The Watermark

The Newsletter From Automated Water & Effluent Ltd Winter 2012/13

TAP SERIES PISTON DOSING PUMPS

To compliment our range of TAM mechanical diaphragm motor driven dosing pumps as featured in the Autumn issue of Watermark we have an even larger range piston dosing pumps offering greater flow rates and pressure outputs.

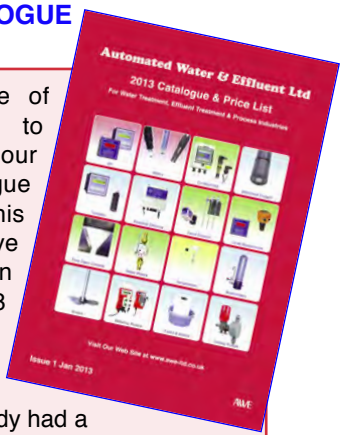
The TAP series of piston dosing pumps is based on the same gearbox with a modified cam arrangement. With two stroke lengths 15 and 25 mm. combined with a wide selection of piston diameters and 3 stroking speeds we are able to offer outputs from 0 - 1.5 Ltrs/Hr up to 1000 Ltrs/Hr. The length of the stroke may be manually adjusted by a micrometer dial adjustment from zero to 100%. For automatic control a servo motor controlled by an industry standard 4 - 20 mA current signal can be specified and fitted during manufacture. Pump head materials are either stainless steel with a stainless steel piston or PVC with ceramic piston. Electric motors are usually 400 volt three phase with an option for 230 VAC single phase and Ex-D if required. For use with inverters we are able to fit oversized motors or for applications which may require long periods of slow running or installation in hot areas we are able to offer fan assisted motors for improved cooling.

If you need data sheets or hand books on the TAM series of RDP dosing pumps then please contact Mrs. Vera Young by telephone **01785 254597.** or e-mail vyoung@awe-ltd.co.uk.

STOP PRESS STOP PRESS

Having included in our Autumn 2012 technical tips an article on the AC-VM multifunction valve we are pleased to announce an improved version of the multi function valve to be supplied during the first quarter of 2013. Improvements for the new MF Valve are the complete valve is moulded in PVDF for greater chemical resistance. The back pressure or loading valve function is adjustable up to 5.0 bar and the pressure relief or safety valve function is adjustable up to 18.0 bar. The new part number is AC-VM-PVDF and it can be supplied with Viton or EPDM seals and with either fittings for 4 x 6 mm or 8 x12 mm LDPE dosing hoses. Please contact the sales office for the full part numbers.

2013 CATALOGUE NOW OUT



Its that time of year again to distribute our new catalogue for 2013 this year we have added an additional 8 pages of products

If you haven't already had a copy of our new catalogue, or would like a colleague to receive one, then please contact Mrs. Vera Young by telephone 01785 254597. Or e-mail vyoung@awe-ltd.co.uk

Temperature Measurement

After 30 years in business we at AWE are well known for our Effluent and Water treatment instrumentation dosing and controls. However as instrumentation engineers we also supply other types of instrumentation, the biggest measured and controlled parameter of all is temperature. With applications ranging from space heating to the control of steel making and heat treating processes. Temperature sensors range from simple bi metal strips to optical pyrometers for non-invasive measurement.

The vast majority of traditional industries temperature measurement and control relies on either thermocouples or resistant thermometers as the two are totally different to follow is a brief description of both sensors as they can look the same are so are often assumed to be the same.

Thermocouples are two wire devices made up from dissimilar metal welded together which when heated produce a small millivolt potential. The output depends upon the materials of construction with a whole range of different materials for differing applications and temperature ranges, which is way beyond the scope of this article. For example a general low cost thermocouple would be a type K which is manufactured from Nickel and Chromium and produces an output of 41μV/oC being a magnetic material can cause some problems with linearity at temperatures above 350 oC this is again outside the scope of this article. For higher temperature applications Type B, R or S can be used up to 1600 oC these thermocouples are considerably more expensive being manufactured from Platinum / Rhodium with an output of 10μV/oC.

The disadvantage of thermocouples is they cannot be connected to standard copper cable as another junction of dissimilar metals would be made in the connecting head which would also produce a millivolt signal and hence an error. So a cable with the same characteristics as the thermocouple must be used to connect back to the temperature controller this is called compensating cable. The connection at the instrument terminals with the comp cable can produce a small millivolt potential which needs to be compensated for this is often referred to as the cold junction temperature.

Thermocouple Types

TTPA1-N

TTPA1-A Temperature probes assembly with a die cast alloy connecting head. With a 1/2" BSP mounting thread to screw into either a process connection or pocket.

TTPA2-A

TTPA2-A Temperature probes assembly with a die cast alloy connecting head. With a straight plain 6 mm or other stem ideal for immersion into the process. Not recommended for installing through compression fitting mounted horizontality due to the weight of the head.

