

SDI-12 Converter 7SDI-1000 User Manual

Version 1.00

7SDI-1000 User Manual

Table of Contents

1	Introduction	3
1.1	System Overview	3
1.2	Sensor Compatibility	3
1.3	SDI Converter Functions.....	4
1.4	Instrument Details	4
2	Wiring & Connections	5
2.1	Quick Set Up - PS1000 and PS7000	6
2.2	Quick Set Up - 3000 series or PS2100.....	7
3	Special User Commands	8
3.1	Sensor Model Type Codes	9
3.2	Changing the output order using XC command.....	10
3.3	Results of Read Sensor Status command.....	11
3.4	Data Values Precision command.....	11
3.5	Results of Start Verification command.....	12

I Introduction

1.1 System Overview

The 7SDI-1000 Converter can be used with various Greenspan sensors to convert the serial RS232 interface to an SDI protocol electrical interface and command protocol. The converter connects to the sensor by means of an HS7 connector and provides power to the sensor through that connector. It is possible for the converter to turn sensor power off using an SDI12 command.

1.2 Sensor Compatibility

The 7SDI-1000 SDI-12 Converter can be used with the following Greenspan sensor models:

Greenspan 3000 Series Sensors:

- PS3100
- CTD3100
- TS3000
- EC3000
- ODO3000
- PH3000
- ORP3000
- DO3000

Other Greenspan pressure sensors:

- PS2100
- PS1000
- PS7000

1.3 SDI Converter Functions

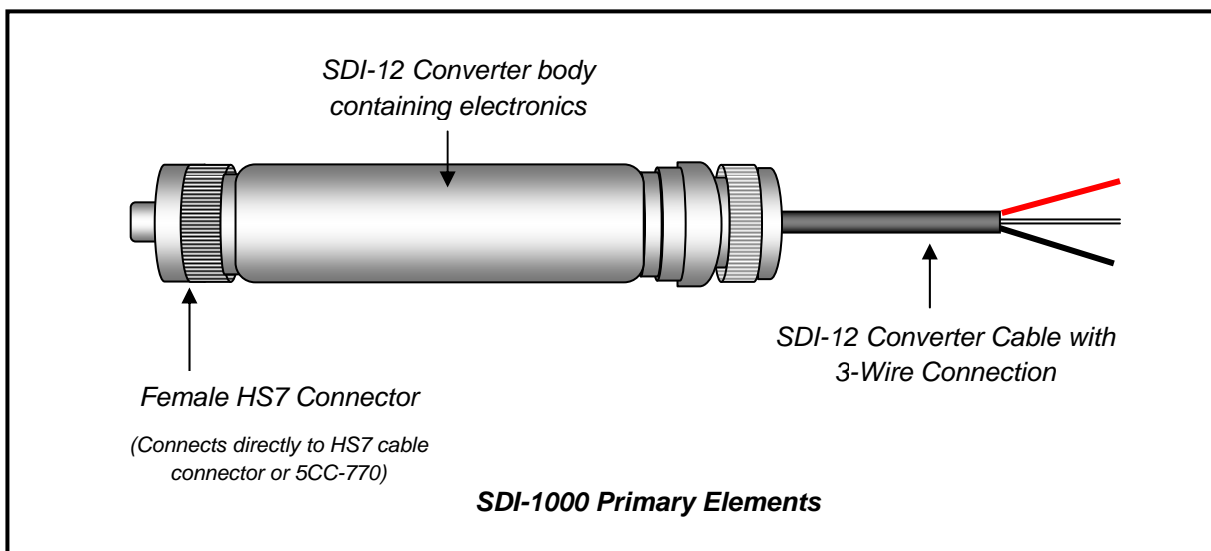
The functions performed by the converter include:

- Support for Version 1.3 SDI12 protocol commands, with the exception of continuous measure (R command).
- Unique hardware serial number returned in the Send Identification command.
- Sensor type identification returned in the Send Identification command, note limited to 6 characters: this means that ODO3000 is returned as OD3000 and CTD3000 and CD3000.
- Switching power to the sensor using a transistor. For PS2100 and 3000 sensors the power is not switched automatically and low power operation is obtained by the sensor going into sleep mode. Power can be switched on or off using an SDI12 user command.
- The converter switches power off automatically from a PS7000 sensor when in sleep (SDI12 idle) mode.
- Field updateable firmware using AVR Bootloader software interface, via sensor port connection (RS232). Contact the Greenspan Factory for details.
- Integrated real time operating system for time sliced handling of SDI12 command processing and sensor communications.
- System event code storage and command to read system events.
- Wide operating voltage range (typically 9 to 30V DC).

