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Users Manual for the WetCorr Instrument

Tron Danielsen and Jan F. Henriksen

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Users Manual for the WetCorr Instrument

1 Introduction

Most descriptive models of material damage due to atmospheric pollutants include time of wetness as an important parameter. This parameter is often estimated from relative humidities but measurements are to be preferred.

Two prototypes of time of wetness recorders have been developed and built at Norwegian Institute for Air Research (NILU). These instruments have been in use in Norway and abroad during the last ten years.

WetCorr is a complete system designed to measure and display important parameters relating to atmospheric corrosion. This user guide is for the existing version of the WetCorr instrument. It is aimed at trained PC users, however, please do read the manual before operation of the WetCorr instrument.

2 About this manual

This manual briefly describes the features of WetCorr. It explains how to set up the system, the lay-out of the instrument and how to use the different options.

This manual assumes that you are familiar with basic terminology and procedures for using Microsoft Windows 3.0.

2.1 User Guide Organization

This handbook is divided into the following parts:

- *Application of the system.* Describes the different components and lay-out of the instrument.
- *Communication to the System Controller.* Describes how to operate and communicate with the instrument by means of a PC locally and/or over a modem.

2.2 Notational Conventions

The following conventions are used to distinguish elements of the text:

10 pt. Helvetica is used to show text which appears on the screen e.g.

C: />PASSWORD:

BOLD, ALL CAPS, is used for commands and program names. These must be typed exactly as they are presented in this manual e.g. **PCPLUS**.

<S>ITE

File Open

BOLD or OLD all mean that either of the marked characters or the full command may be used.

3 Application of the System

The lay-out of the system is shown in the large figure, Figure 1 below.

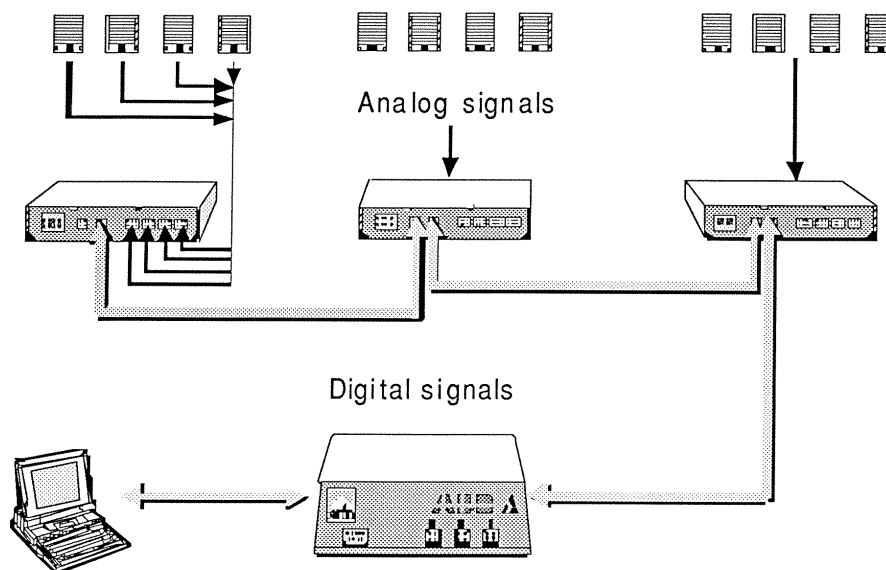


Figure 1: Illustrated application of the system.

The WetCorr system consists of one System Controller SC with up to 16 Sensor Adapters SA each equipped with up to 4 measuring cells or sensors.

3.1 The Measuring Sensor

The sensor is a small gold plated printed circuit as shown in Figure 2. The sensor is delivered with a protective tape which must be removed before use.

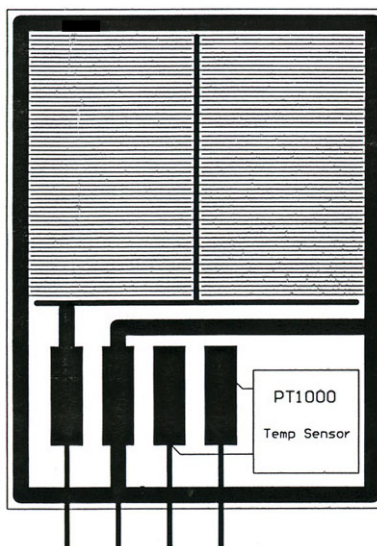


Figure 2: The measuring gold sensor. The sensor measure temperature and current.

