



**INSTALLATION  
SET-UP  
&  
USER OPERATING  
MANUAL  
for  
MK2 Virgo  
Temperature Recorders**



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## **1. USER INFORMATION**

**Congratulations on buying a Storm Products Recorder we are sure that it will give you a long and trouble free service.**

The unit is designed under stringent BSI ISO 9001:2000 procedures and manufactured under BSI ISO 9002:2000 processes using the latest automatic assembly techniques, processes and technology.

Virgo & R-type Recorders accept between 1 and 6 temperature sensor inputs, plus 2 magnetic door switch inputs and 2 defrost input. 10 inputs in total.

Temperature is stored in memory, displayed and printed in degrees Celsius.

### **Important Information**

#### **VIRGO RECORDERS FOR INTERNAL OR EXTERNAL APPLICATIONS**

The following advice must be followed at all times.  
Failure to do so may invalidate the recorder warranty:

- \* Make sure you disconnect the vehicle battery before starting any alterations to the circuit wiring.
- \* The unit warranty does not allow for users tampering with the unit or gaining access to the internal printed circuit board or components of the unit.
- \* Remember to seal any cable entries made through the vehicle body with a suitable water proof sealant in order to ensure that water does not get into the vehicle or recorder interior.
- \* Only qualified and Storm approved personnel should attempt to carry out repairs or alterations to the unit or its software.
- \* See warranty card for details of warranty returns procedure.

## **FIRST SWITCH ON**

After the installation wiring is complete switch on the unit by connecting to the battery for the first time. Follow the simple procedures outlined below to get your recorder up and running and to allow it to identify your installation configuration.

**1.** Power up the unit. The recorder initialises and displays various parameters as it boots up and after a short delay the display shows **Date and time**, and then begins to cycle round the sensor probes, in turn, showing the temperature being sensed by each one. The recorder is fully operational at this stage and will use the pre-set default parameters as set at the factory.

**As part of the recorder's initialising procedure the recorder counts the number of correctly connected sensors in your installation and uses information to determine the format of future printouts and display details. The recorder remembers the last installation configuration it saw. If in the future the number of sensors in your installation is changed, the recorder must be allowed to recalculate the sensor configuration to allow it to make the best use of the printer and display facilities.**

**2.** In order to allow the recorder to identify your new installation after a sensor configuration change the actual number of sensors fitted, simply press the two "Up/Down" keys **[↑]** **[↓]** simultaneously to take you into the programming menu.

The message "**Logging Disabled**" will be shown on the display for a short period.

Release the keys and you will automatically enter the "**Programming Mode**" at the "**1. EXIT**" position on the programming mode menu.

**3.** When this happens press the "Enter" key **[↵]** and release. The unit will display "**Initialising**" or "**Instrument Calibration**" then "**unit type & revision code**". The instrument is now scanning your installation and checking for errors. When this is complete the time and date will be displayed and the unit will resume its normal operation but this time it will show information on all sensors properly connected. If any sensor is not shown as active it will be because it is not connected to the recorder correctly. Check the sensor circuit and ensure the wiring is correct and once correct repeat the initialising routine from "**2**" above. (Note: Open circuit sensors will show as -39.9 on the display.)

**4. Some recorder versions will prompt for a password before you are allowed to enter the Program Mode.**

The password default is **1111** and the displayed characters should be changed by using the up/down **[↑]** **[↓]** keys to change the character highlighted by a cursor below the character. Next press the return key to accept the character and the cursor will highlight the next character. Enter all four characters in this manner. When the last character is accepted the display will change to "**1. Exit**". **Resume initialisation as at "3."** above.

**5.** If the date and time shown on the display are not correct, for your time zone, set the time and date using the procedures outlined on Page 7 of this manual.

**6.** Providing you have followed the simple procedure detailed above the recorder unit is now fully operational.

You may wish to change some of the operational parameters to suit your own application.

Procedures for accomplishing this are shown on Pages 6-9 of this manual.

