T776XX | B

REVISIONS			
LTR	DESCRIPTION	DATE	APVD
1	Preliminary	10/25/06	BRC
2	Updated Environmental Specs. Added table 2 & 3	2/1/07	BRC
A	Original Release Per C.O.5854	3/21/07	BRC
B	Updated Input Sensitivity, EMC and Shock / Vib specs. C.O.5878	6/6/07	BRC

RECORD OF REVISION STATUS OF EACH SHEET

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
1	1	1	1	1	1	1	1	1	1	1	1	1	/															
2	1	1	1	1	1	2	2	2	2	2	2	2	2	/														
A	A	A	A	A	A	A	A	A	A	A	A	A	A	/														
B	B	B	A	A	A	A	B	A	A	A	A	A	A	/														

PRODUCT SPECIFICATION

APPROVALS		DATE
PREPARED	BRClark / KAErasmus	10/6/06
CHECKED	BRClark	3/22/07
DSGN ENGR	BRClark	3/22/07
QUAL ENGR	CEGerard	3/22/07
MFG ENGR	PJulian	3/23/07

AI-TEK Instruments, LLC
CHESHIRE, CT USA 06410

TITLE:

TACHTROL 30/10

SIZE	CODE IDENT. NUMBER	DWG. NO.
A	1XP56	T776XX

CAD SHEET 1 OF 14

1.0 **Scope**

This product specification covers the requirements for AI-TEK Instruments, LLC TACHTROL 10 and 30 part numbers T77610-XX and T77630-XX.

2.0 **Applicable Documents**

The documents listed in this section are specified in sections 3 and 4 of this specification. In the event of a conflict between documents referenced herein and the contents of this specification, the contents of this specification takes precedence.

2.1 **Company Documents**

See Engineering Bill

2.2 **Government**

MIL-STD-810C Environmental Test Methods

2.3 **Third Party Documents**

EN 61326:1997 Class A radiated and conducted emissions
EN 61326:1997 with amendments A1, A2 and A3, Immunity
EN 61000-4-2:1998 Electrostatic Discharge
EN 61000-4-3:1998 Radiated Immunity
EN 61000-4-4:1995 Electrical Fast Transients/Burst
EN 61000-4-5:1995 Surges
EN 61000-4-6:1996 Conducted Immunity
EN 61000-4-11:1994 Supply Dips and Variations

3.0 **Requirements**

3.1 **General**

This specification delineates all functional and dimensional requirements for AI-TEK Instruments, LLC TACHTROL 10 and 30 series tachometers. See Table I for part numbers.

3.2 **Characteristics**

3.2.1 **Physical**

3.2.1.1 **Configuration**

Outline dimensions shall be in accordance with Figures indicated in Table I

3.2.2 **Electrical**

All measurements taken at 25°C unless otherwise specified.

SIZE	CODE IDENT. NUMBER	DWG NO.:	REV B
A	1XP56	T776XX	SHEET 2

3.2.2.1 **Input Power**

3.2.2.1.1 **Power consumption**
3.5 watts, typical for tachometer only
Add 0.5 watts per remote display
Add 2.0 watts for 12V out

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

3.2.2.1.3 **AC Voltage**
80-264 Vac 50-60 Hz

3.2.2.1.4 **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.

3.2.2.2 **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.

3.2.2.3 **Input Signal Characteristics**

3.2.2.3.1 **Channel A & B**

3.2.2.3.1.1 **Frequency**

Upper Limit: 50 kHz absolute maximum (20 μsec period); 40kHz typical
Lower Limit: 0.005 Hz absolute minimum (200 sec. period); 0.05Hz typical
Minimum Pulse Width: 0.5 μsec.
Wave shape: Square or Sinusoidal

3.2.2.3.1.2 **Input Impedance**
12 kΩ typical

3.2.2.3.1.3 **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%.
200 mV pk absolute minimum input sensitivity.

3.2.2.3.1.4 **Common Mode Rejection Ratio**
>40 db @1kHz typical

SIZE	CODE IDENT. NUMBER	DWG NO.:	REV **B**
A	**1XP56**	**T776XX**	SHEET 3

3.2.2.3.1.5 **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

3.2.2.3.2 **Verify and Reset**

3.2.2.3.2.1 **Frequency**
Essentially DC, Minimum Pulse Width: 250 μsec.