The sensor should also be conditioned before use. Place all new sensors on an appropriate mount at 45 degrees angle. Expose the sensors to open air and allow two to three rain events at the actual site where measurements are to be performed. A layer of deliquescent salt will be formed and will make it possible to define and calibrate the wetness current response.

The “leakage” current flowing through the cell is dependent of the grade of wetness and contamination of the sensor surface. This current is converted to a digital signal along with the temperature of the sensor surface. The SA values are collected and store by the SC. All communication and collection of data from the SC is done by means of a PC.

Experience from practical use has shown that the sensors should be glued to the material surface. Silicon cement or double coated adhesive tape is recommended. If the sensors are not fixed to the surface, rain may pass the sensor and the run-off may not be recorded by the sensor.

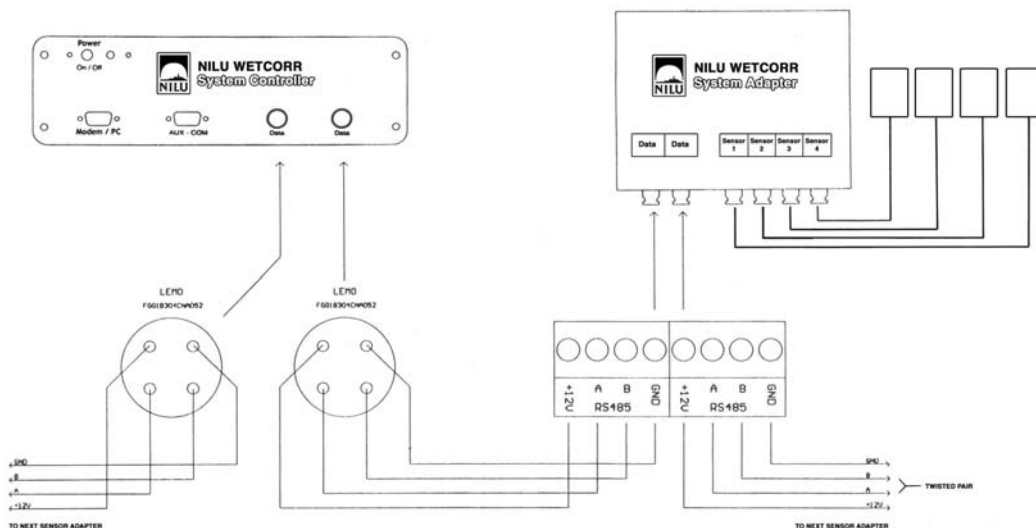


Figure 3: Schematic set up of the WetCorr system.

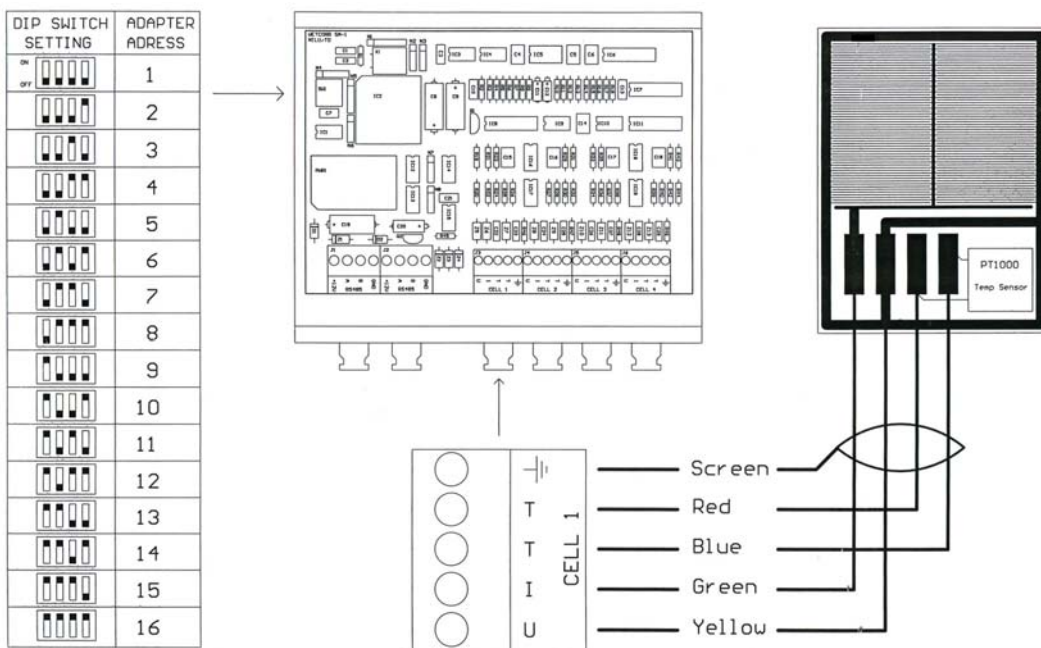


Figure 4: The set up for connection between the WetCorr sensor and the SA and the Dip Switch settings for the adapter addresses.

