INSTRUCTION MANUAL

SDMS-30 Multipoint Scanning Snow Depth Sensor

Revision: 01/17

Precautions

DANGER — MANY HAZARDS ARE ASSOCIATED WITH INSTALLING, USING, MAINTAINING, AND WORKING ON OR AROUND **TRIPODS, TOWERS, AND ANY ATTACHMENTS TO TRIPODS AND TOWERS SUCH AS SENSORS, CROSSARMS, ENCLOSURES, ANTENNAS, ETC**. FAILURE TO PROPERLY AND COMPLETELY ASSEMBLE, INSTALL, OPERATE, USE, AND MAINTAIN TRIPODS, TOWERS, AND ATTACHMENTS, AND FAILURE TO HEED WARNINGS, INCREASES THE RISK OF DEATH, ACCIDENT, SERIOUS INJURY, PROPERTY DAMAGE, AND PRODUCT FAILURE. TAKE ALL REASONABLE PRECAUTIONS TO AVOID THESE HAZARDS. CHECK WITH YOUR ORGANIZATION'S SAFETY COORDINATOR (OR POLICY) FOR PROCEDURES AND REQUIRED PROTECTIVE EQUIPMENT PRIOR TO PERFORMING ANY WORK.

Use tripods, towers, and attachments to tripods and towers only for purposes for which they are designed. Do not exceed design limits. Be familiar and comply with all instructions provided in product manuals. Manuals are available at www.campbellsci.ca or by telephoning (780) 454-2505 (Canada). You are responsible for conformance with governing codes and regulations, including safety regulations, and the integrity and location of structures or land to which towers, tripods, and any attachments are attached. Installation sites should be evaluated and approved by a qualified personnel (e.g. engineer). If questions or concerns arise regarding installation, use, or maintenance of tripods, towers, attachments, or electrical connections, consult with a licensed and qualified engineer or electrician.

General

- Prior to performing site or installation work, obtain required approvals and permits.
- Use only qualified personnel for installation, use, and maintenance of tripods and towers, and any attachments to tripods and towers. The use of licensed and qualified contractors is highly recommended.
- Read all applicable instructions carefully and understand procedures thoroughly before beginning work.
- Wear a **hardhat** and **eye protection**, and take **other appropriate safety precautions** while working on or around tripods and towers.
- **Do not climb** tripods or towers at any time, and prohibit climbing by other persons. Take reasonable precautions to secure tripod and tower sites from trespassers.
- Use only manufacturer recommended parts, materials, and tools.

Utility and Electrical

- **You can be killed** or sustain serious bodily injury if the tripod, tower, or attachments you are installing, constructing, using, or maintaining, or a tool, stake, or anchor, come in **contact with overhead or underground utility lines**.
- Maintain a distance of at least one-and-one-half times structure height, 6 meters (20 feet), or the distance required by applicable law, **whichever is greater**, between overhead utility lines and the structure (tripod, tower, attachments, or tools).
- Prior to performing site or installation work, inform all utility companies and have all underground utilities marked.
- Comply with all electrical codes. Electrical equipment and related grounding devices should be installed by a licensed and qualified electrician.

Elevated Work and Weather

- Exercise extreme caution when performing elevated work.
- Use appropriate equipment and safety practices.
- During installation and maintenance, keep tower and tripod sites clear of un-trained or non-essential personnel. Take precautions to prevent elevated tools and objects from dropping.
- Do not perform any work in inclement weather, including wind, rain, snow, lightning, etc.

Maintenance

- Periodically (at least yearly) check for wear and damage, including corrosion, stress cracks, frayed cables, loose cable clamps, cable tightness, etc. and take necessary corrective actions.
- Periodically (at least yearly) check electrical ground connections.

WHILE EVERY ATTEMPT IS MADE TO EMBODY THE HIGHEST DEGREE OF SAFETY IN ALL CAMPBELL SCIENTIFIC PRODUCTS, THE CLIENT ASSUMES ALL RISK FROM ANY INJURY RESULTING FROM IMPROPER INSTALLATION, USE, OR MAINTENANCE OF TRIPODS, TOWERS, OR ATTACHMENTS TO TRIPODS AND TOWERS SUCH AS SENSORS, CROSSARMS, ENCLOSURES, ANTENNAS, ETC.

