

# Pulse Input Adapters (Part #: S-UCC-M00x and S-UCD-M00x)

for use with HOBO® H21, H22, and U30 Series Data Loggers

The Pulse Input Adapters are used to log the number of switch closures per interval and are designed to work with smart sensor-compatible HOBO data loggers. The adapter has a plug-in modular connector that allows it to be added easily to these loggers.

Two versions are available:

- Mechanical contact closure (S-UCD-M00x). Ideal for connecting tipping-bucket rain gauges to HOBO H21 series loggers or U30 series loggers.
- Solid-state electronic switches (S-UCC-M00x). Used for connecting compatible pulse output sensors to HOBO H22 or U30 series loggers.



## Inside this package

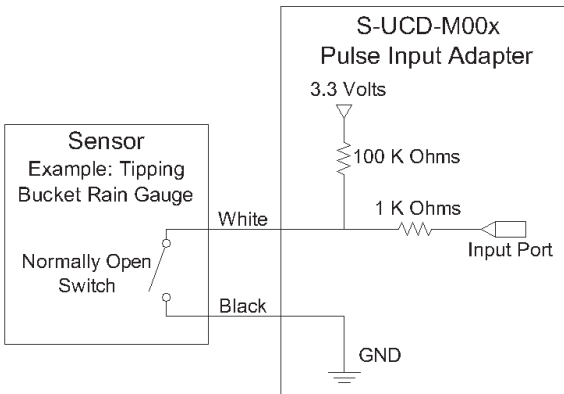
- Pulse Input Adapter
- 2 wire nuts

| Specification                                                                       | Pulse Input Adapter                                                                                           |                                                                                  |
|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
|                                                                                     | S-UCC-M00x<br>for Electronic Switches                                                                         | S-UCD-M00x<br>for Contact Closures                                               |
| Maximum Input Frequency                                                             | 120 Hz (120 pulses per second)                                                                                | 2 Hz (2 pulses per second)                                                       |
| Measurement Range                                                                   | 0 – 65,533 pulses per logging interval                                                                        |                                                                                  |
| Resolution                                                                          | 1 pulse                                                                                                       |                                                                                  |
| Lockout time                                                                        | 45 $\mu$ s $\pm$ 10%                                                                                          | 327 ms $\pm$ 10%                                                                 |
| Recommended Input Type                                                              | Electronic solid state switch closure or CMOS-level digital output (example: FET, opto-FET or open collector) | Mechanical contact closure (example: reed switch in a tipping-bucket rain gauge) |
| Preferred Switch State <sup>†</sup>                                                 | Active low input                                                                                              | Normally open                                                                    |
| Edge Detection                                                                      | Falling edge, Schmitt Trigger buffer (logic levels: low $\leq$ 0.6 V, high $\geq$ 2.7 V)                      |                                                                                  |
| Minimum Pulse Width                                                                 | 1 ms                                                                                                          |                                                                                  |
| Input/Output Impedance                                                              | 100 K $\Omega$                                                                                                |                                                                                  |
| Open Circuit Input Voltage                                                          | 3.3 V                                                                                                         |                                                                                  |
| Maximum Input Voltage                                                               | 3.6 V                                                                                                         |                                                                                  |
| User Connection                                                                     | 24 AWG wires, 2 leads: white(+), black(-)                                                                     |                                                                                  |
| Operating Temperature Range                                                         | -40° to 75°C (-40° to 167°F)                                                                                  |                                                                                  |
| Overall Cable Length                                                                | 6.5 m (21.3 ft.) or 1.57 m (5.1 ft.)                                                                          |                                                                                  |
| Length of Smart Sensor Cable                                                        | 50cm (1.6 ft.)                                                                                                |                                                                                  |
| Housing                                                                             | Weatherproof Xenoy housing protects input adapter electronics                                                 |                                                                                  |
| Housing Dimensions                                                                  | 12.7 x 2.9 cm (5 x 1.13 in.)                                                                                  |                                                                                  |
| Weight                                                                              | S-UCx-M001: 114 g (4 oz.); S-UCx-M006: 250 g (9 oz)                                                           |                                                                                  |
| Bits per Sample                                                                     | 16                                                                                                            |                                                                                  |
| Number of Data Channels                                                             | 1                                                                                                             |                                                                                  |
| Measurement Averaging Option                                                        | No (reports the number of pulses over the logging interval)                                                   |                                                                                  |
| Part Number                                                                         | S-UCC-M001 (1 m), S-UCC-M006 (6 m)                                                                            | S-UCD-M001 (1 m), S-UCD-M006 (6 m)                                               |
|  | The CE Marking identifies this product as complying with the relevant directives in the European Union (EU).  |                                                                                  |

