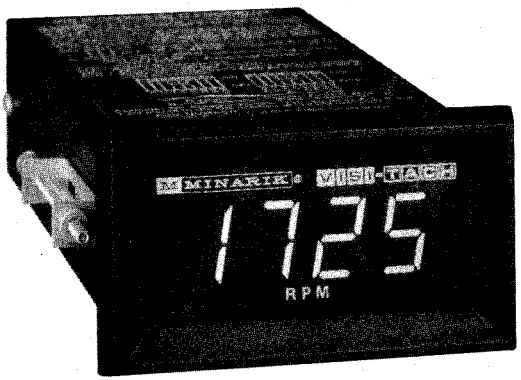
INSTRUCTION MANUAL

VISI-TACH®

DIGITAL SPEED and TIME INDICATING SYSTEMS MODELS VT-3 and VT-3U TACHOMETERS and MODELS VT-5 and VT-5U TIME IN PROCESS INDICATORS



Minarik Electric

Masters of Control®

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General Information

The Minarik VISI-TACH VT-3 and VT-5 Series provides a means of monitoring rotating shafts by using a pickup and pickup wheel or shaft mounted optical encoder and exhibiting the results on an illuminated numeric display. Digital indication eliminates the need for “reading between the lines” necessary with analog systems. The VT-3 Series is normally used to display RPM (revolutions per minute) although they can be calibrated to display RPS (revolutions per second), RPH (revolutions per hour), FPS (feet per second), etc. The VT-5 Series has an inverse relationship with RPM and displays the time in process. They are normally calibrated to display SPR (seconds per revolution) and MPR (minutes per revolution). These easy to install systems make VISITACH an economical approach to speed instrumentation.

Features

* PROGRAMMABLE DISPLAY
* PROGRAMMABLE GATE TIME
* PROGRAMMABLE DECIMAL POINT
* LARGE 0.7” LED DISPLAY
* PROGRAMMABLE LEADING ZERO BLANKING
* AVAILABLE PANEL MOUNT or UNCASED
* PROGRAMMABLE INPUT: MAGNETIC PICKUP or OPTICAL ENCODER
* PROGRAMMABLE POWER SUPPLY 5 VDC or 12 VDC OUTPUT

Specifications

READOUT	**4 ea. 0.7 in [18 mm] LED**
DECIMAL POINT	**Programmable in each of four locations**
GATE TIME ACCURACY	**Equal to power line frequency**
DISPLAY ACCURACY	**± 1 count**
SENSOR INPUT	**Magnetic pickup or optical encoder**
MAXIMUM INPUT RATE	**20,000 Pulses per Second**
	(Limited to 1,500 Pulses per Second with Model 220C Encoder)
POWER LINE INPUT	
VT-3-115	**115 VAC ± 10%, 50/60 Hertz, 5.5 Watts**
VT-3-115U	**115 VAC ± 10%, 50/60 Hertz, 5.5 Watts**
VT-3-230	**230 VAC t 10%, 50/60 Hertz, 5.5 Watts**
VT-3-230U	**230 VAC ± 10%, 50/60 Hertz, 5.5 Watts**
VT-5-115	**115 VAC ± 10%, 50/60 Hertz, 5.5 Watts**
VT-5-115U	**115 VAC t 10%, 50/60 Hertz, 5.5 Watts**
VT-5-230	**230 VAC t 10%, 50/60 Hertz, 5.5 Watts**
VT-5-230U	**230 VAC t 10%, 50/60 Hertz, 5.5 Watts**
PROGRAMMABLE POWER SUPPLY	
5 VDC, 50 Milliamperes	**Regulated Source, ± 4%**
12 VDC 25 Milliamperes	**Unregulated Source, ± 20%**
PROGRAMMABLE GATE TIME	
Minimum Time on 60 Hertz	**0.0167 Seconds**
Minimum Time on 50 Hertz	**0.0200 Seconds**
Maximum Time on 60 Hertz	**34.1167 Seconds**
Maximum Time on 50 Hertz	**40.9400 Seconds**
Minimum Increments on 60 Hertz	**0.0167 Seconds**
Maximum Increments on 50 Hertz	**0.0200 Seconds**
OPERATING TEMPERATURE	**-10° – +40° C**
APPROXIMATE WEIGHT	
VT-3 and VT-5	**13 Ounces**
VT-3-U and VT-5U	**10 Ounces**

Visi-Tach Model Number Description

115 VAC INPUT

VT-3-115 and VT-5-115	**Standard Unit, Panel Mount**
VT-3-115U and VT-5-230U	**Standard Unit, Chassis Mount**

230 VAC INPUT

VT-3-230 and VT-5-230	**Standard Unit, Panel Mount**
VT-3-230U and VT-5-230U	**Standard Unit, Chassis Mount**

