TACHOMETERS

Reliable, Predictable, Cost Effective

AI-TEK Tachometers
Power Is Useless Without Control.

a.i.tek
instruments

Quality Speed Sensors Also Available

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Tachometers

About AI-Tek® Tachometers

Not all tachometers are the same, and this is certainly true of the **AI-Tek** Instruments tachometry line.

Designed with severe industrial environments in mind, these units will provide reliable around-the-clock operation for years under adverse conditions.

AI-Tek Instruments is a leader in manufacturing this type of instrument.

Our prices reflect the design, quality, ruggedness and engineering of the equipment. What you really get with **AI-Tek** Instruments is a superb price performance ratio. It may not initially be the least expensive equipment available; but, in the long run, the value of this equipment is that it will outperform and outlast others.

Introduction of the New Generation Tachometer Line

The new generation **TACHPAK** and **TACHTROL** series tachometers have been designed with all of the functions and durability embodied in the previous tachometer series as well as improvements to extend performance, accuracy and function. Both **TACHPAK** and **TACHTROL** now share a common processing platform. This commonality allows both to perform identical tachometry functions, streamlines programming and minimizes the learning curve. The main physical difference between the two is the characteristic integrated display function found in all **TACHTROL** series tachometers.

The new generation **TACHPAK** 10 & 30, **TACHTROL** 10 & 30 and **TACHTROLplus** meet the following common environmental specs:

Temperature	-10°C to +55°C operating -40°C to +80°C storage
Thermal Cycle	50 cycles: -40°C to +80°C 200 cycles: -10°C to +55°C
Humidity	90% RH non-condensing per IEC 654-1, IEC 68-2-3
Vibration	MIL-STD-810C Environmental Test Methods, method 514.2, procedure VIII, figure 514.2-6, curve V; 1.5g's 10-2000 Hz, 5.5 hrs./axis, 3 axis IEC 60068-2-6, 10-150Hz, 2g, 10 sweep cycles / axis, 3 axis
Shock	MIL-STD-810C Environmental Test Methods, method 516.2, procedure I and figures 516.2-2, for ground equipment; 30g's half sine, 11ms. 3 axis, 18 total IEC 60068-2-27; 50g half sine, 11ms, 3 axis, 18 total
EMC	CE Compliant
RoHS	RoHS compliant per European Directive 2002/95/EC

Support Documents On Website Include: **TACHLINK**, Manual, Tach Training Video

Tach Package Contents: **TACHPAK 10 & 30** and **TACHTROL 10 & 30** are shipped in a single carton containing one instrument, **TACHLINK**, a manual on CD ROM, and a USB cable. **TACHTROL plus** is shipped in a single carton containing one instrument and a display cable with RJ-11 terminations. **TACHTROL 10 & 30** and **TACHTROL plus Explosion Proof and NEMA 4X** are shipped in a single carton containing one instrument and accessories as described above, one infrared remote and one DIN rail mounting kit. **TACHPAK 10 & 30 Explosion Proof and NEMA 4X** are shipped in a single carton containing one rated enclosure and one instrument and accessories as described above.

It is the customer's responsibility to determine whether the product is proper for customer's use and application.

The information contained herein is subject to change without notice. Refer to the factory for verification of any details.

T77510

T77530

TACHPAK® 10 & 30
Digital Process Tachometer

Part Number Series
T77510 & T77530

CE
RoHS

TACHPAK 30 Key Features:

- Wide range of AC or DC power (12-30 Vdc, 80-264Vac 50-60Hz)
- Greatly improved instrument accuracy, processing speed and response time.
- Frequency, period or counter modes.
- User-defined inputs for logic level, averaging, alarm set points and hysteresis,
- Signal normalization and math functions allow mathematical manipulation of input signals. Results can be displayed along with user-defined units.
- Accepts sinusoidal and square wave inputs as found in variable reluctance and digital output speed sensors.
- Accepts bi-directional sensor inputs and will decode quadrature or direction signal logic
- 2 solid state relays (fast response time) and 2 mechanical relays (high power)
- Analog output: 0-20mA, 4-20mA, -20-0-(+) 20mA (can be used with bi-directional sensor)
- Two programming methods: Front panel on display or USB2.0 connectivity to PC / Windows-based **TACHLINK**.
- Utility RS485 communication allows full **TACHLINK** function over longer distances (up to 8000 ft)
- Drives up to 8 remote displays (TACHTROL plus). A single display can be up to 1000 ft away with a simple RJ11 (phone jack) connection. Longer runs, cable type and number of displays will affect distance.
- Security mode protects unauthorized access for programming or alarm resets (through display or **TACHLINK**)
- Mounts to DIN rail. Power can be applied through special DIN bus when used with **AI-TEK** power supply.
- Environmentally hardened for temperature, vibration and shock. EMC / CE compliant to current BS/ EN directives.
- Designed and manufactured compliant with RoHS.

TACHPAK 10 Key Features:

- Same as TACHPAK 30 but excludes solid state relays, analog output and utility **RS485**

Programming Features:

Programming has been greatly simplified and can be accomplished by 2 different methods. Many configurable attributes have been added to improve flexibility and function.

- Display front panel: **TACHTROL** 10 and 30 can be programmed through the integrated display/membrane panel. **TACHPAK** 10 and 30 can also be programmed in the same manner with the addition of a **TACHTROL plus** remote display. In either case programming is accomplished

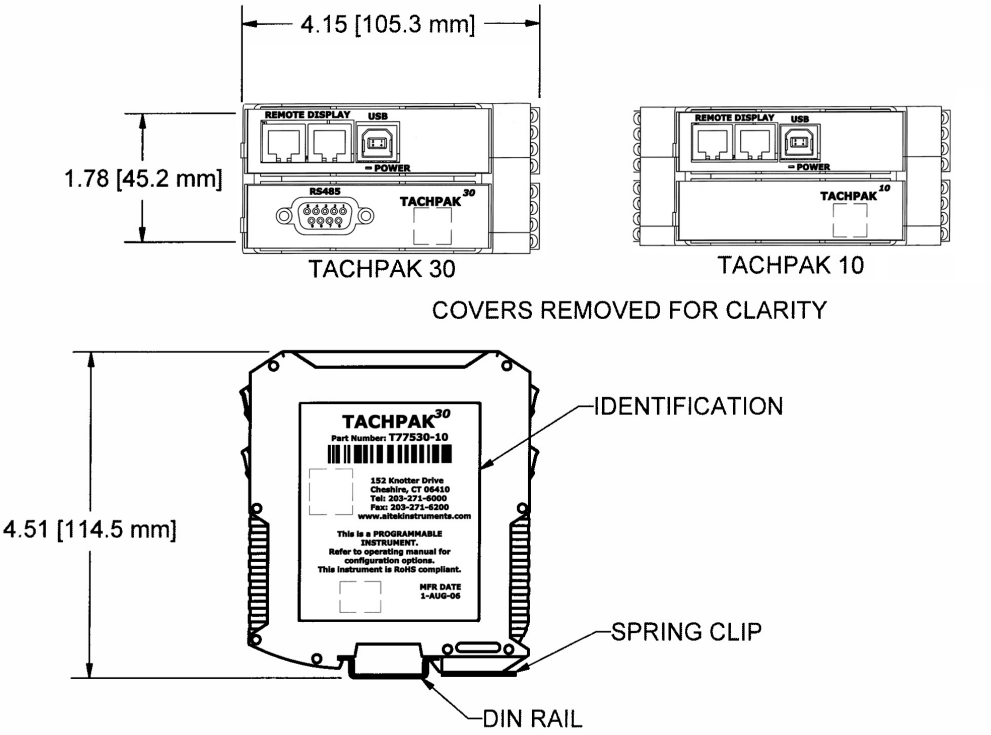
Programming Features continued:

by navigating through a series of nested menus. In the case of tachometer instruments embedded in explosion proof or **NEMA 4X** enclosures, remote access solves the problem of programming by making use of an IR link to allow full front panel control via a hand-held remote.

- **TACHLINK®:** PC / Windows-based custom software allows the user to program all configurable attributes of **TACHPAK** and **TACHTROL** by PC via a USB2.0 or RS485 connection. In addition, the PC can be used to display data, perform security functions, diagnostics, analog output calibration and real-time data logging; all available through the **TACHLINK**.

Applications:

- Fast response overspeed shutdown
- Petrochemical production applications
- Pump or generator alarm
- Low speed switching
- Start-up, over/under speed switching
- Textile production applications
- Machine control
- Paper & pulp production
- Turbine speed control
- Food processing
- Conveyor alarms
- Printing industry
- Metal production
- Mining applications
- Test labs
- Generator set
- Broken or slipping belt drives



Ordering P/N	Input Power	Enclosure	Net Weight (lbs.)
T77510-10	80-264 Vac/12-30 Vdc	Standard	0.6
T77510-40	80-264 Vac/12-30 Vdc	NEMA 4X	3.4
T77510-70	80-264 Vac/12-30 Vdc	Explosion Proof	24.0
T77530-10	80-264 Vac/12-30 Vdc	Standard	0.7
T77530-40	80-264 Vac/12-30 Vdc	NEMA-4X	3.5
T77530-70	80-264 Vac/12-30 Vdc	Explosion Proof	24.0

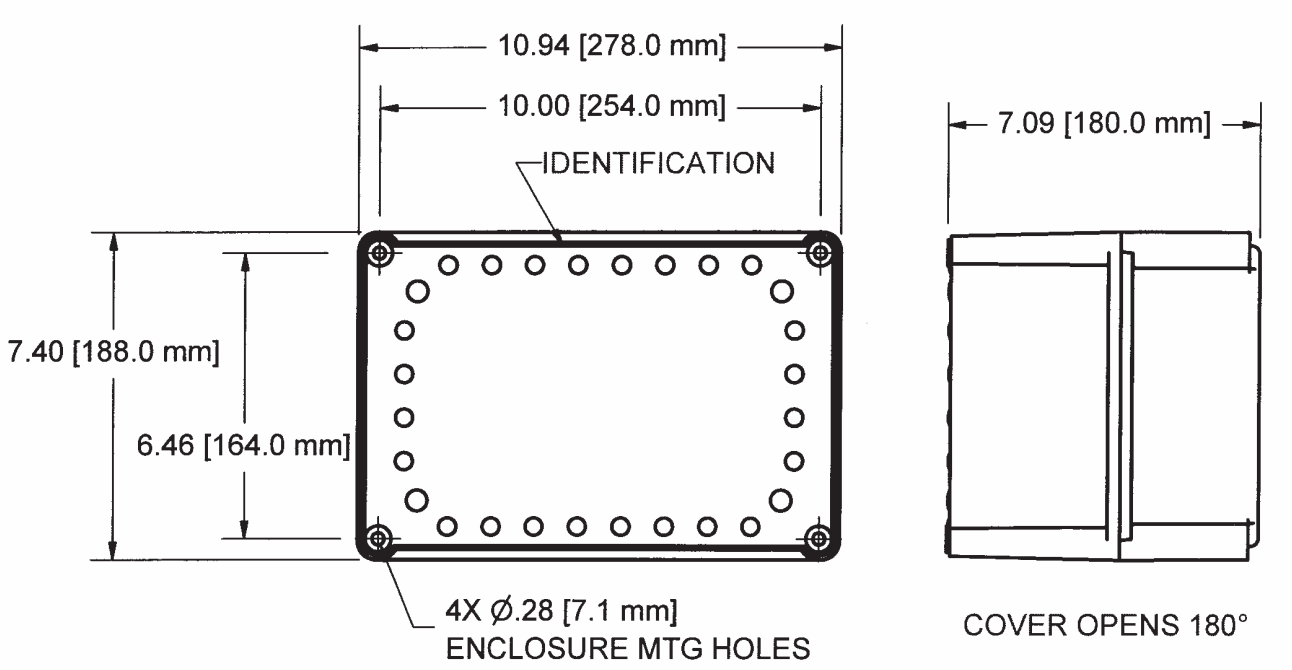
Table 2: Connection Information			
Terminal Block	**Pin #**	**TACHPAK 30**	**TACHPAK 10**
Remote Display	Use RJ11 type connector. No individual breakout of pins.		
USB	Use USB “B” type connector. No individual breakout of pins.		
RS485 DB9	1,5	GND	Not Available
	2	Tx -	
	3	Rx -	
	6	Tx +	
	7	Rx +	
	4,8,9	Not Used	