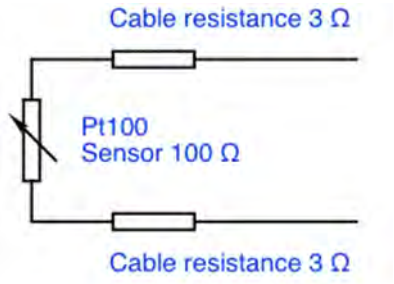
TPP1

Temperature probe pocket for use where the probe cannot be removed from the process for calibration or maintenance without stopping the process.

PRT Theory

The measuring instrument or transmitter supplies a low voltage to the platinum resistance sensor which causes a current to flow making an electrical circuit.

By ohms law the voltage drop in the circuit and hence current flow is proportional to the resistance in the circuit. As the temperature increases the resistance of the Pt100 increses which is a positive temperature coefficent. The problem with the two wire configuration is the instrument reads the resistance of the connecting cable as well as the temperature sensor. To follow are some connection details for 3 and 4 wire systems.

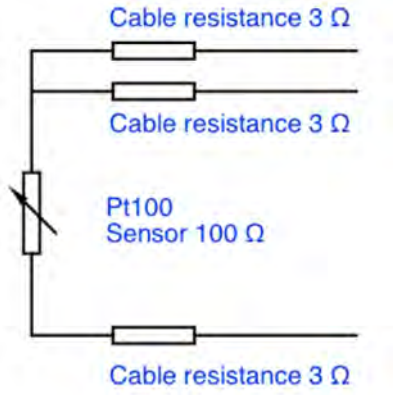


Connections for two wire instrument

Red wire

White wire

Circuit resistance 3 + 100 + 3Ω =106 Ω

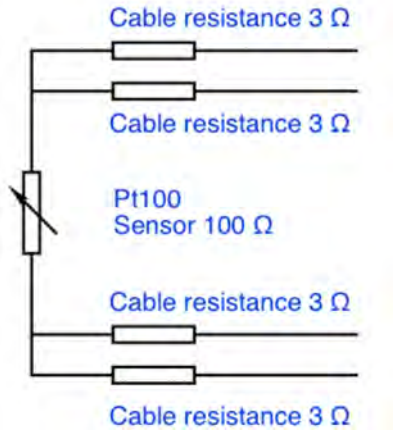


Connections for two wire instrument
Red wire

Red wire

White wire

The instrument measures the resistance between the red and white wires and the resistance between the red wires and subtracts the resistance between the red wires which assumes the resistance in all the wires are equal to each other



Connections for four wire instrument
Red wire

Red wire

White wire

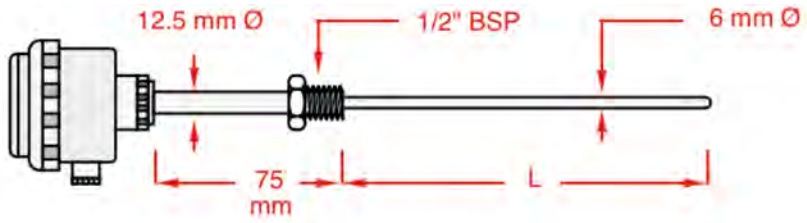
White wire

The four wire connections are usually connected to the four arms of a wheatstone bridge type circuit so the resistanaces cancel each other out.
In our opinion the cost of installation on long cable runs is greater than installing a two wire temperature transmitter which eliminates the problem.

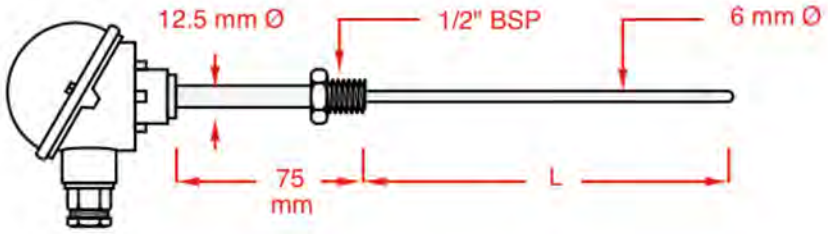
Platinum Resistance Thermometer Table

Temperature	Resistance	Temperature	Resistance	Temperature	Resistance
0 oC	100 Ω	20 oC	107.79 Ω	75 oC	128.98 Ω
-20 oC	92.16 Ω	25 oC	107.79 Ω	100 oC	138.51 Ω
-50 oC	80.31 Ω	30 oC	111.67 Ω	150 oC	157.33 Ω
-100 oC	60.26 Ω	50 oC	119.40 Ω	200 oC	175.86 Ω