### **For your information:**

**The resident default values in the units memory on delivery from the factory are listed below:**

<b>Language:</b> <i>English,</i>	<b>Company Name:</b> <i>Storm,</i>
<b>Vehicle Registration:</b> <i>S00XXX,</i>	<b>Sample rate:</b> <i>15 minutes,</i>
<b>Alarms:</b> <i>all off. ,</i>	<b>Frozen Alarm levels:</b> <i>-18C to -25C,</i>
<b>Chilled Alarm levels:</b> <i>+8C to 0C.,</i>	<b>Alarm Delay:</b> <i>15 minute.</i>

**THE TEMPERATURE RECORDER YOU HAVE JUST INSTALLED HAS BEEN MANUFACTURED AND APPROVED TO EUROPEAN STANDARD EN12830 CLASS 1 TYPE T/B, THEREFORE MEETING THE EUROPEAN DIRECTIVES 92/1/EEC AND 93/43 EEC.**

**THE UNIT HAS BEEN MANUFACTURED TO BS EN 9001:2000 STANDARDS USING OUR PROCEDURES AND ASSOCIATED DRAWINGS, THEN TESTED, CALIBRATED AND 100% INSPECTED.**

**ALL IN CONDITIONS AND REQUIREMENTS AS DETAILED WITHIN OUR QUALITY STANDARDS**

# 1 INTRODUCTION

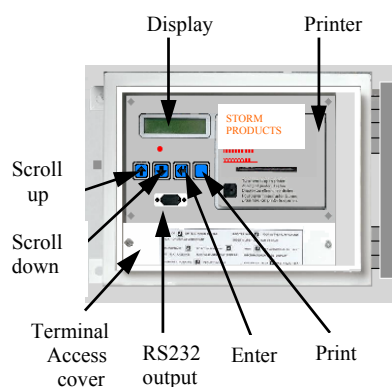
## General Description

Your Temperature Recorder comes complete with printer. It accepts up to 6 sensors as inputs, 2 magnetic door switches and 2 defrost inputs. An outside alarm can be connected to the recorder using the volt free alarm relay contacts provided on the terminal block. Temperature is displayed in degree Celsius.

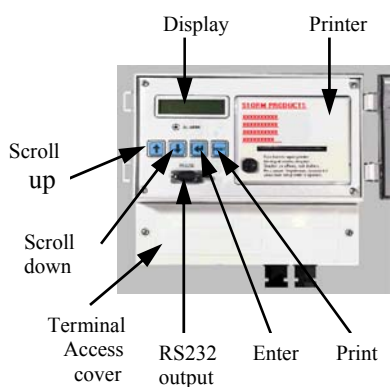
Additional Features :

- Programmable sample rates from 1 to 60 minutes.
- Regular paper printout (not special thermal paper)
- Print Back From Feature.
- Alpha-numeric backlit display . Selectable in 7 languages.
- RS232 communications..
- Full Two Year Factory Warranty

### Virgo—Metal Box



### Virgo- Polycarbonate Box



## 2 SYSTEM SET-UP

Logging — Password

**PARAMETERS MENU**

1. EXIT
2. LANGUAGE ?
3. PRINT PROG. SETTINGS
4. COMPANY NAME
5. VEHICLE REGISTRATION
6. SET DATE
7. SET TIME
8. SAMPLE RATE
9. SET ALARM RANGES
10. CHANGE ALARM SETTINGS
11. SET ALARM DELAY
12. PRINT ALL DATA
13. JOURNEY START TIME



Set the parameters of the recorder by entering the Program menu..  
To do this Press the Up and Down keys together. The Display will show "1. Exit." This is the top of the parameter menu as shown on the left..

If a Password is required, please refer to Page 4 paragraph 4, use the procedure outlined in that section and return to this section once "1. Exit" appears on the display

Use the Up and Down keys to scroll to the option you wish to change.

Once the required parameter is displayed Press the Enter key to enter the required parameter option and make the change using the instructions detailed against this option.

### 2: Change Language

Item "13" appears only on Ticket Software Versions Only

2. LANGUAGE ? — ENGLISH



Use this option to select 1of 7 languages.