Dimensions

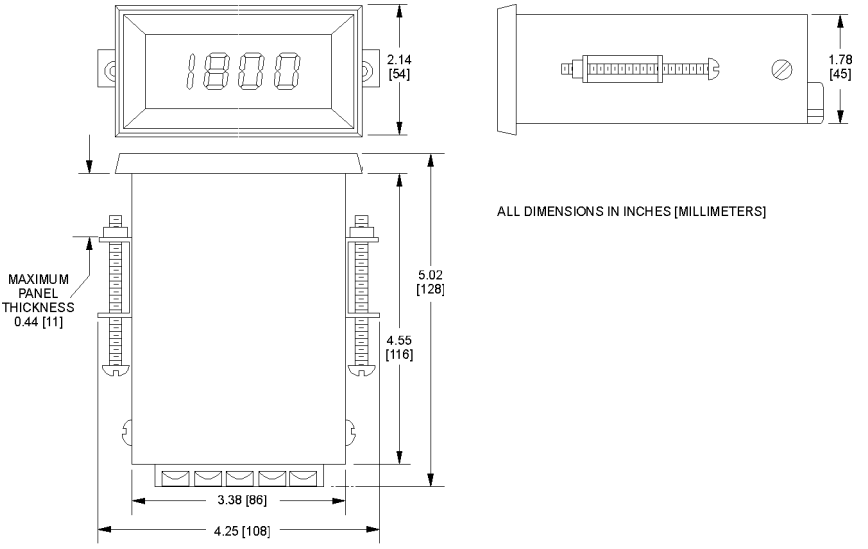

Figure 2. VT-3 and VT-5 Dimensions

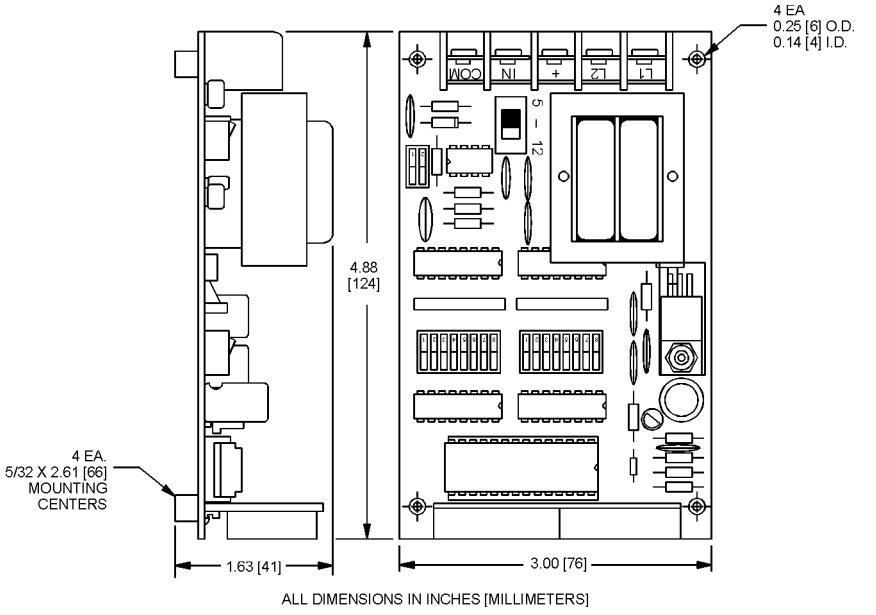

Figure 1. VT-3U and VT-5U Dimensions

Programming Instructions

Programming the VT-3

The following steps describe the correct method used to select the type of sensor input, select the power supply output, program the display readout, select leading zero blanking and decimal point locations.

STEP 1 - REMOVE PC BOARD

Unscrew the two screws holding the rear cover to the case and remove the cover. Then, slide the PC board assembly out of the case.

STEP 2 - SET SENSOR INPUT SWITCHES

The VT-3 Visi-Tach o is shipped from stock with the sensor programming DIP switches set for a Magnetic Pickup. If an Optical Encoder input is to be used the sensor selection DIP switch DS3 (located left rear) must be changed to reflect the type of input being used. To program the DIP switch, change the setting by using a small screwdriver to push the high side of the rocker arm down. When the rocker arm is down on the number side, the switch section is ON and when it is up on the number side, it is OFF.