Assistance

Products may not be returned without prior authorization. The following contact information is for Canadian and international clients residing in countries served by Campbell Scientific (Canada) Corp. directly. Affiliate companies handle repairs for clients within their territories. Please visit *www.campbellsci.ca* to determine which Campbell Scientific company serves your country.

To obtain a Returned Materials Authorization (RMA), contact CAMPBELL SCIENTIFIC (CANADA) CORP., phone (780) 454-2505. After a measurement consultant determines the nature of the problem, an RMA number will be issued. Please write this number clearly on the outside of the shipping container. Campbell Scientific's shipping address is:

CAMPBELL SCIENTIFIC (CANADA) CORP.
RMA#_____
14532 131 Avenue NW
Edmonton, Alberta T5L 4X4
Canada

For all returns, the client must fill out a "Statement of Product Cleanliness and Decontamination" form and comply with the requirements specified in it. The form is available from our web site at *www.campbellsci.ca/repair*. A completed form must be either emailed to *repair@campbellsci.ca* or faxed to (780) 454-2655. Campbell Scientific (Canada) Corp. is unable to process any returns until we receive this form. If the form is not received within three days of product receipt or is incomplete, the product will be returned to the client at the client's expense. Campbell Scientific (Canada) Corp.f reserves the right to refuse service on products that were exposed to contaminants that may cause health or safety concerns for our employees.

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CRBasic Examples

1. Introduction

The SDMS-30 Series Snow Gauge scans the laser on a circular path on the surface of snow and measures distance from each point on the path. Once it finishes a round of measurements, it takes an intelligent average of the depths at these points to provide a representative average snow depth of the target area. Communication options include SDI-12, RS-232, and RS-422.

FIGURE 1-1. Circluar Laser Area

Figure 1-1 demonstrates the circular pattern scanned by the sensor. Sophisticated filtering algorithms are implemented to provide a reliable measurement in various weather and surface conditions.

The size of the target area on the surface of snow varies depending on the height and the tilt angle of the SDMS-30.

1.1 Features

The model SDMS-30 Series Snow Gauge is a 2D (two-dimensional) multipoint scanning snow gauge.

SDMS-30 Highlights

- Provides representative average snow depth of target area
- Filters out erroneous measurement data caused by noise or foreign materials
- Detects new snowfall quickly and reliably
- Can operate on natural ground or snow plate
- Compact and light structure
- Simple installation process
- After mounting, the sensor performs a fully automatic calibration process to calculate install angle and height
- Output data on RS-232, RS-422 (RS-485) or SDI-12 serial data interface

2. Precautions

The SDMS-30 uses a Class 2 laser. Do not stare into laser beam.

3. Initial Inspection

- Upon receipt of the SDMS-30, inspect the packaging and contents for damage. File any damage claims with the shipping company. Immediately check package contents against the shipping documentation. Contact Campbell Scientific about any discrepancies.
- The model number and cable length are printed on a label at the connection end of the cable (if a cable was purchased). Check the model number information against the shipping documents to ensure the expected product and cable length are received.
- The SDMS-30 is shipped with a Quick Start Guide, 4 screws, 2 lock washers, 2 band clamps, mounting bracket, 4 lens wipes, a ResourceDVD, and the Female DB9 terminal block.

4. QuickStart

4.1 Set Up Using SDI-12

Use Table 4-1 when setting up an SDMS-30 to communicate to a Campbell Scientific datalogger via SDI-12.

TABLE 4-1 Set up Wiring for SDI-12

Step	Procedure
1	Connect the Black cable wire from the sensor to a 12-15 Vdc, 2 Amp power supply's ground.
2	Connect the Red cable wire from the sensor to a 12-15 Vdc, 2 Amp power supply.
3	Connect the Green wire to the SDI-12 channel of a datalogger.
4	Connect the Brown wire to the SDI-12 ground.
5	Apply power to your sensor.
6	Send sample SDI-12 datalogger program.
7	Set "calibrate now" flag to "true" to initiate automatic calibration (will begin within one minute). The sensor will begin measuring and storing values each minute.
For a full list of SDI-12 commands, see Section 6.1 *SDI-12 Command List.*	

4.2 Set Up Using RS-232

Use Table 4-2 when setting up an SDMS-30 to communicate to a Campbell Scientific datalogger via RS-232.