Printouts and Display information will be converted to the selected language

Once the new Language selected Press the ENTER key to accept this information and return you once more to the Parameter menu.

### 4: Company

STORM PRODUCTS



This option gives you the facility to print out your company name using up to 15 characters at the start of each data printout.

Use the up and down keys to scroll throughout the characters and numbers.

Press the enter key to accept and move to next character.

**Note:** It is necessary to move through the full 15 characters before the unit will accept the new Name. Use blanks as spaces if necessary



Once the new Name is set Press the ENTER key to accept this information and return you once more to the Parameter menu.


### **5: Vehicle Registration**


This option gives you the facility to print out your vehicle registration number using up to 14 characters on your data printout. The set number is also used for identification of any uploaded stored data files when using a Ramlog, user Laptop or PC.

VA 1234

 Press Enter to enter the Required function.




  Use the up and down keys to scroll throughout the characters and numbers.


 Press the enter key to accept and move to the next character. **Note:** It is necessary to move through the full 14 characters before the unit accepts the new Registration. Use blanks as spaces if necessary .

 Once the new Registration No. is set Press the ENTER key to accept this information and return you once more to the Parameter menu.

### **6: Set Date**




DATE 1: 1:98


   Use the up,down and enter keys to set the current date. Date format: Day/Month/Year  
Note: The recorder provides automatic compensation for Leap Years

 Once the new date is set Press the ENTER key to accept this information and return you once more to the Parameter menu.

### **7: Set Time**

TIME 12: 1:15

   Use the up, down and enter keys to set the current time.  
Note: The recorder provides an automatic winter/summer one hour offset for European users


 Once the new time is set Press the ENTER key to accept this information and return you once more to the Parameter menu.

### **8: Set Sample Rate (Time between recordings)**

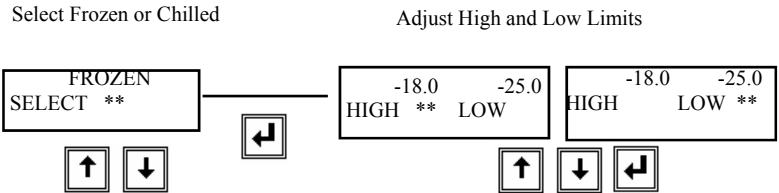
CURRENT

Use the up, down and enter keys to set the sample rate. The sample rate is the time interval between each temperature recorder reading (normally 15 mins).

 Once the new rate is set Press the ENTER key to accept this information and return you once more to the Parameter menu.

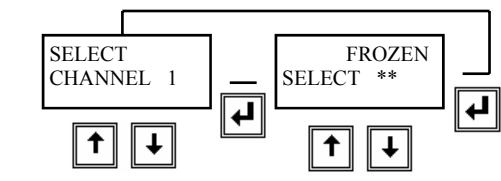
**9: Set Alarm Ranges**



The Recorder has 3 alarm levels—**Frozen, Chilled and OFF**.

**10: Change Alarm Settings**

Select the channel                      Change to Frozen



This function is used to assign each channel alarm to Frozen, Chilled or Off.  
Please note that this function is also available in the **Run Mode** by pressing the **Enter** key.

SELECT CHANNEL <EXIT>

Exit from the set-up loop using this command.

**11. Set Alarm Delay**

CURRENT ALARM DELAY 15 (mins)



Use the up, down and enter keys To set the alarm delay. The alarm

The “Alarm Delay” is the time that an over or under temperature condition must exist before it is treated as a valid alarm and flagged as such by the recorder.

This facility eliminates short term transient alarms caused by valid door openings etc. being highlighted and stored as alarm conditions.



### **13: Set Journey Start Time (Ticket Versions only)**

TIME 12: 1:15  
\*\*

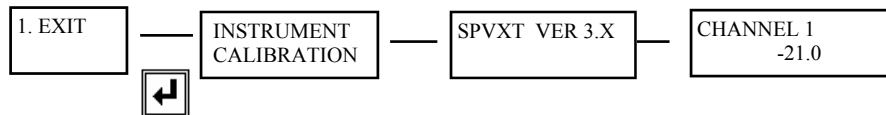


Use the up, down and enter keys to set your daily journey start time.