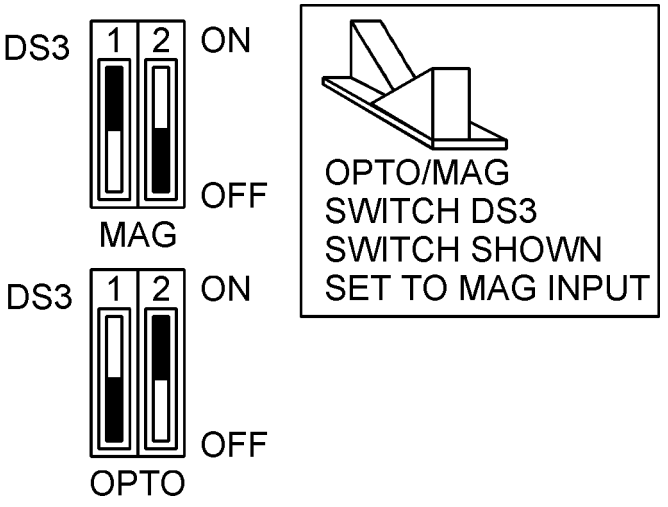

Figure 3. MAG/OPTO Select DIP Switch

STEP 3 - SET POWER SUPPLY OUTPUT SELECTOR SWITCH

The VT-3 Vi Visi-Tach is shipped from stock with the power supply output set for 5 VDC. To change the output voltage slide the switch handle from 5 to 12 as marked on the top of the PC board.

STEP 4 - PROGRAM THE READOUT DISPLAY

The VT-3 VISI-TACH is shipped from stock with the programming DIP switch set for 60 Hertz operation using a 30 tooth pickup wheel for direct motor shaft RPM with leading zero blanking. If the application is for use: (1) on 50 Hertz, (2) with a pickup wheel other than 30 teeth, (3) with an optical encoder with other than 30 lines, or (4) with other than RPM direct shaft readout, then the following formula is used to determine the proper Program (PGM) Number to set on the programming DIP switches.

Formula #1

$$\frac{\text{DDN X PLF X 60}}{\text{RPM X PPR}} = \text{PGM Number}$$

DDN = Desired Display Number
PLF = Power Line Frequency in Hertz
RPM = Revolutions Per Minute of Pickup Wheel
PPR = Pulses Per Revolution (Number of Teeth on Pickup Wheel or lines on Optical Encoder)

Example:

DDN = 1800 RPM
PLF = 60 Hertz
RPM = 1800 RPM
PPR = 30 Teeth

$$\frac{\text{1800 X 60 X 60}}{\text{1800 X 30}} = \text{120 PGM Number}$$

NOTE: When changing the desired display readout number, the update or gate time is also changed. The gate time is the time required for the VISI-TACH to count the pulses per second (RPM/60 x PPR) and show the results on the display readout. The gate time in seconds is arrived at by dividing the PGM NUMBER by the POWER LINE FREQUENCY in Hertz.

Formula #2

$$\frac{\text{PGM NUMBER}}{\text{PLF}} = \text{Gate time in seconds}$$

A gate time between 0.3 and 3 seconds is normally desired.

If the gate time is too short, there will be readout display flicker; if the gate time is too long, inaccuracies can develop in the readout when there are rapidly changing speeds. Long gate times can be shortened by increasing the number of teeth on the pickup wheel or number of lines on the optical encoder. Short gate times can be increased by adding one or two zeros to the desired readout number. If one zero is added, the display will read in tenths and if two zeroes are added it will read in hundredths. For instructions on lighting the appropriate decimal point please refer to Step 6.

Example: A 30:1 ratio gearmotor with a 30 tooth pickup wheel mounted on the 1800 RPM motor shaft and a 60 Hertz input powerline frequency. The display readout is to show 60 RPM (1800 : 30) which is the top speed of the gear driven shaft.

Using formula #1, the results are:

$$\frac{60 \times 60 \times 60}{1800 \times 30} = 4 \text{ PGM number}$$

Using formula #2, the results are:

$$\frac{4}{60} = 0.067 \text{ sec gate time}$$

Since .067 is too short a gate time, we will change the Desired Display Number from 60 to 600 and again use formula #1.

$$\frac{40}{600} = 0.667 \text{ sec gate time}$$

Since .667 seconds gate time is within the acceptable range, 600 is the Desired Display Number and the decimal point should be lighted as described in Step 5. The display will then show 60.0 when the motor is running at 60 RPM and will reflect the speed in tenths of RPM as the speed changes.

STEP 5 - SET READOUT DISPLAY SWITCHES

Using the PGM Number obtained in Step 4, program DIP switches DS1 and DS2 located approximately left of center on the PC board. To program the DIP switches, change the setting by using a small screwdriver to push the high side of the rocker arm down. When the rocker arm is down on the number side, the switch section is ON and when it is up on the number side it is OFF. As each switch section is placed in the ON position, its PGM Number is added to that of any other switch section's PGM Number in the ON position.