TABLE 4-2 Set up Wiring for RS-232

Step	Procedure
1	Connect the Black cable wire from the sensor to a 12-15 Vdc, 2 Amp power supply's ground.
2	Connect the Red cable wire from the sensor to a 12-15 Vdc, 2 Amp power supply.
3	Connect the Blue wire to a datalogger TX (C1).
4	Connect the Yellow wire to a datalogger RX (C2).
5	Connect the Brown wire to ground (G).
6	Apply power to your sensor.
7	Send sample RS-232 datalogger program as seen in Section 10.1 *RS-232 Sample Program.*
8	Set "calibrate now" flag to "true" to initiate automatic calibration (will begin within one minute). The sensor will begin measuring and storing values each minute.

For a full list of RS-232 commands, see Section 6.2 *RS-232/RS-422 Command List*.

5. Specifications

Power Supply Specifications

- 12 – 15 Vdc, 2 Amp

Current Draw Specifications (at 12 Vdc)

- Standby Current Draw: 50 mA
- Active Current Draw : 300 mA
- Heater Current Draw: 1200 mA

Sensor Specifications

- Method: multipoint laser scanning
- Number of Scanning Points: 36 points
- Range: 1 - 5 meters
- Target Area Diameter: 30 cm – 200 cm depending on installation height and angle
- Gauge Pointing Angle: 0 to 45° from vertical
- Half Angle: 7°
- Resolution: 1 mm
- Accuracy: ±3 mm

Communication Protocols

- SDI-12
- RS-232
- RS-485

General

- Operating Temperature: -40°C to 50°C*
- Weight: 1.8 kg (3.9 lbs)
- Enclosure Protection Class: IP68
- Laser Safety: Class 2

*With sensor heater on.

Dimensions

- Height: 12 cm (4.72”)
- Length: 28 cm (11.02”)
- Width: 10 cm (3.94”)

6. Operation

The SMDS-30 measures the current snow depth at user-programmable interval (in minutes) and transmits data on its serial data lines to an external device such as a datalogger. By default, the sensor is in polling mode, where measurements are triggered on request by a datalogger.

6.1 SDI-12 Command List

The snow SDMS-30 supports much of SDI-12 features and specifications. Table 6-1 is a list of currently available SDI-12 commands and responses to the commands, where "a" is the address of the sensor.

TABLE 6-1 SDI-12 Command List

Commands	Responses	Remarks
?!	a⏎	Query sensor address
al!	"system info"⏎	SDI-12 version, manufacturer, model, firmware version (e.g. 013wtherpiasdms30v6.111-24-2016)
aAb!	b⏎	Change address.
a!	a⏎	Acknowledge active
aM!	00601⏎	Start measurement. Average depth value will be provided by "aD0!" following a service request.
aD0!	+depth⏎	Average depth.
aC1!	06041⏎	Start concurrent measurement. Average depth and individual depth data at each sample point by will be provided by "aD0!" through "aD8!"
aD1! Thru aD8!	40 individual sample data	Grouped in 8 packets.
aR0!	+depth⏎	Similar to aD0 for continuous measurement mode
aXA!		Perform automatic calibration to determine installation angle and height
aXIx! Where x is the desired interval		Set the measurement interval in minutes (default is 0 – polling mode). Allowed values are 0, 1, 2, 3, 4, 5, 6, 10, 15, 20, 30, 60.
aXTxx! Where xx is the desired threshold		Set the heater threshold value (default is 0°C). The heater will turn on when the internal temperature drops below this value, and will remain on until the temperature climbs above the threshold. The allowed values are from -40°C to 10°C
aXHxx! Where xx is the height in mm		Manually set the current sensor height in millimeters. This option would only be used if the automatic calibration fails due to problems in the target area.
aXGxx! Where xx is the existing snow depth in mm		Reset the sensor ground level. This command would be used with the offset if there is existing snow on the ground when the sensor is installed.
"a" refers to the address of the sensor.		

