Data Logger Mitec SatelLite -U

Manual

Data Logger SatelLite-U

Manual

This manual is valid for instruments with program version 2
and for other versions in applicable parts.
We reserve the right to make technical improvements and changes.
Document No. B10004 Rev. A

Mitec Instrument AB

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Contents

Data Logger Mitec SatelLite

Mitec SatelLite professional Data Logger.

This is the manual for the Mitec 1-channel data logger SatelLite.

SatelLite is designed to satisfy high requirements regarding quality and handling. The instruments in the SatelLite family are encased in sturdy aluminium casing. The sensors are connected via a 6-pole gold plated connector and setup and reading is performed from a PC provided with a Mitec program. The likewise built-in crystal clock is provided both with time and date and can be started and stopped at the desired time.

Unique battery operation

The built-in electronics is powered by one single standard 1.5 V battery. The cost of batteries is thereby reduced to one tenth, compared to the cost of the special Lithium batteries used by similar instruments of other makes. The power consumption is very low and one battery can last over a year, all strongly depending on how the measurements are performed.

Universal inputs

SatelLite-U has inputs for different types of signals and sensors. Signal type is selected by connecting the appropriate signal cable to the connector. The instrument recognise the cable and adapts itself.

Signal types handled by SatelLite are DC voltage, DC current and pulses (contact closure and active DC-pulse).

The programs from Mitec automatically assigns the data with sensor and instrument ID for complete and full traceability in accordance with the requirements as stated in ISO 9000.

Large memory

SatelLite is delivered with a built-in data memory that will not lose its information when the battery runs out. Three different memory sizes are available for, 4.500 or 20.000 measured values.

Made in Sweden

SatelLite is part of the Mitec system for professional collection of measured values. Measured data can be analysed with one or the other of our programs for Windows, WinLog or Monitor. These two programs can also be used for other Mitec products. A choice of additional products are available as accessories.

Mitec is a Swedish company. SatelLite is designed and manufactured in Säffle, Sweden.


SatelLite-U
Universal Logger
Sno: 1385
32k X
mitec
Battery: LR6 1,5V
Made in Sweden by Mitec Elektronik AB
VARTA
energy
2000
ALKALINE

Quick Start

First Attempt

The easiest way to learn SatelLite is to start by reading through this manual and then make a test measurement.

If you want to start directly with a measurement you can do this by following the instructions on this page.

What is needed

To carry out a measurement you need:

- Data Logger SatelLite-U, signal cable and a cable for PC-connection.
- Program WinSat, WinLog or Monitor (version 1.51 or later).

Connect the battery

Check that the battery is fitted in the instrument.

Sensor

The signal cable is connected to the 6-pole connector.

Start with WinSat

There is no ON/OFF key. In standby position the instrument uses very little power. The green LED in the contact flashes when the instrument is in operation. Start the measurement with any of the programs WinLog, Monitor or WinSat.

See below and also the short description of the WinSat program.

THE MANUAL

This manual has four main parts. By all means, do a **QUICK START** but then read through the chapter **BASICS**!