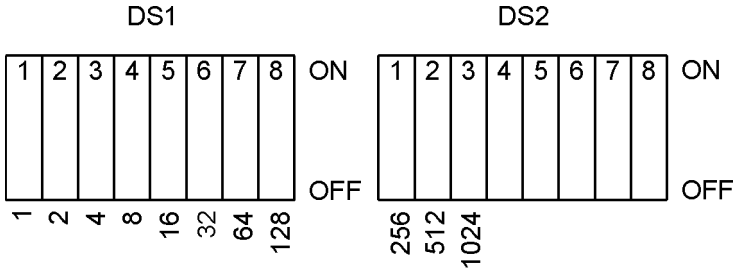

Figure 4. DS1 and DS2 PGM Numbers

Example 1

With switch sections 1 and 2 in the ON position, the PGM Number is 3 (1 + 2 = 3), with switch sections 1, 2 and 3 in the ON position, the PGM Number is 7 (1 + 2 + 4 = 7), etc.

Example 2

To enter the PGM Number 120 (which was obtained in the first example shown in step 4) switches 4, 5, 6 and 7 are placed in the ON position (8 + 16 + 32 + 64 = 120).

STEP 6 - SET DECIMAL POINT and ZERO BLANKING

Using the chart shown in Figure 5 program the DIP switches shown in Figure 6 to provide the desired decimal point and zero blanking.

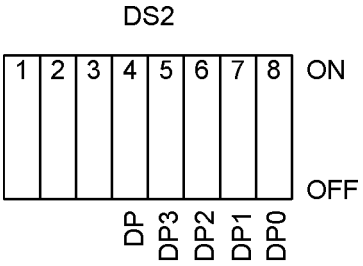

Figure 6. DS2 Decimal Point and Zero Blanking Switches

	DP0 ON	DP1 ON	DP2 ON	DP3 ON
DP OFF	0	00	000	0000
DP ON	0.	0.0	0.00	0.000

Figure 5. Decimal Point and Zero Blanking

STEP 7 - REPLACE PC BOARD

After the DIP switches have been properly programmed, slide the PC board back into the case. Install rear cover and replace the two pan head slotted screws which hold the cover in place.

Programming the VT-3U

Programming instructions for the VT-3U VISI-TACH are the same as those for the VT-3 shown on pages 4 through 8 except Steps 1 and 7 do not apply.

Programming the VT-5

The following steps describe the correct method used to select the type of sensor input, select the power supply output, program the display readout, select leading zero blanking and decimal point locations.

STEP 1 - REMOVE PC BOARD 1

Unscrew the two screws holding the rear cover to the case and remove the cover. Then, slide the PC board assembly out of the case.

STEP 2 - SET SENSOR INPUT SWITCHES

The VT-5 Visi-Tach is shipped from stock with the sensor programming DIP switches set for a Magnetic Pickup. If an Optical Encoder input is to be used the sensor selection DIP switch DS3 (located left rear) must be changed to reflect the type of input being used. To program the DIP switch, change the setting by using a small screwdriver to push the high side of the rocker arm down. When the rocker arm is down on the number side, the switch section is ON and when it is up on the number side, it is OFF.

STEP 3 - SET POWER SUPPLY OUTPUT SELECTOR SWITCH

The VT-5 Visi-Tach o is shipped from stock with the power supply output set for 5 VDC. To change the output voltage slide the switch handle from 5 to 12 as marked on the top of the PC board.

STEP 4 - PROGRAM THE READOUT DISPLAY

The VT-5 VISI-TACH is designed to measure time per revolution of a shaft. The user must calculate the relationship of time at a particular shaft speed to arrive at the desired display number. Normally this number will represent seconds per revolution. The following formulae are used to determine the proper Program (PGM) Number to set on the programming DIP switches.

DDN = Desired Display Number
GT. = Gate Time (in Seconds)
PLF = Power Line Frequency in Hertz
RPM = Revolutions Per Minute of Pickup Wheel or Encoder
PPR = Pulses Per Revolution (Number of Teeth on Pickup Wheel or lines on Optical Encoder)

Formula #1

$$\frac{DDF}{PLF} = \text{Gate time in seconds}$$

Formula #2

$$\frac{RPM}{60} \times PPR = PPS$$

Formula #3

$$PPS \times GT = \text{PGM number}$$

Since the maximum Program Number is 2047, in some cases of high shaft speed, a sprocket or encoder with a smaller number of teeth or lines may be necessary. It may even be desireable to use a set screw on a sprocket as the “tooth” to count the shaft revolutions. The following example will demonstrate this technique.