6.2 RS-232/RS-422 Command List

Currently available serial commands in the command mode are listed with their functions and usages in Table 6-2.

TABLE 6-2 RS-232/RS-422 Command List

Command Usage	Default Value	Function
@v⏎	1	Set the verbose level: 0 - none/1 – show information. The verbose level should be kept at 1 for use with the sample RS-232 datalogger program.
@i x⏎	0 (polling mode)	Set measurement interval in minutes. The sensor should be kept in polling mode for use with the sample RS-232 datalogger program. The allowed values are 1, 2, 3, 4, 5, 6, 10, 20, 30 and 60.
@m⏎	n/a	Start measurement.. The result immediately shows up if verbose level is set to 1. Otherwise, it will show up at regular 1 minute interval.
@s⏎	n/a	SDMS-30 status. This shows various system information such as current firmware version and installation angle and height.
@a⏎	n/a	Perform automatic calibration to determine installation angle and height
@h xx⏎ Where xx is the height in mm	n/a	Manually set the current sensor height in millimeters. This option would only be used if the automatic calibration fails due to problems in the target area.
@g xx⏎ Where xx is the existing snow depth	n/a	Reset the sensor ground level. This command would be used with the offset if there is existing snow on the ground when the sensor is installed.
@lowtemp x⏎ Where x is the desired threshold	0°C	To check the current threshold value, type "@lowtemp" ⏎. To modify the heater threshold value, includes the value x. The heater will turn on when the internal temperature drops below this value, and will remain on until the temperature climbs above the threshold. The allowed values are from -40°C to 10°C
@b x⏎ Where x is an index for the desired baud rate	3 (9,600bps)	Check or modify the baud rate of the serial port. To check current the baud rate, type "@b" ⏎. To modify the baud rate, include the desired index as per below. 0: 57600, 1: 38400, 2: 19200, 3: 9600, 4: 4800, 5: 2400, 6: 1200
@d⏎	n/a	Check and modify the current SDMS-30 date * to modify the SDMS-30 date, type "@d" ⏎ and follow instructions.
@t⏎	n/a	Check and modify the current SDMS-30 time * to modify the SDMS-30 time, type "@t" ⏎ and follow the instructions.

7. Wiring

The cable/connector assembly provides all the required connections outlined below:

- 12 - 15 Vdc, 2 Amp power supply
- Full duplex RS-422 (RS-485) interface for external loggers
- SDI-12 interface for external loggers

Align markers on the male and female connectors to plug in and fasten the cable to the sensor.

Table 7-1, Table 7-2 and Table 7-3 outline assignments of wires of the connecting cable. Use proper tools to connect the wires to the datalogger and other devices.

TABLE 7-1 Firmware Update Wiring

Color	Function	Connection to DB9
White*	Firmware Reset	Pin 4
Blue	RX	Pin 3
Yellow	TX	Pin 2
Brown	Ground	Pin 1
*Only use when resetting firmware.		

TABLE 7-2 Power Wiring

Color	Function	Connection
Red	Power	12V
Black	Power Ground	G

TABLE 7-3 SDI-12 Wiring

Color	Function	Connection to Datalogger
Green	SDI-12 Signal	C1/C3/…
Brown	Signal Ground	G

TABLE 7-4 RS-422 Wiring		
Color	**Function**	**Connection to Datalogger**
Blue	RX+	C1
Brown	RX-	C2
Yellow	TX+	C3
Jumper to Brown	TX-	C4

TABLE 7-5 RS-232 Wiring		
Color	**Function**	**Connection to Datalogger**
Brown	Signal Ground RS-232	G
Blue	RX	C1/C3/…
Yellow	TX	C2/C4/...

7.1 Powering Up

The SDMS-30 requires a 12 – 15 Vdc power supply capable of providing up to 2 Amps continously.

