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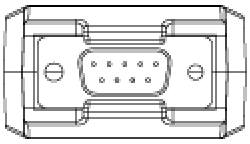
Model PA10/*T* Serial Temperature Sensor

User's Manual
Rev 2.2 2013



PA10/*x* Specifications

Temperature Range: -40 º C to +85 º C (-40 º F to +185 º F)
Dimensions: 9.1 cm (3.6") x 4.2 cm (1.7") x 2 cm (0.8")
Housing Material: injection molded ABS plastic
Housing Colour: bone white
Power source: Data Cable (DTR/RTS) pins.
Current Consumption: ~10 mA
Communications Interface: RS232.
Maximum extension cable length: 152.5 m (950 ft.). .
Communications Protocol: 16-bit error detecting and correcting ASCII protocol.

Communication

The PA10/x sensor communicates at **2400 baud, 8 data bits, no parity, one stop bit (8N1)**.

For data-lline powered operation, both DTR (Data Terminal Ready) and RTS (Request To Send) shall be asserted by the host at all times while communications are taking place. The PA10/x requires approximately 200 microseconds from the time that DTR+RTS are asserted, until the time it is ready for receiving data.

The communication between the host and the PA10/x is a simple master/slave style of protocol. The host (computer or device server) register queries, and the PA10/x responds. The fields in each query and response packet are separated by a ':' (colon) character, and the packet is terminated with a carriage-return (Hex 0D) character, or a carriage-return/line-feed pair (Hex 0D/0A).

REGISTER	**VARIABLE**	**DESCRIPTION**
R0	VARS	Number of Registers.
R1	PRODUCT	Product Name.
R2	SERIAL	Unit Serial Number.
R3	VENDOR	Vendor Identification Data.
R4	VERSION	Firmware Version.
R5	CELCIUS	Celcius Reading.
R6	FAHRENHEIT	Fahrenheit Reading.
R7	HUMIDITY	Humidity Reading (PA10/HT Only).

Command Packet Format

rr<CR>

rr	A register name.
<CR>	The carriage-return character. (0D Hex). <CR><LF> is also acceptable.

Command Packet Example:

R5<CR>

Response Packet:

rr:t:a:xxxx:s:yyyy:zzzz<CR><LF>

rr	The register name.
t	The data type (I=integer,R=real,S=string,B=boolean).
a	Access Mode (R=read,W=read/write).
xxxx	Contains the value for the register.
s	Unit of measure.
yyyy	Register name.
zzzz	Hexadecimal 16-Bit Checksum.

Response Packet Examples:

R0:I:R:7:*:VARS:FBE9<CR><LF>

Register 0; Returns the number of variables/registers in the sensor. Different models of Pike Aero sensors have different numbers of registers, so this register can be queried to determin the maximum number of registers to be read out fomr the device.

R1:S:R:PA10/T:*:PRODUCT:F9BB<CR><LF>

Register 1; Returns the product model identifier string.

R2:S:R:0006127:*:SERIAL:FA30<CR><LF>

Register 2; Returns the unique serial number of the device, useful for identification when multiple sensors are deployed.

R3:S:R:www.pikeaero.com:*:VENDOR:F531<CR><LF>

Register 3; Returns the vendor identifier. Normally returns 'www.pikeaero.com', however may be changed by 3rd party resellers.

R4:S:R:2.2:*:VERSION:FA96<CR><LF>

Register 4; The sensor *protocol.firmware* revision identifier.

R5:R:R:25.8125:C:CELCIUS:F9C8<CR><LF>

Register 5; The temperature reading in degrees celcius.

R6:R:R:78.4580:F:FAHRENHEIT:F8E5<CR><LF>

Register 6; The temperature reading in degrees fahrenheit.

Checksum Calculation

Add the ASCII value of each character up to and including the 6th colon (':') character, into an unsigned 16-bit accumulator, then invert the bits of the 16-bit accumulator in order to arrive at the checksum value.