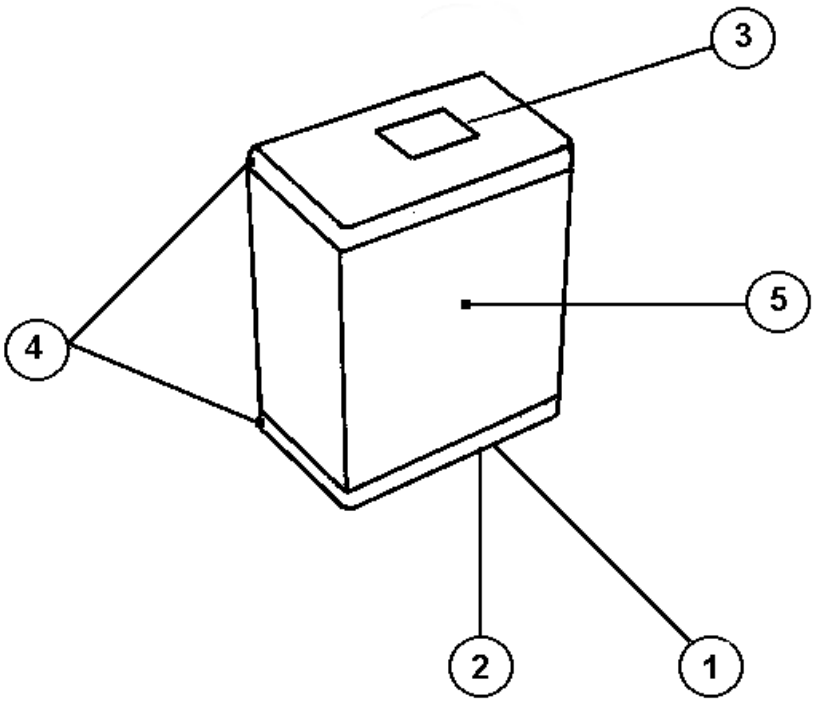
"Quick Start" provides a brief information for those who want to start with practical measurements and that way learn how to handle the instrument.

BASICS and **HANDLING** will give you the necessary basic information you need to know in order to handle the instrument correctly. These parts of the manual are a must to read.

ADDITIONAL INFORMATION includes descriptions of various items and can be read as needed.

Basics

Main Parts



1.. 4-pole connector for computer connection.

2.. Flashing green LED shows when activated

3.. 6-pole connector for input signals.

4.. Removable endpieces.

5.. Aluminium casing

Power Supply

SatelLite is designed and constructed for portable use.

Internally it operates with a power supply of 5 V. The primary power supply unit is a common 1.5 V battery.

It has a non-volatile memory and will retain its information even when the battery runs out.

Battery replacement

We recommend a 1.5V alcali battery of type IEC 6LR6. The battery is mounted to a holder inside the casing.

- Remove both end pieces.
- Extract the circuit card from the casing.
- Install a new battery. **NOTE! Turn the battery the correct way!**
- Put the circuit card in the lower end piece (the one with the 4-pole connnector).
- Pull the aluminium cover over the card and snap fasten it to the end piece.
- Snap fasten the top end piece to the aluminium casing.

The LED shall flash three times when the battery is snap fastened to the holder.

A battery that is *temporarily* inserted incorrectly will not harm the instrument. However, after a while the protective circuit will burn off and this can cause serious permanent damage to the instrument. Therefore, always check that the battery is inserted the correct way.

Power consumption

In standby position SatelLite has a very low power consumption. During measuring the consumption will increase. The magnitude of the increase will depend on selected registration interval, measuring frequency and how often data is tapped from the memory. A normal life time for an alcali battery type LR6 is 1 month to 1 year.

See further information below.

Weak battery

SatelLite continuously monitors the condition of the battery and will tell you in the program when it needs replacement.

NOTE! Disconnect the cable to the PC when it isn't in use. The power consumption from the battery in SatelLite increases when it is connected.

Different types of batteries

SatelLite only uses a so called 1.5V Pen Light battery (size AA, 14 x 50 mm). This type of battery is both inexpensive and common and can be bought practically everywhere.

We recommend an alcali battery type IEC LR6 as it has a high capacity.

However, do note that even alcali batteries have different capacities. Some of the cheaper types have a capacity that is as low as approx. 1800 mAh. Try to select a battery type that corresponds to the types indicated below.

We recommmend:

Duracell MN1500 with a specified capacity of 2700 mAh

Varta 4006 with a specified capacity of 2500 mAh

At low temperatures the capacity decreases and in these cases we recommend 1,5 V Lithium batteries for expample *Energizer FR6.*

Common dry batteries type IEC R6 can also be used, but they do have a life time that is less than half of the alcali batteries. We do not recommend use of the brown stone batteries due to their short life time.

You can also find NiCd batteries in this size, but again we do not recommend that you use them. One of the reasons is that they are a potential hazard to the environment and the other reasons are their poor capacity and relatively high cost.