Warning **To avoid shock or damage to the instrument, never apply power while working on wiring and connections. Never open the sensor when power is turned on.**

Once mounting and wiring of the SDMS-30 are done (Section 11 *Mounting* and Section 7 *Wiring*), apply power to the SDMS-30.

8. Calibration

Once the SDMS-30 is fully installed, calibrate it for proper operation. Calibration sets the height and angle of the sensor to ensure accurate measurements. This occurs automatically (Section 8.1 *Automatic Calibration*) or manually (Section 8.2 *Manual Calibration*).

8.1 Automatic Calibration

SDMS-30 supports a fully automatic calibration process. This process automatically calculates the height and inclination angle of SDMS-30. If the sensor is moved, it requires recalibration. This is done by issuing a calibration request command (SDI-12 “aXA!” or RS-232 “@a”). When using the RS-232 command, the sensor will ask to confirm the request. Enter “y” to proceed.

8.2 Manual Calibration

Manual calibration is only required if automatic calibration fails. After installation, enter the height of the sensor and run a ground level resetting procedure.

Entering the height can be done by sending the appropriate command (SDI-12 “aXHxxxx!” or RS-232 “@h xxxx” Where xxxx is the sensor height). When using the RS-232 command, the sensor will ask to confirm the height. Enter “y” to proceed.

After entering the sensor height, initate a ground level reset. (SDI-12 “aXG!” or RS-232 “@g”). When using the RS-232 command, the sensor will ask to confirm the request. Enter “y” to proceed.

9. Updating Firmware

To update the firmware of the sensor, download the firmware available on the website http://www.campbellsci.ca/sdms-30.

1. Wire up the SDMS-30 sensor to the DB9 female terminal block as per Table 10-1.

TABLE 10-1 Wiring for Firmware Update

Color	Function	Connection to 9-pin RS-232
Blue	RX	Pin 3
Yellow	TX	Pin 2
White	Sensor RST	Pin 4
Brown	Ground	Pin 5

2. Connect the DB9 female to your computer’s RS232 port using a standard serial cable, or to a USB port using a serial-to-USB adapter.
3. Apply power to the sensor.
4. Open a connection to the sensor using Terminal Emulator software (e.g. HyperTerminal) using the following communication options. Ensure that the correct COM port is selected.

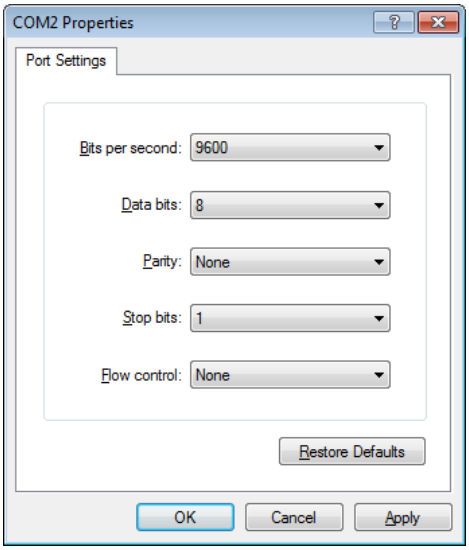

FIGURE 9-1. Settings for Terminal Emulator Software

5. Change the sensor baud rate to 57,600 by sending the command "@b 0" through the Terminal software.
6. Extract the firmware .zip file downloaded from the website.
7. Run the Xloader.exe program from the folder (Figure 9-2)
8. Browse the files on the PC using the "…" button. Select the *.cpp.hex firmware file from the folder.
9. From the *Device* dropdown, select "SDMS".
10. From the *COM Port* dropdown, select the COM port connecting the sensor to your computer.
11. Click the *Upload* button. You will see the message "Uploading…" in the bottom of Xloader.
    a. The firmware update may take a couple minutes. Upon successful completion of the firmware update, an "XXXXXX bytes uploaded" message will appear.