Table 3: Connection Information			
Terminal Block	**Pin #**	**TACHPAK 30**	**TACHPAK 10**
TB1	1	Input Com	Input Com
	2	A Sig	A Sig
	3	B Sig	B Sig
	4	Direction Input	Direction Input
TB2	5	Verify -	Verify -
	6	Verify +	Verify +
	7	Reset -	Reset -
	8	Reset +	Reset +
TB4	9	Analog Out +	Not Available
	10	Analog Shield	
	11	Analog Out -	
	12	Not Used	
TB3	13	In GND	In GND
	14	12-30 Volt In	12-30 Volt In
	15	+12 Vdc Out	+12 Vdc Out
	16	Out GND	Out GND
TB5	17	Relay 1 Com	Relay 1 Com
	18	Relay 1 N.C.	Relay 1 N.C.
	19	Relay 1 N.O.	Relay 1 N.O.
	20	Not Used	Not Used
TB6	21	Relay 2 Com	Relay 2 Com
	22	Relay 2 N.C.	Relay 2 N.C.
	23	Relay 2 N.O.	Relay 2 N.O.
	24	Not Used	Not Used
TB8	25	AC/Earth Gnd	AC/Earth Gnd
	26	Not Used	Not Used
	27	AC Hot	AC Hot
	28	AC Neutral	AC Neutral
TB7	29	Digital 1 (no polarity)	Not Available
	30	Digital 1 (no polarity)	
	31	Digital 2 (no polarity)	
	32	Digital 2 (no polarity)	

Connection to 12-30 Volt In is also available on the bottom of **TACHPAK 10 & 30**. A special DIN rail power bus adapter is available as an accessory and works with the accessory power supply.

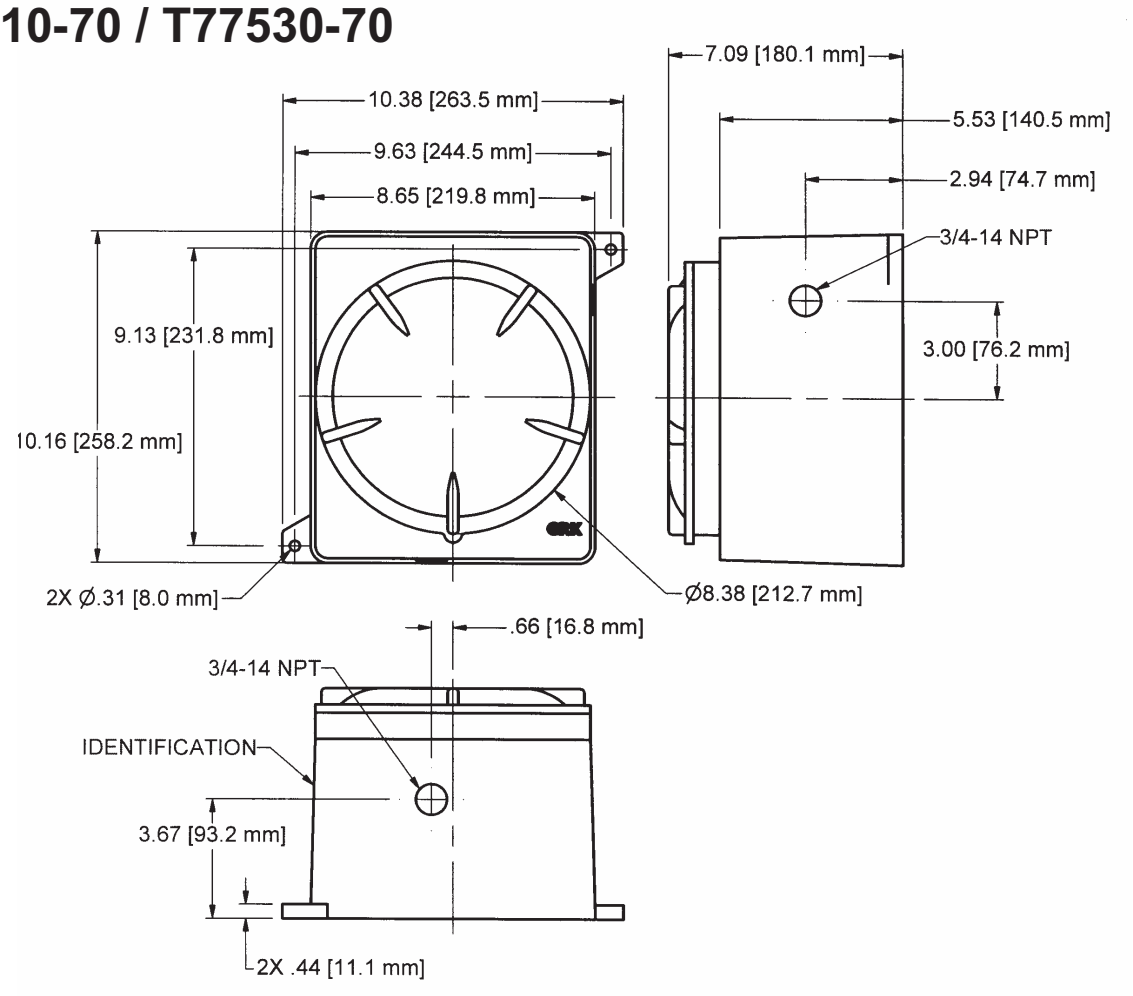
TACHPAK Enclosure Options

T77510-40 / T77530-40



TACHPAK Enclosure Options

T77510-70 / T77530-70



EXPLOSION PROOF

UL/CSA for hazardous locations
Class I, Groups B, C & D;
Class II, Groups E, F & G
also
Class I, Zone 1, Groups IIB, H2, IIA

ATEX
0102 Ex II 2 G EEx d IIC
For use in Zone 1,
Group IIC, Category 2 G,
IP66 hazardous locations

Specifications:

Electrical

All measurements taken at 25°C unless otherwise specified.

Input Power

Power consumption

3.5 watts, typical for tachometer only
Add 0.5 watts per remote display
Add 2.0 watts for 12V out
9.5 watts max.

DC Voltage

12-30 volts. Reverse polarity protected. Available on terminal blocks and din rail in parallel (TACHPAK only).

AC Voltage

80-264 Vac 50-60 Hz

Power Sharing

If DC input and AC input are both supplied, DC will be loaded above approximately 15 volts. Below 15Vdc input, AC will be loaded.

Output Power

Regulated to 12 volts @ 150mA when input voltage is 13.6 volts and above. Below 13.6 volts, output voltage ≈ input voltage –1.5V.

Input Signal Characteristics

Channel A & B

Frequency

Upper Limit: 50 kHz absolute maximum
(20µsec period); 40kHz typical
Lower Limit: 0.005 Hz absolute minimum
(200 sec. period); .05 Hz typical
Minimum Pulse Width: 0.5 µsec.
Wave shape: Square or Sinusoidal

Input Impedance

12 kΩ typical

Input Sensitivity

Upper and Lower Limit: +/-30 volts max. (AC or DC).
Logic 0 and Logic 1 thresholds are user adjustable from 200mV to +28 volts in approx. 20mV steps +/-3%.
200mV peak absolute min. imput sensitivity.

Common Mode Rejection Ratio

>40 db @1kHz typical

Electrical Isolation

Channel A, B and Direction share common ground
Channel A, B or Direction to output: 500 Vrms
Channel A, B or Direction to ground: 500 Vrms

Verify and Reset

Frequency

Essentially DC, Minimum Pulse Width: 250 µsec.

Input Impedance

10mA current regulated

Input Sensitivity

3.5 volts min. pulse to ground

Common Mode Rejection Ratio

>40 db @ DC typical

Electrical Isolation

Signal to signal 500 Vrms
Signal to ground 500 Vrms

Direction

Frequency

Essentially DC
Minimum Pulse Width: 0.5 µsec.

Input Impedance

12 kΩ typical

Input Sensitivity

Upper and Lower Limit: +/-30 volts max. (AC or DC).
Logic 0 and Logic 1 thresholds are user adjustable from 0 to 28 volts in approx. 20mV steps +/-3%.

Common Mode Rejection Ratio

>40 db @1kHz typical

Electrical Isolation

Channel A, B and Direction share common ground
Direction to output: 500 Vrms
Direction to ground: 500 Vrms

Output Characteristics

Relays (Mechanical)

Physical

Form C

Contact Rating

10A @125/250 Vac, 6A @ 277 Vac, 5A @ 100V dc, 2500 VA

Response Time (operate and release)

Input to output 16.5 msec max.
(10 msec relay only)

Electrical Isolation

1500 Vrms, 1 minute coil to contacts

Switchpoint Accuracy

Internal instrument accuracy to alarm setpoint: ±.005%

Relays (Solid State)

Physical
Form A

Contact Rating
400mA @ 60V (AC or DC)
On resistance: 2Ω max

Response Time (operate and release)
Operate: 2 ms max, 0.8 ms typical
Release: 0.5 ms max, 0.1 ms typical

Electrical Isolation
500 Vrms, 1 minute

Switchpoint Accuracy
Internal instrument accuracy to alarm setpoint: ±.005%

Analog Output

Ranges
0 to 20mA, 4 to 20mA, -20 to 0 to +20mA; user selectable

Accuracy
Internal instrument accuracy: ±.005%; plus ±.05% of full scale range at room temp with 400 ohm load; ±0.1% over temp range and load range. Unit is factory calibrated. Can be re-calibrated using TACHLINK.