This facility sets the start time used for printing a Journey Ticket.

Press the Enter key to confirm

### **Run**



To return to the RUN MODE select option 1 (EXIT) and press Enter.

The recorder will perform an auto-calibration, detect which sensors are connected to it then display unit type & software version.

The system will then cycle and display all installed sensor temperatures as it monitors and records them with time

**NOTE:- THE DISPLAY LAYOUT MAY VARY BETWEEN MODELS**

### **Alarms**

#### **1. On recorders displaying only one Temperature Channel at a time.**

Should an alarm occur the display will flash 'ALARM' at the appropriate channel on the display during its normal monitor cycle.

#### **2. On recorders displaying more than one Temperature Channel at a time.**

Should an alarm occur the display will display an "\*" next to the Channel in alarm during its normal monitor cycle.

3. In Normal use it may be necessary for the driver to alter the settings of compartments from Frozen to Chilled or Off. This can be done without entering the Program menu.

To do this simply press Enter and follow the same procedure as that given under the Change Alarm Settings heading on Page 8 Heading 10.

## Scrolling Software Printout Types

Units with Scrolling software printouts are designed mainly for the long haul multi day trip market.

When the PRINT button is pressed, the unit prints out continuously either until:

1. the PRINT button is pressed & held again until the print stops. Releasing the button will allow the unit to print the "Signed Line" and then stop. or
2. If the print button is not pressed to stop the print the printout will continue to until the time and date that the Program Mode was last entered on the recorder. This enables long trips to be monitored by entering the program mode then immediately exiting to the normal run mode to set the trip start.

The example to the right gives a typical printout with scrolling software.

```
FRONT PANEL TEST
VEHICLE OSN5405
DATE 23/ 03/ 07

RECORDING EVERY 30 mins
ALARM SETTINGS :-
FROZEN -18.0 /-25.0
CHILLED 8.0 /0.0
.....

DATE 10/ 1/07
TIME 17:00
  S1  S2      S3  S4
-20.3 -9.6    1.0  12.2
  S5  S6
 19.5  31.9
TIME 16:30
  S1  S2      S3  S4
-20.3 -9.6    1.0  12.2
  S5  S6
 19.5  31.9
TIME 16:00
  S1  S2      S3  S4
-20.3 -9.6    1.0  12.2
  S5  S6
 19.5  31.9
TIME 15:30
  S1  S2      S3  S4
-20.3 -9.6    1.0  12.2
  S5  S6
 19.5  31.9
INITIAL ALARM SETTINGS
CH. 1  OFF
CH. 2  OFF
CH. 3  OFF
CH. 4  OFF
CH. 5  OFF
CH. 6  OFF

SIGNED.....
```

**Print (Delivery & Journey) Ticket Types**

Recorders with Delivery & Journey ticket style printout software are designed mainly for the short haul multi-delivery market.

In RUN mode there are 2 modes of printing, Delivery Ticket mode & Journey Ticket mode.

When the "Print" key is pressed the display will show "Delivery Ticket" .

If the "Print" key is not pressed again, after a short delay the recorder will print out a "Delivery Ticket". As shown below.

If the "Print key is pressed for a second time, immediately after the first "Print" key press the Display will change to "Journey Ticket" and immediately start printing the "Journey Ticket". See a portion of a "Journey Ticket" below.

A "Journey Ticket" prints out a maximum of 24 hours of stored data starting from the time the "Journey Ticket" was requested. If 24 hours worth of readings is not yet stored in memory, the "Journey Ticket" will stop printing at the end of the stored readings.

THE JOURNEY TICKET PRINTING CAN BE STOPPED AT ANY TIME.

Simply wait until a few temperature readings are printed out and then press the "Print" key and hold down. After a short time the printing will cease. Release the key and the printing will start up again, print out the "Signed ....." line and stop.