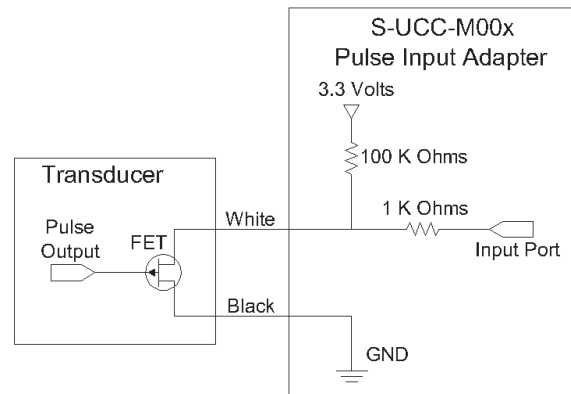
<sup>†</sup> For maximum battery life, the Pulse Input Adapters should be used with their preferred switch type. The adapters will work with active high inputs (S-UCC) and normally closed switches (S-UCD), but battery life will not be optimized.

## Input Connections

The Pulse Input Adapter sensor has two input connections. The white wire (+) is powered at 3.3 V through a 100 K $\Omega$  resistor. This power is supplied from the logger's battery. The black wire (-) is connected through the adapter to the logger's ground connection. The input cable can be connected directly to screw terminals on the sensor or to sensor cables with the included wire nuts.



Wiring for S-UCD-M00x



Wiring for S-UCC-M00x

## Connection using Wire Nuts

**IMPORTANT:** If using wire nuts, make sure the connection is protected from the elements.

1. Strip 1 cm (3/8") of insulation from the end of wires, taking care not to nick the metal conductors.
2. Twist the stripped wires together clockwise and then screw on the wire nut clockwise.
3. Check the connection by gently pulling on the wires to verify a solid mechanical connection. Always strain-relief the connection to make sure that the connection is not broken by being jerked or repeatedly worked back and forth.

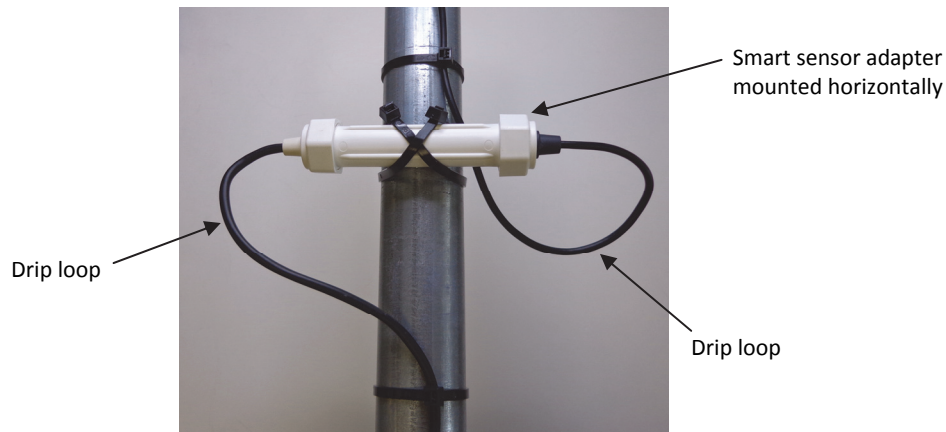
## Connecting to the Logger

To start using the Pulse Input Adapter, stop the logger and insert the adapter's modular jack into an available sensor connection port on the logger. For expansion options, see the logger's user manual.

The logger automatically detects the new input adapter the next time you launch it. Launch the logger and verify that the Pulse Input Adapter is functioning correctly. Refer to the logger's user guide for more details about connecting HOBO smart sensors.

## Mounting

To provide long-term protection from moisture entry, the smart sensor adapter must be mounted horizontally and with the cable wires routed with drip loops so that water drains away from the cable entry point as shown in the example below. When mounted properly, the housing is weatherproof (but not waterproof).



## Maximizing Battery Life

The Pulse Input Adapters consume about 1  $\mu$ A of current with the input high (switch open) and about 33  $\mu$ A with the input low (switch closed). For maximum logger battery life, use the Pulse Input Adapters with normally open switches or with transducers that are off (circuit open) for 90% of the time or longer.