Resolution
Step size: 610 nanoamps per lsb. 16 bit D/A

Linearity
±0.02% typical

Loop Impedance
100-1000 Ω

Response Time
Input to output 6.55 msec+ 1 msec settle at 1kΩ (worst case) to .1% of final value

Electrical Isolation
500 Vrms continuous

Display (applies to remote displays)

Resolution
Black and White graphics display. 64x128 Pixels.

Accuracy
±.05% of full scale

Communication Protocol
RS485: 19.2kbaud, 8-n-1 protocol, Half duplex, Tachometer is bus master

Network

- Multiplex up to seven displays plus one integrated display. Displays are addressable.
- With all seven displays at the end of one RJ11 6-4 cable, max length would be 125 ft (38m), limited by voltage drop in cable. Cable must be 1:1 type (not flipped), described as RJ11 6-4 reversed cable. For longer distances the RJ type cable should not be used. With #18 wire max run to a single display is 1000 ft (305m).
- Response time: 1 second update to all displays, PC and RS485

Electrical Isolation
500Vrms to ground continuous

Utility RS485
Full access to TACHLINK, single drop only

Communication Protocol
RS485: 19.2kbaud, 8-n-1 protocol, Half duplex, Tachometer is bus master

Maximum Transmission Distance
8000 ft (2400m)

Electrical Isolation
500Vrms to ground continuous

USB
Full access to TACHLINK,
Version 1.1 / 2.0 compatible

Processing Platform
PIC18F series micro controller

Clock Speed
10MHz, ±50 ppm at room temp

Acquisition Time
Basic instrument acquisition time / period 6.55 ms

Accuracy
Basic instrument accuracy ±.005% (50 ppm)

Resolution
Basic instrument resolution: ±.025% or better

TACHTROL® 10 & 30
Dual Input
Digital Tachometer

Part Number Series
T77610 &T77630

CE
RoHS

TACHTROL 30 Key Features:

- Wide range of **AC or DC** power (12-30 Vdc, 80-264Vac 50-60Hz)
- Greatly improved instrument accuracy, processing speed and response time.
- Frequency, period or counter modes.
- User-defined inputs for logic level, averaging, alarm set points and hysteresis,
- Signal normalization and math functions allow mathematical manipulation of input signals. Results can be displayed along with user-defined units.
- Accepts sinusoidal and square wave inputs as found in variable reluctance and digital output speed sensors.
- Accepts bi-directional sensor inputs and will decode quadrature or direction signal logic
- 2 solid state relays (fast response time) and 2 mechanical relays (high power)
- Analog output: 0-20mA, 4-20mA, -20-0-(+) 20mA (can be used with bi-directional sensor)
- Two programming methods: Front panel on display or USB2.0 connectivity to PC / Windows-based **TACHLINK**.
- Utility **RS485** communication allows full **TACHLINK** function over longer distances (up to 8000 ft)
- Drives up to 7 remote displays (**TACHTROL plus**). A single display can be up to 1000 ft away with a simple **RJ11** (phone jack) connection. Longer runs, cable type and number of displays will affect distance.
- Security mode protects unauthorized access for programming or alarm resets (through display or **TACHLINK**)
- Environmentally hardened for temperature, vibration and shock. **EMC / CE** compliant to current BS / EN directives.
- Has integrated display and will mount in same panel opening as **TACHTROL 3**
- Display capabilities include two independent output channels for speed, count period or equation results, Alarm status / security, Mode, User defined units for each channel, 128x64 LCD graphics display with backlight.
- Designed and manufactured compliant with RoHS.

TACHTROL 10 Key Features:

- Same as **TACHTROL 30** but excludes solid state relays, analog output and utility **RS485**

It is the customer's responsibility to determine whether the product is proper for customer's use and application.

Programming Features

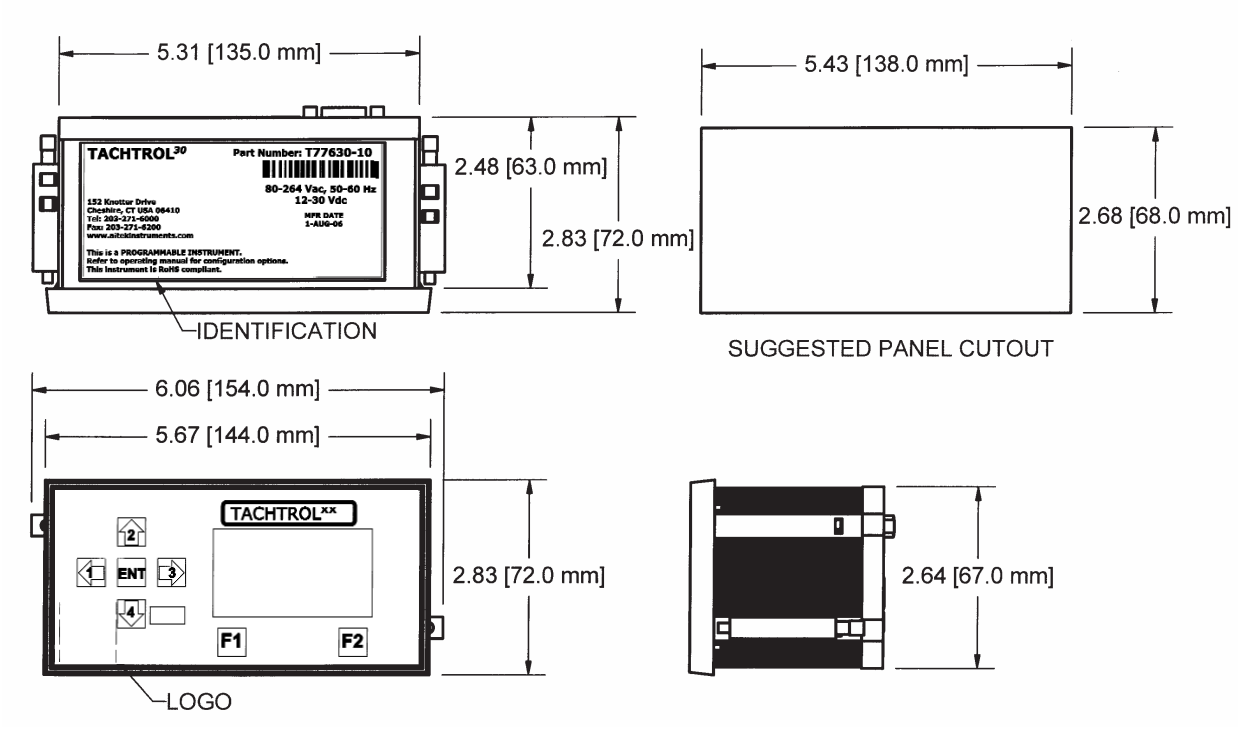
Programming has been greatly simplified and can be accomplished by 2 different methods. Many configurable attributes have been added to improve flexibility and function.

- Display front panel: **TACHTROL 10 and 30** can be programmed through the integrated display/membrane panel. **TACHPAK 10 and 30** can also be programmed in the same manner with the addition of a **TACHTROL plus** remote display. In either case programming is accomplished by navigating through a series of nested menus. In the case of tachometer instruments embedded in explosion proof or NEMA 4X enclosures, remote access solves the problem of programming by making use of an IR link to allow full front panel control via a hand-held remote.
- PC / Windows-based **TACHLINK**: Custom software allows the user to program all configurable attributes of **TACHPAK** and **TACHTROL by PC** via a **USB2.0** or **RS485** connection. In addition, the **PC** can be used to display data, perform security functions, diagnostics, analog output calibration and real-time data logging; all available through the **TACHLINK**.

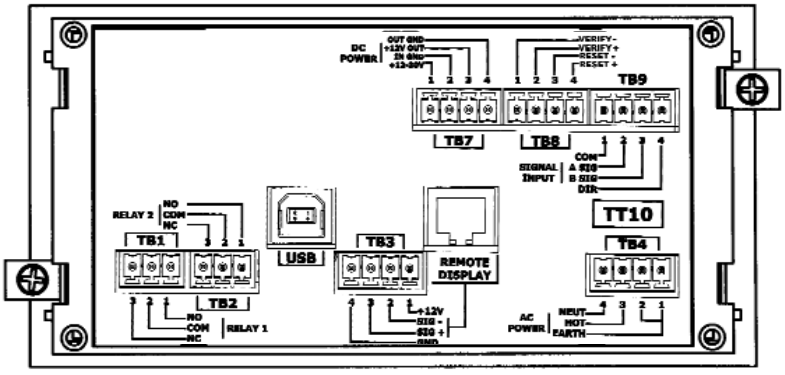
Applications:

- Fast response overspeed shutdown
- 2 Channel Speed/Draw Monior
- Bi-directional Tachometer
- Reverse Rotation Alarm
- Low Speed Tachometer
- Clutch Slip Alarm
- Winder Control
- Ahead/Astern Marine Tachometer
- Expanded analog Scale Speed Transmitter
- Flow Rate Monitor
- Process Time Monitor
- Time per Event Monitor
- Autoranging Tachometer
- Computer Signal Conditioner
- Averaging Tachometer
- Line Frequency Monitor 60.00 Hz/400.0 Hz
- RS485 Speed Transmitter

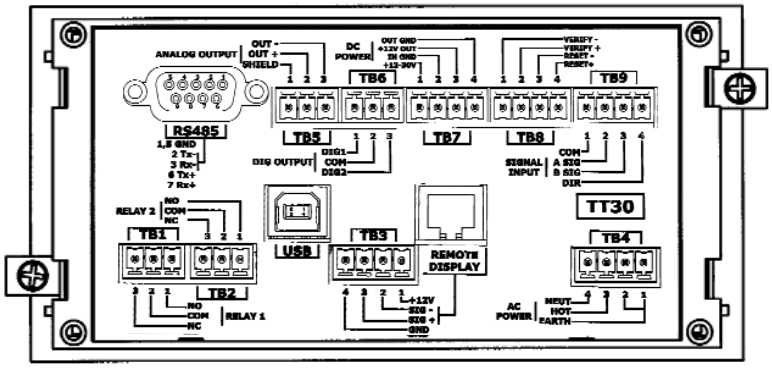
Ordering P/N	Input Power	Enclosure	Net Weight (lbs.)
T77610-10	80-264 Vac/12-30 Vdc	Std. Panel Mount	0.8
T77610-40	80-264 Vac/12-30 Vdc	NEMA 4X	3.9
T77610-70	80-264 Vac/12-30 Vdc	Explosion Proof	42.0
T77630-10	80-264 Vac/12-30 Vdc	Std. Panel Mount	0.9
T77630-40	80-264 Vac/12-30 Vdc	NEMA-4X	4.0
T77630-70	80-264 Vac/12-30 Vdc	Explosion Proof	42.0