**Delivery Ticket**

STORM PRODUCTS  
1234567890  
Date 18/ 1/ 07  
Time 10:30

DELIVERY TICKET

**Current Values**

S1	S2	S3	S4
-20.0	-10.0	-5.0	+10.0
S5	S6		
-8.0	+16.0		

SIGNED .....

**Journey Ticket**

STORM PRODUCTS  
1234567890  
Date 18/ 1/ 07  
Time 10:45

JOURNEY TICKET

Recording every 15 mins  
Alarm Settings:-  
Frozen -18.0 / -25.0  
Chilled 8.0 / 0.0

DATE 18/ 2/ 1

TIME 10:40

S1	S2	S3	S4
20.0	-9.7	-5.0	-20.0
S5	S6		
-9.7	-5.0		

TIME 10:25

S1	S2	S3	S4
20.0	-9.7	-5.0	-20.0
S5	S6		
-9.7	-5.0		

TIME 10:10

S1	S2	S3	S4
20.0	-9.7	-5.0	-20.0
S5	S6		
-9.7	-5.0		

Journey Start 6:00

SIGNED .....

## 12: Print All Data & Print Back From

Select Item 12. on Menu “Print all data” by pressing the ENTER key.



The display will show the start and end dates stored in the memory.

For example: From 29/05/07  
To 29/08/07

### PRINT ALL DATA

If a print out of the whole memory is required simply press the ENTER key 3 times to step through the “From” date without changing the initial “From” date. Press the ENTER key again and the recorder will begin to print out the whole of the data held in memory.



### PRINT BACK FROM

To print back from a selected part of the data stored in memory press the ENTER key once to select the Day Setting function and use the Up/Down keys to set the Day number. Once the Day is set press the ENTER key to enter the Month setting and repeat the Same procedure to set the required Month and Year. After the Year is set press the ENTER key again to start the print.



To STOP the print at any time, wait until at least 4 lines with temperatures have been printed then press and hold down the ENTER key until the printing stops and then release the return button.



The printer will start up again and print out the “Signed .....“ line and then stop completely.

Once the required printing is complete the display will show 1. Exit. Press the ENTER key to exit the menu. The unit will initialise, show the firmware revision number and then revert to normal Operation showing temperatures and times.



### Portion of Typical Printout

```

DATE: 18:11:06
VEHICLE: J123ABC

RECORDING EVERY 15m

ALARM SETTINGS:-
FROZEN -18.0 / 25.0
CHILLED 18.0 / 0.0
.....
CH 1 CHILLED
CH 2 FROZEN
CH 3 OFF
CH 2 OFF

12.25
S1   S2   S3   S4
12.2 -1.8 -8.9  7.5
12.40
S1   S2   S3   S4
12.2 -1.7 -8.6  7.0
12.55
S1   S2   S3   S4
12.3 -1.8 -8.6  7.0

SIGNED.....
    
```

## 5. INSTALLATION

Open the recorder box and inspect the

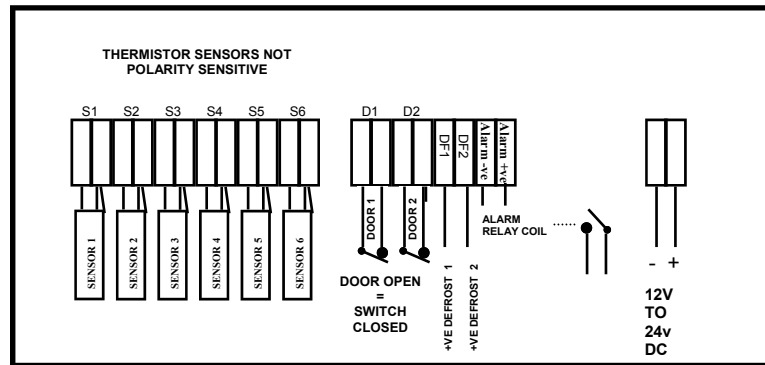
ITEMS	QUANTITY
Sensors Lengths as Supplied	2
Power Supply Cable	1
Printer Paper Roll	1
Installation Kit (VIRGO ONLY)	
M6250 Rubber Rawlnuts	4
M6-40 Bolts	4
M6 Washers	4
Fuseholder & 3A fuse	1
Heatshrink Sleeving	1
Warranty Card	

