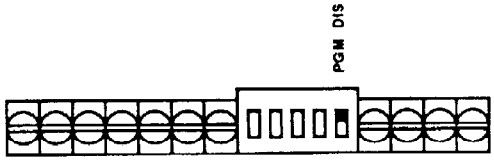
F. SOLID STATE OUTPUTS

Connect loads to either or both of the open collector outputs. Output voltage is 0.5 VDC typ. @ 50 ma.
NOTE: Inductive loads require external suppression.



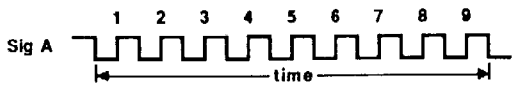
G. PROGRAM DISABLE SWITCH

Set switch as shown below to prevent unauthorized programming changes. This function prevents the unit from entering the Program Mode.



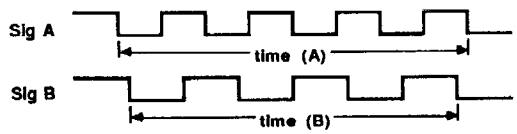
APPLICATIONS . . .

RATE Calibrator = $\frac{\text{Displayed Rate}}{\text{Frequency of A (Hz)}}$



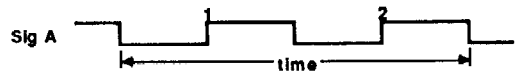
freq (A) = $\frac{\text{counts}}{\text{time}}$

RATIO Calibrator = $\frac{\text{Displayed Ratio}}{\text{Freq (A)/Freq (B)}}$



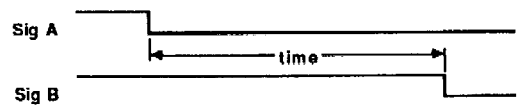
ratio = $\frac{\text{freq (A)}}{\text{freq (B)}}$

TIME Calibrator = $\frac{\text{Displayed Period}}{\text{Period of A (sec)}}$



period (A) = $\frac{\text{time}}{\text{counts}}$

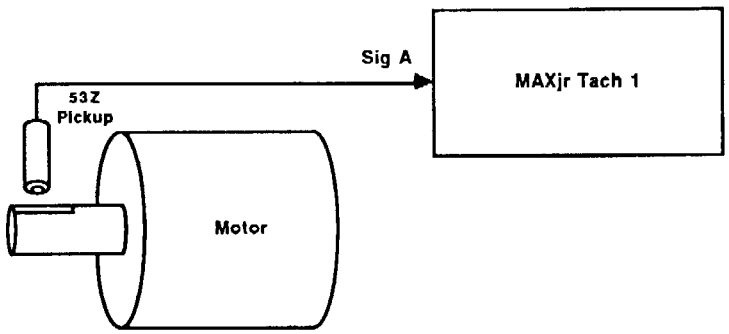
Calibrator = $\frac{\text{Displayed Time}}{\text{Interval from A to B}}$



interval = time

MOTOR RPM

A pickup can be positioned as shown to detect the motor shaft keyway. It will then provide one output pulse for every revolution of the shaft. When the motor is running at 1800 rpm, the frequency of the pulses is



Freq (A) = $\frac{1800 \text{ rev}}{\text{minute}} \times \frac{1 \text{ minute}}{60 \text{ seconds}} \times \frac{1 \text{ pulse}}{\text{rev}}$

= 30 Hz

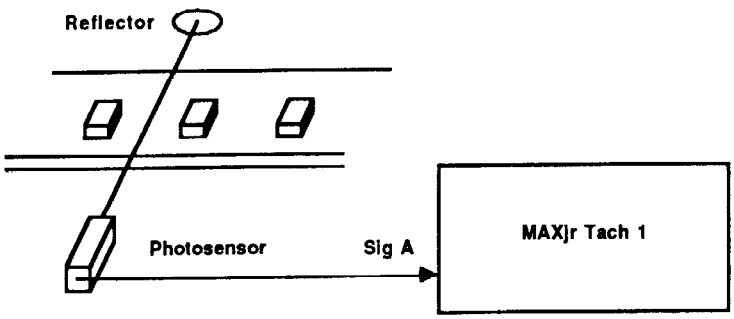
DECIMAL POINT: .0 (to read 1800.0 rpm)

CALIBRATOR = $\frac{1800.0 \text{ rpm displayed}}{30 \text{ Hz input}}$ = 60.000

INPUTS A AND B: Hi range

PRODUCTION RATE

Parts on the conveyor break the beam of light and cause one output pulse per object. If the conveyor moves 2666 parts every hour, the pulse rate is



Freq (A) = $\frac{2666 \text{ parts}}{\text{hour}} \times \frac{1 \text{ hour}}{3600 \text{ sec}} \times \frac{1 \text{ pulse}}{\text{part}}$

