



TB4, TB4MM, CS700, and CS700H

HS Hyquest Solutions Tipping Bucket Rain Gages



Accurate
Ideal for high-intensity precipitation

Overview

The TB4, TB4MM, CS700, and CS700H are tipping bucket rain gages manufactured by HS Hyquest Solutions. They funnel precipitation into a mechanism that tips when filled to the calibrated level. The TB4, CS700, and CS700H measure in 0.01 inch increments; the TB4MM measures in 0.2 mm increments.

Each of the rain gage's tips is marked by a dual reed switch closure that is recorded by a Campbell Scientific datalogger. After measurement, the water drains through two orifices (accepts

12 mm tubing) in the base, allowing the measured water to be collected in a separate container.

The TB4, TB4MM, CS700, and CS700H are ideal for locations where intense rainfall events may occur. They include a siphoning mechanism that allows the rain to flow at a steady rate regardless of rainfall intensity. The siphon reduces typical rain bucket errors and produces accurate measurements for up to 50 cm per hour.

Benefits and Features

- › More accurate measurement of high-intensity precipitation
- › High precision
- › TB4, TB4MM, and CS700 compatible with all Campbell Scientific dataloggers; CS700H compatible with most of our dataloggers

Heated Rain Gage

The CS700H is a heated rain gage for measuring the water content of snow. It includes an internal snow sensor that is activated when the air temperature drops below 4°C. If the snow sensor detects snow in the catch area (funnel), the heating elements

automatically turn on and keep the funnel temperature at +10°C. The heater goes into a wait mode when snow has not been detected for 18 minutes. The heating element is also automatically deactivated when the air temperature drops below -20°C.

Mounting

The base of the tipping bucket rain gage is supported by three legs. A CM240 Leveling Base and Mount or a user-supplied base plate with leveling capability is required. The CM240 may be at-

tached to a CM300-series mounting pole, or to a user-supplied, 1.5 inch IPS (1.9 inch outer diameter), unthreaded pipe. A concrete pad is recommended.

Wind Screen

Campbell Scientific offers the 260-953 Wind Screen to help minimize the affect of wind on the rain measurements. This wind

screen consists of 32 leaves that hang freely and swing as wind moves past them.

questions & quotes: 435.227.9120

www.campbellsci.com/tb4-l



Ordering Information

Tipping Bucket Raingages

Recommended cable length is 25 ft, but many customers will order a 50 ft cable to place the gage away from the tower or tripod.

- TB4-L** Tipping bucket with thermoplastic base and 0.01 inch tips. Enter cable length (in feet) after the -L. Must choose a cable termination option (see below).
- TB4MM-L** Tipping bucket with thermoplastic base and 0.2 mm tips. Enter cable length (in feet) after the -L. Must choose a cable termination option (see below).
- CS700-L** Tipping bucket with aluminum base and 0.01 inch tips. Enter cable length (in feet) after the -L. Must choose a cable termination option (see below).
- CS700H-L-LP** Heated tipping bucket with aluminum base and 0.01 inch tips. Enter signal cable length (in feet) after the -L and enter the power-cable length after the -LP. Must choose a power supply option (see below).

Cable Termination Options for non-heated raingages

- PT** Cable terminates in stripped and tinned leads for direct connection to a datalogger's terminals.
- PW** Cable terminates in a connector for attachment to a prewired enclosure.
- CWS** TB4/TB4MM cable terminates in a connector for attachment to a CWS900 interface. Connection to a CWS900 interface allows the TB4 or TB4MM to be used in a wireless sensor network. This option is only for the TB4 and TB4MM.

Power Supply Options for powering CS700H heater

- AC** AC used to power the CS700H's heater. Phoenix Contact power supply provides dependable power to the CS700H and other Campbell Scientific components in cold climates.
- DC** User-supplied batteries power the heater, and is intended for remote areas using wind or solar power to recharge the batteries. Required battery capacity varies according to site location and application.

Mounting Poles

- CM300** 23 inch Mounting Pole with Cap
- CM305** 47 inch Mounting Pole with Cap
- CM310** 56 inch Mounting Pole with Cap

Pedestal Options for Mounting Poles (choose one)

- NP** No Pedestal Base
- PJ** CM340 Pedestal J-Bolt Kit
- PS** CM350 Pedestal Short Legs (23 inch legs)
- PL** CM355 Pedestal Long Legs (39 inch legs)

Common Accessories

- CM240** Leveling Base and Mount for TB4, TB4MM, CS700, or CS700H.
- 260-953** Novalynx Alter-type Rain Gage Wind Screen

Specifications

- › Sensor Type: Tipping bucket with siphon
- › Accuracy:
 - ±2% @ < 250 mm hr⁻¹ (9.8 in. hr⁻¹);
 - ±3% @ 250 to 500 mm hr⁻¹ (9.8 to 19.7 in. hr⁻¹)
- › Resolution
 - TB4/CS700/CS700H: 0.01 in
 - TB4MM: 0.2 mm
- › Measurement Range:
 - 0 to 700 mm hr⁻¹ (0 to 27.6 in. hr⁻¹)
- › Temperature Range
 - TB4/TB4MM/CS700: 0° to 70°C
 - CS700H: -40° to +70°C
- › Humidity Range: 0 to 100%
- › Orifice Diameter: 20 cm (7.9 in)
- › Drain Tube: Both filters accept 12 mm inner diameter tubing
- › Weight with 25-ft signal cable
 - TB4/TB4MM: 2 kg (4.4 lb)
 - CS700/CS700H: 3.3 kg (7.4 lb)
- › Height
 - TB4/TB4MM: 33 cm (13 in)
 - CS700/CS700H: 34.2 cm (13.5 in)

Heated Rain Gage

- › Snow Sensor and Heater Operating Parameters: -20° to +5°C
- › Average Power Generated: 35 W (150 W during initial minute warm up)
- › Voltage Requirements
 - Main Power: 10 Vdc to 30 Vdc or 12 Vac to 28 Vac
 - SDI-12 Power: 9.6 Vdc to 16 Vdc (SDI-12 standard)
- › SDI-12 Interface: optically isolated, 1200 bps, 7 bits, even parity
- › Power Generated and Current Requirements*
 - Voltage: 12 Vdc
 - Average Wattage: 45 W; 70 W when heater is on
 - Average Ampere (~65% duty cycle): 3.7 A
 - Average Ampere (when heater is on): 5.8 A

Phoenix Contact Power Supply (CS700H-AC only)**

- › Model Name: Quint-PS/1AC/24DC/10
- › AC Input Voltage Range: 85 Vac to 264 Vac
- › Power Consumption
 - 120 Vac: ~2.77 A
 - 230 Vac: ~1.24 A
- › Protective Circuitry: Transient Surge Protection Varistor
- › Integrated Input Fuse: 6.3 A (slow blow, internal)
- › Normal Output Voltage: 24 Vdc ±1%

*If you assume four 10-hr snow storms in a week, then the average weekly energy consumption is $4 \times 10 \times 45 \text{ W} = 1800 \text{ Whr/week}$; the average amp hours over one week are $4 \times 10 \times 3.7 \text{ A} = 150 \text{ Ahr}$; and the amps averaged over a week are $150 \text{ Ahr} / (24 \times 7) = 0.9 \text{ A}$.

**Additional specifications are provided in Phoenix Contact's manual for the Quint-PS/1AC/24DC/10.