PANEL MOUNT, STANDARD ENCLOSURE



REAR VIEW TACHTROL 10



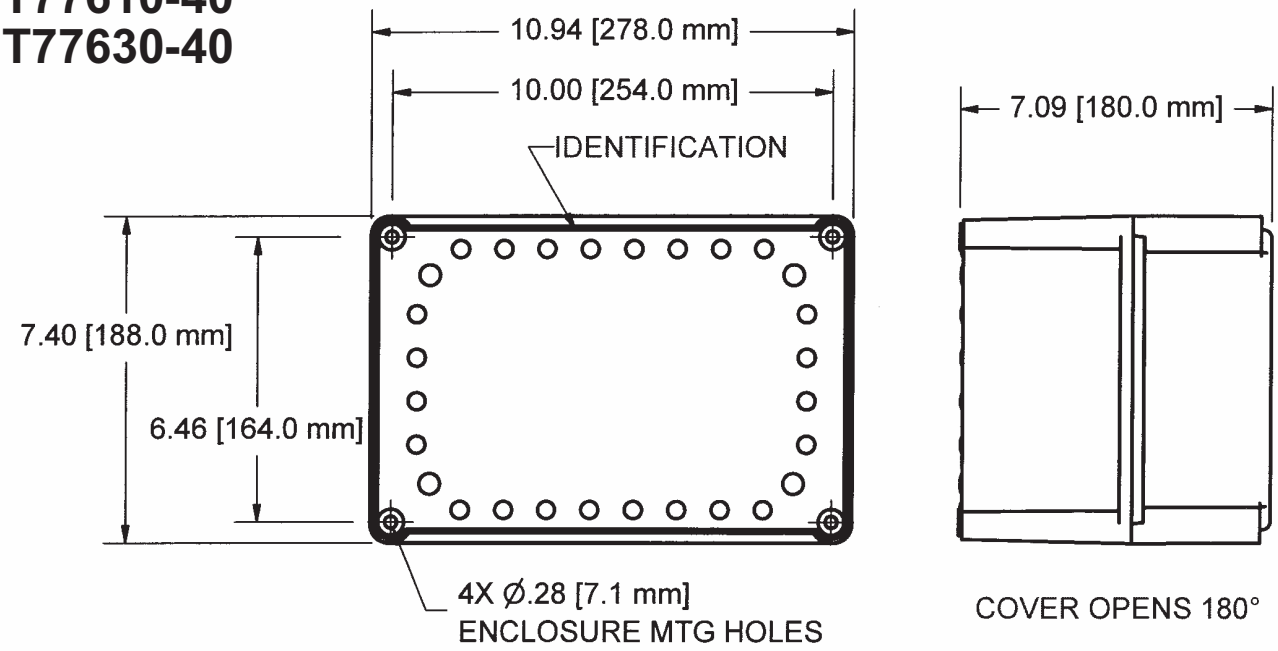
REAR VIEW TACHTROL 30

Table 2: Connection Information			
Terminal Block	**Pin #**	**TACHTROL 30**	**TACHTROL 10**
Remote Display	Use RJ11 type connector. See TB3 for individual breakout of pins.		
USB	Use USB "B" type connector. No individual breakout of pins.		
RS485 DB9	1,5	GND	Not Available
	2	Tx -	
	3	Rx -	
	6	Tx +	
	7	Rx +	
	4,8,9	Not Used	

Table 3: Connection Information			
Terminal Block	**Pin #**	**TACHTROL 30**	**TACHTROL 10**
TB1	1	Relay 1 N.O.	Relay 1 N.O.
	2	Relay 1 Com	Relay 1 Com
	3	Relay 1 N.C.	Relay 1 N.C.
TB2	1	Relay 2 N.O.	Relay 2 N.O.
	2	Relay 2 Com	Relay 2 Com
	3	Relay 2 N.C.	Relay 2 N.C.
TB3 Remote Display	1	+12vdc Out	+12vdc Out
	2	Sig -	Sig -
	3	Sig +	Sig +
	4	Gnd	Gnd
TB4	1	AC/Earth Gnd	AC/Earth Gnd
	2	AC/Earth Gnd	AC/Earth Gnd
	3	AC Hot	AC Hot
	4	AC Neutral	AC Neutral
TB5	1	Analog Shield	Not Available
	2	Analog Out +	
	3	Analog Out -	
TB6	1	Digital 1	Not Available
	2	Dig Com	
	3	Digital 2	
TB7	1	12-30 Volt In	12-30 Volt In
	2	In GND	In GND
	3	+12 Vdc Out	+12 Vdc Out
	4	Out GND	Out GND
TB8	1	Verify -	Verify -
	2	Verify +	Verify +
	3	Reset -	Reset -
	4	Reset +	Reset +
TB9	1	Input Com	Input Com
	2	A Sig	A Sig
	3	B Sig	B Sig
	4	Direction Input	Direction Input

TACHTROL Enclosure Options

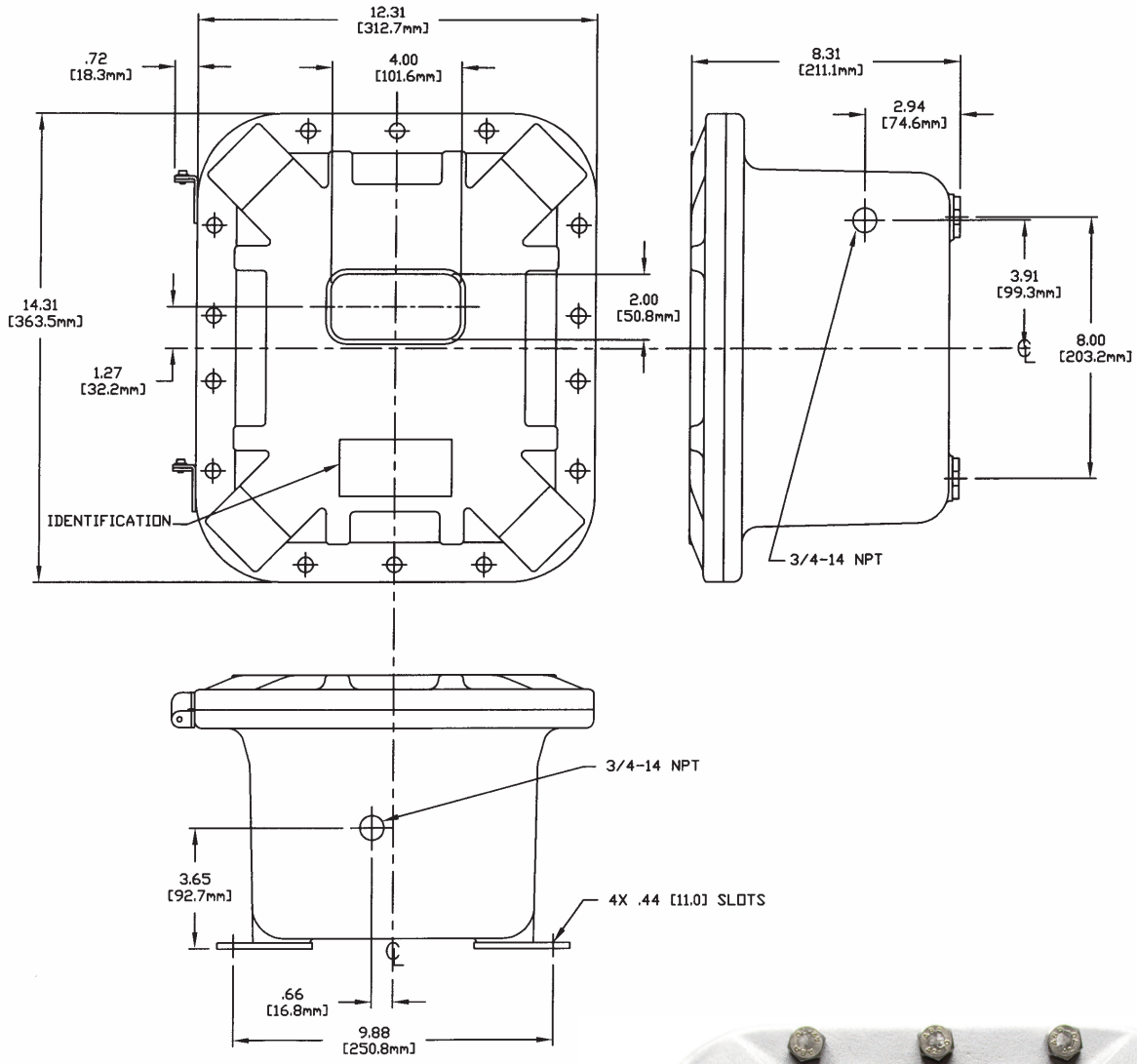
T77610-40
T77630-40



NEMA 4X

TACHTROL Enclosure Options

T77610-70 / T77630-70



EXPLOSION PROOF

UL/CSA for Hazardous Locations
Class 1, Groups B, C & D
Class II, Groups E, F & G
Also Class I, Zone 1, Groups IIB, H2, IIA

ATEX
0102 EX II 2 G
For use in Zone 1 Groups
IIA, IIB & IIB+H2 T6 or T5,
IP56 hazardous locations

Specifications:

Electrical

All measurements taken at 25°C unless otherwise specified.

Input Power

Power consumption

4.0 watts, typical for tachometer only
Add 0.5 watts per remote display
Add 2.0 watts for 12V out
9.5 watts max.

DC Voltage

12-30 volts. Reverse polarity protected. Available on terminal blocks and din rail in parallel (TACHPAK only).

AC Voltage

80-264 Vac 50-60 Hz

Power Sharing

If DC input and AC input are both supplied, DC will be loaded above approximately 15 volts. Below 15Vdc input, AC will be loaded.

Output Power

Regulated to 12 volts @ 150mA when input voltage is 13.6 volts and above. Below 13.6 volts, output voltage ≈ input voltage –1.5V.

Input Signal Characteristics

Channel A & B

Frequency

Upper Limit: 50 kHz absolute maximum
(20µsec period); 40kHz typical
Lower Limit: 0.005 Hz absolute minimum
(200 sec. period); .05 Hz typical
Minimum Pulse Width: 0.5 µsec.
Wave shape: Square or Sinusoidal

Input Impedance

12 kΩ typical

Input Sensitivity

Upper and Lower Limit: +/-30 volts max. (AC or DC).
Logic 0 and Logic 1 threshold is user adjustable from 200mV to +28 volts in approx. 20mV steps +/-3%.