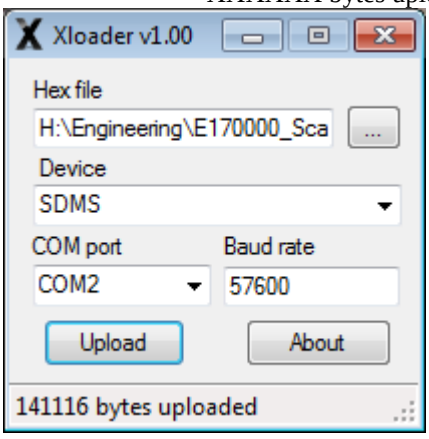

FIGURE 9-2. XLoader

10. Sample CRBasic Programs

10.1 RS-232 Sample Program

Use the sample program in CRBasic Example 10-1 when setting up the sensor to communicate with a datalogger via RS-232.

CRBasic Example 10-1. RS-232 Sample Program for CR1000

```
'SDMS30 RS232 Sample Program (CR1000)

SequentialMode

'User entered constants
Const SDMS30_Interval = 1 'measurement and data output interval (in minutes)
Const SDMS30_COMport = COM1 'Communications port used for connection to SDMS30
Const SDMS30_baud_rate = 57600

'--------------------------------------------------------------------------------
'Wiring for SDMS30
'--------------------------------------------------------------------------------
'The sensor measurement takes about 30 seconds and it is done in the program's
slow sequence

'Blue ------------------------> C1 (RS232 RX) -- if using COM1 as your port
'Yellow ----------------------> C2 (RS232 TX) -- if using COM1 as your port
'Brown -----------------------> G (digital ground)
'Red -------------------------> +12V
'Black -----------------------> G (Power Ground)

'--------------------------------------------------------------------------------
'Diagnostic variables
'--------------------------------------------------------------------------------
Public PTemp, batt_volt
Units PTemp = deg C
Units batt_volt = volts

'--------------------------------------------------------------------------------
' Variables for WeatherPia SDMS30 Scanning Laser Sensor
'--------------------------------------------------------------------------------
Public SDMS30_Measure_Now As Boolean 'the user can set this to TRUE to request a
measurement
Public SDMS30_Calibrate_Now As Boolean 'the user can set this to TRUE to calibrate
the sensor
Public SDMS30_Install_Height
Units SDMS30_Install_Height = mm
ReadOnly SDMS30_Install_Height
Public SDMS30_Install_Angle
Units SDMS30_Install_Angle = degrees
ReadOnly SDMS30_Install_Angle
Public SDMS30_Depth_Avg
Units SDMS30_Depth_Avg = mm
Public SDMS30_Temperature(2)
Units SDMS30_Temperature = deg C
Alias SDMS30_Temperature(1) = SDMS30_Board_Temperature
Alias SDMS30_Temperature(2) = SDMS30_Laser_Temperature
Public SDMS30_Depth_Points(36)
Units SDMS30_Depth_Points() = mm
Public SDMS30_Distance_Points(36)
Units SDMS30_Distance_Points() = mm

Dim SDMS30_string As String * 2000 'string to hold data string received from
SDMS30
Dim SDMS30_string_temp As String * 2000
Dim SDMS30_Serial_Check
```

```
'--------------------------------------------------------------------------------
'Snow depth data table
'--------------------------------------------------------------------------------
DataTable(SnowDepth,1,-1)
    DataInterval (0,SDMS30_Interval,Min,10)
    Sample(1,SDMS30_Depth_Avg,FP2)
