

PRECISION SENSITIVE DIGITAL TACHOMETER INSTALLATION INSTRUCTIONS

Special Instructions for '-SM' & '-SH' Versions

Aetna Engineering Precision Sensitive Digital Tachometers are premium quality instruments. They use "LSI" digital circuitry to provide an instrument guaranteed accurate to one RPM, that, never requires calibration, and performs reliably in the marine environment.

The '-S_' version tachometers are supplied with a special ratio setting designed to operate from the signal provided from a "mag-pickup" or other sensor which receives a particular number of pulses-per-revolution (PPR) from the rotating device to be measured. The PPR ratio refers to the preset number of pulses the tachometer must detect for each revolution of the apparatus to be measured. The '-SM' version is rated for use between 28 and 90 PPR and the '-SH' version is rated for use between 90 and 255 PPR. The overall tachometer performance involves functions beyond the PPR ratio, such as filter constants and signal sensitivity. Therefore, the correct version, '-SM' or '-SH' must be used for the specific PPR ratio desired or satisfactory performance will not be realized.

The tachometers are available with either Light Emitting Diode (LED-Model 8402) or Liquid Crystal Display (LCD-Model 8905) readouts. The LED is best suited for use in shaded sunlight while the LCD should be used in applications where the tachometer will be exposed to direct unshaded sunlight. Both are self-illuminated for night viewing.

The tachometers are supplied with a choice of black or polished stainless steel bezel. The black bezel tachometer includes a trim ring which can be optionally used as required to match existing instrumentation. Aetna tachometers also fit perfectly inside both the round and square VDO Blue Line cases (contact us for detailed instructions).

Mounting:

Select a mounting location where the tachometer may be easily read. The front of the tachometer has a gasketed glass-to-metal seal making it suitable for use in locations exposed to rain and spray. It uses only non-ferrous materials so it can be located in close proximity to a compass without significantly affecting the compass (nevertheless, the compass adjustment should be checked after installation; particularly because the removed tachometers may have been influencing the compass). The unit may be installed in an existing standard 3-3/8 inch diameter hole. It will fit holes up to 4 inches when used with the optional black trim ring. If placing the tachometer under a protective glass cover, be sure that it is adequately ventilated to keep the maximum temperature of the case below 175 degrees Fahrenheit. Exceeding this case temperature may damage the tachometer.

Mount the tachometer using the clamp and hardware provided. In exposed locations it should be bedded down with a bead of sealant behind the flange. Place the tach in the raised trim ring if it is to be used. If the trim ring is positioned so that it will collect water, drill a 3/16" drain hole at the lowest point in the ring. The clamp legs may be bent over or cut off to accommodate thicker panels. An O'ring is included for use as a centering aid when installing the unit in 3-3/8 inch holes. If the hole is tight, roll the O'ring back from the flange then insert the tach so that the O'ring rolls into the hole as the tach is inserted. For larger holes an Oaring type spacer may be made from a length of appropriate diameter wire.

Wiring:

During wiring it is recommended that the negative battery cable be removed from the battery or the master switch(es) turned off.

The tachometer has a grounded case and is for use on negative ground systems only (an isolated case version is available for isolated or positive ground use.) Connect the "Ground" terminal to a point that is connected to the negative (-) battery terminal.

Connect the "+12V" terminal to a point that is energized when the ignition is switched on; typically a purple wire. In most cases, power and ground are available by wiring to the terminals on an adjacent temperature or oil pressure gauge. A one amp fuse must be installed in series with the "+" (Pos) wire in order to enable the internal surge protector function.

To use the Model 8402 on 24 volts connect a 30 ohm, 25 watt resistor (our Model 8924) in series with the "+12V" tachometer terminal. For 32 volts use a 47 ohm, 25 watt resistor (our Model 8932). Failure to use the appropriate ballast resistor may damage the Model 8402 tachometer. The "+12V" terminal on the Model 8905 tach. may be safely connected to 12, 24 or 32 volt systems without a ballast resistor.

The "Points" (Sig.) terminal connects the RPM information signal from the engine to the tachometer. This connection should be made using stranded two conductor twisted-shielded wire. For multiple stations, two or more tachometers may be connected in parallel.