Common Mode Rejection Ratio

>40 db @1kHz typical

Electrical Isolation

Channel A, B and Direction share common ground
Channel A, B or Direction to output: 500 Vrms
Channel A, B or Direction to ground: 500 Vrms

Verify and Reset

Frequency

Essentially DC, Minimum Pulse Width: 250 µsec

Input Impedance

10mA current regulated

Input Sensitivity

3.5 volts min. pulse to ground

Common Mode Rejection Ratio

>40 db @ DC typical

Electrical Isolation

Signal to signal 500 Vrms
Signal to ground 500 Vrms

Direction

Frequency

Essentially DC
Minimum Pulse Width: 0.5 µsec.

Input Impedance

12 kΩ typical

Input Sensitivity

Upper and Lower Limit: +/-30 volts max. (AC or DC).
Logic 0 and Logic 1 threshold is user adjustable from 0 to 28 volts in approx. 20mV steps +/-3%.

Common Mode Rejection Ratio

>40 db @1kHz typical

Electrical Isolation

Channel A, B and Direction share common ground
Direction to output: 500 Vrms
Direction to ground: 500 Vrms

Output Characteristics

Relays (Mechanical)

Physical

Form C

Contact Rating

10A @125/250 Vac, 6A @ 277 Vac, 5A @ 100V dc, 2500 VA

Response Time (operate and release)

Input to output 16.5 msec max.
(10msec relay only)

Electrical Isolation

1500 Vrms, 1 minute coil to contacts

Switchpoint Accuracy

Internal instrument accuracy to alarm setpoint: ±.005%

Relays (Solid State)

Physical
Form A

Contact Rating
400mA @ 60V (AC or DC)
On resistance: 2Ω max

Response Time (operate and release)
Operate: 2 ms max, 0.8 ms typical
Release: 0.5 ms max, 0.1 ms typical

Electrical Isolation
500 Vrms, 1 minute

Switchpoint Accuracy
Internal instrument accuracy to alarm setpoint: ±.005%

Analog Output

Ranges
0 to 20mA, 4 to 20mA, -20 to 0 to +20mA; user selectable

Accuracy
Internal instrument accuracy: ±.005%; plus ±.05% of full scale range at room temp with 400 ohm load; ± 0.1% over temp range and load range. Unit is factory calibrated. Can be re-calibrated using TACHLINK.

Resolution
Step size: 610 nanoamps per lsb. 16 bit D/A

Linearity
±0.02% typical

Loop Impedance
100-1000 Ω

Response Time
Input to output 6.55 msec+ 1 msec settle at 1kΩ (worst case) to .1% of final value

Electrical Isolation
500 Vrms continuous

Display

Resolution
Black and White graphics display. 64x128 Pixels.

Accuracy
±.05% of full scale

Communication Protocol
RS485: 19.2kbaud, 8-n-1 protocol, Half duplex, Tachometer is bus master

Network

- Multiplex up to seven displays plus one integrated display. Displays are addressable.
- With all seven displays at the end of one RJ11 6-4 cable, max length would be 125 ft (38m), limited by voltage drop in cable. Cable must be 1:1 type (not flipped), described as RJ11 6-4 reversed cable. For longer distances the RJ type cable should not be used. With #18 wire max run to a single display is 1000 ft (305m).
- Response time: 1 second update to all displays, PC, and RS485

Electrical Isolation
500Vrms to ground continuous

Utility RS485
Full access to TACHLINK, single drop only

Communication Protocol
RS485: 19.2kbaud, 8-n-1 protocol, Half duplex, Tachometer is bus master

Maximum Transmission Distance
8000 ft (2400m)

Electrical Isolation
500Vrms to ground continuous

USB
Full access to TACHLINK,
Version 1.1 / 2.0 compatible

Processing Platform
PIC18F series micro controller

Clock Speed
10MHz, +/-50 ppm at room temp

Acquisition Time
Basic instrument acquisition time / period 6.55 milliseconds

Accuracy
Basic instrument accuracy +/-.005% (50 ppm)

Resolution
Basic instrument resolution: +/- .025% or better

TACHTROL® plus
Digital Remote Display

Part Number Series
T77810

CE
RoHS

TACHTROL plus :

- An extension of the **TACHPAK** and **TACHTROL** lines. While this device has no intrinsic tachometer function, it is used as a remote display for **TACHPAK 10 & 30** and **TACHTROL 10 & 30**
- Serves as a gateway with both **TACHTROL** and **TACHPAK** instruments for secure, remote programming and alarm reset.
- Use as a hub for multiplexing additional displays.

Programming Features:

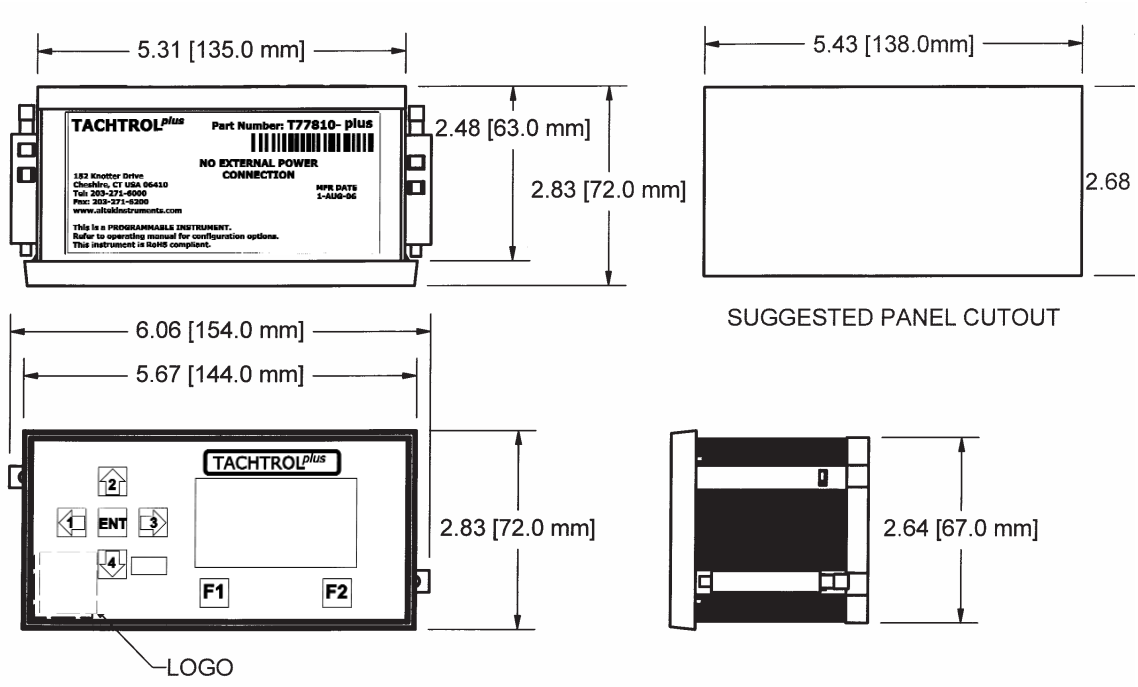
Programming has been greatly simplified and can be accomplished by 2 different methods. Many configurable attributes have been added to improve flexibility and function.

- Display front panel: **TACHTROL 10 and 30** can be programmed through the integrated display/membrane panel. **TACHPAK 10 and 30** can also be programmed in the same manner with the addition of a **TACHTROL plus** remote display. In either case programming is accomplished by navigating through a series of nested menus. In the case of tachometer instruments embedded in explosion proof or **NEMA 4X** enclosures, remote access solves the problem of programming by making use of an **IR** link to allow full front panel control via a hand-held remote.

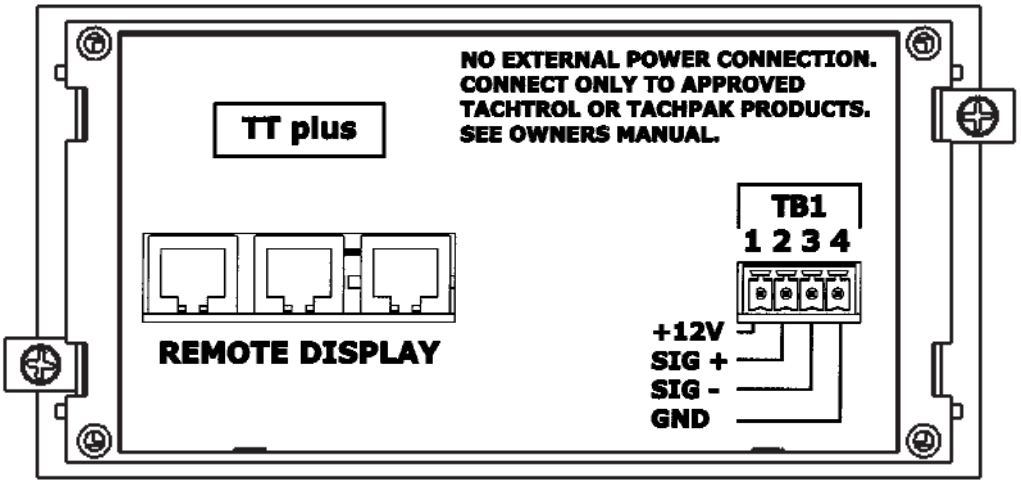
- PC / Windows-based **TACHLINK**: Custom software allows the user to program all configurable attributes of **TACHPAK** and **TACHTROL by PC** via a **USB2.0** or **RS485** connection. In addition, the PC can be used to display data, perform security functions, diagnostics, analog output calibration and real-time data logging; all available through the **TACHLINK**.

Ordering P/N	Input Power	Enclosure	Net Weight (lbs.)
T77810-10	80-264 Vac/12-30 Vdc	Std. Panel Mount	0.6
T77810-40	80-264 Vac/12-30 Vdc	NEMA 4X	3.7
T77810-70	80-264 Vac/12-30 Vdc	Explosion Proof	42.0

It is the customer's responsibility to determine whether the product is proper for customer's use and application.