3.2.2.3.2.2 **Input Impedance**
10mA current regulated

3.2.2.3.2.3 **Input Sensitivity**
3.5 volts min. pulse to ground

3.2.2.3.2.4 **Common Mode Rejection Ratio**
>40 db @ DC typical

3.2.2.3.2.5 **Electrical Isolation**
Signal to signal 500 Vrms
Signal to ground 500 Vrms

3.2.2.3.3 **Direction**

3.2.2.3.3.1 **Frequency**
Essentially DC
Minimum Pulse Width: 0.5 μsec.

3.2.2.3.3.2 **Input Impedance**
12 kΩ typical

3.2.2.3.3.3 **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%.

3.2.2.3.3.4 **Common Mode Rejection Ratio**
>40 db @1kHz typical

3.2.2.3.3.5 **Electrical Isolation**
Channel A, B and Direction share common ground
Direction to output: 500 Vrms
Direction to ground: 500 Vrms

SIZE	CODE IDENT. NUMBER	DWG NO.:	REV A
A	1XP56	T776XX	SHEET 4

3.2.2.4 **Output Characteristics**

3.2.2.4.1 **Relays (Mechanical)**

3.2.2.4.1.1 **Physical**
Form C

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

3.2.2.4.1.3 **Response Time (operate and release)**
Input to output 16.5 msec max. (10msec relay only)

3.2.2.4.1.4 **Electrical Isolation**
1500 Vrms, 1 minute coil to contacts

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

3.2.2.4.2 **Relays (Solid State)**

3.2.2.4.2.1 **Physical**
Form A

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

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

3.2.2.4.2.4 **Electrical Isolation**
500 Vrms, 1 minute

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

3.2.2.4.3 **Analog Output**

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

SIZE	CODE IDENT. NUMBER	DWG NO.:	REV A
A	1XP56	T776XX	SHEET 5

3.2.2.4.3.2 **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.

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

3.2.2.4.3.4 **Linearity**
0.02% typical

3.2.2.4.3.5 **Loop Impedance**
100-1000 Ω

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

3.2.2.4.3.7 **Electrical Isolation**
500 Vrms continuous

3.2.2.4.4 **Display (applies to both remote and integrated displays)**

3.2.2.4.4.1 **Resolution**
Black and White graphics display. 64x128 Pixels.

3.2.2.4.4.2 **Accuracy**
.05% of full scale

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

3.2.2.4.4.4 **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

SIZE	CODE IDENT. NUMBER	DWG NO.:	REV A
A	1XP56	T776XX	SHEET 6

3.2.2.4.4.5 **Electrical Isolation**
500Vrms to ground continuous

3.2.2.4.5 **Utility RS485**
Full access to TACHLINK, single drop only

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

3.2.2.4.5.2 **Maximum Transmission Distance**
8000 ft (2400m)

3.2.2.4.5.3 **Electrical Isolation**
500Vrms to ground continuous

3.2.2.4.6 **USB**
Full access to TACHLINK,
Version 1.1 / 2.0 compatible

3.2.2.5 **Processing Platform**
PIC18F series micro controller

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

3.2.2.5.2 **Acquisition Time**
Basic instrument acquisition time / period 6.55 milliseconds

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

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

3.3 **Environmental**

3.3.1 **Operating Temperature**
-10 to 55°C

3.3.2 **Thermal Cycle**
50 cycles: -40°C to +80°C
200 cycles: -10°C to +55°C

3.3.3 **Dielectric Strength**
See applicable Specifications sub-sections

3.3.4 **Humidity**
90% RH non-condensing per IEC 654-1, IEC 68-2-3

3.3.5 **Vibration**
MIL-STD-810C Environmental Test Methods, method 514.2, procedure VIII, figure 514.2-6, curve V; 1.5g's 10-2000Hz, 5.5 hrs. / axis, 3 axis