Assume:
115 VAC, 60 Hz power supply line
Motor Speed = 1800 RPM
Desired Display (by calculation) = 240 Seconds

The motor has a sprocket on its shaft that is secured by a set screw protruding above the sprocket’s hub surface. This set screw will result in a single pulse per revolution of the shaft, sensed by a magnetic pickup. Using formula #1, the results are:

$$\frac{240}{60} = 4 \text{ seconds}$$

Using formula #2, the results are:

$$\frac{1800}{60} \quad X\ 1 = \quad 30\ PPS$$

Finally, using formula #3, the results are:

$$4\ X\ 30 \quad = \quad \begin{matrix}120\ PGM \\ number\end{matrix}$$

If the motor had a 30 tooth sprocket mounted on the shaft, as in our PK1 kit, then the PPS would be 30 times greater or 900 PPS. This would result in a program number of 3600 (4 x 900) which is greater than the 2047 maximum allowable program number.

This problem can be solved by using a sprocket with fewer teeth or by reducing the desired diplay number to two digits, indicating minutes instead of seconds.

Most applications of this type normally do not require a wide range of speed changes, so the increase in gate time with decreasing speeds may not be too important.

STEP 5 - SET READOUT DISPLAY SWITCHES

Using the PGM Number obtained in Step 4, program DIP switches DS1 and DS2 located approximately left of center on
the PC board. To program the DIP switches, change the setting by using a small screwdriver to push the high side of the rocker arm down. When the rocker arm is down on the number side, the switch section is ON and when it is up on the number side it is OFF. As each switch section is placed in the ON position, its PGM Number is added to that of any other switch section’s PGM Number in the ON position.

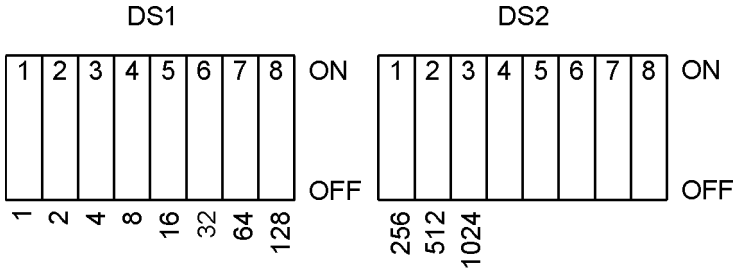

Figure 7. DS1 and DS2 PGM Numbers

For example: With switch sections 1 and 2 in the ON position, the PGM Number is 3 (1 + 2 = 3), with switch sections 1, 2 and 3 in the ON position, the PGM Number is 7 (1+2+4=7), etc.

Second example: To enter the PGM Number 120 (which was obtained in the example shown in step 4) switches 4, 5, 6 and 7 are placed in the ON position (8 + 16 + 32 + 64 = 120).

STEP 6 - SET DECIMAL POINT and ZERO BLANKING

Using the chart shown in Figure 6 (page 8) program the DIP switches shown in figure 2-7 (page 4) to provide the desired decimal point and zero blanking.

STEP 7 - REPLACE PC BOARD

After the DIP switches have been properly programmed, slide the PC board back into the case. Install rear cover and replace the two pan head slotted screws which hold the cover in place.

Programming the VT-5U

Programming instructions for the VT-5U VISI-TACH are the same as those for the VT-5 shown on pages 9 through 12 except Steps 1 and 7 do not apply.

Installation

Warning

This equipment should be installed, adjusted and serviced by qualified electrical maintenance personnel familiar with the construction and operation of the equipment and the hazards in volved. It is the responsibility of the equipment manufacturer or individual installing the apparatus to take diligent care when installing equipment. The National Electrical Code (NEC), sound electrical and safety codes, and when applicable, the Occupational Safety and Health Act (OSHA) should be followed when installing the apparatus to reduce hazards to person and property.

The chance of electric shocks, fires or explosion can be reduced by giving proper consideration to the use of grounding, thermal and over-current protection, type of enclosure and good maintenance procedures.

Under no circumstances should power and logic leads be bundled together. Induced voltage can cause unpredictable behavior in any electronic device, including motor controls.

Installing the Visi-Tach

1. Cut a rectangular opening I-25/32” high by 3-3/8” wide in your panel.
2. Unscrew the two mounting bracket screws until the threaded end is almost flush with the threaded bushing.
3. Place the VISI-TACH through the panel opening and install the mounting brackets by engaging the two hooks on each bracket into the two slots on each side of the unit, with the threaded end of the screws towards the back of the panel.
4. Screw the two mounting bracket screws in until they “bite” into the rear of the panel. The screws should be tight enough to prevent the Visi-Tach from moving, but do NOT over tighten the screws or you may damage your panel.
5. Connect appropriate wiring to the terminal strip as shown in Figure 2 on page 2.