1.4 Instrument Details

The Greenspan 7SDI-1000 consists of the following elements:

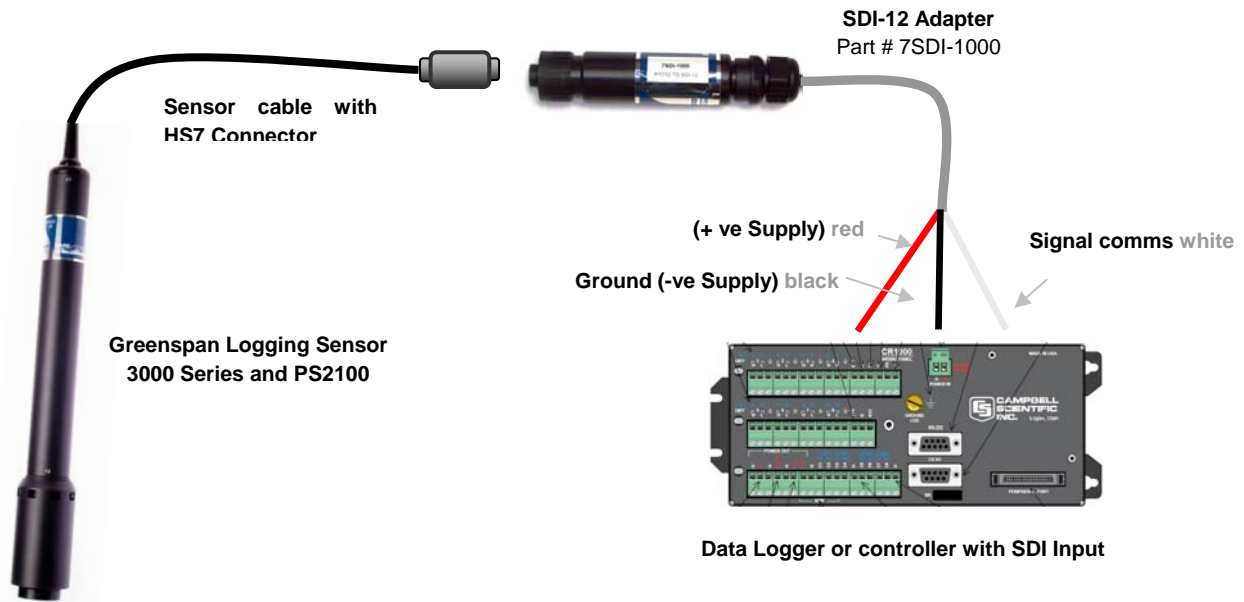
- Female HS7 Connector
- SDI-12 Converter body (houses adaptor electronics)
- SDI-12 Converter cable with 3-wire connection (Red, White & Black wires)



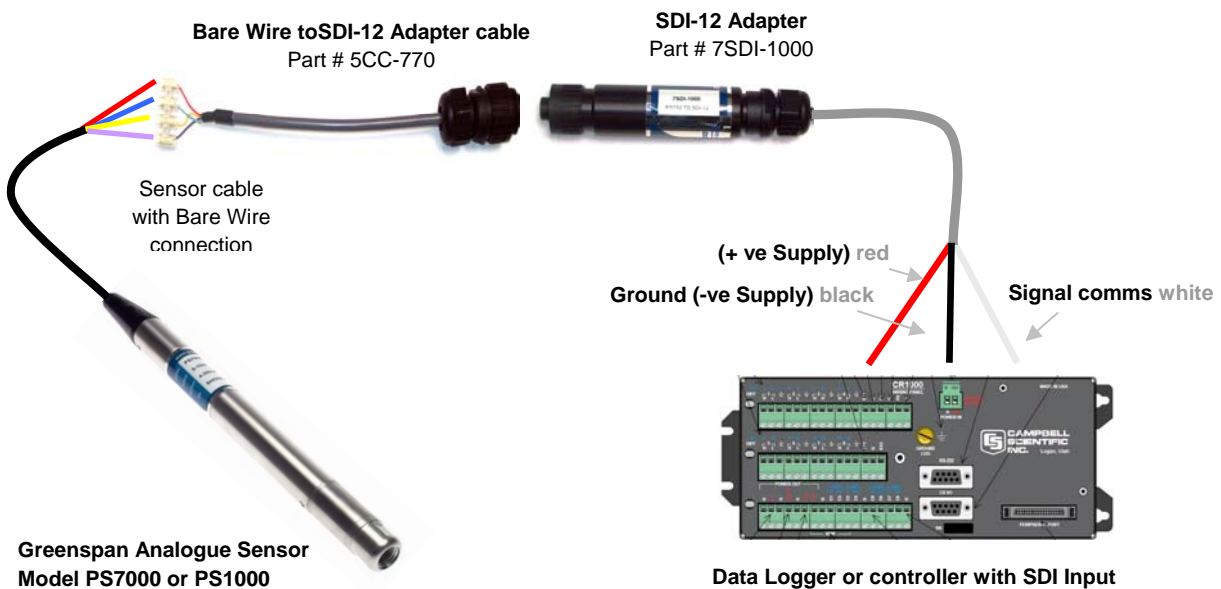
If the 7SDI-1000 is being used in conjunction with bare wire sensor (i.e. PS1000 or PS7000) a 5CC-770 Adaptor cable is required. Refer to the Wiring and Connections section for further information