Calculation of battery life time

The Mitec programs WinSat, WinLog and Monitor are used for the programming of SatelLite.

During the programming you also state the capacity of the selected battery. If the battery is new you state the capacity as indicated on the battery. If the battery is used you must estimate the remaining capacity.

The program will then calculate expected life time on the basis of how the instrument is setup and will indicate how many days it will last. This calculation is based on the assumption that the capacity will not fall due to e.g. low temperature.

Do note that the stated capacity is valid at room temperature. The capacity drops at low temperatures. This is especially important to note with brown stone batteries as they are quite unsuitable for use in temperatures below zero.

When the instrument is reprogrammed, the program will remember the consumed capacity in the battery and will take regard of that when a new calculation is made.

However, if you remove the battery this information will be lost and you must yourself estimate how much of its capacity is left. The program will automatically discover that the battery has been removed and will alarm for this.

If the battery runs out of power while measuring you will not lose the measured data, they can be read when a new battery has been installed.

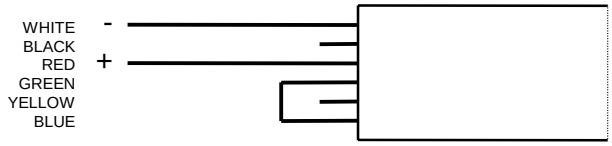
Sensor

Signal cables

Different signal cables are available as accessories:

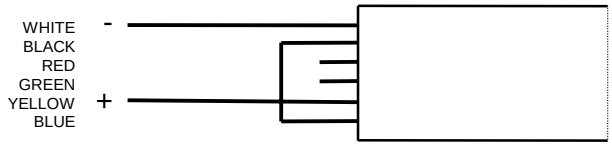
MS-UD101	0-1V DC.
MS-UD102	0-10V DC.
MS-ID100	0-20 (4-20) mA DC.
MS-DP100	Pulse (max 4 Hz). Contact closure and 4-24V pulse.

MS-UD101. 0-1V DC



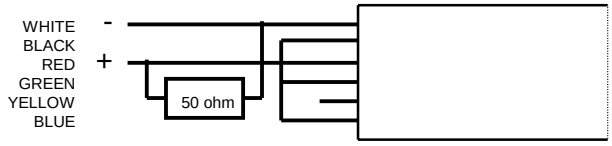
Signal cable

MS-UD102. 0-10V DC



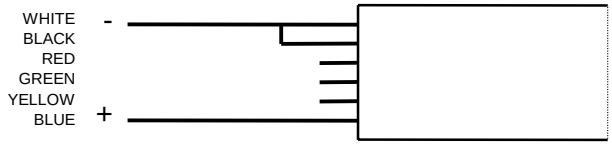
Signal cable

MS-ID101. 0-20 mA DC



Signal cable

MS-DP100. Pulse



Signal cable

Automatic input adaptation

The signal cables is connected via a 6-pole gold plated modular connector. SatelLite recognise the cable type by identifying the wiring *(See above).*

When the cable is connected the instrument adapts itself automatically and use the appropriate scaling. Information (measuring range and sort) concerning the input, is stored with the measured data and transferred to PC for presentation.

This unique feature makes SatelLite-U very flexible and the same instrument can be used for different measurements.

SatelLite-U can be used for many different sensors and instruments with an output signal, for example pressure transmitters, water meters, CO2-meters, humidity sensors, and all industrial transmitters with an 0-20 (4-20) mA signal.

The PC software WinLog and Monitor has built in functions for scaling and adaptation of diagrams, while the smallest program WinSat is fixed to the cable used for the application.

Note! Do not connect PC and sensor at the same time. The inputs are not galvanicly isolated and measurement as well as data transfer may be disturbed. Also the instrument could be destroyed if the voltage between PC COM-port and signal input are to high.

Unplug the sensor cable when the PC is connected.

Start of the instrument

The instrument is ready for use as soon as the battery has been connected. SatelLite has a very low power consumption in standby position and therefore has no power switch.