VT-3U and VT-5U installation

1. Since the VT-3U and VT-5U are uncased models, they must be installed in a suitable enclosure to prevent exposure to dangerous voltages.
2. The VT-3U and VT-5U are mounted by utilizing the 4 each 1/4” x 1/4” standoffs mounted on the PC board. These standoffs have a .140” hole diameter which provide sufficient clearance for a number 6 machine screw.
3. Drill or punch 4 each .140” mounting holes on 4.15” x 2.6” centers. Be certain that the mounting surface is flat so the PC board will not be warped when the mounting screws are tightened.
4. Mount the uncased VISI-TACH unit with 4 each number 6 machine screws, lock washers and nuts. The machine screws should be long enough so that when tightened at least two threads extend beyond the nut.
5. Connect appropriate wiring to the terminal strip as shown in Figure 1 on page 2.

Parts List

MINARIK MODELS VT-3, VT-3U, VT-5 and VT-5U

REF.#	PART NUMBER NEW	(OLD)	DESCRIPTION
C1	011-0033	(M A149)	680 MFD 16 VDC
C2-C4	010-0027	(MA137)	0.1 MFD 50 VOLT
C5-C6	010-0021	(M A150)	0.22 MFD 50 VOLT
C7	010-0027	(MA137)	0.1 MFD 50 VDC
C8-C9	010-0014	(MA148)	0.01 MFD 50 VOLT
C10	010-0027	(MA137)	0.1 MFD 50 VOLT
C11	010-0014	(MA148)	0.01 MFD 50 VOLT
D1-D2	071-0012	(M668)	1N5397 1 AMP 600 VOLT DIODE
D3	071-0024	(MD612)	1N914 DIODE
D4	071-0012	(M668)	1N5397 1 AMP 600 VOLT DIODE
DISP	040-0015	(M1542)	NSB7882 DISPLAY
DS1-DS2	084-0001	(MA809)	8 CIRCUIT DIP SWITCH
DS3	084-0003	(MA832)	2 CIRCUIT DIP SWITCH
IQ	061-0001	(MB691)	7805U
IC2	060-0017	(MD628)	MC14584B
IC3	060-0011	(MC667)	4040B
IC4-IC5	060-0013	(MD627)	MC145601UB
IC6	060-0023	(MC616)	CA3130E
IC7	060-0018	(MD626)	ICM7217IJI
R1-R4	030-0021	(MB300)	10K OHM 1/4 WATT
R5	030-0001	(MA393)	22 OHM 1/4 WATT
R6	030-0031	(MB303)	240K OHM 1/4 WATT
R7	030-0008	(MB320)	240 OHM 1/4 WATT
R8	030-0031	(MB303)	240 K OHM 1/4 WATT
R9	030-0005	(MB314)	100 OHM 1/4 WATT
R10	030-0026	(MB344)	180 OHM 1/4 WATT
R11	030-0013	(MB322)	1K OHM 1/4 WATT
RN1-RN2	034-0003	(MB333)	10K OHM SIP RESISTOR NETWORK
SW1	085-0006	(MA837)	SPDT SLIDE SWITCH
T1	230-0025	(M596)	115:20 VCT TRANSFORMER

Input Devices

PK-1 Magnetic Pickup

General information

The PK1 pickup kit consists of a magnetic sensor with 6 inch electrical wire leads and a pickup wheel with four different bore hubs. The sensor is a non-contact transducer that converts mechanical motion into electrical energy. It is capable of sensing any ferro-magnetic material having discontinuities such as gear teeth or slots. The pickup wheel has 30 teeth, operates bi-directional and can sense direct RPM from 10 through 9999 RPM. It is supplied with hubs of 0.31 inch [8 mm], 0.38 inch [10 mm], 0.50 inch [13 mm]and 0.63 inch [16 mm] bore.

Installation

Warning

The clearance between the sensor and pickup wheel should be as small as possible for maximum output voltage. This clearance, though, must be sufficient to allow for “wobble” or “run out” in order to avoid pickup damage.

Under no circumstances should power and logic leads be bundled together. Induced voltage can cause unpredictable behavior in any electronic device, including motor controls.

1. Assemble the pickup wheel hub to the pickup wheel (sprocket) with a small amount of “loctite” adhesive. After the “loctite” has set, secure the pickup wheel to the driven shaft with the set screw in the pickup wheel hub.
2. For maximum performance the magnetic pickup should be mounted in a nonferrous housing or bracket. In high vibration environments, the mounting must be as rigid as possible to inhibit sensor movement.
3. The magnetic pickup is mounted through a 0.33inch [8 mm] hole and held in place by two locknuts, one on each side of a mounting bracket. Turn the sensor into the hole until it touches the highest point on the pickup wheel. Using a feeler gauge, back the sensor out to a 0.005-0.010 inch gap. Secure the sensor with the locknuts.
4. Connect the pickup to the VISI-TACH units as shown on page 2.