2 Wiring & Connections

SDI-12 Adapter with 3000 series Logging sensor



SDI-12 Adapter with an analogue output PS7000 or PS1000 Sensor



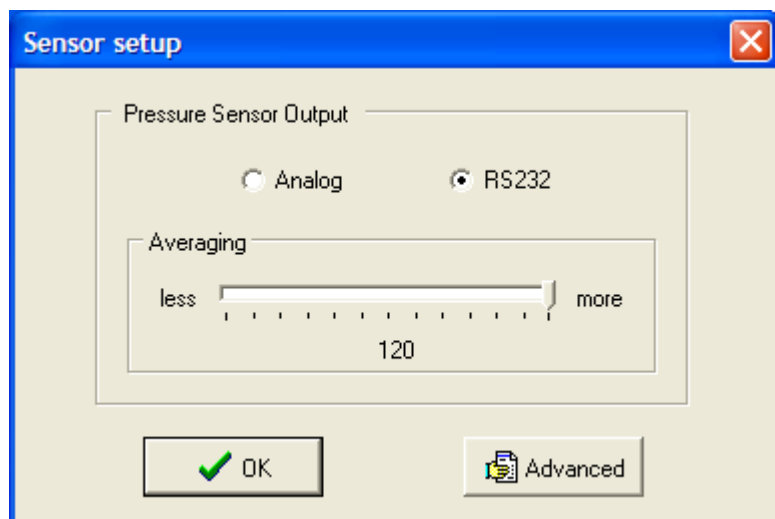
Signal Name	HS7 Pin #
TXD	2 (Yellow)
RXD	3 (Violet)
+12V	1 (Red)
Ground	5 & 6 (Green)

2.1 Quick Set Up - PS1000 and PS7000

Sensor set up

Set the PS1000/7000 as a RS232 instrument

1. Connect the sensor to a PC and run the PS7000 utility.
2. Click Sensor Set Up
3. Click RS232 radio button
4. Click OK



Provide physical connections

There is a cable available to assist connecting a bare wire sensor to the 7SDI-1000 adapter. Greenspan Part # 5CC-770 (pictured below)



Plug the Hirschman connector into the mating connector on the 7SDI-1000

Use the screw terminals to join the bare wires from the sensor. Red to Red, Blue to Blue, Yellow to yellow and Violet to Violet.

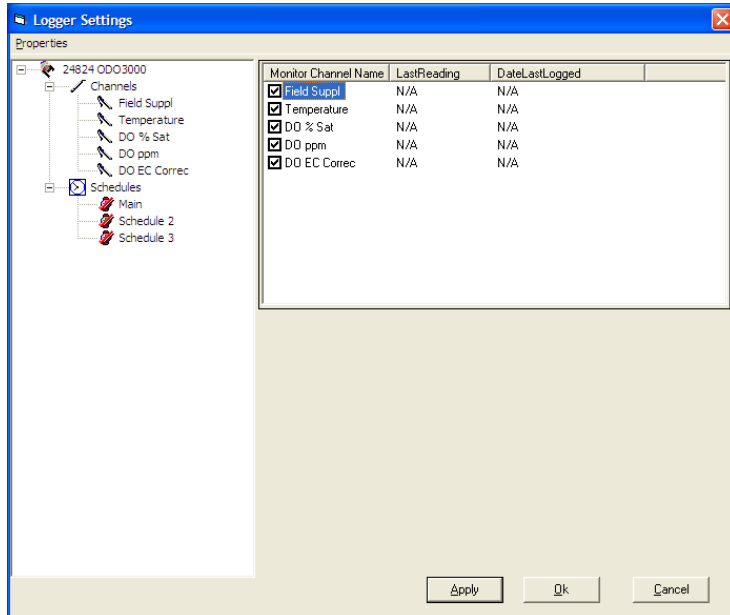
7SDI-1000

Set the 7SDI-1000 for the PS1000/7000

2.2 Quick Set Up - 3000 series or PS2100

Sensor set up

- Select data channels required using SmartCom.