IEC 60068-2-6, 10-150Hz, 2g, 10 sweep cycles / axis, 3 axis

3.3.6 **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

3.3.7 **EMC**
EN 61326:1997 Class A radiated and conducted emissions with amendments A1, A2 and A3

EN 61326:1997 with amendments A1, A2 and A3, Immunity
EN 61000-4-2:1998 Electrostatic Discharge: ±4kV contact, ±8kV air
EN 61000-4-3:1998 Radiated Immunity: 10V/m
EN 61000-4-4:1995 Electrical Fast Transients/Burst: ±2kV AC, ±1kV I/O > 3m
EN 61000-4-5:1995 Surges: ±1kV differential mode, ±2kV common mode, ±1kV line to ground I/O > 30m
EN 61000-4-6:1996 Conducted Immunity: 3V
EN 61000-4-11:1994 Supply Dips and Variations: 100%, 0.5 cycle each polarity

3.4 **Material**
Noryl, black (UL 94 V-0)

3.5 **Identification Of Product**
The unit and shipping carton will be permanently marked. See Engineering Bill

4.0 **Quality Assurance Provisions**

4.1 **Quality Conformance Inspection**
See Engineering Bill

5.0 **Preparation For Delivery**
See Engineering Bill

6.0 **Notes**
N/A

Table 1 See Table 3 for applicable options	
Part Number	**Figure**
T77610-10 TACHTROL 10, STD enclosure	1,B
T77630-10 TACHTROL 30, STD enclosure	1, A
T77610-40 TACHTROL 10, NEMA 4X enclosure	2, B
T77630-40 TACHTROL 30, NEMA 4X enclosure	2, A
T77610-70 TACHTROL 10, UL / ATEX Explosion proof enclosure	3, B
T77630-70 TACHTROL 30, UL / ATEX Explosion proof enclosure	3, A

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	

SIZE	CODE IDENT. NUMBER	DWG NO.:	REV A
A	1XP56	T776XX	SHEET 9

Table 3: Connection Information			
Terminal Block	**Pin #**	**TACHTROL 30 FIG. A**	**TACHTROL 10 FIG. B**
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