Diesel engines have no ignition and therefore require a tachometer sender to generate the digital impulses required by the tachometer. Traditionally a mechanically driven sender was mounted on the tachometer drive cable fitting on the engine. Many newer engines do not have such a fitting and instead use a magnetic pickup. A "mag." pickup is a device that senses the passage of gear teeth in a non-contact manner. It is screwed into a threaded hole in the gear

housing and adjusted so that the clearance is approximately one-half turn back from contact with the gear. The two sender wires are connected to the signal and ground terminals at the tachometer using a twisted/shielded cable. Connect the two wires from the sender through the two twisted inner conductors. Connect the shield to the engine block. Do not connect the tachometer end of the shield. If the signal is continued on to another tachometer, carry the shield connection through but do not connect it to anything but the engine. Using a single wire and the engine ground is not recommended and will yield inferior results.

Diesel Sender Installation:

The Aetna Engineering Models 8910, 8912 and 8922 are magnetically coupled senders which sense the passage of flywheel gear teeth or similar items. They generate the electrical RPM signal used by the tachometer. The 8910 and 8912 are housed in a 3/4" diameter by 16 threads per inch case while the 8922 is contained in a 5/8" by 18 threads per inch case. Both the 8912 and 8922 have dual electrical outputs.

Note that some engines built offshore have metric sized sender mounting holes. Although Aetna does not provide metric sized senders, most metric "mag pickup" senders will satisfactorily drive Aetna tachometers.

The sender is installed by screwing it into a threaded hole on the flywheel bell housing or other housing. It is screwed in until the end contacts the gear then backed-off one-half turn and secured in position with the jam nut. The sender is connected to the tachometer using two conductor twisted-shielded wire as previously described.

This combination of tachometer and sender will register the engine speed accurately to within +/- one RPM when the sender is driven at exactly the preset number of pulses-per-revolution rated on the tachometer

Testing:

Reconnect the battery and turn the ignition on. The display should illuminate and show "0000" indicating power is reaching the unit. Start the engine and verify that the display indicates engine RPM. When the engine is cold and idling without load the right hand digits may seem to "jump." This is due to fluctuation in the engine speed and is pronounced because the readout displays variations as small as one RPM. The RPM's should steady when the engine is warmed and operated above idle under a *constant load*. *Should the display continue to jump excessively check engine tuning, look for a fouled injector or a fuel suction line air leak. Contact the factory for more suggestions.*

If the tachometer shows all zeros with the engine running, check the signal wiring from the engine. If the tachometer's digits fail to show at all, the problem is in the power wiring to the tachometer and not in the signal wiring. If the indicated RPM is in error, check that the ratio select switches are set properly.

The tachometer includes special circuitry to minimize loran interference from the digital processor. Nevertheless, if a loran set is aboard, it should be checked for interference by observing the loran SNR when the ignition is on without the engine running. Be sure any interference isn't from an alarm buzzer or bell. If interference is detected, check the loran antenna & ground or install a filter, such as the "MAR-P5" from Marine Technology (562) 595-6521, in the +12 volt power and ground leads to the tachometer.

The tachometer is now ready to use. *No adjustment is ever necessary. The circuitry employs a piezoelectric crystal to permanently maintain calibration.*

On the Model 8402 the built-in dimmer senses the ambient light and adjusts the display intensity for comfortable viewing. When operated in bright light the case will feel warm to the touch. This is normal and will not damage the unit provided the case temperature does not exceed 175 degrees.

The Model 8905 has internal backlighting provided by solid state lamps that do not require routine replacement. The 8905 consumes less than one-half watt and does not create significant heat.

A special anti-fogging compound is applied to the inside of the glass during manufacture. Internal fogging of the glass may be reduced by removing the ratio switch cap. In cases of persistent fogging, contact the factory for additional help. No routine maintenance of the tachometer is required. Clean the glass with a soft cloth. The sensor end of the sender should be cleaned periodically of any accumulation of magnetic particles which can shunt the magnetic sensitivity.