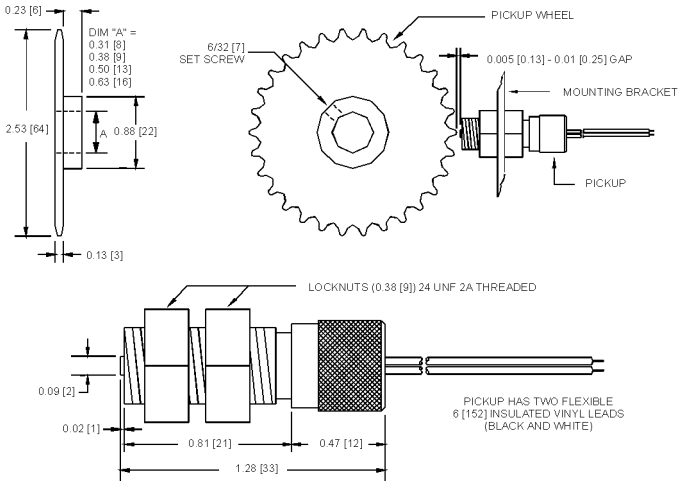

Figure 8. PK1 DIMENSIONAL DATA

PK-3 and PK-4 Magnetic Pickups

General information

The PK-3 and PK-4 pickup kits consist of a magnetic sensor with a 10 foot electrical cable and an aluminum NEMA “C”’ face adapter ring, complete with mounting bolts and lock washers. The sensor is a non-contact transducer that converts mechanical motion into electrical energy. It is capable of sensing any ferro-magnetic material having discontinuities such as gear teeth or slots. The pickup wheel has 60 teeth, operates bi-directional and can sense direct RPM from 10 through 9999 RPM. The PK-3 fits NEMA 56C C-face motors and the PK-4 fits NEMA 145TC C-face motors.

Installation

1. Temporarily mount the aluminum adapter ring (8) on the motor (1) using two of the four bolts (7) supplied with the kit. If no speed reducer is to be mounted on the motor, permanently mount the adapter ring with the four bolts (7) and lock washers (6).

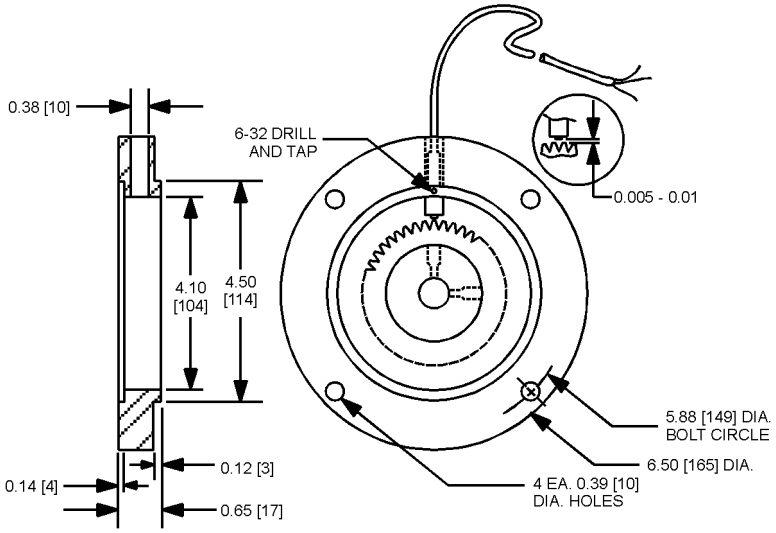

Figure 9. PK-3 and PK-4 DIMENSIONAL DATA

2. Start the two large socket head set screws (2) supplied with the kit into the pickup wheel (gear) (3) and slip it onto the motor shaft.
3. Start the small socket head set screw (4) supplied with the kit into the adapter ring (8) and place the magnetic pickup (5) into the hole located on the edge of the adapter ring.
4. Move the pickup wheel on the motor shaft until it centers on the end of the magnetic pickup and tighten the two set screws.:
5. Adjust the magnetic pickup in the hole of the adapter ring until it touches the highest point on the pickup wheel and then back it out to a 0.005-0.010 inch gap and tighten the set screw. The gap is best obtained using a feeler gauge. NOTE!!! The clearance between the sensor and pickup wheel should be as small as possible for maximum output voltage. This clearance, though, must be sufficient to allow for “wobble” or “run out” in order to avoid pickup damage.
6. Remove the two bolts and mount the speed reducer onto the adapter ring and motor. Install the four bolts and lock washers and tighten.
7. Connect the pickup to the VISI-TACH units as shown on page 2.