Resetting to zero after a battery replacement

As soon as supply power is connected SatelLite will automatically perform a resetting to zero. This is acknowledged by three flashes from the LED.

The instrument is now ready for use but not before certain configuration has been carried out with help of the PC program.

Please continue your reading under ”*Handling”* below.

Handling

Setup and Readings

Use the PC

All setup and readings on SatelLite are made from the PC. Mitec provides three different programs. Programs with **version 1.51** or later has to be used.

SatelLite is connected to PC via Mitec LPC-7 cable.

Note! Do not connect PC and sensor at the same time. The inputs are not galvanicly isolated and measurement as well as data transfer may be disturbed. Also the instrument could be destroyed if the voltage between PC COM-port and signal input are to high.

Complete series of PC programs

WinSat is specially made for SatelLite and only includes the basic functions.

WinLog is the standard Mitec program for communication, analysis and calculation and it can be used with all Mitec data loggers.

Mitec Monitor is the most advanced program and includes XY-diagrams, macro functions, modem communication, etc.

All programs are in the English language with manuals in English and support from Mitec.

Below we show only the functions in the programs that concern SatelLite at setup and checking. We refer you to the manual for each program regarding analysis of the measured data.

General information about program setup

The programs use somewhat different methods for ”Setup” but the functions all look alike when you start them up. Below we introduce the common parts.

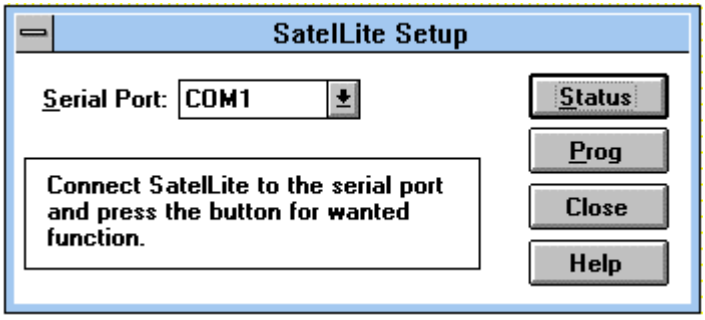
See further on in this manual for information about the installation of the WinSat program.

SatelLite Setup

The first box that is shown provides two choices, Status and Programming.

Status is used to show the configuration of the instrument and what will happen when **Prog** is used for instrument setup.

Optional communication port can be used.



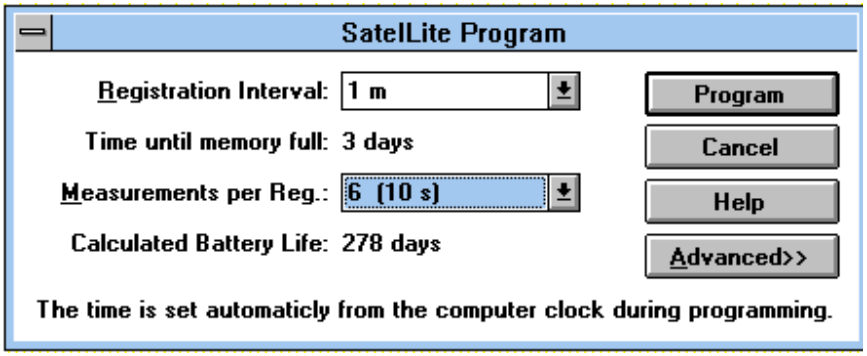
Status, general

When the ”STATUS” key is depressed you can see configuration and operation of the instrument.