3.2 Set up of the system

The set up of the system is shown in Figure 3. Keep in mind that unused inputs may give erroneous signals in rainy weather. It is recommendable to seal the unused input nipples.

The interface cable between SA and SC is screw connector. Several SA's can be daisy-chained. Each SA has 4 Dip switches to define the unique SA-address. See Figure 4. This means that the SC will sort the data correctly independent of where the SA is placed in the chain. It is, however, up to the user to take notice of such details to aid the data processing.

The SA is intended to be placed close to the measuring sensor and is constructed for outdoor use. It is recommended to use screws to fasten the metal plate at the back of the SA to a suitable surface.

4 Communication with the System Controller (SC)

The SC has a RS-232C serial interface port. The SC is set up with a baud rate of 9600, NO parity, 8 data bits and 1 stop bit.

All communication and collection of data from the SC is done with a PC. The PC must have an ANSI terminal emulating program. Datastorm Technologies' **PCPLUS** or Microsoft's **TERMINAL** under **WINDOWS** are two such programs. Please refer to **PROCOMM+** User's manual for installation and use pf **PCPLUS**.

4.1 Main Menu

Initiate **PCPLUS** from *C:/PCPLUS*> by typing **PCPLUS** and pushing <ENTER>.

If you are connected to the controller, PCPLUS initiates your modem, and a message appears:

Press any key to enter PCPLUS Terminal mode.

Set the communication parameters to 9600 baud, no parity, 8 data bits and 1 stop bit on COM1. (9600, N, 8, 1).

If the system Controller is connected and you have the correct settings, the following menu will appear:

PASSWORD:

Enter your password, or push <ENTER> for none.

```

                                     Site number and name
-----|-----
****      MAIN MENU      9500 WETCORR NILU      TIME: 911122 1650
                                     ****
-----|-----
LIST      :      LIST SENSOR ADAPTERS
DISP      :      DISPLAY 1 MINUTE DATA FROM SELCTED SENSOR
                                     ADAPTER
LCON      :      LIST SENSOR ADAPTERS CONNECTED

CONFIG    :      SYSTEM CONFIGURATION
SITE      :      EDIT SITE
TIME      :      SET DATE AND TIME
HELP      :      RETURN TO THIS MENU
>

```

4.2 Menu List

The commands:

- LIST : will display and download the collected data from the selected sensor adapter, SA (01 to 16) for the time period selected.
- DISP : displays on-line data from the selected SA (01 to 16) every minute.
- LCON : displays the number of connected SAs (sensors adapters).
- CONFIG : displays which SAs that are connected. You will be prompted to select the sampling interval and cell voltage for each SA.
- SITE : edits the site number and name. E.g. 9500 WETCORR NILU.
- TIME : edits the date and time settings.
- HELP : returns to the main menu.

4.2.1 Site number (SITE)

The site number refers to a specific measuring site. Change of site leads to a change of site name and number. You are recommended to do this each time you change site for the System Controller.

To change the site number and name type <S>ITE and hit <ENTER>:

```
SITE : 9500 WETCORR NILU      SITE OK ? : Y/N
```

E.g.: To change site number and name:

```
SITE : 9500 WETCORR NILU      SITE OK ? : N
SITE : 8540 WETCORR TEST
```


9500 WetCorr NILU means that the site number 9500 was used when the controller collected data at NILU, and then when another test is performed, the site number and name is changed to 8540 WetCorr TEST.

4.2.2 Parameter setting for data sampling (CONFIG)

Always configure the SC and select the sampling interval and cell voltage before you begin to collect data.

WARNING!

Remember to download the collected data to file before changing the parameter settings. The collected data will be erased once you change the sampling interval or the cell voltage.

Type **<C>ONFIG** and hit **<ENTER>**. The following message appears:

```
THIS COMMAND WILL ERASE LOGGED DATA
DO YOU WANT TO DO THIS? Y/N
```

Type **Y** and hit **<ENTER>**, and you will be prompted to select the sampling intervals and the cell voltage for each connected SA:

```
SENSOR ADAPTER 01 · 01 MINUTES 0200 mV SETTING OK? Y/N
```

Legal sampling intervals: Selectable from 1 to 60 minutes (1, 2, 3, 4, 5, 6, 10, 15, 30 or 60)

Cell voltage: 0-2 V (Recommended value 100-200 mV)

The selected settings apply to all cells connected to this particular SA.