Model 22-C optical encoders

General information

Model 220C is a hollow shaft, bi-directional, rotary optical encoder designed to mount directly on a motor shaft. As the shaft rotates, output pulses are generated at a rate proportional to the shaft speed. Model 220C30 has 30 pulses per shaft revolution for direct RPM sensing of 0 through 3000 RPM and Model 220C-300 has 300 pulses for direct RPM sensing of 0 through 300 RPM. Available bore sizes are 1/2”, 5/8” or 3/4”. 5 volt DC, 50 mA, input voltage provided by the VisiTach

Installation

1. Install rotary optical encoder on driven shaft and tighten the two set screws.
2. Use a 4-40 machine screw to prevent the optical encoder body from turning. Use only one of the three threaded stop mount holes. The screw must be loose fitting in the holding bracket (customer supplied) to allow for “wobble” or “run out” in order to prevent possible bearing or shaft damage.
3. Connect the pickup to the Visi-Tach as shown on page 2.

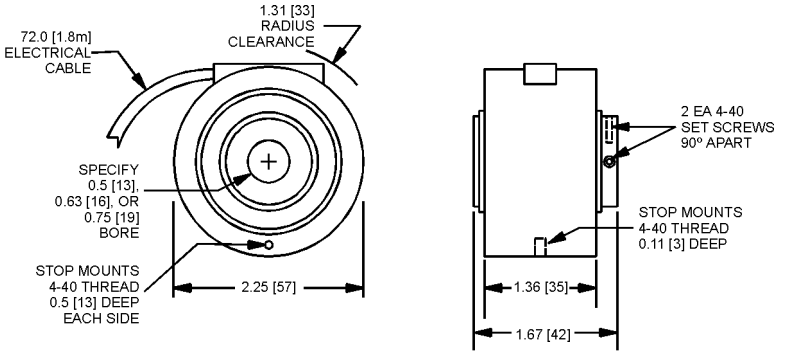

Figure 10. 220C Dimensional Data

Model 711 optical encoder

General information

The Model 711 is a shaft-coupled, bi-directional, rotary optical encoder, that generates output pulses as the shaft rotates. This ensures that the output pulses are proportional to shaft speed. The unit can be supplied on special order (approximately 5 weeks delivery) for applications requiring a fast gate time from a slow moving shaft with pulse rates as high as 1,270 pulses per shaft revolution. The maximum recommended input speed is 6,000 RPM. It can be either base or face mounted and the driven shaft is mounted in sealed ball bearings. The encoder operates on 5 volts DC, 50 mA, which the VISI-TACH provides, and it has a MS-3102E-14S-6P electrical connector as part of its assembly. The mating plug is a CR-3106A-14S6S-6, which must be ordered separately.

Installation

1. The 711 rotary optical encoder can be either base or face mounted with four 6-32 screws. Use lockwashers to prevent the screws from loosening due to vibration. Since the mounting holes are tapped 0.25 in (6 mm) deep, be sure that the screws do not extend over 0.25 in (6 mm) beyond the mounting surface or the case may be damaged.
2. Align the encoder input shaft with the motor shaft. Use a flexible coupling to couple the two shafts together so that any wobble or run out will be absorbed by the flexible coupling and prevent possible damage to bearings or shafts.
3. Using the connector wiring diagram (Figure 12) connect the pickup to the VISITACH as shown on page 2.

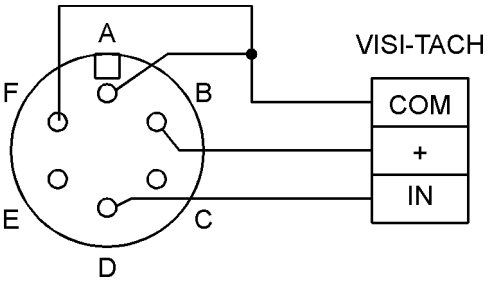

Figure 12. 711 Series Encoder Connections

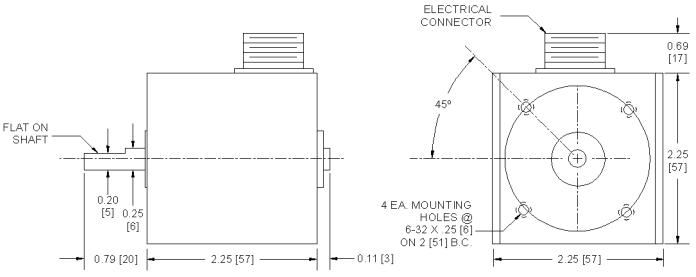

Figure 11. 711 Series Encoder Dimensions

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