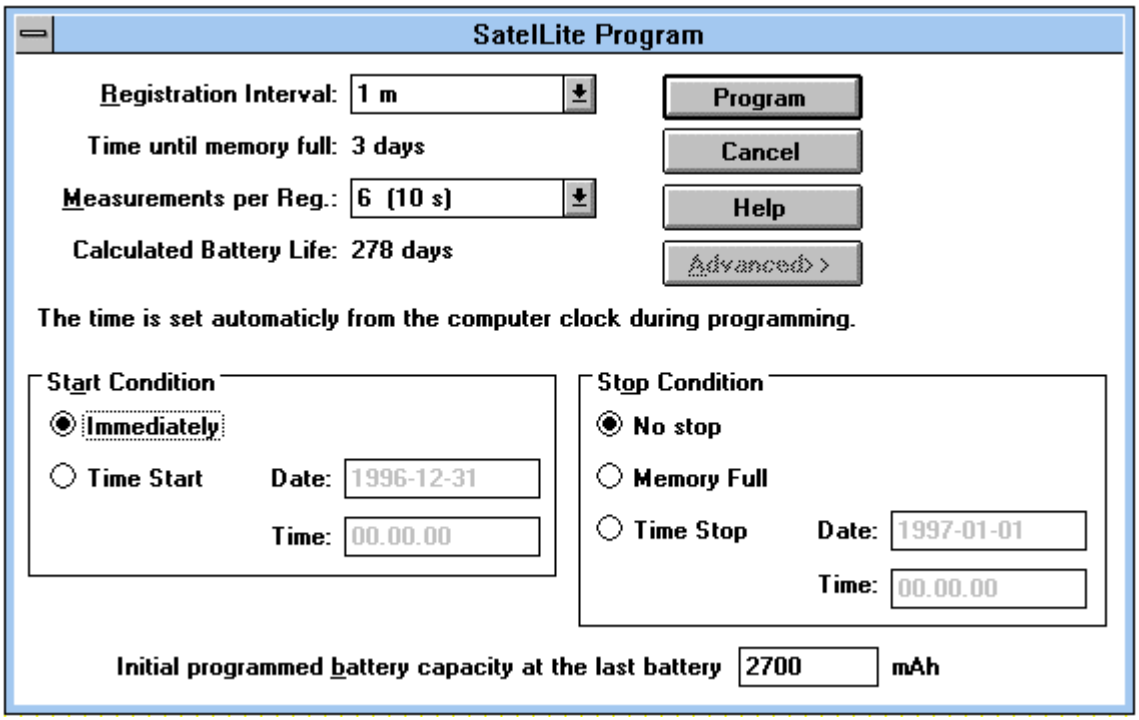
Also see chapter *”Checking of Activity”*.

Programming, general

If you instead of status select ”PROG” the box below will be shown.



Further functions can be reached if you depress the ”ADVANCED” key.



You can now do the desired settings. See below for a closer description.

Set Date & Time

The clock is one of the more important parts of the data logger. The quarts crystal clock in SatelLite can show year, month, day, hour, minute and second.

The clock is read and adjusted from the PC-program.

SatelLite Setup

All configurations are performed under this function. Every time a new configuration is done the clock is also set.

The program reads the actual time in the PC and loads this information to SatelLite.

Therefore, make sure that the clock in the PC shows the correct time!

THE CLOCK

The clock is controlled by a quarts crystal and its accuracy is similar to a common wrist watch, i.e. the variation in error can be between a few seconds up to approx. 1 minute per month.

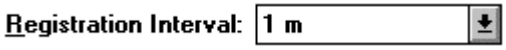
Setting of Registration Interval

The registration interval (the storage interval) is the time taken between two storages of measured values in the logger memory.

Setting of registration interval

- Select SatelLite Setup
- Depress the Prog key.

  The programming box (see above) is shown.



Select registration interval from the scroll bar.

Store the settings

Store the settings by pressing PROGRAM or make additional settings in the ADVANCED menu. Choose number of measurements for a registration.

What is a registration interval

The principle for a data logger (measured value sampler) is that it automatically makes measurements and stores these in its memory for later reading.

A basic function is the registration interval, the time lapse between two storages in the memory. (Compare with the speed of the paper on a line printer).

The table below shows available registration intervals.