The sender may be tested with an ohmmeter. Measurement of the resistance on the leads should be between 100 and 1000 ohms. During installation, wiring can be verified by temporarily running a separate wire pair directly from the sender to the tachometer.

Limited Warranty

Aetna Engineering warrants its tachometers to be free of defects in material and workmanship for a period of two years from the date of purchase as shown on the original consumers purchase receipt.

Warranty service will be provided free of charge if the unit is delivered to Aetna Engineering during the warranty period accompanied by original consumer proof of purchase. Any transportation, removal, or reinstallation charges will be paid by the purchaser whenever incurred in connection with this warranty. In absence of proof of purchase receipt, the warranty period shall be two years from the date of manufacture.

This warranty does not apply to units subjected to misuse, neglect, accident, incorrect installation wiring, improper installation, water damage, or units used in violation of the installation instructions furnished by us. This warranty excludes any incidental or consequential damages connected with failure or defect in the product. Aetna Engineering products are not designed, intended or approved for use on or involving aircraft or in hazardous locations.

This warranty gives you specific legal rights and you may have other rights which vary from state to state.



Aetna Digital Tachometers

SWITCH SETTING INSTRUCTIONS

For use by Factory Authorized Personnel Only

Version '-SM'

Version '-SH'

PPR	Switch Position							
	1	2	3	4	5	6	7	8
28	off	off	off	on	on	on	off	off
29	off	off	off	on	on	on	off	on
30	off	off	off	on	on	on	on	off
31	off	off	off	on	on	on	on	on
32	off	off	on	off	off	off	off	off
33	off	off	on	off	off	off	off	on
34	off	off	on	off	off	off	on	off
35	off	off	on	off	off	off	on	on
36	off	off	on	off	off	on	off	off
37	off	off	on	off	off	on	off	on
38	off	off	on	off	off	on	on	off
39	off	off	on	off	off	on	on	on
40	off	off	on	off	on	off	off	off
41	off	off	on	off	on	off	off	on
42	off	off	on	off	on	off	on	off
43	off	off	on	off	on	off	on	on
44	off	off	on	off	on	on	off	off
45	off	off	on	off	on	on	off	on
46	off	off	on	off	on	on	on	off
47	off	off	on	off	on	on	on	on
48	off	off	on	on	off	off	off	off
49	off	off	on	on	off	off	off	on
50	off	off	on	on	off	off	on	off
51	off	off	on	on	off	off	on	on
52	off	off	on	on	off	on	off	off
53	off	off	on	on	off	on	off	on
54	off	off	on	on	off	on	on	off
55	off	off	on	on	off	on	on	on
56	off	off	on	on	on	off	off	off
57	off	off	on	on	on	off	off	on
58	off	off	on	on	on	off	on	off
59	off	off	on	on	on	off	on	on
60	off	off	on	on	on	on	off	off
61	off	off	on	on	on	on	off	on
62	off	off	on	on	on	on	on	off
63	off	off	on	on	on	on	on	on
64	off	on	off	off	off	off	off	off
65	off	on	off	off	off	off	off	on
66	off	on	off	off	off	off	on	off
67	off	on	off	off	off	off	on	on
68	off	on	off	off	off	on	off	off
69	off	on	off	off	off	on	off	on
70	off	on	off	off	off	on	on	off
71	off	on	off	off	off	on	on	on
72	off	on	off	off	on	off	off	off
73	off	on	off	off	on	off	off	on
74	off	on	off	off	on	off	on	off
75	off	on	off	off	on	on	on	on
76	off	on	off	off	on	on	off	off
77	off	on	off	off	on	on	off	on
78	off	on	off	off	on	on	on	off
79	off	on	off	off	on	on	on	on
80	off	on	off	on	off	off	off	off
81	off	on	off	on	off	off	off	on
82	off	on	off	on	off	off	on	off
83	off	on	off	on	off	off	on	on
84	off	on	off	on	off	on	off	off
85	off	on	off	on	off	on	off	on
86	off	on	off	on	off	on	on	off
87	off	on	off	on	off	on	on	on
88	off	on	off	on	on	off	off	off
89	off	on	off	on	on	off	off	on
90	off	on	off	on	on	off	on	off