    Sample(2,SDMS30_Temperature(),FP2)
    Sample(36,SDMS30_Depth_Points(),FP2)
    Sample(36,SDMS30_Distance_Points(),FP2)
EndTable

'Main Program
BeginProg

    'Open COM port for SDMS30
    SerialOpen (SDMS30_COMport,SDMS30_baud_rate,0,10,2000)

    'Retrieve install angle and height from the sensor
    SerialFlush (SDMS30_COMport)
    SerialOut (SDMS30_COMport,"@s" + CHR(13),"",0,0)
    SerialIn (SDMS30_string,SDMS30_COMport,1000,"",2000)
    SplitStr(SDMS30_string_temp,SDMS30_string,"Angle:",1,4)
    SplitStr(SDMS30_Install_Angle,SDMS30_string_temp,"",1,0)
    SplitStr(SDMS30_string_temp,SDMS30_string,"Height:",1,4)
    SplitStr(SDMS30_Install_Height,SDMS30_string_temp,"",1,0)

    Scan (10,Sec,5,0)
        PanelTemp (PTemp,_60Hz)
        Battery (batt_volt)

         'The user's programming for other sensors would go here in the main scan

    NextScan

    SlowSequence
    Scan (1,min,5,0)

        If SDMS30_Calibrate_Now = true
        'Calibration process
        SDMS30_Calibrate_Now = false

        SerialFlush (SDMS30_COMport)

        SDMS30_Serial_Check = SerialOut (SDMS30_COMport,"@a" + CHR(13),"are you
sure?",2,50)

        If SDMS30_Serial_Check = 13 Then
            SDMS30_Serial_Check = SerialOut (SDMS30_COMport,"y" +
CHR(13),"confirmed.",2,50)
            SerialIn (SDMS30_string,SDMS30_COMport,1000,"",2000)
            SplitStr(SDMS30_string_temp,SDMS30_string,"Angle:",1,4)
            SplitStr(SDMS30_Install_Angle,SDMS30_string_temp,"",1,0)
            SplitStr(SDMS30_string_temp,SDMS30_string,"Height:",1,4)
            SplitStr(SDMS30_Install_Height,SDMS30_string_temp,"",1,0)
        EndIf

        Else
            If TimeIntoInterval(0,SDMS30_Interval,min)
                SDMS30_Measure_Now = true
            EndIf

            If SDMS30_Measure_Now = true Then
                SDMS30_Measure_Now = false

                SerialFlush (SDMS30_COMport)

                'Send the measurement command
```

```
                SDMS30_Serial_Check = SerialOut (SDMS30_COMport,"@m" +
CHR(13),"measurements",2,50)

                'Receive and parse the response from the sensor
                SerialIn (SDMS30_string,SDMS30_COMport,1000,"",2000)

                SplitStr (SDMS30_Depth_Avg,SDMS30_string,"[M]",1,4)

                SplitStr (SDMS30_string_temp,SDMS30_string,"[t]",1,4)
                SplitStr(SDMS30_Temperature(),SDMS30_string_temp,"",2,0)

                SplitStr(SDMS30_string_temp,SDMS30_string,"[P]",1,4)
                SplitStr(SDMS30_Depth_Points(),SDMS30_string_temp,"",36,0)

                SplitStr(SDMS30_string_temp,SDMS30_string,"[R]",1,4)
                SplitStr(SDMS30_Distance_Points(),SDMS30_string_temp,"",36,0)
            EndIf
        EndIf
        CallTable SnowDepth

    NextScan
EndProg
```