= 0.7406 Hz

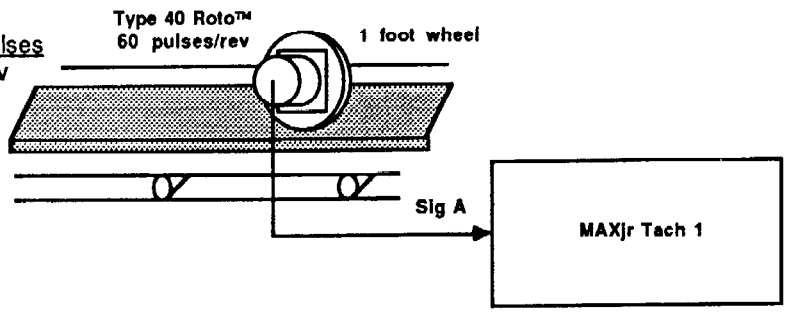
DECIMAL POINT: none (to read whole parts/hour)

CALIBRATOR = $\frac{2666 \text{ parts/hr displayed}}{0.7406 \text{ Hz input}}$ = 3600.0

INPUTS A AND B: Lo range

LINE SPEED

A measuring wheel is in contact with the material which is moving at 100 feet per minute. The frequency of pulses is



Freq (A) = $\frac{100 \text{ feet}}{\text{minute}} \times \frac{1 \text{ min}}{60 \text{ sec}} \times \frac{1 \text{ rev}}{\text{foot}} \times \frac{60 \text{ pulses}}{\text{rev}}$

= 100 Hz

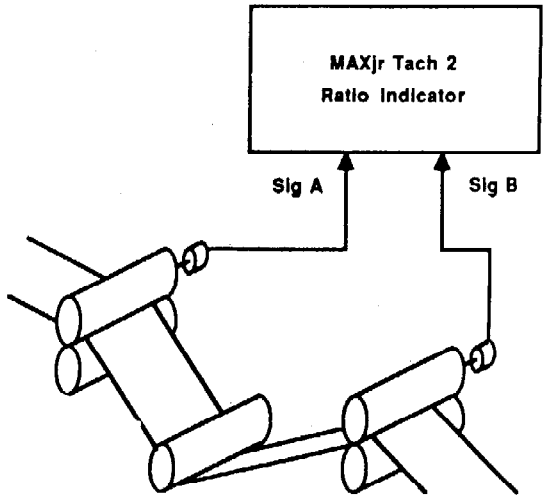
DECIMAL POINT: none (to read 100 fpm)
.0 (to read 100.0 fpm)
.00 (to read 100.00 fpm)

CALIBRATOR = $\frac{100 \text{ fpm displayed}}{100 \text{ Hz input}}$ = 1.0000

INPUTS A AND B: Hi range

RATIO (DRAW OR EXTENSION)

To determine the Calibrator value for a ratio application, the frequencies of the A and B inputs must be known. These can be calculated from the material speed, roll diameters, and encoder resolution. With a 6 inch diameter roll driving A and an 8 inch on B (with like Rotopulsers™), the ratio of Freq (A) to Freq (B) is 1.3333.



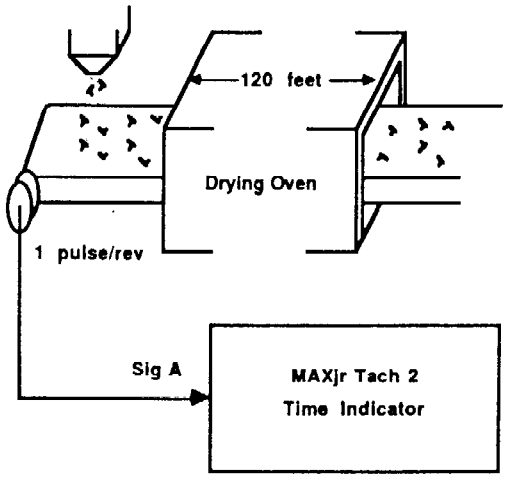
DECIMAL POINT: .000
CALIBRATOR = 1.000 (with no extension) / 1.3333
= 0.7500
INPUTS A AND B: Hi range
FUNCTION: Ratio

PRODUCTION TIME

At a Rotopulser™ speed of 1800 rpm and a corresponding conveyor speed of 60 feet per minute, the time in the oven becomes

$$\frac{1\ \text{min}}{60\ \text{feet}} \times 120\ \text{feet} \times = 2\ \text{minutes}$$

$$\text{Period (A)} = \frac{1\ \text{min}}{1800\ \text{rev}} \times \frac{60\ \text{sec}}{\text{min}} \times \frac{1\ \text{rev}}{\text{pulse}}$$
$$= 0.03333\ \text{sec}$$