PPR	Switch Position							
	1	2	3	4	5	6	7	8
91	off	on	off	on	on	off	on	on
92	off	on	off	on	on	on	off	off
93	off	on	off	on	on	on	off	on
94	off	on	off	on	on	on	on	off
95	off	on	off	on	on	on	on	on
96	off	on	on	off	off	off	off	off
97	off	on	on	off	off	off	off	on
98	off	on	on	off	off	off	off	on
99	off	on	on	off	off	off	on	on
100	off	on	on	off	off	on	off	off
101	off	on	on	off	off	on	off	on
102	off	on	on	off	off	on	on	off
103	off	on	on	off	off	on	on	on
104	off	on	on	off	on	off	off	off
105	off	on	on	off	on	off	off	on
106	off	on	on	off	on	off	on	off
107	off	on	on	off	on	off	on	on
108	off	on	on	off	on	on	off	off
109	off	on	on	off	on	on	off	on
110	off	on	on	off	on	on	on	off
111	off	on	on	off	on	on	on	on
112	off	on	on	on	off	off	off	off
113	off	on	on	on	off	off	off	on
114	off	on	on	on	off	off	on	off
115	off	on	on	on	off	off	on	on
116	off	on	on	on	off	on	off	off
117	off	on	on	on	off	on	off	on
118	off	on	on	on	off	on	on	off
119	off	on	on	on	off	on	on	on
120	off	on	on	on	on	off	off	off
121	off	on	on	on	on	off	off	on
122	off	on	on	on	on	off	on	off
123	off	on	on	on	on	off	on	on
124	off	on	on	on	on	on	on	off
125	off	on	on	on	on	on	off	on
126	off	on	on	on	on	on	on	off
127	off	on	on	on	on	on	on	on
128	on	off	off	off	off	off	off	off
129	on	off	off	off	off	off	off	on
130	on	off	off	off	off	off	on	off
131	on	off	off	off	off	off	on	on
132	on	off	off	off	off	on	off	off
133	on	off	off	off	off	on	off	on
134	on	off	off	off	off	on	on	off
135	on	off	off	off	off	on	on	on
136	on	off	off	off	on	off	off	off
137	on	off	off	off	on	off	off	on
138	on	off	off	off	on	off	on	off
139	on	off	off	off	on	off	on	on
140	on	off	off	off	on	on	off	off
141	on	off	off	off	on	on	off	on
142	on	off	off	off	on	on	on	off
143	on	off	off	off	on	on	on	on
144	on	off	off	on	off	off	on	off
145	on	off	off	on	off	off	off	on
146	on	off	off	on	off	off	on	off
147	on	off	off	on	off	off	on	off
148	on	off	off	on	off	on	off	off
149	on	off	off	on	off	on	off	on
150	on	off	off	on	off	on	on	off
151	on	off	off	on	off	on	on	on
152	on	off	off	on	on	off	off	off
153	on	off	off	on	on	off	off	on

Aetna Digital Tachometers

SWITCH SETTING INSTRUCTIONS

For use by Factory Authorized Personnel Only
Version '-SH'