11. Mounting

The SDMS-30 is designed to be environmentally sealed for outdoor installations. The enclosure provides protection from moisture or high humidity. It is not intended for operation under water. All that is required is an appropriate mounting fixture.

Position the SDMS-30 about one meter above the maximum seasonal snow depth height. This will provide enough height for required accuracy and resolution.

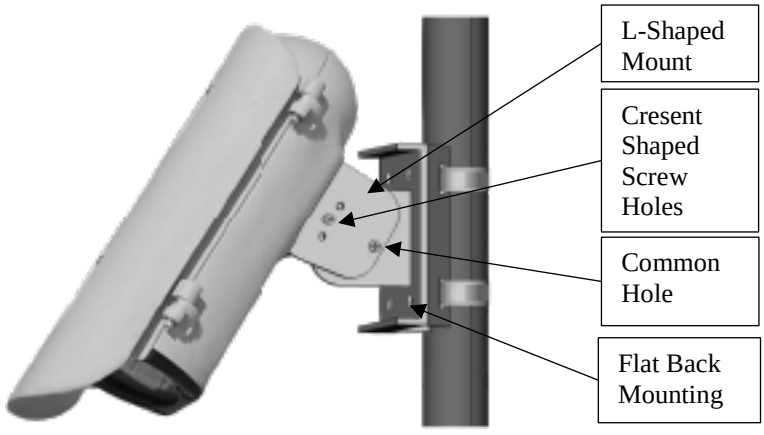

FIGURE 11-1. SDMS-30 Diagram

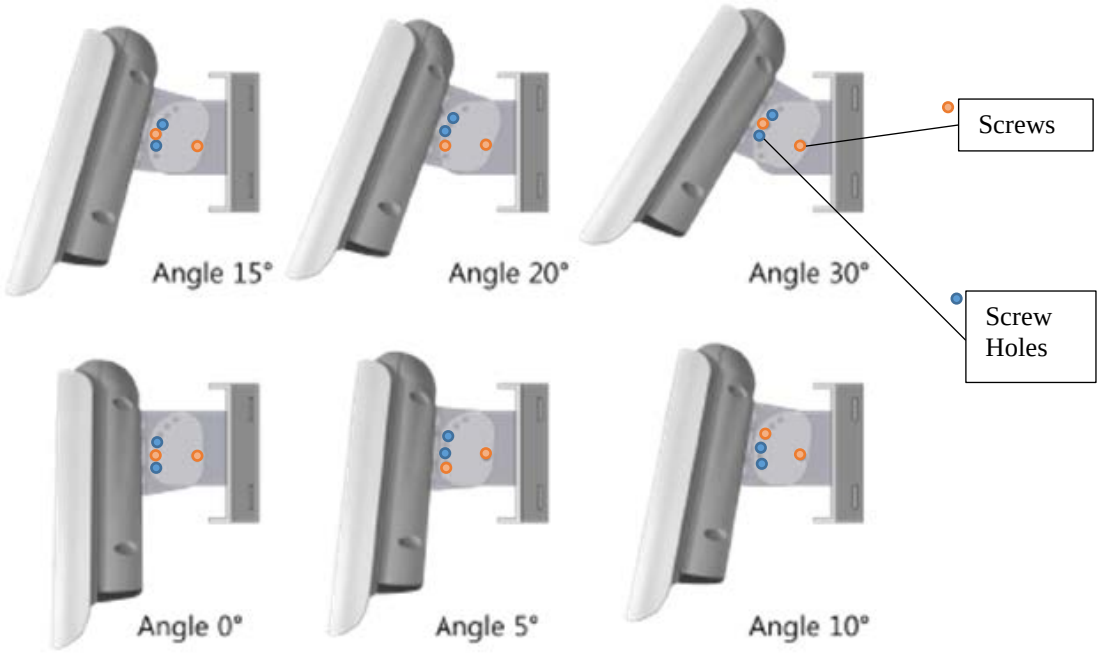

FIGURE 11-2. SDMS-30 Mounting Angles

TABLE 11-1 SDMS-30 Mounting Procedure	
Step	**Procedure**
1	Attach the L shaped mount to the flat back mount using the common hole and crescent shaped screw holes.
2	Using Figure 11-2, decide which angle your sensor is to be mounted at.
3	Bolt the L shaped mounting piece to the underside of the sensor. The big middle circle should line up with the cable connector.
4	Install sensor and mount 1 meter above maximum seasonal snow depth height. For mounting to poles, use thin hose clamps.
5	Line up the connector end of the cable to the cable connector on the sensor. Lightly push the connector into place and screw the connector to secure.

11.1 Adjusting Inclination Angle or Direction of the SDMS-30

The SDMS-30 can be installed at any angle between 0 and 45 degree from the pole. After loosely tightening the screw on the common hole (Figure 11-1), the inclination angle can be adjusted in 5 degree increment by matching one of the three holes on the L-shaped mount attached to the sensor and one of the six holes on the flat backed mount attahed to the pole (Figure 11-1). Use the second screw to fix the inclination angle by tightening the screw though the SDMS-30 part and the bracket part. Lastly, completely tighten the common hole screw. See Figure 11-2 for mounting angle options.

12. Maintenance

When properly installed, the SDMS-30 requires little maintenance other than regular cleaning and inspection. As for other measurement instruments you many need regular maintenance as follows:

- Check if the target area is free from any obstacles or foreign materials
- Inspect the window of the SDMS-30 and remove any dust or foreign deposit. Clean the window glass with soft cleaning fabric or tissues, water, and soft cleaning detergents
- Inspect the bracket and other mounting clamps for loosened screws or clamps

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