SIZE	CODE IDENT. NUMBER	DWG NO.:	REV A
A	1XP56	T776XX	SHEET 10

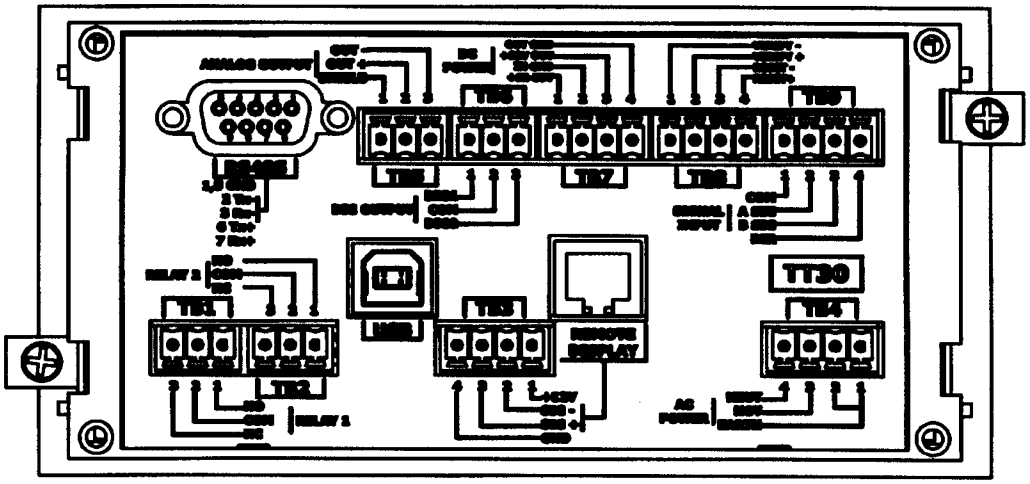

FIGURE A

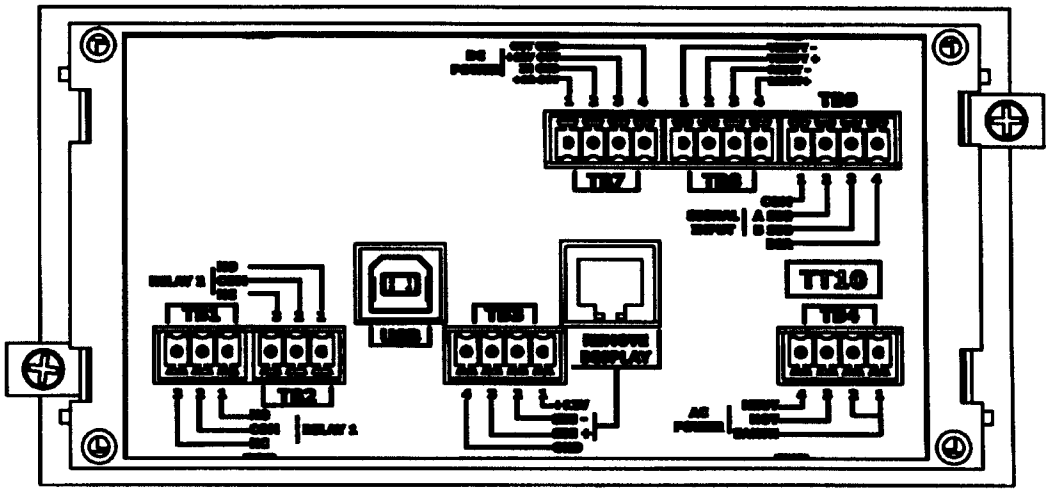

FIGURE B

SIZE	CODE IDENT. NUMBER	DWG NO.:	REV A
A	1XP56	T776XX	SHEET 11

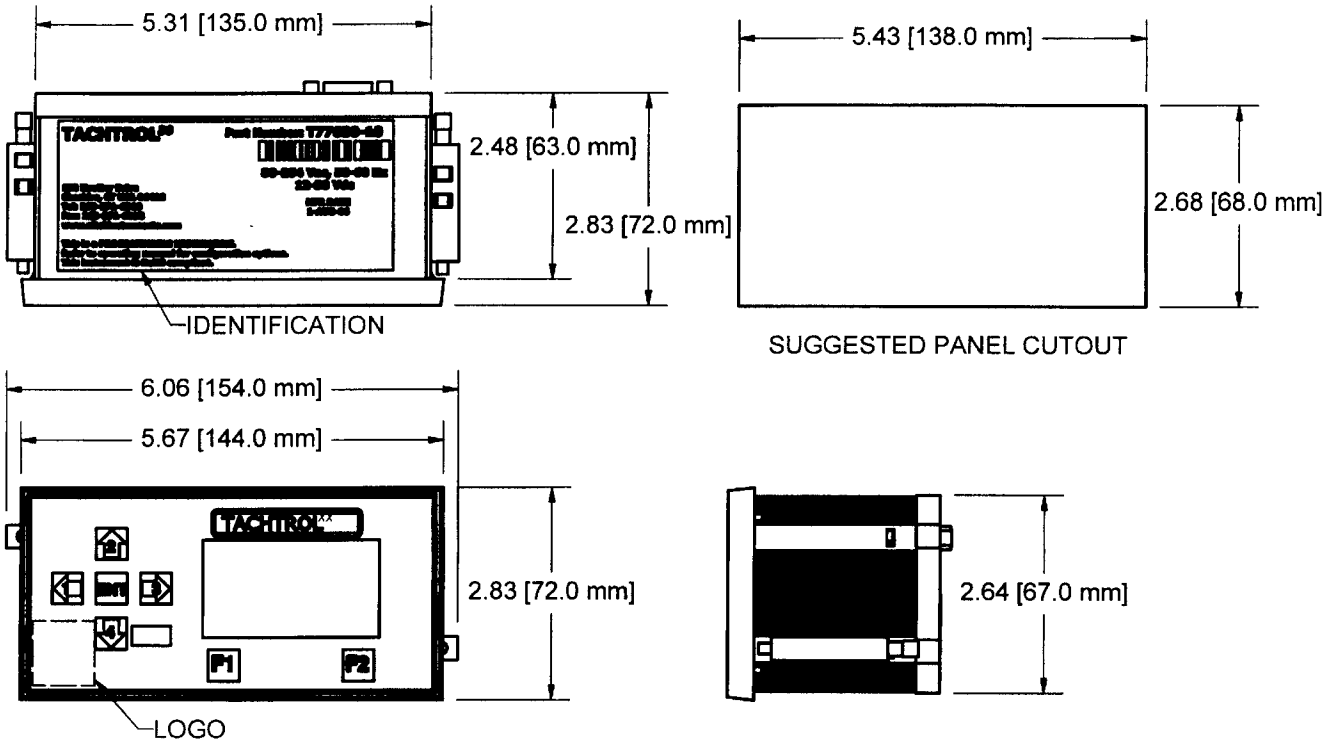