SDI-1000

- Plug the sensor cable into the HS7 connector on the 7SDI-1000
- Connect the 3 wires into the SDI input of the datalogger or controller
- Open a terminal that allows SDI-12 commands to be sent and received
- Set model type
- Set data channel output order if required
- Set data precision if required

3 Special User Commands

The 7SDI-1000 supports standard SDI commands and some additional special user commands to allow for the easy set-up of the sensor and converter set.

All special user commands begin with an 'X' character, which follows the address, for example 0XM1! will send a command to configure the converter for operation with a PS7000 sensor. Command details are listed below: please reference to the SDI12 protocol specification command/response syntax:

Name	Command	Response
Set ODO sensor gain to x ¹	aXGx!	a<CR><LF>
Set ODO sensor offset to x ¹	aXOx!	a<CR><LF>
Reset ODO sensor gain and offset ¹	aXR!	a<CR><LF>
Set model number to m ²	aXMm!	attn<CR><LF>
Set data channel output order ³	aXCcccc!	a<CR><LF>
Read sensor status ^{4 5}	aXS!	att0<CR><LF>
Set decimal precision, c x where c = channel number (0 to 9), x = precision (0 to 5) ⁶	aXDcx!	a<CR><LF>
Set time to respond at M command, s seconds ⁷	aXTsss!	a<CR><LF>
Turn Sensor power on	aXP1!	a<CR><LF>
Turn sensor power off	aXP0!	a<CR><LF>
Wipe turbidity sensor	aXW!	a<CR><LF>

Note 1: Refer to ODO sensor manual for details on calibration of ODO sensors.

Note 2: See section 3.1 for further instruction

Note 3: See section 3.2 for further instruction

Note 4: See section 3.3 for further instruction

Note 5: Only available with logging sensors (i.e. not PS7000).

Note 6: See section 3.4 for further instruction

Note 7: Format of time must be the same as that returned by the M command, and must comprise 3 characters. For example for a sensor at address zero and for 10 seconds, enter 0XT010!

3.1 Sensor Model Type Codes

The 7SDI-1000 must be set to the appropriate sensor model. This is done using SDI-12 commands. Connect the 3 wires on the 7SDI-1000 to a SDI-12 device (e.g. Datalogger).

The device will have some way of manually sending SDI-12 commands. Open this.

Send address query command - **?!**

The 7SDI-1000 will respond with the Address (will assume address 0 for future examples).

Send identification command – **0!**

The 7SDI-1000 will respond with an ID string 012GREENSPN#####2.4000011DD3926, the ##### represents the sensor model.

If the model is PS7000, send set model 1 command – **0XM1!**

The 7SDI-1000 will respond with the Address. To check, send identification command – **0!**

The 7SDI-1000 will respond with an ID string 012GREENSPN**PS7000**2.4000011DD3926

For example:

```
?!
0
0!
012GREENSPN#####2.4000011DD3926
0XM1!
0
0!
012GREENSPNPS70002.4000011DD3926
```

The following list of codes is to be used for configuring the model number using the XM command.

