

SENSORS AND SYSTEMS
FOR MONITORING GROWING PLANTS

SF-4T-SDI-12
SF-5T-SDI-12
Sap Flow Sensors
User's Manual

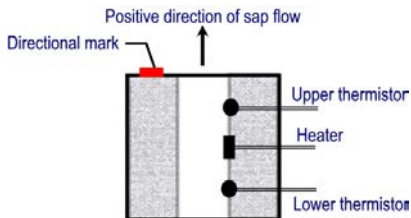


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Introduction

The SF-4T and SF-5T are designed for monitoring relative variations of sap flow rate in a leaf petiole or small shoot. The sensor's probe is made as a hollow collapsible heat-insulating cylinder. A spring loaded heater and a pair of bead thermistors are located inside the cylinder.



A signal conditioner provides powering of the heater and conditioning of the output signal.

All SF-type sensors are tested on the water filled hose within the approximate measurement range of 12 ml/h.

The probe is connected by a standard 1-meter cable to the waterproof box with the signal conditioner inside.

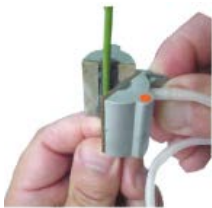
The output cable length should be specified in the order if required.

Specifications

	SF-4T	SF-5T
Measurement range	Not specified	
Approximate range of 12 ml/h was determined on a stem simulator – a fiber-filled PVC hose with 5 mm in diameter.		
Output SF-4/5T	2	
Accuracy	Not specified	
Suitable stem diameter, mm	1 to 5	4 to 10
Operating temperature	0 to 50 °C	
Warm up time	5 min	
Overall dimensions, mm	30 × 30 × 40	30 × 35 × 40
Supply voltage	5 to 24 VDC @ 400 mW max	
Cable length between probe and signal conditioner	1 m	

Installation

- Choose an appropriate part of stem for installing the sensor. Make sure that sap flow rate in the stem does not exceed 12 ml/h. The rough estimation may be done assuming the average transpiration rate equal to 1.5 ml/h per square decimeter of leaf surface.
- Open the sensor wide enough to place it on the stem. Make sure that the red directional mark corresponds to upward flow.



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- Make sure that the sensor is firmly placed and cannot slide or twist with application of gentle force.

- Carefully cover the sensor with two or three layers of aluminum foil in order to protect the sensor from external heat effects. It is absolutely necessary for reliable measurements.

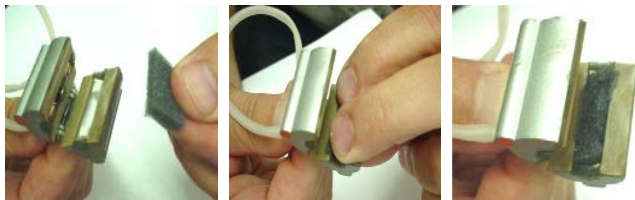


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- To provide the firm positioning of a sensor on stems with diameter below 4 mm for SF-4T and 8 mm for SF-5T, insert a foam-rubber bar into the internal empty part of a sensor as it is shown below



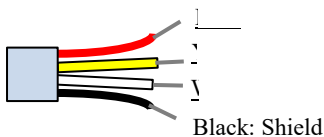
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Connection

The connection diagram is shown below. The shield shall be grounded at the data loggers side or connected to the ‘minus’ contact of the power source.



Data logging

SDI-12 : single output with the M! or C! command in accordance with SDI-12 Standard (version 1.3).

Example CR1000 program

'CR1000 Series Datalogger

'date: 20/6/2016

'program author: Implexx Sense

'Program to measure sap flow via SF-4 sensors with 5 min heating protocol.

'Wiring:

'===== SF-4T Sensor =====

'Red = Power input = 12V Power

Black = Power ground = G or GND

'White = Data = C1

'Declare Public Variables

'SF-4T Sensor:

Public SF1

Public SF2

Public batt_volt

Public panel_temp

'Define Data Tables

DataTable (SF_Example,1,-1)

 DataInterval (0,15,Min,10)

 Sample (1,batt_volt,FP2)

 Sample (1,panel_temp,FP2)

 Sample (1,SF1,FP2)

 Sample (1,SF2,FP2)

EndTable

Example CR1000 program (cont.)

'Main Program
BeginProg

Scan (15,Min,0,0)

'Record battery voltage and panel temperature

Battery (batt_volt)

PanelTemp (panel_temp,_50Hz)

'Measure sensors via SDI-12.

'SF1 has SDI-12 address "0".

'SF2 has SDI-12 address "1".

SDI12Recorder(SF1,C1,0,"C",1.0,0)

SDI12Recorder(SF2,C1,1,"C",1.0,0)

'Call Output Tables

CallTable SF_Example

NextScan

EndProg

Warranty and Liability

This product is for research use only. Not for use in human diagnostic or therapeutic procedures.

The SF-4/5 Sensor is covered by a one year limited warranty.

The warranty does not include repair or replacement necessitated by accident, neglect, misuse, unauthorized repair, or modification of the product. In no event will Implexx Sense be liable for any direct, indirect, consequential or incidental damages, including lost profits, or for any claim by any third party, arising out of the use, the results of use, or the inability to use this product.

REPAIR OR ADJUSTMENT

Equipment that is not covered by the warranty will, if possible, be repaired by Implexx Sense with appropriate charges paid by the customer. In case of return of equipment please contact us for return authorization.

Customer Support

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Implexx Sense
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