

# TW/NG-1 & DG-2 Unique Features

The motto of 2Wire Innovations is "**Tomorrow's Irrigation Today**".

The TW/NG-1 decoder series and its interface the DG-2 have many unique features, making them further advanced than any other decoder system in the world.

Here are the main features and their benefits.

## **TW/NG-1 GEO-LOCATION**

During installation of the decoder into the valve box, the NFC app can be used to insert the decoder's latitude and longitude, storing its position to within a couple of meters. This decoder can be interrogated by the DG-2 and given to the host controller. This means that subsequent technicians can be directed to a decoder's location. This feature is patented in USA with patent applications pending in other parts of the world.

## **TW/NG-1 INSTALLATION NOTES**

During installation of the decoder into the valve box, the app can be used to insert notes, such as "Green 6 Left Hand" G6 LH or "Lawn next to Gatehouse" LWN GAT HSE. This can be interrogated by the DG-2 and given to the host controller. It may then be inserted into a GIS to give pop-up notes when required.

## **TW/NG-1 DECODER STATUS**

Using command 7 to a decoder (rather than just an on/off), the voltage at the decoder and the status of its solenoid is reported back. This remotely gives invaluable information to help faultfinding any reported failures of the cabling or valves.

## **CONFIRMATION OF WATER FLOWING:**

Up till now any decoder system will only tell the user that the valve's solenoid has operated successfully, not that water is actually flowing through the valve. To confirm this, an expensive flow meter is often fitted and calculations have to be performed by the host controller that overall flow has increased enough to imply successful valve operation.

A new generation of valves is now being produced. A low-cost mechanism to detect the position of the diaphragm in the valve's control chamber is fitted. This provides a volt-free reed switch which will close when the diaphragm is fully flexed, meaning the valve is completely open and passing water under pressure. Using this feature, successful water flow in on/off valves can be determined by a TW/NG-1-CC sensor decoder *without the use of expensive flow meters*.

## **DG-2. AUTOMATIC DATA COLLECTION:**

This polling goes on in the background, but only now and again, so as not to clog commands for valve on/off or sender interrogation

### **Detection of duplicated decoder numbers:**

DELTAI in 40-026 holds the number of mA increase due to the reply from a successful decoder switch. This is typically +250 to +290 mA. If a decoder number is duplicated, both will respond to the same 'on' command and both will produce a reply at the same time, so DELTAI will be approximately double. This is a reliable marker of double numbering.

Setting 40-003 "Current change threshold upper (mA)" to less than double the reply value will generate a fail but leave the DELTAI value to be inspected by the host controller.

### **A tally of discovered decoders:**

DISCOVERED, 40-029 to 40-036, holds a tally of decoders discovered during successful on/off or from a background check, using talkback command 7 to see if there is any reply. (Result in same format as in ACTUAL array, 1 bit per decoder)

Discovery of fitted decoders is initiated when the 2wire line is first powered up. When all 127 decoder stations have been interrogated this will be suspended. The operation takes approximately 7 minutes to complete all 127 possible decoder, however normal valve on/off and sender interrogation using Modbus commands can commence immediately.

### **Background retrieval of decoder stored parameters.**

When commanded, the DG-2 inches through the fitted decoders, asking for all 35 parameters from each, then storing them into an EEPROM page. This is normally done at commissioning time. If all 127 decoders have been fitted, this will take about 21 hours.

Information can be collected from just one individual decoder using a different command instead.

When collection is completed, if subsequently asked through Modbus to publish the INFORMATION inside a decoder, the DG-2 instantly retrieves all 35 parameters that were stored in EEPROM and places them into the INFORMATION holding register array 40-038 to 40-072, ready for Modbus reading by the host.

### **Valve Status Reporting:**

A new generation of valves is now being produced. A low-cost mechanism to detect the position of the diaphragm in the valve's control chamber is fitted. This provides a volt-free reed switch which will close when the diaphragm is fully flexed, meaning the valve is completely open and passing water under pressure. Using this feature, successful water flow in on/off valves can be determined *without the use of expensive flow meters*.

The decoder TW/NG-1-CC has an extra pair of wires (coloured grey) to connect to this reed switch, When commanded by the DG2, the contact state will be returned. 1 = valve fully open, 0 = valve closed. This is reported in the DG2 using the ModBus function 03, 'Read Holding Registers'. If the valve is fully open, the register data bit will be 1.

Please note this flowing data bit is separate from the data bit in the ACTUAL holding register bank. This latter indicates whether the solenoid state attached to the decoder matches that which is in the same bit in the DESIRED holding register bank. The ACTUAL bit value is available about one second after commanding the valve to change state.

As valves take time to open and close, the 'flowing' data will not reflect the diaphragm position for several seconds, sometimes tens of seconds, depending on the valve's design. Thus, the time elapsed before the ModBus interrogation of the coil must be defined in the RTU host controller that operates the interface.

The DG2 will cyclically interrogate all valves that are currently commanded on, taking about 3 seconds per valve. This will be published in the holding register bank (named FLOWING) and read using ModBus function 03.

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