PANEL MOUNT STANDARD ENCLOSURE

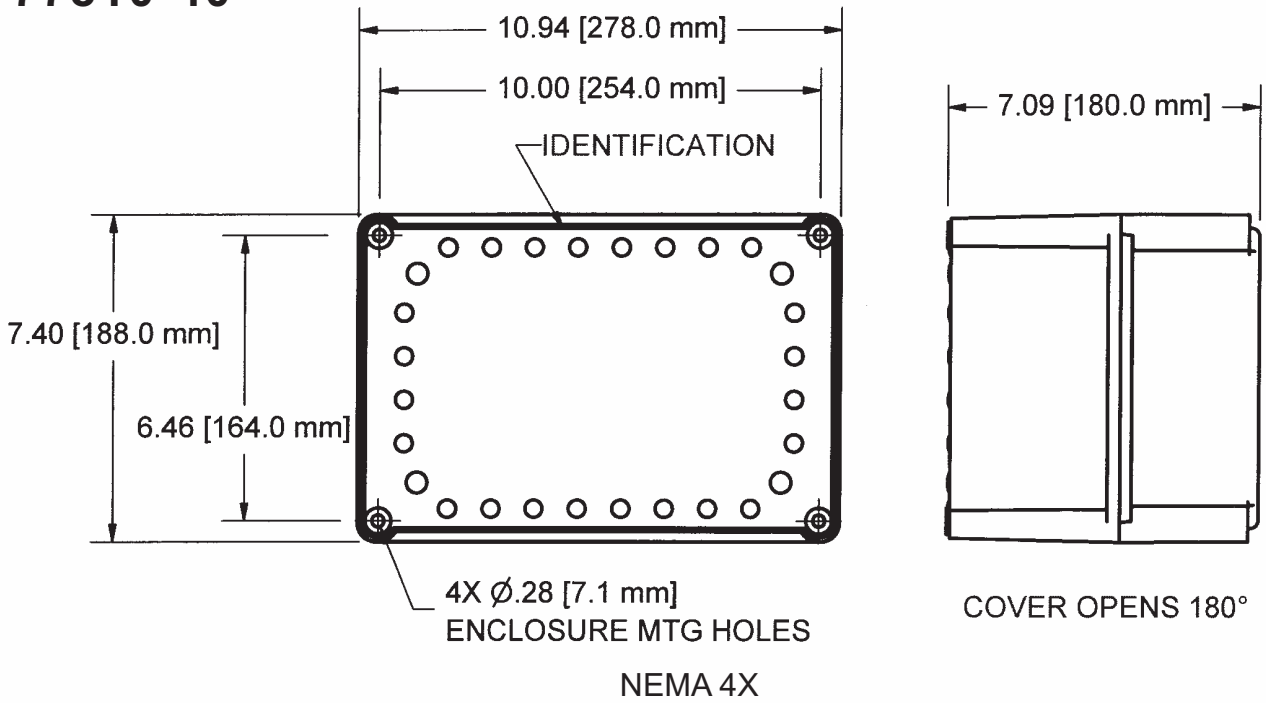


REAR VIEW - CONNECTIONS

Table 2: Connection Information		
Terminal Block	**Pin #**	**TACHTROL plus**
TB1 Remote Display	1	+12vdc In
	2	Sig +
	3	Sig -
	4	Gnd
Remote Display	Use RJ11 type connector. See TB1 for individual breakout of pins.	

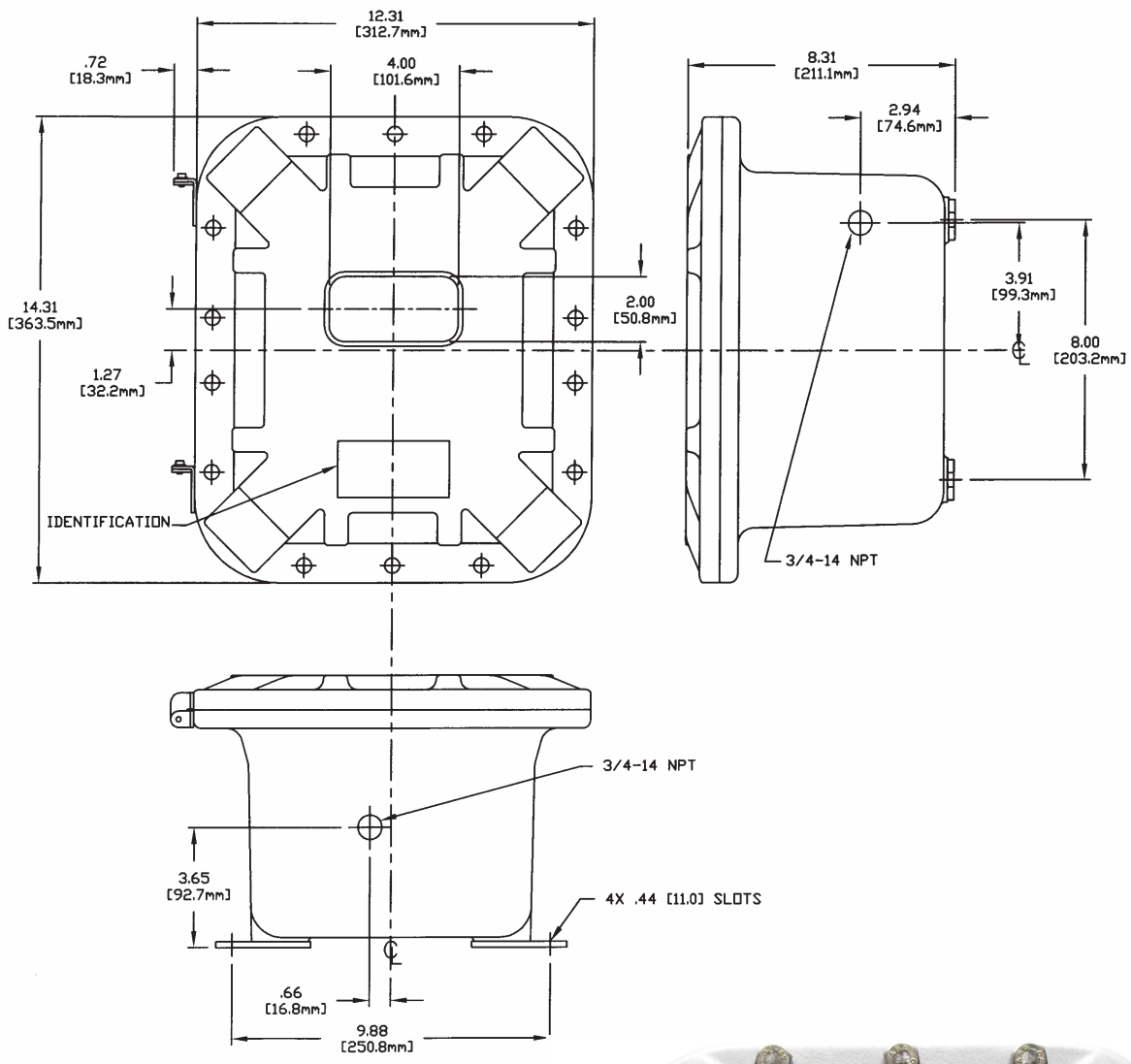
TACHTROL plus Enclosure Options:

T77810-40



NEMA 4X

TACHTROL plus Enclosure Options
T77810-70



EXPLOSION PROOF

UL/CSA for Hazardous Locations
Class 1, Groups B, C & D
Class II, Groups E, F & G
Also Class I, Zone 1, Groups IIB, H2, IIA

ATEX
0102 EX II 2 G
For use in Zone 1 Groups
IIA, IIB & IIB+H2 T6 or T5,
IP56 hazardous locations

Specifications:

Electrical

All measurements taken at 25°C unless otherwise specified.

Input Power

No external power connection. Connect only to approved TACHTROL and TACHPAK products.

Power consumption

0.5 watts per remote display

Remote Display

Resolution

Black and White graphics display. 64x128 Pixels.

Accuracy

±.05% of full scale

Communication Protocol

RS485: 19.2kbaud, 8-n-1 protocol, Half duplex, Tachometer is bus master

Network

- Multiplex up to seven displays plus one integrated display. Displays are addressable.
- With all seven displays at the end of one RJ11 6-4 cable, max length would be 125 ft (38m), limited by voltage drop in cable. Cable must be 1:1 type (not flipped), described as RJ11 6-4 reversed cable. For longer distances the RJ type cable should not be used. With #18 wire max run to a single display is 1000 ft (305m).
- Response time: 1 second update to all displays, PC, and RS485

Electrical Isolation

500Vrms to ground continuous

NEW GENERATION TACHOMETER ACCESSORIES
RoHS

REMOTE

P/N: T776/8 - REMOTE

Used with all **TACHTROL 10 & 30 & plus Devices**

Net weight: 0.15 lbs

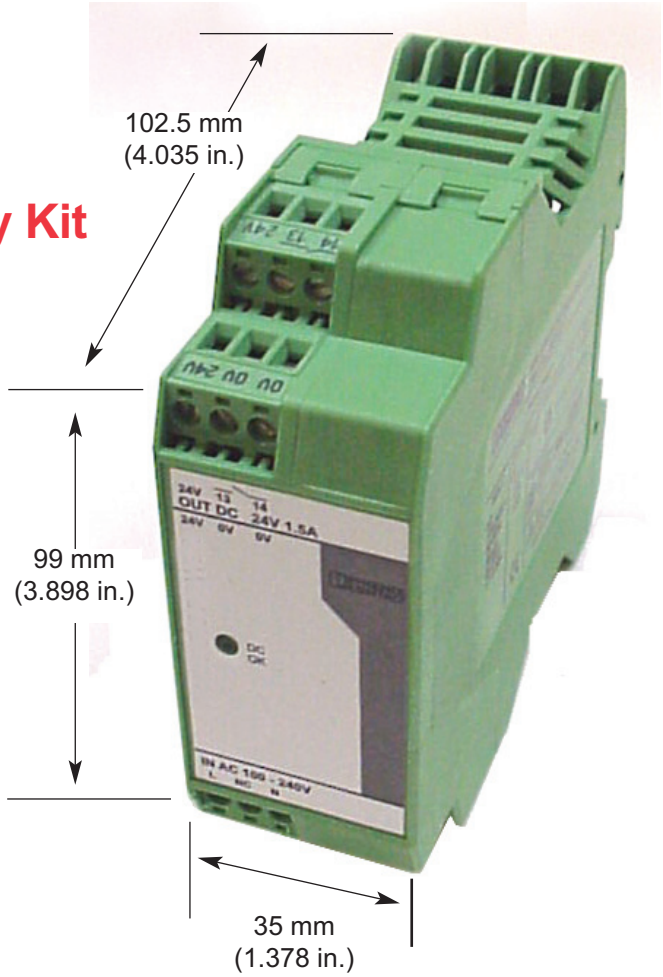
Optional, Higher Power Supply Kit with T-Bus Connector

P/N: T775/6-PWR SPLY

Optional use with all **TACHPAK 10 & 30** & **TACHTROL 10 & 30** when more supply power required.

Rating: 100-240 VAC/24 VDC/1.5A

Net weight: 1 lb.