### Installing and using the Recorder

**Before proceeding please ensure you read the following:-**

- In accordance with normal good Engineering practice, ensure that recorder sensor cables are routed away from High Voltage cables and other cables such as Radio Antennas by a minimum of 30cm. Do not bundle sensor cables with those of other appliances.
- The sensor used for the return air should be located as close as possible to the unit return air sensor.
- Ensure that you fit the 3A in-line fuse. This should be connected directly to the battery to ensure protection of the supply cable. The recorder is protected by it's own internal fuse. (3A)
- Ensure that the sensor screens are connected to 0V as shown in the wiring diagram which is provided with the recorder.
- The recorder identifies the number of sensors that are connected only after **the initialisation process has been performed. See Page 4 for details. If the recorder, for example, fails to see some sensor values or displays -39.9C in positions where no sensor is fitted, on first switch on, please remember this requirement**
- If a sensor is not connected correctly or the cable is open circuit, the message -39.9 is shown and the value will be recorded.
- Exposed cables between the rear box chassis and the cab on rigid vans should be protected from chaffing using suitable split trunking.

## SPV6M/P Wiring Diagram (Virgo M & P)



### Notes:

1. A switched dc voltage output is provided at the "Alarm+ve and Alarm-ve" terminals for use with driving external alarm circuits.

*In an Alarm condition the "Alarm-ve" terminal switches to -ve Battery Volts whilst the "Alarm+ve" terminal is held permanently at +ve Battery Volts.*

Use an Alarm Relay with Coil Operating Volts = Volts on battery input terminals.

\*\*For polarised coils connect the positive end to "Alarm+ve"\*\*\*

**Maximum Permissible Alarm Terminal Load Current = 1A dc max**

2. The "Defrost" inputs expect a positive input of 12 to 24 volts dc to be switched to the "Defrost" inputs to advise the recorder when the fridge unit enters a defrost cycle. This may require the use of an external relay to provide this signal.

### Fitting

On Virgo units fit the recorder on the external front bulkhead below the fridge unit on trailers. Ideally on the nearside, using the M6250 rubber rawlnuts as supplied.

Due to the large choice of locations and fixing locations inside cab's no standard fixings are supplied with in cab units except the cage fixing on the 'R' unit

All recorders will have at least 2 probes (the shorter probe is for return air). Route the probes up the inside of the bulkhead adjacent to the unit frame using plastic trunking. Drill through the bulkhead using a 12mm drill and feed the probes through to the inside of the body.

Once the probes are inside, position the return air sensor as close to the unit return air control sensor as possible.

Run the air sensor probe down the body following the bulkhead to roof joint for 3/4 of the way down the Trailer. Then bring the probe out at a right-angle to the centre of the Trailer and fix the sensor in the air flow from the evaporator. Enclose both sensor cables with plastic trunking. It is envisaged the trunking and the probes will be fitted at the same time.

**Paper & Ribbon Set-Up(VIRGO)**

**Refer to fig 1**

- Remove Printer cover by turning the cover locking button 1/4 turn in any direction
- Pull off cover

**Refer to fig 2**

- Remove printer ribbon, if required, by lifting off
- Hinge up printer mechanism to reveal paper bin
- Fit new paper roll in paper bin with free paper end at bottom

**Refer to figs 2 & 3**

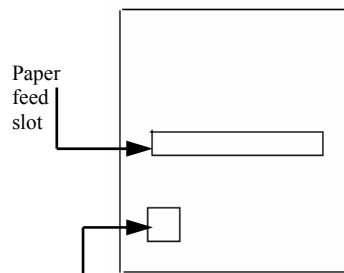
- Push free end of paper into feed slot on bottom of printer mechanism and feed Paper through the paper slot. Press the **Print** button on the recorder to drive the paper. Press **Print** to stop the printer when approximately 5” of paper is exposed  
Drop printer mechanism back in place and replace printer ribbon if previously removed, ensuring that paper is fed through the centre of the ribbon aperture

**Refer to fig 1**

- Feed paper through end slot in printer cover and refit cover by pressing firmly into position
- Lock cover by pushing in cover locking button
- Check operation of paper feed by pressing the Print button on the recorder .Press Print again to stop printing when you are sure that the paper is feeding correctly.
- Your printer is now ready for use.