DB9F RS232 Pinout

PIN	SIGNAL	IN/OUT *	DESCRIPTION
1	DCD	N/C	Data Carrier Detect
2	RxD	OUT	Receive Data
3	TxD	IN	Transmit Data
4	DTR **	IN	Data Terminal Ready
5	GND	-	Signal Ground
6	DSR ***	OUT	Data Set Ready
7	RTS **	IN	Request To Send
8	CTS ***	OUT	Clear To Send
9	RI	N/C	Ring Indicator

- * IN/OUT Relative to the PA10/x device.
- ** DTR and RTS are required as a power source and must be asserted for data-line powered operation.
- *** The DSR and/or CTS can be optionally asserted by special order.

PATool

PATool is a command-line software utility for accessing a directly connected Pike Aero sensor, or a Pike Aero sensor remotely over TCP/IP.

The PATool source code is provided under the GPL license in order to assist integration into custom applications.

PATool Command-line Options:

```
--version     -v       Print Version
--nosave      -n       Don't save command line setting (default=save)
--settings    -s <n>   Settings file to use
--help        -h -?    Print this help

--device       -d <n>  Set the serial device [/dev/ttyS0]
--baud         -b <n>  Set the serial device [2400]
--server       -S      Go into server mode.
--serverport   -p <n>  Set TCP listen port [20100]
--connecthost  -H <n>  Set TCP connect host []
--connectport  -P <n>  Set TCP connect port [20100]
--udp          -u <n>  Set UDP broadcast port [20200]
--backlog         <n>  Set backlog [20]
--logging      -l <n>  Set Logging Level 0..9 [0]
--rxtimeout    -x <n>  Set the timeout for received packets [4]
--rxretries    -t <n>  Set the number of reciever retry attempts [5]
--logfile      -f <n>  Set the logfile output (current=)
--readregister -R <n>  Read the device register <n>.
--readvariable -V <n>  Read the device variable <n> by name.
--sepchar      -S <n>  Set the output field separator character to <n>.
--opendelay    -o <n>  Set the open delay in milliseconds.
--outputformat -O <n>  Set the output format [0]
--protocol        <n>  Set protocol version [0]
```

Setup a PATool TCP/IP server on port 20100

```
$ patool --device /dev/ttyS0 --server --serverport 20100
```

Query a remote patool server by variable name

```
$ patool --connecthost 192.168.1.4 --connectport 20100 --readvariable CELCIUS
22.187
```

Query a remote patool server by register number

```
$ patool --connecthost 192.168.1.4 --connectport 20100 --readregister 5
22.187
```

Query a specific sensor variable by name

```
$ patool --device /dev/ttyS0 --readvariable CELCIUS
22.62
```

Output format 0 (default)

```
$ patool --device /dev/ttyS0 --outputformat 0
7
PA10/T2
1010120
www.pikeaero.com
2.2
22.187
71.937
```

Output Format 1

```
$ patool --device /dev/ttyS0 --outputformat 1
7 *
PA10/T2 *
1010120 *
www.pikeaero.com *
2.2 *
22.250 C
72.50 F
mike@grumpy:~$
```

Output Format 2 (default field separator TAB (Hex 08) char)

```
$ patool --device /dev/ttyS0 --outputformat 2
R0      I       R       7       *       VARS    R1
S       R       PA10/T2 *       PRODUCT R2      S
R 1010120  *       SERIAL  R3      S       R
www.pikeaero.com        *       VENDOR  R4      S
R       2.2*       VERSION R5      R       R
22.312  C       CELCIUS R6      R       R
72.162  F       FAHRENHEIT
```

Output Format 2 (with field separator character (:))

```
$ patool --device /dev/ttyS0 --outputformat 2 --sepchar :
R0:I:R:7:*:VARS:R1:S:R:PA10/T2:*:PRODUCT:R2:S:R:1010120:*:SERIAL:R3:S
:R:www.pikeaero.com:*:VENDOR:R4:S:R:2.2:*:VERSION:R5:R:R:22.250:C:CELCIUS
:R6:R:R:72.162:F:FAHRENHEIT:
```