NEW GENERATION TACHOMETER ACCESSORIES
RoHS

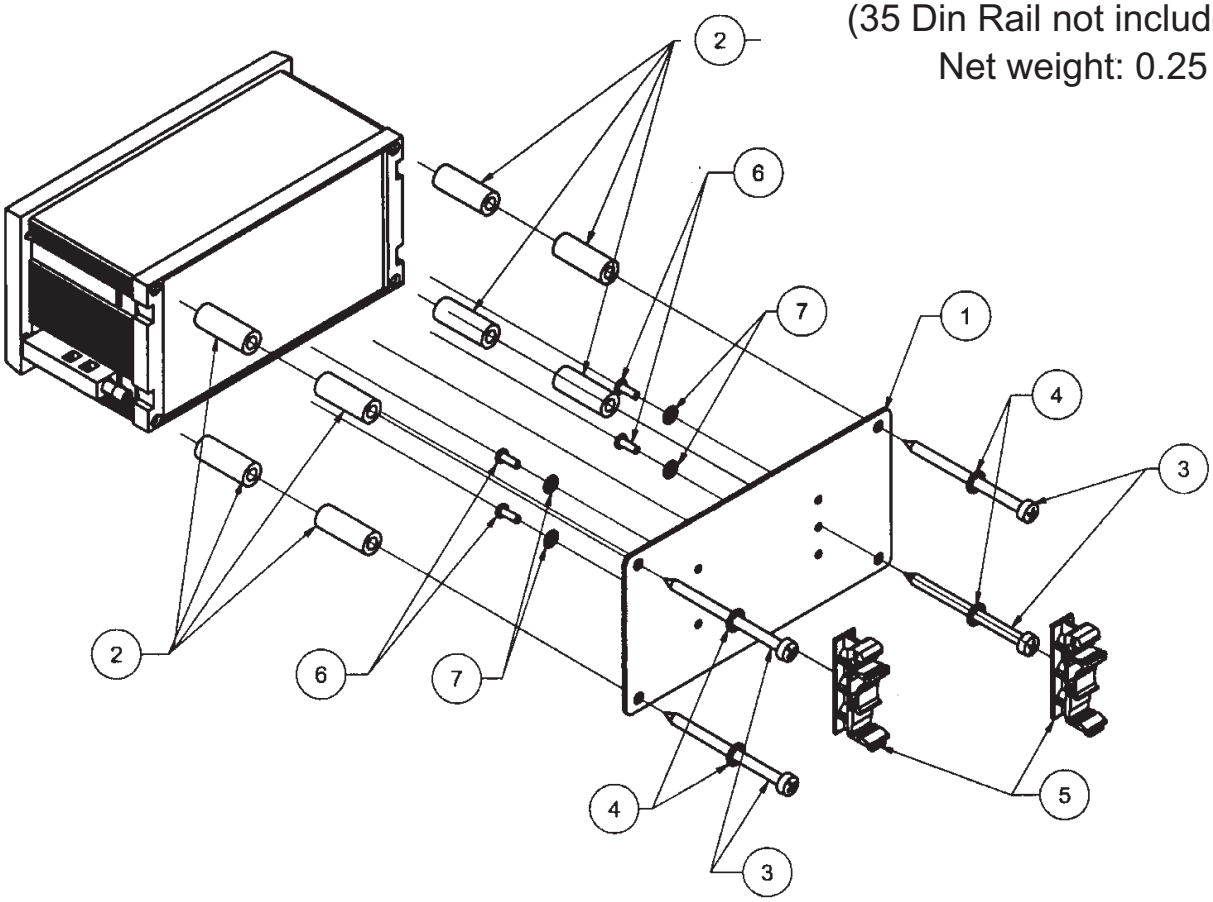
TACHTROL-TO-DIN RAIL MOUNTING KIT

P/N: 675-0300-001

Used with all **TACHTROL 10 & 30 & plus**

(35 Din Rail not included)

Net weight: 0.25 lbs



Overall Depth = 7.75 inches

675-0300-001, Tachtrol Mounting Kit			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	150-0201-001	PLATE
2	8	196-0202-001	SPACER, NYLON
3	4	186-0206-001	SCREW, TAPPING #8 X 2.5", SST
4	4	227-0301-002	WASHER, #8, INTERNAL TOOTH LOCK
5	2	020-0310-001	BRACKET, DIN RAIL CLIP
6	4	186-0207-001	SCREW, MACHINE #4-40 UNC-2A X .3125
7	4	227-0301-001	WASHER, #4, INTERNAL TOOTH LOCK

STACKTACH
Single Input
Industrial Tachometer

CE
Compliant

Part Number Series T77410

Precisely What You Need
AI-Tek's STACKTACH

AI-Tek is pleased to introduce a new tachometer to meet today's requirements for compact packaging. Using the same highly reliant and quality design customers have come to depend on, **AI-Tek** now makes a tachometer available in a .9" thick (22.5mm) **DIN** rail mount package. Easily programmed through a hand held pendant, the **STACKTACH's** Analog Output can be set for 0-20 or 4-20 mA range for the precise scale you need. The 6 Amp, 300 Vac, C-form relay can be set for the exact speed and hysteresis required for your application.

Features and Advantages

Designed to meet the latest European standards, the **STACKTACH** is mounted in a rugged IP40 rated enclosure and has been fully tested to the following standards.

- *EMC - Electromagnetic Compatibility:* complies to CE per EMC Directive 89/336/EEC. Immunity per EN 50082-2, 1995 Emission per EN 50081-2, 1995.
- *Vibration:* Meets IEC 68-2-6, 10 to 150 Hz, 2g.
- *Shock:* Meets IEC 68-2-27, 50g half sine

.

Powered by 24 Vdc, **AI-Tek** can also provide a switching power supply, capable of powering as many as three **STACKTACHs**. This power supply is **UL, CSA** and **DIN VDE** listed and CE compliant.

- Fast response overspeed shutdown
- PLC control input
- Petrochemical production
- Pump or generator alarm
- Low speed tachometer
- Expanding analog scale speed transmitter
- Start-up, over/under speed switching
- Textile production applications
- RPM measurement
- Paper and pulp production
- Turbine speed control input
- Metal production
- Mining applications
- Frequency measurement
- Test labs
- Generator sets
- Food processing
- Conveyor protection
- Printing industry

It is the customer's responsibility to determine whether the product is proper for customer's use and application.

Applications

Ordering P/N	Description	Weight
T77410-10	**STACKTACH** using 24 Vdc supply, (1) Analog Output, (1) 6 Amp Relay	6 oz.
T77410-P	Programming Pendant	8 oz.
T77410-100/240AC	Switching Power Supply - able to convert 100 Vac thru 240 Vac. 50-60 Hz input to 24 Vdc output.	5 oz.

Specifications

Signal Input

Type: Active or passive pickup determined by software settings (jumper required for active pickups)

AC Input (sine wave):
Input Impedance = 2000 ohms
Sensitivity @ 1KHz = 250 Vrms
Max. Voltage Input = 25 Vrms

Pulse Input (TTL compatible):
Input Impedance = 2000 ohms
Min. Pulse Width = 10 µS
Logic 0 = V in < .5V
Logic 1 = V in > 1.5V
(+ 12 VDC @ 50mA supplied for powered sensors)

Frequency Range: Upper limit 30 kHz. Lower limit software selectable form .0625 Hz to 10 Hz.

Input Power*

24 Vdc (24-30 V), std. 600 ohm analog load. 7 watts max. power.
*A switching power supply, P/N T77410 - 100/240 AC, is available. It converts 100 Vac thru 240 Vac, 50/60 Hz input power to 24 Vdc output.

Output

Relay Output: One SPDT relay, rated 6 amps @ 28 Vdc or 300 Vac, 170 W or 1800 VA. Frequency hysteresis selectable from 0.0% to 99.9%, or latching with remote reset. Relay logic and type selectable. Time hysteresis selectable 000 to 999 data acquisitions or latching with delay of 000 to 999 data acquisitions.

Analog Output: Selectable from 0 to 20 mA or 4 to 20 mA ± .5%. True current, 600 ohm maximum loop resistance. Full scale and zero scale selectable from 0 Hz to 30 kHz.

Response: 50 millisec. updates above 100 Hz. See manual for updates between 20 and 100 Hz, one cycle below 20 Hz.

Accuracy: ±0.05% for relay setpoints in operations over temperature range, ±0.5% of full scale for analog outputs.

Environmental

Temperature: -10°C to 55°C operating. -40°C to 80°C storage.

Vibration: Tested to IEC 68-2-6, 10-150 Hz, 2g.

Shock: Tested to IEC 68-2-27 50g half sine.

Enclosure: IP 40

Humidity: Tested to IEC 654-1, IEC 68-2-3 90% Humidity.

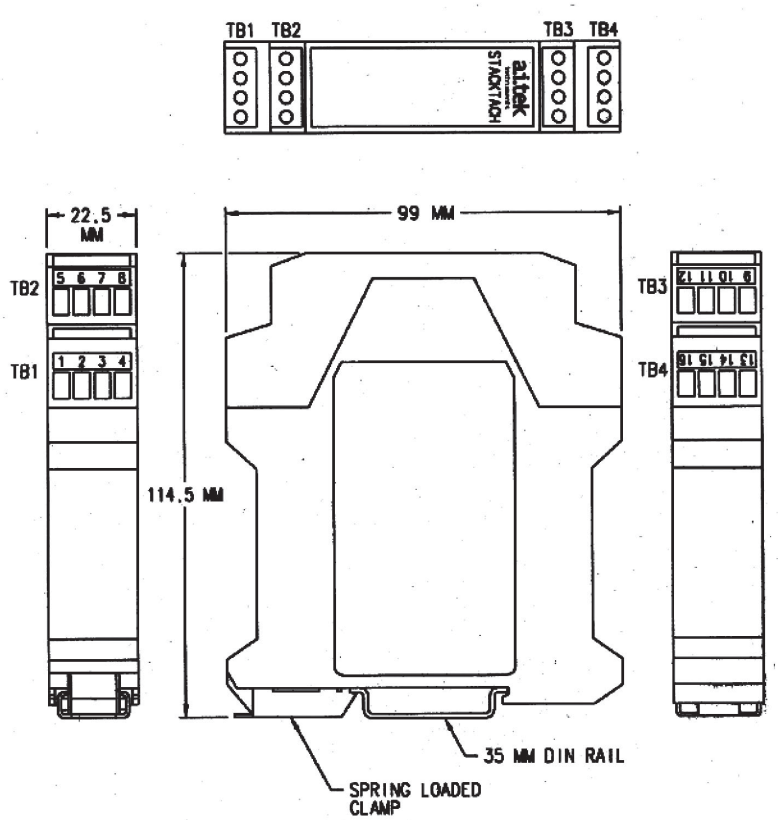
Constant Storage: Retained in EAROM and may be altered 1,000,000 times.