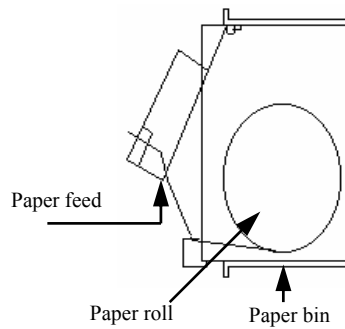
**Fig 1**

**Printer Front View**

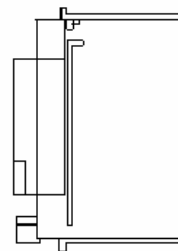


**Fig 2**

**Paper Path for Printer**



**Fig 3**



## Fault Finding

Fault Description	Cure
Display blank	<ol style="list-style-type: none"><li>1: Check voltage to unit,. Volts should be DC and between 9 and 32 volts. If no power check 'in line fuse and cabling.</li><li>2: Check the polarity of the supply. The recorder is protected against reversed connections but will not power up. Check the positive side of the supply is on the +ve connector pin. See page 14.</li><li>3: Try switching off the power, wait for 20 seconds and then reconnect.</li></ol>
Sensor position displays & prints 39.9 (sensor open circuit)	<ol style="list-style-type: none"><li>1: Check if sensor connected. If not add sensor.</li><li>2: Disconnect sensor &amp; measure resistance across leads (+20°=30kΩ, 0°=100kΩ). If sensor reads open circuit (high value &gt;300kΩ) check for cut sensor cable.</li></ol> If sensor values ok, <b>unit appears faulty</b> check by fitting known good sensor.
Sensor position displays and prints -49.9 (short circuit sensor)	<ol style="list-style-type: none"><li>1: Disconnect sensor , unit should now read -39.9.</li><li>2: Check terminal block wires and screen cables are not shorted</li><li>3: Check recorder using known good sensor, if unit ok replace with full length new sensors or use Storm's Waterproof Sensor repair kit.</li></ol>
Unit shows 39.9 in unused Channels or does not show sensors in used Channels .	<p><b>The unit needs initialised.:</b> Enter the Program Menu by pressing the two "up/ down" keys simultaneously and release. At "1. EXIT" on the display, press the ENTER key to exit the menu. During the recorder's return to the RUN mode it will scan the connected sensors , initialise and resolve these problems, provided the required number of good sensors remain connected during this procedure.</p> <p><b>Always use the lowest numbered sensor positions on the terminal block.</b> For example : For 1 sensor use position S1 for 2 sensors use positions S1,S2, for 3 sensors use S1,S2,S3 for 4 sensors use S1,S2,S3,S4 etc</p> <p><b>Note: The recorder assumes that there will always be at least one sensor fitted. If no sensors are fitted the recorder will operate as though there was 1 sensor fitted and show 39.9 (open circuit) on Channel 1.</b></p>

## Replacement parts

### Virgo

Sensors	HS10/150-XX where XX = Length 5,10,15 or 20 Metres
Sensor repair kit	HS10/150-RKIT
Front panel	PI100143STK
Complete	
Printer only	PL100142K
Paper roll x 10	User Kit 2R
Printer Ribbon x 5	User Kit 4R
Main PCB Metal box scrolling	PL100157K
Main PCB plastic box scrolling	PL100157PK
Main PCB Metal box ticket	PL100157TK
Main PCB plastic box ticket	PL100157PTK

### R unit

Sensor repair kit	HS10/150-RKIT
Paper roll x 10	User Kit 2R
Printer Ribbon x 5	User Kit 4R
Recorder units	Factory repair only



## **READ ME**

Clyde Valley Control Systems Ltd. reserve the right to make improvements in the products described in this manual at any time without notice.

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