PPR	Switch Position								PPR	Switch Position							
	1	2	3	4	5	6	7	8		1	2	3	4	5	6	7	8
154	on	off	off	on	on	off	on	off	205	on	on	off	off	on	on	off	on
155	on	off	off	on	on	off	on	on	206	on	on	off	off	on	on	on	on
156	on	off	off	on	on	on	off	off	207	on	on	off	off	on	on	on	on
157	on	off	off	on	on	on	on	off	208	on	on	off	on	off	off	off	off
158	on	off	off	on	on	on	on	off	209	on	on	off	on	off	off	off	on
159	on	off	off	on	on	on	on	on	210	on	on	off	on	off	off	on	off
160	on	off	on	off	off	off	off	off	211	on	on	off	on	off	off	on	on
161	on	off	on	off	off	off	off	on	212	on	on	off	on	off	on	off	off
162	on	off	on	off	off	off	on	off	213	on	on	off	on	off	on	off	on
163	on	off	on	off	off	off	on	on	214	on	on	off	on	off	on	on	off
164	on	off	on	off	off	on	off	off	215	on	on	off	on	off	on	on	on
165	on	off	on	off	off	on	off	on	216	on	on	off	on	on	off	off	off
166	on	off	on	off	off	on	on	off	217	on	on	off	on	on	off	off	on
167	on	off	on	off	off	on	on	on	218	on	on	off	on	on	off	on	off
168	on	off	on	off	on	off	off	off	219	on	on	off	on	on	off	on	on
169	on	off	on	off	on	off	off	on	220	on	on	off	on	on	on	off	off
170	on	off	on	off	on	off	on	off	221	on	on	off	on	on	on	off	on
171	on	off	on	off	on	off	on	on	222	on	on	off	on	on	on	on	off
172	on	off	on	off	on	on	off	off	223	on	on	off	on	on	on	on	on
173	on	off	on	off	on	on	off	on	224	on	on	on	off	off	off	off	off
174	on	off	on	off	on	on	on	off	225	on	on	on	off	off	off	off	on
175	on	off	on	off	on	on	on	on	226	on	on	on	off	off	off	on	off
176	on	off	on	on	on	off	off	off	227	on	on	on	off	off	off	on	on
177	on	off	on	on	off	off	off	on	228	on	on	on	off	off	on	off	off
178	on	off	on	on	off	off	on	off	229	on	on	on	off	off	on	off	on
179	on	off	on	on	off	off	on	on	230	on	on	on	off	off	on	on	off
180	on	off	on	on	off	on	off	on	231	on	on	on	off	off	on	on	on
181	on	off	on	on	off	on	off	on	232	on	on	on	off	on	off	off	off
182	on	off	on	on	off	on	on	off	233	on	on	on	off	on	off	off	on
183	on	off	on	on	off	on	on	on	234	on	on	on	off	on	off	on	off
184	on	off	on	on	on	off	off	off	235	on	on	on	off	on	off	on	on
185	on	off	on	on	on	off	off	on	236	on	on	on	off	on	on	off	off
186	on	off	on	on	on	off	on	off	237	on	on	on	off	on	on	off	on
187	on	off	on	on	on	off	on	on	238	on	on	on	off	on	on	on	off
188	on	off	on	on	on	on	off	off	239	on	on	on	off	on	on	on	on
199	on	off	on	on	on	on	off	on	240	on	on	on	on	off	off	on	off
190	on	off	on	on	on	on	on	off	241	on	on	on	on	off	off	off	on
191	on	off	on	on	on	on	on	on	242	on	on	on	on	off	off	on	off
192	on	on	off	off	off	off	off	off	243	on	on	on	on	off	off	on	on
193	on	on	off	off	off	off	off	on	244	on	on	on	on	off	on	off	off
194	on	on	off	off	off	off	on	off	245	on	on	on	on	off	on	off	on
195	on	on	off	off	off	off	on	on	246	on	on	on	on	off	on	on	off
196	on	on	off	off	off	on	off	off	247	on	on	on	on	off	on	on	on
197	on	on	off	off	off	on	off	on	248	on	on	on	on	on	off	off	off
198	on	on	off	off	off	on	on	off	249	on	on	on	on	on	off	off	on
199	on	on	off	off	off	on	on	on	250	on	on	on	on	on	off	on	off
200	on	on	off	off	on	off	off	off	251	on	on	on	on	on	off	on	on
201	on	on	off	off	on	off	off	on	252	on	on	on	on	on	on	off	off
202	on	on	off	off	on	off	on	off	253	on	on	on	on	on	on	off	on
203	on	on	off	off	on	off	on	on	254	on	on	on	on	on	on	on	off
204	on	on	off	off	on	on	off	off	255	on	on	on	on	on	on	on	on

Procedure: Position the switches according to the table using a thin stylus such as the metal filler from a ball point pen. Care should be taken to use only moderate pressure in actuating the individual switches to avoid damaging them. Use of plenty of light and magnification can be helpful. Switch #1 is on the left, #8 on the right; up is on and down is off.