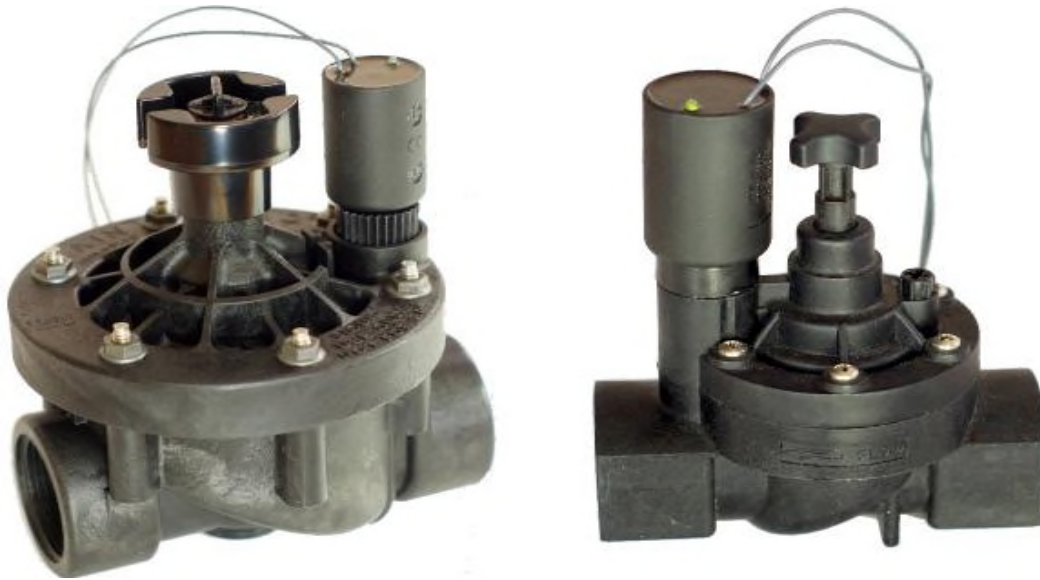


## Decoder-In-A-Solenoid (DIAS™) Advanced Technology *(Patent Applied For)*



**2Wire Decoder built-into a valve solenoid**

### Special Features

- Combines a 2Wire Decoder and Solenoid into one product.
- Reduces number of field wire connections by 50%
- Multi-colored LED provides feedback — reduces troubleshooting time.
- Screws into most valves. (Threaded adapters for Hunter & Rain Bird).
- Compatible with all Underhill & Tonick 2Wire Controllers and Converters.
- Superior distance and number of concurrent active stations.
- No grounding necessary along the 2Wire path.
- Built-in powerful protection from Lightning surges.
- Can re-use old wiring. Earth leakage on 2Wire well tolerated.
- ‘Out of the box’, works as a normal 24VAC solenoid with ultra low current.
- Works with the Tonick Sensor decoder range; soil moisture, flow and pressure.

# DIAS Electrical Specifications:

- 19-32 VAC, 60 Hz preferred. (Low cost inverters available for 50Hz regions)
- In normal 24VAC solenoid mode, works equally with 50Hz and 60Hz.
- In-Rush Current – 300mA-350mA
- Holding Current - 30mA (2-way solenoid), - 60mA (3-way solenoid), both relatively independent of applied AC voltage.
- Idle Current (typical) – 4.5mA
- Maximum Active Valves per 2Wire path:
  - 2-way 16 (spread relatively equally along the path)
  - 3-way 10 (spread relatively equally along the path)
- Valves Clustered together: (Low water pressure: ~3Bar)
  - 2-Way
    - 1000m 16
    - 1500m 12
    - 2000m 8
  - 3-way
    - 1000m 8
    - 1500m 7
    - 2000m 6
- Maximum operating distance 2-way: (Low water pressure: ~3Bar)
  - 2.5mm<sup>2</sup> conductors 11,000m 35,750 feet (1 valve active)
  - AWG14 conductors 10,000m 32,500 feet (1 valve active)
  - 4mm<sup>2</sup> conductors 22,000m 71,500 feet (1 valve active)
- Solenoid thread size:
  - 3/4" UNF20, front thread
  - 1/8" BSP Female, 3-way back water port thread
- Adaptor for 3/4" UNF20 to Hunter thread
- Adaptor for 3/4" UNF20 to Rain Bird thread

