Fusion
Decoder-in-Solenoid
Bidding Specifications

Application
The following bidding specifications represent Underhill's 3-way and 2-Way Fusion Decoder-in-solenoid products for international markets only.

Both products are compatible with Underhill's 2Wire products listed as follows:

- Sapien™ 2Wire Controller – TW3-240
- Novo™ 2Wire Converter – W-NOV-U
- Portable Programmer – DEC-PROG-240

Note: The Novo is limited to the total number of stations managed by a "host" controller as the sole determinant of maximum station capability.

The Fusion product represents an Underhill 2Wire decoder integrated into a 2-way or 3-way solenoid. The Fusion solenoid is compatible with the following valve manufacturer's in either model listed in the table below;

3-Way Fusion Decoder-in-Solenoid	
Make/Model	Notes
Bermad – 3-Way Solenoids	Integral solenoid w/ same pitch and thread as standard Bermad series solenoid

2-Way Fusion Decoder-in-Solenoids	
Rain Bird (all valve models except 300BPE, 300BPES series)	Incorporates a separate valve adapter to mate with Rain Bird valves
Hunter (all valve models)	Incorporates a separate valve adapter to mate w/ Hunter valves
Toro / Irritrol (all valve models does not include golf valve-in-head models)	Incorporates a separate valve adapter to mate w/ Toro / Irritrol valves

The Fusion product has been designed to operate in both multi-wire and Underhill 2Wire irrigation control systems interchangeably. The only difference is when applied in a 2Wire application the Fusion solenoid requires programming with a corresponding station number or address.

This product has low holding current enabling more stations to operate at one time assuming there is hydraulic capacity in the supply system. The maximum allowable number of valves that can be operated simultaneously spread equally along a 2wire path (wire sized appropriately) are:

- 2-Way models – 16
- 3-way models – 10

Materials

The Fusion solenoid is a fully encapsulated 2-way or 3-way model w/ a non-capturing plunger. A daylight brite, multi-colored LED is encapsulated in the top of the solenoid and will emit different colors depending on its application. Fusion solenoids have 2 (qty) 18" lengths of stranded 16 gauge wires.

The Fusion solenoid adapters are molded from virgin black carbonized, glass-filled nylon. The Fusion solenoid thread pitch is ¾" UNF20 while the male end of the solenoid adapter mates with the corresponding manufacturer, (Hunter, Rain Bird, Toro/Irritrol). The valve adapters for the Rain Bird and Hunter solenoid adapters require O-ring supplied with product to operate properly.

The Fusion solenoids electrical specifications are listed as:

- Minimum operating voltage* 19-32 VAC @ 60 Hz
- In-rush current 300-350 mA
- Holding current 30 mA (2-way model)
  60 mA (3-way model)
- Idle Current 4.5 mA
- In multi-wire control applications works in both 50Hz and 60Hz ranges.

Recommended Maximum Operating Distance (Single Valve actuation)

- 10 AWG - 71,500 ft.
- 12 AWG – 35,750 ft.
- 14 AWG – 32,500 ft.

Operation

When using the Fusion product in a multi-wire application, no additional tasks are needed so skip to the "Installation" paragraph.

When using the Fusion product in a 2Wire application, the solenoid must be programmed using an Underhill Portable Programmer, p/n DEC-PROG-240. The programmer must have v32 software to program a Fusion Solenoid. This is displayed very quickly when AC power is initially applied to the programmer. If the programmer indicates another version software, then order a replacement portable programmer.

Connect either one of the black solenoid wires into the red and black terminal posts on the Portable Programmer. Then select the corresponding station number using the "Raise/Lower" buttons. Press and hold the "PROG." button for 3 seconds to start the programming process. A green LED will illuminate on the Portable Programmer indicating the Fusion solenoid has been

programmed successfully. The Fusion solenoid's LED will also illuminate an orange/red color indicating it's received a message.

Installation
For 3-way Fusion models remove and replace the OEM solenoid w/ the Fusion solenoid.

For 2-Way Fusion models, thread the Fusion solenoid into the appropriate valve adapter that corresponds to the existing manufacturer's valve. Unthread and remove the OEM solenoid and replace with the thread adapter and Fusion 2-Way solenoid.

Make the field wire connections with a DBRY connector to ensure a watertight connection.

The Fusion's LED will illuminate different colors depending on it's application and the following colors reflect when used in a 2Wire application.

- Green – Voltage is being sent down the 2Wire path.
- Red – The Fusion solenoid has not programmed with an address and will not operate
- Orange – The Fusion solenoid has been signaled "On" and the valve should be operating
- No Color – There is a broken wire upstream of this valve location.

The Fusion LED in multi-wire applications has the following behavior

- Green – Voltage is being received from the controller to this specific valve when operating from a hand-held command, scheduled start time or manual operation.
- No Color – There is a broken common or pilot wire.

Fusion solenoids when used in conjunction w/ Underhill 2Wire control systems require a ground rod or ground plate a minimum distance of 10' from the control product. No additional grounding along the 2Wire path or at the terminus of each 2Wire path leg is required.

Note the Fusion product is incompatible with existing Underhill decoders TW-TK-DEC-01 on the same 2Wire path. This can easily be distinguished in the field as the decoder has a blue label.

Both the decoder and 8-station Senders are warranted for a period of 2-years from the date of purchased when installed properly. This includes the correct wire connectors for decoders **and** grounding of the corresponding 2Wire control product.

Decoders and 8-Station Senders shall be manufactured and distributed by Underhill International Corporation, Mission Viejo, CA.