4.3 Collection of data by using PCPLUS

Follow this procedure for each connected SA:

1. Go to the main menu by hitting **<ESC>** or type **<H>ELP**
2. Type **ST** and push **<ENTER>** to list the collected data for the selected SA:

```
SELECT SENSOR ADAPTER (01-16): 01
```

3. Hit **<ENTER>** and following menu will be displayed:

```
LIST SENSOR ADAPTER 01          9500 WETCORR NILU
DATA LOGGED FROM:      911122  1057
TO:                    911122  1700
LIST DATA FROM:      911122  1057      (Ref. 4.2, pt. 3)
TO:                    911122  1700
```

4. Choose date and time period to list.

In this example the logged time period is from 10:57 on November 22 1991 to 17:00 on the same day. The same period is selected for listing.

5. Hit **<ENTER>**:

STOP ON FULL PAGE? Y/N

6a) To view data:

Type **Y** and hit **<ENTER>**. A table of data appears on the screen:

Date	Time	Cur1	Tmp1	Cur2	Tmp2	Cur3	Tmp3	Cur4	Tmp4
911122	1057	100	234	89	221	76	210	119	249
....	and	so	on						

This listing stops on full page. Hit **SPACE** or **N** for **NEXT** to view next page. If you want to view the previous page hit **P** for previous.

6b) To download data to file (Log on/off):

Type **N**, but before hitting **<ENTER>** follow this procedure carefully:

Turn on file logging by:

Pushing **<Alt+F1>** (This is a toggle function).

To log file on/off use the **PCPLUS <Log on Log closed>** command, **<Alt+F1>**. This command allows you to log everything appearing on the screen while you are connected to the PC. (See Procomm Plus User manual).

PCPLUS asks for the name of the log file:

E.g.: A:\9500SA01.TXT means Diskette drive A, Site number 9500 Sensor Adapter 01.

Hit **<ENTER>** and PLPLUS displays *LOG OPEN* on the status line.

All output to the screen will now be recorded to this file.

7. Hit **<ENTER>** and data for SA 01 will be logged.

The file name appears as a text on top of the file.

9500SA01									
911122	1057	100	234	89	221	76	210	119	249
... and so	on								
911122	1700	320	323	313	210	298	199	342	238

8. When finished logging data for SA 01, turn off file logging by pressing **<ALT+F1>**, which is shown by *LOG CLSED* appearing on the status line.

9. Repeat the procedure 1-8 for each SA. (**E.g.** SA 02: a:\9500SA02.TXT.)

When you have completed the file storing of the collected data, you can proceed with data processing.

Appendix A

Technical information of the instrument

Characteristics of the instrument

The instrument is module-designed with the following parts:

- ❖ 1 System Controller (SC)
- ❖ 1-16 Sensor Adapters (SA)
- ❖ 1-64 Sensors

Each Sensor Adapter can control and record signals from four sensors.

The instrument is designed to measure the wetness at selected sites within a distance of 250 meters from the SC.

The characteristics of the parts of the instrument:

System Controller (SC)

- Controller unit for communication between the SA and SC. SC is also the centre for external communication to a PC directly or through a modem.
- Gives power to the sensors and SA.
- Sampling and storing unit for all measured data.

Technical data

Size	Approx. 280 x 260 x 90 mm
Capacity	Max. 16 SA with 164 sensors
Max. length cables	250 m
Working supply	12 V DC
Communication	PC / MODEM
Memory size	1 Mbyte
Selected sample intervals	1,2,3,4,5, 10,15, 20, 30, 60
Applied sensor voltage	0 to $\pm 2V$

Sensor Adapter (SA)

- ❖ **Adapter unit for max. four sensors**
- ❖ **Measures temperature and current as an average over the sampling period**
- ❖ **Convert temperature and current measurements to digital signals**



Size	170 x 145 x 50 mm
Capacity	4 sensors for each SA
Max. length of cables	2 m
Measuring range	0 - 400 μA
Lowest resolution	0,1 nA
Resolution	\pm 1% of measured value
Precision	1% or better
Data communication	RS 485 (2400 bits/s)
Power supply	9-15 V, ca. 30 mA
Operation condition	Rain proof and -28 to +85C

Sensor

❖ Measure temperature and current flow (TOW)

Technical data Time of wetness sensor:

Size	30 x 23 mm
Gold thickness	1.5 μm +0,25 μm
Insulation gap	127 μm +2 μm

Temperature sensor

Type	Pt - 1000 (glued to the TOW sensor)
Temperature range	-28 to +105 °C
Accuracy typical	$\pm 0,2$ °C