## Third-party Sensors

When making a connection to a third-party sensor, take time to make sure that the connection is reliable. The connection should be protected from rain, dirt, and direct exposure to the elements. Third-party sensors purchased from Onset, such as WattNode<sup>®</sup> or Veris pulse output kWh transducers, are supplied with documentation that provides additional information for system configuration.

## Verifying Functionality

To verify proper operation of the Pulse Input Adapter, connect the adapter to a logger and launch the logger. For the S-UCD-M00x model, enter a known number of pulses (for example, if using a tipping-bucket rain gauge, tip the bucket several times). Then read out the logger and verify that the number of pulses in the data file is correct.

If you think either the S-UCC-M00x or S-UCD-M00x model is not capturing pulses, check the connections to the adapter and verify the device being measured is functioning normally. If you believe the adapter is not working properly, you can send the adapter back to Onset for repair. Contact Onset or your Onset Authorized Dealer for a Return Merchandise Authorization (RMA) number.

## Using the S-UCD-M00x Adapter (for Contact Closures)

This section describes using the S-UCD-M00x to connect the H21-001, H21-002, or U30 Station to a device with a mechanical contact closure.

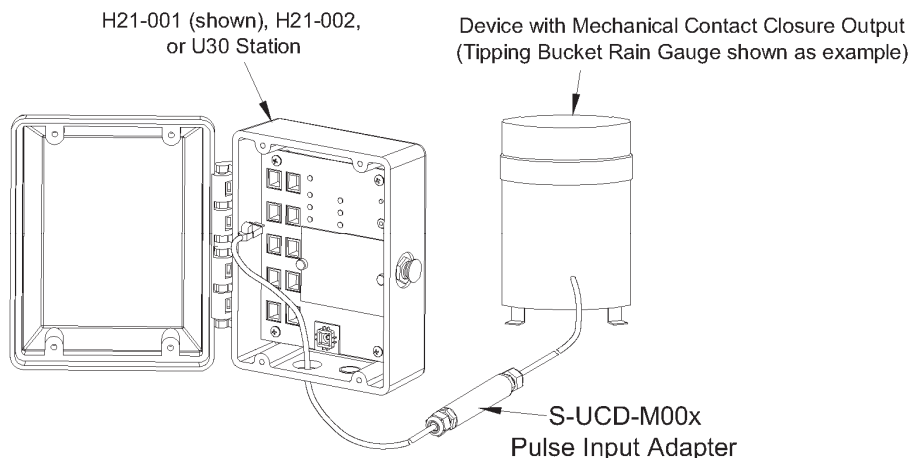
### Guidelines

- The adapter housing should be installed outside the logger enclosure. Be sure to follow the instructions included with the logger to ensure that the logger is properly sealed where the sensor cable exits the logger enclosure.
- Secure the adapter housing to the mast or sensor mounting arm. Excess cable should be coiled and secured with cable ties.
- If sensor cables are left on the ground, use a conduit to protect against such things as animals, lawn mowers and exposure to chemicals.

### Example: Tipping Bucket Rain Gauge or Mechanical Contact Closure

The S-UCD-M00x is designed to work with tipping-bucket rain gauges and other devices with normally open, mechanical contact closure, switched outputs with a maximum pulse frequency of 2 Hz. This sensor has a pre-set lockout time of 327 ms and is designed to work with signals that must be de-bounced to be accurately measured.

A typical setup for connecting a sensor with a mechanical contact closure is shown below.



S-UCD-M00x Example

### ***De-bouncing***

“Bounce” is a phenomenon where a single pulse may contain several false pulses or bounces. De-bouncing a signal is typically required when measuring signals from mechanical switches, contact closures, and reed switches.

The lockout time prevents bounce-induced false pulses from being counted as separate switch closures. If your gauge has a counter display and battery, disconnect them and connect the Pulse Input Adapter in their place. In most cases, the black and white wires can be connected directly to the relay output. (When connecting to relay or switch contacts, polarity does not matter.)

### **Using the S-UCC M00x Adapter (for Electronic Switches)**

This section describes using the S-UCC-M00x to connect the H22-001 or U30 Station to a device with an electronic switch.

#### ***Example: FET Switch Transducer***

The 120 Hz Pulse Input Adapter (S-UCC-M00x) is designed for devices with a normally open solid-state switch, FET switch or open collector, with a maximum pulse frequency of 120 Hz. This input adapter will not work with sensors that have mechanical switch outputs, AC outputs, or outputs that must be de-bounced (see previous section).

A typical setup of a FET switch transducer is shown below.