Interval	Interval	Interval
0.25 s	1min	1 h
0.50 s	2 min	2 h
1 s	5 min	4 h
2 s	10 min	6 h
5 s	15 min	8 h
10 s	30 min	12 h
15 s	--	24 h
30 s	--	--

How is a registration performed

The registered value is the mean value from a number of measurements. The number of measurements performed can be selected when programming. The alternatives are those shown in the scroll bar in the programming box.

What interval shall be chosen

Mainly two factors determine what interval to choose.

The process time constant i.e., the most important one is how fast the input signal varies. To get a reasonably representative picture of the variations in the input signal you must make sure of at least two storages per period. The period time is defined as the time lapse between e.g., two max values (or min values) in a varying signal.

Available memory is also of great importance. For every measurement you must make an estimate of the time required to fill the memory.

How data is stored in the memory

SatelLite normally has sufficient space for approx. 5.000 measured values and can be extended to accommodate approx. 20.000 measured values.

When the memory is full the oldest values can either be discarded and replaced by a new value (standard condition) or the measurement can be stopped. This is determined during the programming. See chapter ”Automatic Stop of Measurement”.

When is the memory full

The influencing factor here (apart from the memory size), is the registration interval.

NOTE! The available memory is not exactly 5000 values, it varies somewhat due to the configuration.

The tables below show the time it takes to fill the memory. With memory size 20 000 the times stated below will be quadrupled.

Interval	Time to fill memory	Interval	Time to fill memory	Interval	Time to fill memory
0.25 s	20 min	1min	3 days	1 h	199 days
0.50 s	40 min	2 min	7 days	2 h	398 days
1 s	80 min	5 min	17 days	4 h	796 days
2 s	3 h	10 min	33 days	6 h	1194 days
5 s	7 h	15 min	50 days	8 h	1592 days
10 s	13 h	30 min	99 days	12 h	2386 days
15 s	20 h	--	--	24 h	4773 days
30 s	40 h	--	--	--	--

Selection of Measuring Frequency

Select number of measurements per registration

In SatelLite you can choose how many measurements that shall be performed for each registration. The value that is stored (registered) is the mean value of the measurements.

- Select SatelLite Setup
- Depress the PROG key.

  The programming box is shown (see above).

Select the measuring interval from the scroll bar.

Store the settings

Store the settings by pressing PROGRAM or make additional settings in the ADVANCED menu. Select number of measurements for a registration.

Note! When using pulse input the measuring frequency has no significance, only registration interval has to be selected.

Measuring frequency states how often a measurement shall take place. A registration (storage of data in the memory) is the mean value from a number of measurements. The number can be chosen as required.

The table below shows available alternatives.

Interval	Measurements /registration	Interval	Measurements /registration	Interval	Measurements /registration
0.25 s	1	1min	1-240	1 h	8-125
0.50 s	1-2	2 min	1-240	2 h	15-240
1s	1-4	5 min	1-150	4 h	30-240
2 s	1-8	10 min	2-150	6 h	30-240
5 s	1-20	15 min	2-225	8 h	60-240
10 s	1-40	30 min	4-225	12 h	90-240
15 s	1-60	--	--	24h	180-240
30 s	1-120	--	--	--	--

Manual Start and Stop

The collection of measured values can start as soon as the setup described in the preceding chapter has been made. This can be done automatically or manually. Below we describe the procedure for a manual start/stop.

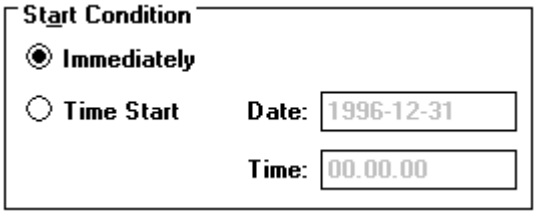
Immediate start of the measurement

The measurement can be started in conjunction with the programming of the instrument.

- Select SatelLite Setup
- Push the PROG key.

  The programming box (see above) is shown.
- Push the ADVANCED key.

  The dialogue box extends. The extension includes a section about start conditions.



Choose the alternative ”Immediate” to start the measurement in conjunction with the programming.

Note! The signal cable has to be connected to the 6-pole connector before log starts.