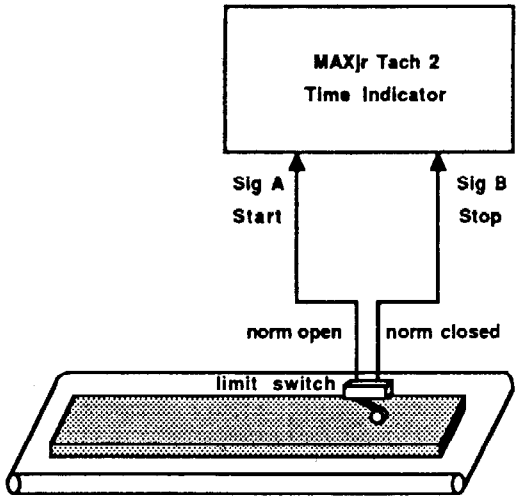


DECIMAL POINT: .00 (to read hundredth minutes)
CALIBRATOR = 2.00 minutes displayed / 0.03333 sec
= 60.00
INPUTS A AND B: Hi range
FUNCTION: Time

TIME INTERVAL

The length of pieces of material can be indicated by measuring the time it takes the piece to pass a fixed sensor at a constant speed. At a conveyor speed of 3 inches per second, a 48 inch piece would result in a Start/Stop time interval of

$$\frac{1\ \text{sec}}{3\ \text{inches}} \times 48\ \text{inches} = 16\ \text{seconds}$$

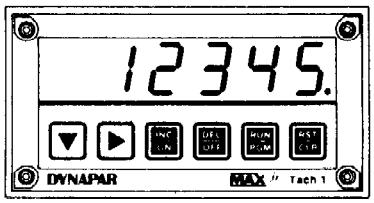


DECIMAL POINT: .000 (to read thousandth inches)
CALIBRATOR = 48.000 inches displayed / 16 seconds
= 3.0000
INPUTS A AND B: Lo range

NOTE: INPUTS A AND B MUST BE SET FOR LO RANGE FOR START/STOP MEASUREMENT. Interval A to B must be ≥ 0.7 sec and ≤ 50 sec.

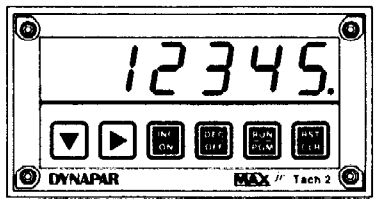
FUNCTION: Time

ORDERING INFORMATION . . .



Rate Indicator with Alarms

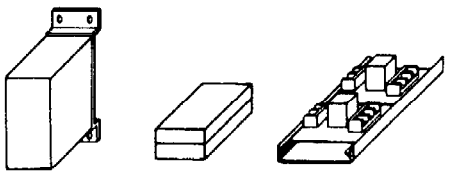
Model No.
MTjr1-0 for 115 VAC
MTjr1-E for 230 VAC



Rate/Ratio/Time Interval Indicator with Alarms

Model No.
MTjr2-0 for 115 VAC
MTjr2-E for 230 VAC

PANA MOUNT ACCESSORIES



B C D

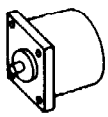
Model	Description	Current Req.	Pkg.
PM10	16 VA Power Conditioner		B
PM21	Dual Differential Receiver with Transducer Supply	25 ma	B
PM26	Dual high voltage opto-isolator to open collector converter (for AC tachometer inputs)		C
PM31	SPDT Relay Module (rated 7.5 A @ 120 VAC)	30 ma	D
PM41	Relay/Accessory Supply		D
16D70-234	12" Snap-Trak™		D

TRANSDUCERS

to be announced

53Z Zero Speed Pickup

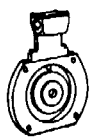
40 Rotopulser™



52BH Magnetic Pickup

60 Rotopulser™

76AZT Rotopulser™



WARRANTY

Standard products manufactured by the Company are warranted to be free from defects in workmanship and material for a period of one year from the date of shipment, and products which are defective in workmanship or material will be repaired or replaced, at the option of the Company, at no charge to the Buyer. Final determination as to whether a product is actually defective rests with the Company. The obligation of the Company hereunder shall be limited soley to repair and replacement of products that fall within the foregoing limitations, and shall be conditioned upon receipt by the Company of written notice of any alleged defects or deficiency promptly after discovery within the warranty period, and in the case of components or units purchased by the Company, the obligation of the Company shall not exceed the settlement that the Company is able to obtain from the supplier thereof. No products shall be returned to the Company without its prior consent. Products which the Company consents to have returned shall be shipped F.O.B. the Company's factory. The Company cannot assume responsibility or accept invoices for unauthorized repairs to its components, even though defective. The life of the products of the Company depends, to a large extent, upon the type of usage thereof, and THE COMPANY MAKES NO WARRANTY AS TO FITNESS OF ITS PRODUCTS FOR SPECIFIC APPLICATIONS BY THE BUYER NOR AS TO PERIOD OF SERVICE UNLESS THE COMPANY SPECIFICALLY AGREES OTHERWISE IN WRITING AFTER THE PROPOSED USAGE HAS BEEN MADE KNOWN TO IT.

THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO ANY WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE.

This warranty does not apply to experimental or developmental products.

SERVICE: If this product requires service, call Dynapar for an RMA (Return Material Authorization) number, pack it in a sturdy carton and ship prepaid to: Service Dept. at address below.

Include:
1. Description of problem
2. Name of responsible person
3. Purchase order number
4. Return shipping instructions

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