

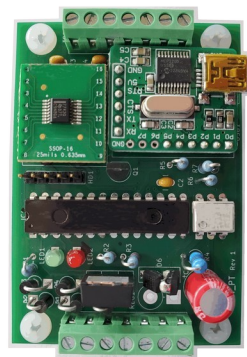


AMT Millennium USB

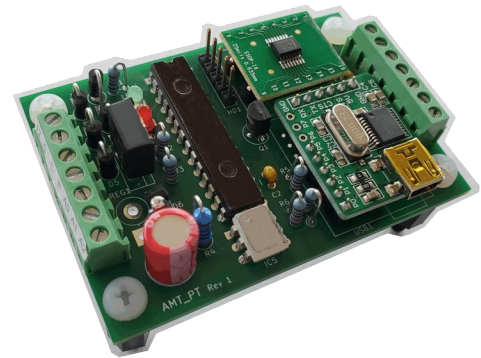
USB Pulse-Rate Totalizer & I/O Module

Technical Specification

A compact, optically isolated USB I/O module that connects pulse-output sensors directly to any Windows PC, industrial PC, PLC, Raspberry Pi, or custom controller — using a simple ASCII serial command interface that any language or platform can drive. A non-volatile 56-bit totalizer means the Millennium never loses count through a power cycle. Both the pulse input and USB interface are optically isolated, eliminating ground loops in noisy industrial environments. Developed as a board-level PCB design.



Top view



Isometric view

PULSE / TOTALIZER INPUT

Channels	1 (dedicated pulse / totalizer input)
Signal	Optically isolated, 5 to 24 VDC
Frequency range	0.5 Hz to 30 kHz
Minimum pulse width	> 33.33 us high / low
Totalizer	56-bit non-volatile counter; retained through power loss
Maximum count	72,057,594,037,927,935
Count longevity	approx 76,000 years at 30 kHz approx 457,000 years at 5 kHz

ANALOG & DIGITAL I/O

Analog inputs	3 channels, 0 to 5 VDC, 12-bit resolution (0 to 4,096)
Digital inputs	2 channels, 5 VDC
Digital outputs	3 channels (2 user + 1 power-on indicator), 5 VDC

COMMUNICATIONS

USB interface	Optically isolated, Mini-B connector, 128,000 baud
Protocol	ASCII serial commands via USB
Input power	+12 VDC, < 30 mA

ASCII COMMAND REFERENCE

Command	ASCII Code	Description
Read Counter	'&' (38d, 26h)	Returns the accumulated pulse total
Read Rate	'^' (94d, 5Eh)	Returns the current pulse frequency
Reset Counter	'-' (45d, 2Dh)	Clears the counter via USB command
Read Analog - Single	'\$' + ch# (36d, 24h)	Returns 12-bit ADC value for one analog channel
Read Analog - All	'\$' (35d, 23h)	Returns all three analog channel values
Read Digital In - Single	'!' + ch# (33d, 21h)	Returns state of one digital input channel
Read Digital In - All	'@' (64d, 40h)	Returns all digital input states
Write Digital Out	'\$' + ch# + '01'/'00'	Sets a digital output ON ('01') or OFF ('00')

COMPATIBLE HOST DEVICES

Windows PC	Any USB port
Industrial PC / HMI	Panel mount
PLC (USB host)	Direct connect
Raspberry Pi / SBC	Linux / IoT
Custom controller	ASCII serial interface

TYPICAL APPLICATIONS

Flow measurement (turbine / gear / paddle-wheel flowmeters), fuel and fluid dispensing, spindle / RPM monitoring, energy submetering (pulse-output kWh meters), rotating equipment and run-hour logging, industrial IoT / edge data collection.