## Test conditions for the above data:

- Plunger stroke 1.8mm
- Bottom port orifice size 1.8mm diameter
- 32VAC at 60Hz from the controller
- Distances need to be derated at higher water pressures
- Cluster numbers need to be derated at higher water pressures
- Each idle DIAS draws approximately 4.5mA. Large numbers of valves on the same 2-way path will lower the cluster limits and maximum distance of the furthest valve.
- DIAS will not reliably operate below 19VAC. Use Ohm's Law with long cable lengths;



## Advanced Features:

- The DIAS can be programmed from a low cost Portable Programmer.
- Program the corresponding station number into DIAS as part of initial controller setup and installation. Addresses 1-127.
- Connects to a 2Wire path with a single pair of wires directly to the solenoid.
- Ultra-low holding current allows more stations to be operated at one time.
- Program decoder's address to 0 to turn into a normal 24VAC solenoid.
- The DIAS comes standard with co-molded LED providing visual feedback:-
  - Green Colour — Decoder is "Ready" as a decoder
  - Orange Colour (Red & Green together) - Solenoid is "ON" as a decoder
  - Red Colour — Solenoid is "ON" as a normal 24VAC solenoid
  - No Colour— No Power, broken wire.



**3-Way Solenoid**

(In decoder mode, standby. Green)

**2-Way Solenoid**

(In conventional solenoid mode, on. Red)



## Further Information:

The DIAS will respond to both 1 - 63 and 1 - 127 addresses. Address 0 (out of the box), it will behave as a normal 24VAC solenoid. (See notes)

DIAS comes in two versions; a normal 2-way water port solenoid or a 3-way with a back water port for use in large valves, as in Agriculture.

There is a radical improvement in performance over a conventional Tonick TW/2W or Underhill TK-DEC-1. With DIAS, typically 8 - 10 3-way solenoids can be active on one 2.5mm<sup>2</sup>/14 AWG cable, or up to 16 2-way. Distances of many Km are possible.

Uses the same proven Tonick lightning protection that does not need earth stakes along the 2Wire path.

As with existing Tonick controllers, the system is tolerant of significant 2Wire cable leakage to earth. This means old cables may be re-used, or new ones can be of significantly lower cost. For instance, two individual PVC insulated, direct-bury conductors may be laid side by side. Correspondingly, expensive wire joiners are unnecessary. Grease-filled wire nuts are quite adequate.

Due to careful design and miniaturization, the size of the DIAS is almost the same as many conventional solenoids.

DIAS may be used with the **Tonick Sensor decoder range** of soil moisture, flow, pressure and digital input.

To use DIAS, a valve should be purchased without a solenoid, or the existing solenoid removed and re-used in other projects. Thread adaptors are available for Rain Bird and Hunter valves. The DIAS has a 3/4" UNF thread which fits almost all other valves. The DIAS just screws in like a normal solenoid. Gone are the two other waterproof connections from decoder to solenoid, together with the concern of DC electrolytic destruction of the wires if the joints are not perfect.

Software upgrades are available for the Tonick Programmer/Tester (TW-2W-P/T), the BT2 (OEM decoder interface) in all its variants, the TW-3, Sapien, RM-2 controllers and NOVO multi-wire to 2Wire converter.



## Notes:

- It is not possible to mix conventional Tonick TW/2W or Underhill TK-DEC-1 decoders with DIAS; it must be all one or the other.
- DIAS is best run at 60Hz to achieve full performance.
- A useful range of low cost inverters are available for 50Hz areas. One of these would replace the transformer that normally accompanies the controller. Versions of inverters include 12VDC input, 24VDC input and Universal line power input 90-265VAC.
- Use of an inverter will remove the occasional instance of poor controller performance on site, due to noisy and distorted incoming 115V/230V line power.
- It is not possible to combine a DIAS electronic circuit with a 3rd party solenoid.
- De-rating the BT2 at ambient temperatures greater than +50degC will be less likely required, as currents with typically 8 DIAS on together are well within its +70degC range
- When working as a normal 24VAC solenoid (address 0), the DIAS cannot be used with many 3<sup>rd</sup> party irrigation decoders. In this mode the DIAS is designed to work with multi-wire systems that feed 24VAC to irrigation solenoids.

### **For further information contact:**

Tonick Watering Ltd

Wilsonwells Croft

Crimond

Fraserburgh

AB43 8YH

UK

[www.tonick.co.uk](http://www.tonick.co.uk)

Tel: +44 1346 531193

[sales@tonick.co.uk](mailto:sales@tonick.co.uk)

All trade marks, acknowledged

Specification preliminary and subject to change without notice

**Rev: 1.3 10/08/2015**