FIGURE 1
Standard Enclosure

SIZE	CODE IDENT. NUMBER	DWG NO.:	REV A
A	1XP56	T776XX	SHEET 12

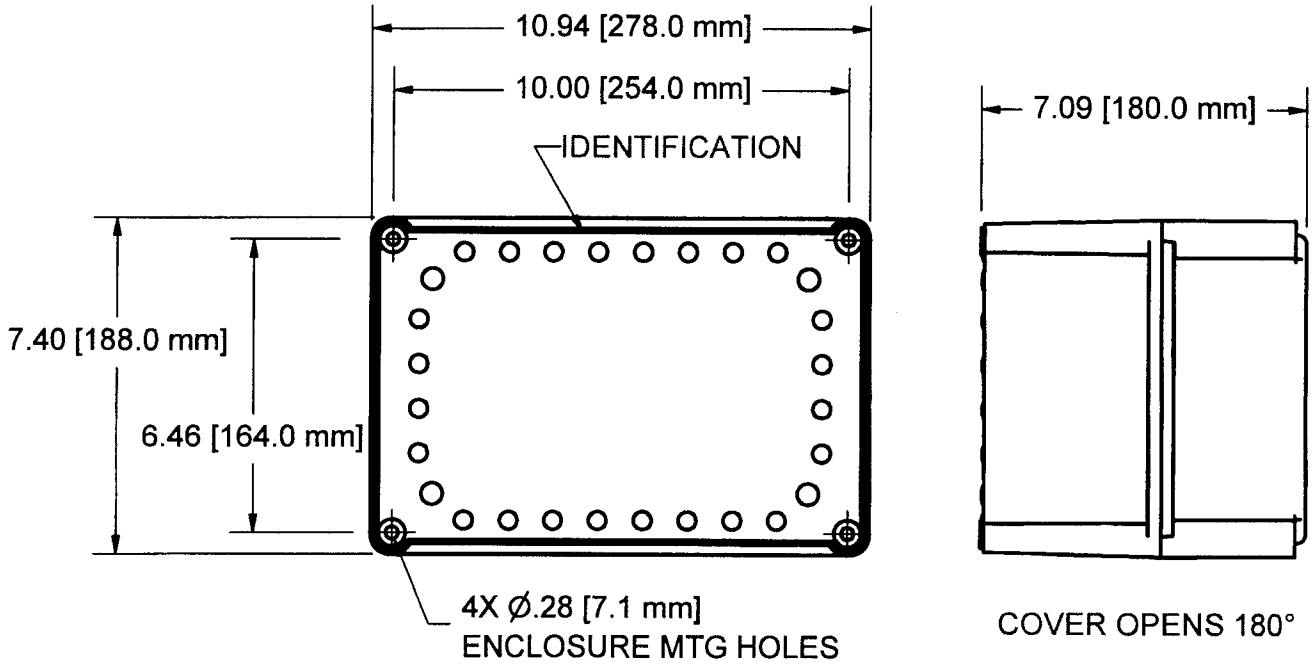

FIGURE 2
NEMA 4X

SIZE	CODE IDENT. NUMBER	DWG NO.:	REV A
A	1XP56	T776XX	SHEET 13