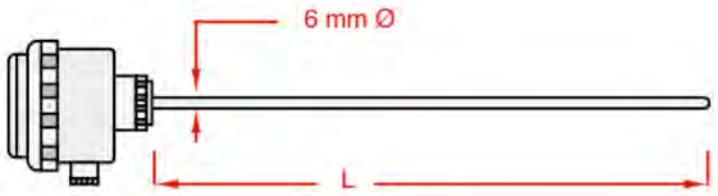
Temperature Sensor Dimensions



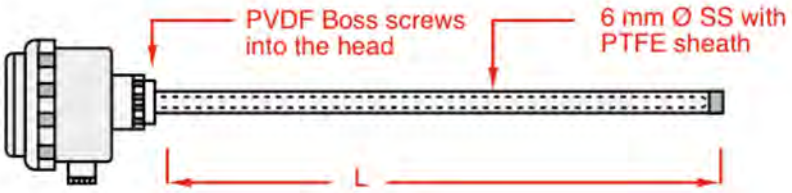
TPA-1N (Temperature probe assembly) in 316 stainless steel with ABS connecting head with terminals or optional two wire transmitter
TPA-1 series of temperature sensors have a 75 mm long by 12.5 mm dia lagging extension.



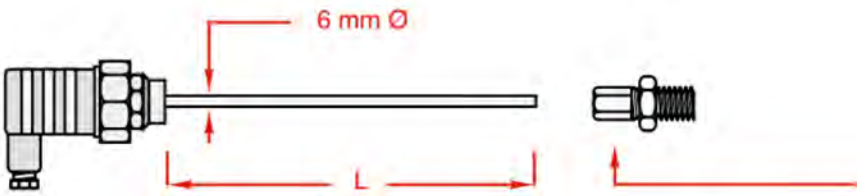
TPA-1A As above with die cast alloy connecting head usually fitted to thermocouples.



TPA-2N in 316 stainless steel with ABS connecting head with terminals
TPA-2 series of temperature sensors have a 316 stainless steel shaft parallel for the whole length.



TPA-2N-PTFE temperature sensors have a 316 stainless steel shaft parallel for the whole length sheathed in PTFE with a PVDF bush so no metal parts are exposed.



TPA- 3 Temperature probe assembly) in 316 stainless steel with Hirschmann removable connector.

Optional Stainless steel compression fitting with 1/4" BSP male thread or other as specified.

Resistant Thermometers RTDs

Are resistance devices usually made from platinum which have an extremely accurate and linear resistance change with temperature, the PT100 is 100Ω at 0oc and 138.51 at 100^{o}C RTD and can be used for higher temperatures up to 650^{o}C in theor,y they become quite fragile at temperatures above 300^{o}C. As our RTDs are mainly used for liquid and ambient air temperature measurements this has never been a problem. The disadvantage with RTDs sensors is that the cable from sensor to the controller can add resistance to that of the sensor creating errors. So many instruments incorporate circuits for 3 or 4 wire sensors where the additional conductors are connected to a bridge circuit to compensate for the cable resistance. As a rough rule if the cable conductors are all the same resistance a 3 wire input works well. On long cable runs where there could be some difference in the resistance of the conductors a 4 wire input would prove better. A better solution to the problem of long cable runs is to fit a two wire transmitter into the sensor head where the RTD sensor resistance is converted into an industry standard 4 - 20 mA signal which can be run up to 1000m using our LMK2 connecting cable.

We offer 3 standard styles of temperature sensor as follows and can manufacture others to order.

TPA1 stainless steel insertion temperature sensor with 6 mm dia insertion length TBA 1/2" BSP male thread and 75 mm long lagging extension fitted with either ABS or Alloy connecting head can be either 3 wire RTD or thermocouple type TBA.

TPA2 stainless steel insertion temperature sensor with 6 mm dia insertion length TBA can be supplied with compression fitting usually fitted vertically into processing tanks for longer immersion lengths the riser tube can be 12mm or greater in diameter

TPA2-N-PTFE as above with ABS connecting head and PTFE sheath for use in aggressive chemicals where stainless steel cannot be used.

TPA3 Stainless steel insertion sensor 6 mm dia fitted with Hirschmann connector for easy removal and refitting PRTs only.

TT100

TT100 Two wire temperature transmitter for mounting in the probe head converts the 3 wire RTD sensor into a 4 -20mA current signal powered by the receiving instrument.

TPA1-N

TPA1-N Temperature probe assembly fitted with a ABS connecting head.
With a 1/2" BSP mounting thread to screw into either a process connection or pocket.

TPA2-N

TPA2-A Temperature probes assembly with a ABS connecting head. Straight plain 6 mm or other stem diameter ideal for immersion into the process. Option for PTFE sheath for solutions where stainless steel is unsuitable.

TPA-3

TPA3 Temperature probes assembly with a Hirschmann connector for easy replacement of sensor. Straight plain 6 mm Ø stem diameter ideal for imersertion into the process or for use with TPP2 pocket

TPP2

Temperature probe pocket for use where the probe cannot be removed from the process for calibration or maintenance without stopping the process.

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