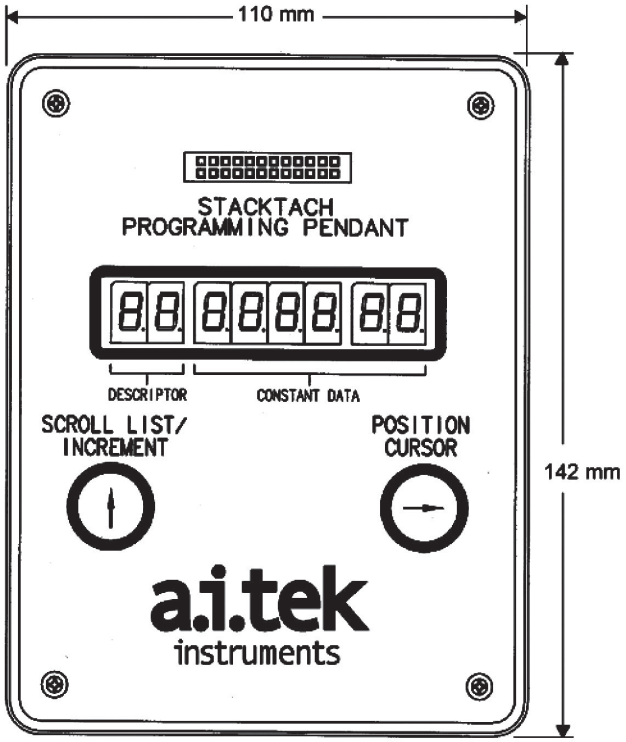
Electrical References: DC power is referenced to digital common. Analog output is referred to analog output common. Passive inputs are balanced. Active pickup inputs are referenced to circuit common. Form C relay contacts are isolated.

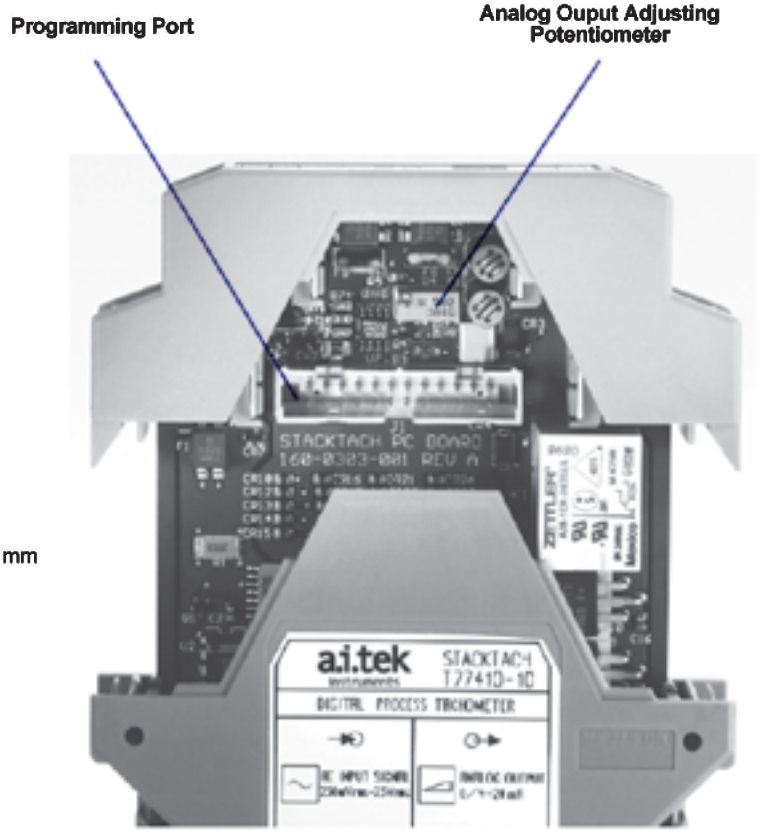
Electromagnetic Compatibility: The STACKTACH shall function to the requirements of the European Council Directive 89/336/EEC, the EMC Directive.

IMMUNITY per EN 50082-2 1995:
EN61000-4-2, 1995: ESD: ±8kV Air, ±4kV contact discharge.
EN61000-4-3, 1997: Radiated R-F: 10 V/m, 80 to 1000 MHz.
ENV50204, 1995: Radiated pulsed: 10 V/m, 900 MHz.
EN61000-4-4, 1994: EFT/B: 2 kV
ENV50141: Conducted noise: 10V, 150 KHz to MHz.
EN61000-4-8, 1994: Power frequency, magnetic field: 1 A/m.
EMISSION per EN50081-2 1995:
EN55011, 1998: Class B radiated emissions.

Terminal Block #	Terminal	Description
TB1	1	Input Signal +
TB1	2	Input Signal -
TB1	3	Shield
TB1	4	+12 Vdc Output (50 mA max.)
TB2	5	0-20/4-20 mA Analog Output (+)
TB2	6	0-20/4-20 mA Analog Output (-)
TB2	7	Verify/Calibrate (when connected to +12 Vdc)
TB2	8	Digital Common
TB3	9	Digital Common
TB3	10	+24 Vdc Input
TB3	11	Relay Resent (when connected to Digital Common)
TB3	12	Earth
TB4	13	K1 Common
TB4	14	No Connection (not used)
TB4	15	K1 Normally Closed
TB4	16	K1 Normally Open







Programming Pendant

Target / Speed Variables Conversion

$$f = \frac{RPM}{60} \times PPR = \frac{SS \times PPR}{\pi \times D} = \frac{UPM}{60} \times PPU = \frac{UPH}{3600} \times PPU$$

$$SS = \frac{RPM}{60} \times \pi \times D = \frac{f \times \pi \times D}{PPR}$$

$$RPM = \frac{60 \times f}{PPR} = \frac{60 \times SS}{\pi \times D}$$

$$D = \frac{(PPR + 2)}{DP} = \frac{SS \times PPR}{f \times \pi}$$

$$DP = \frac{(PPR + 2)}{D} = \frac{25.4}{M}$$

$$CP = \frac{\pi}{DP} = \frac{\pi \times PD}{PPR}$$

$$PD = \frac{PPR}{DP} = \frac{CP \times PPR}{\pi}$$

$$M = \frac{25.4}{DP} = \frac{25.4 \times D}{(PPR+2)}$$

$$PPR = (D \times DP) - 2 = \frac{60 \times f}{RPM} = \frac{f \times \pi \times D}{SS}$$

Definitions:

f	=	frequency in Hz or cycles per second (cps)
SS	=	surface speed in inches per second (ips)
RPM	=	rotary speed in revolutions per minute
PPR	=	pulses per revolution or number of gear teeth
D	=	outside diameter of target (gear) in inches
PD	=	pitch diameter of target (gear) in inches
π	=	3.14
UPM	=	unit measure per minute
UPH	=	unit measure per hour
PPU	=	pulses per unit measure
DP	=	diametral pitch = number of teeth in 1 inch pitch diameter
CP	=	circular pitch = arc distance between teeth on pitch circle
M	=	metric module = pitch diameter in mm divided by number of gear teeth

New Generation Tachometer Cross Reference

NEW	OLD
TACHPAK 10	**TACHPAK 1**
T77510-10 80-264Vac, 12-30Vdc, Standard	T77130-11 120 Vac / 24Vdc, Standard
	T77130-12 240 Vac / 24Vdc, Standard
T77510-40 80-264Vac, 12-30Vdc, NEMA 4X	T77130-41 120Vac / 24Vdc, NEMA 4X
	T77130-42 240Vac / 24Vdc, NEMA 4X
T77510-70 80-264Vac, 12-30Vdc, Explosion Proof	T77130-71 120Vac / 24Vdc, Explosion Proof
	T77130-72 240Vac / 24Vdc, Explosion Proof
TACHPAK 30	**TACHPAK 3**
T77530-10 80-264Vac, 12-30Vdc, Standard	T77430-11 120Vac / 24Vdc, Standard
	T77430-12 240Vac / 24Vdc, Standard
T77530-40 80-264Vac, 12-30Vdc, NEMA 4X	T77430-41 120Vac / 24Vdc, NEMA 4X
	T77430-42 240Vac / 24Vdc, NEMA 4X
T77530-70 80-264Vac, 12-30Vdc, Explosion Proof	T77430-71 120Vac / 24Vdc, Explosion Proof
	T77430-72 240Vac / 24Vdc, Explosion Proof
TACHTROL 30	**TACHTROL 3**
No Cross Reference Offered	T77310-01 120Vac / 24Vdc, Less Enclosure
	T77310-02 240Vac / 24Vdc, Less Enclosure
T77630-10 80-264Vac, 12-30Vdc, Standard Panel Mount	T77310-11 120Vac / 24Vdc, Standard Panel Mount
	T77310-12 240Vac / 24Vdc, Standard Panel Mount
No Cross Reference Offered. Use T77630-40 for closest match.	T77310-21 120Vac / 24Vdc, Splash Proof Panel Mount
	T77310-22 240Vac / 24Vdc, Splash Proof Panel Mount
T77630-40 80-264Vac, 12-30Vdc, NEMA 4X	T77310-41 120Vac / 24Vdc, NEMA 4X
	T77310-42 240Vac / 24Vdc, NEMA 4X
T77630-70 80-264Vac, 12-30Vdc, Explosion Proof	T77310-71 120Vac / 24Vdc, Explosion Proof
	T77310-72 240Vac / 24Vdc, Explosion Proof
TACHTROL 10	No "OLD" Versions. Refer to TACHTROL 3 for closest match.
T77610-10 80-264Vac, 12-30Vdc, Standard	
T77610-40 80-264Vac, 12-30Vdc, NEMA 4X	
T77610-70 80-264Vac, 12-30Vdc, Explosion Proof	
TACHTROL plus	No "OLD" Versions. Refer to old analog meter.
T77810-10 Standard	
T77810-40 NEMA 4X	
T77810-70 Explosion Proof	

New Generation Tachometer Configuration Chart

	AC Voltage 80-264 Vac	DC Voltage 12-30Vdc	Utility RS485	USB / TACHLINK Compatible	Analog Output	Mechanical Relays (2)	Solid State Relays (2)	Infrared Remote Compatible**	Panel Mount	DIN Rail Mount	NEMA 4X	Explosion Proof / ATEX
TACHPAK 10												
T77510-10	X	X		X		X				X		
T77510-40	X	X		X		X					X	
T77510-70	X	X		X		X						X
TACHPAK 30												
T77530-10	X	X	X	X	X	X	X			X		
T77530-40	X	X	X	X	X	X	X				X	
T77530-70	X	X	X	X	X	X	X					X
TACHTROL 10												
T77610-10	X	X		X		X		X	X			
T77610-40	X	X		X		X		X			X	
T77610-70	X	X		X		X		X				X
TACHTROL 30												
T77630-10	X	X	X	X	X	X	X	X	X			
T77630-40	X	X	X	X	X	X	X	X			X	
T77630-70	X	X	X	X	X	X	X	X				X
TACHTROL plus	TACHTROL plus is a remote display only. It is used to provide display and programming functions. Up to 8 displays can be connected to a single tachometer. ***											
T77810-10								X	X			
T77810-40								X			X	
T77810-70								X				X

** Infrared remote included with TACHTROL -40 and -70 units only.

*** Seven TACHTROL plus displays for TACHTROL 10 & 30 / Eight TACHTROL plus displays for TACHPAK 10 & 30

a.i.tek instruments

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www.aitekinstruments.com

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