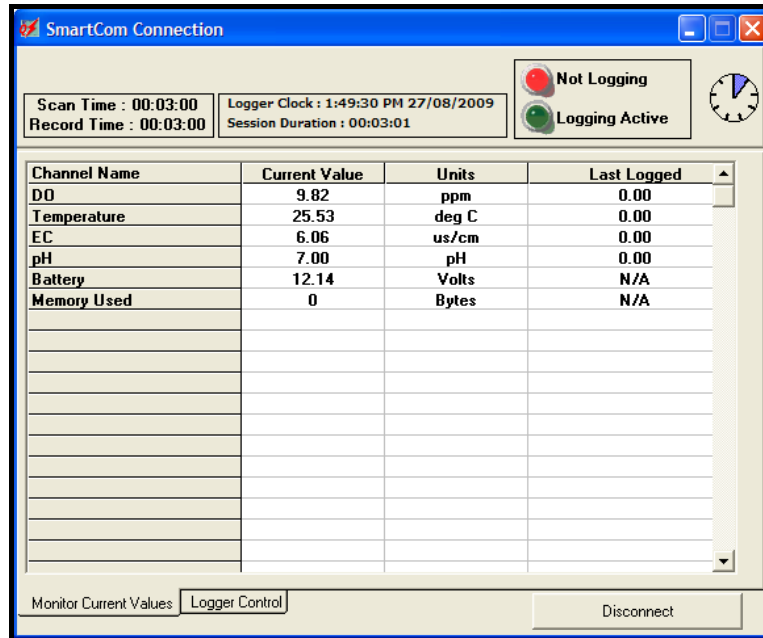
Code	Model	Model number displayed by I command
0	No sensor connected	XXXXXX
1	PS7000 **	PS7000
2	PS2100	PS2100
3	PS3000	PS3000
4	TS3000	TS3000
5	DO3000	DO3000
6	EC3000	EC3000
7	CTD3000	CD3000
8	PH3000	PH3000
9	ODO3000	OD3000
A	Multiparameter	MP3000

**** Important Note**

When connecting to a PS7000 or PS1000, the sensor must be set up in serial mode. As a default, PS7000 and PS1000 sensors are set up in analogue mode when they leave the factory.

3.2 Changing the output order using XC command

Connect the sensor to SmartCom and monitor the current values. Make note of the values that correspond to the different channels. Note – Memory used is not a channel.



The default order of the data that is returned via SDI-12 is the same order as they appear in the SmartCom monitor e.g. For a CS304 the output order will be (Battery, DO, Temperature, EC and pH).

Connect the 7SDI-1000 and sensor to a SDI-12 device and open a terminal emulator that allows the manual input of SDI-12 commands. Retrieving the data (M command followed by the D command) will allow the determination of the Channel output order. The example shown is for a CS304 which has 5 channels. The first channel number starts with 0.

```

OM!
00105
0
0D0!
0+12.14+9.80+25.52+6.90+7.00
    
```

Channel #	Data Via SDI-12	Data from SmartCom	Channel name (from SmartCom)
0	12.14	12.14	Battery
1	9.80	9.82	DO
2	25.52	25.53	Temperature
3	6.90	6.06	EC
4	7.00	7.00	pH

To change the output order, send the special command followed by the channel numbers in the desired output order. All channel numbers must be included. E.g. if the desired output for this example sensor is 0-battery, 2-temperature, 1-DO, 3-EC and 4-pH send:

0XC02134!

0

Sensor responds with the address number if the input is accepted. Data will now be returned in this order:

0M!

00105

0

0D0!

0+12.14+25.53+9.77+6.69+7.00

3.3 Results of Read Sensor Status command

The read sensor status command will cause the converter to issue a Get Logger Status command to the sensor and to store the results in a buffer for the SDI12 D command. The numbers returned by the D command correspond as follows:

a<+l><+vv.vv><+DD/MM/YY><+HH:MM:SS><+mmmmm><CR><LF>

where:

- l is the logging status: +0 not logging, +1 logging
- vv.vv is the version code, eg +01.01
- DD/MM/YY is the logger current date
- HH:MM:SS is the logger current time
- mmmmm is the logger memory used (in bytes).

3.4 Data Values Precision command

The XD user command is used to set a specific data values' decimal precision for any proceeding M or C commands. The default precision on power up is set to 2 decimal places. After an initial M or C command is input and the values received the user is able to specify a decimal precision for a specific data value using its position within the received data.

The format of the Data Values Precision command is:

aXDnp!

where:

- n is the index of the data value who's precision you wish to set, starting at 1.
- p is the number of decimal places the user wishes to display ranging from 0 to 5.

For example, if the data received from an initial M and then D command was:

0+0.23+23.42+12.55<CR><LF>

The user could use the following XD command to set the decimal precision of the first data value (0.23) to 4:

0XD14!

The response for any following M then D commands would then be similar to:

0+0.2341+23.54+12.65<CR><LF>

3.5 Results of Start Verification command

The start verification command will cause the converter to read analogue voltages within the converter and to store the results in a buffer for the SDI12 D command. The numbers returned by the D command correspond as follows:

a<+xxx.xx><+yyy.yy><CR><LF>

where:

- xxx.xxx is the field supply voltage in volts
- yyy.yy is the voltage input rail in volts

For normal operation these values should be around 12 volts (i.e. equal to the supply voltage).