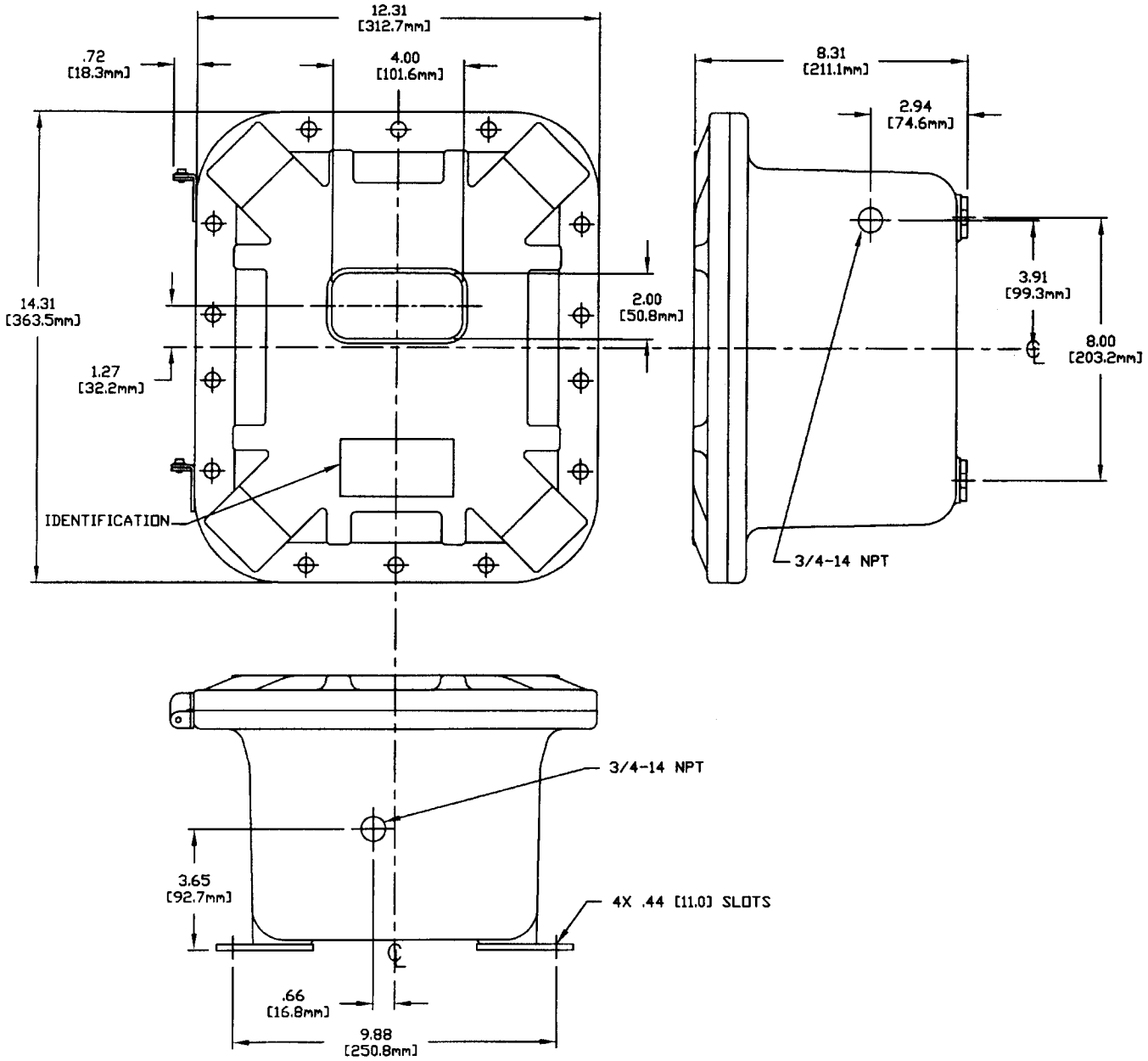

FIGURE 3

UL/CSA for Hazardous Locations
Class I, Groups B, C & D; Class II, Groups E, F & G also Class I, Zone I, 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

SIZE	CODE IDENT. NUMBER	DWG NO.:	REV A
A	1XP56	T776XX	SHEET 14