If no signal cable is connected to the 6-pole connector, the log start will be delayed until the connector is plugged in. This goes for all start conditions, both delayed and immediate.

Stop the measurement immediately

The measurement continues until the next programming opportunity (unless you have selected automatic stop).

The above dialogue box will show if you try to program a SatelLite while a measurement is in progress.

Push ”YES” to stop the measurement and ”NO” to continue with an uninterrupted logging.

Start and stop can also be made at a specific time. See chapters ”Automatic Start of Measurement” and ”Automatic Stop of Measurement".

NOTE. A reprogramming will automatically erase all previously collected information. This is the only time the memory will be emptied.

Conditional Start and Stop of Logging

Apart from starting the measurement with SatelLite **manually** it is possible to start the measurement **conditionally** or at a **specific time**.

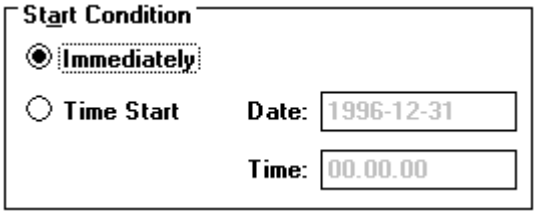
The logging can stop when the **memory is full** or at a **specific time**.

Start at a specific time

- Select SatelLite Setup
- Push the PROG key.

  The programming box (see above) will show.
- Push the ADVANCED key.

  The dialogue box for programming is also provided with a box for start up condition.



Select the alternative ”Time start” and enter date and time for start of the logging.

Store the Setting and activate Start

When the desired conditions have been set and the configuration is complete you push key PROGRAM in the dialogue box.

Note! When autostart has been activated the text "**Begin**" will show at status check until the startup conditions have been fulfilled and registration can start.

Thereafter the text ”**Running**” will show.

Start at a **specific time** can be very useful when trouble shooting. Time start is also used when you want to synchronise several different measuring instruments and this way get measured values taken at the same time.

The measuring will proceed continuously after start until a stop condition has been fulfilled or you perform a manual stop.

NOTE! When start has been ordered and until the start conditions have been reached, the text **Begin** will be shown under Status check.

This means that measurement has commenced but that the start conditions have not yet been met. As soon as the start conditions have been reached the text **Running** will be shown in the display and storing in the memory starts.

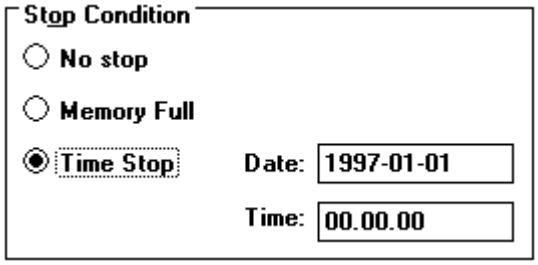
The registration will continue until an automatic or manual stop has been ordered.

Stop at a specific time

- Select SatelLite Setup
- Push the PROG key.

  The programming box (see above) will be shown.
- Push the ADVANCED key.

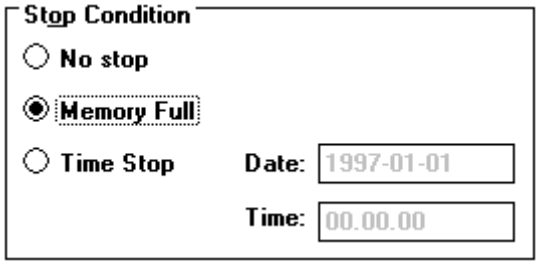
  The dialogue box for programming includes a box for stop conditions.



Select the alternative ”Time Stop”, enter date and time when you want the logging to stop.

Stop when memory is full

The box for stop conditions also includes the alternative ”Memory Full”.



Store the Settings and activate start

When the desired conditions have been selected and the configuration is completed you store the settings by pushing the PROGRAM key in the dialogue box.

Checking of Activity

LED on SatelLite

A green LED sits behind the computer contact. When the instrument is logging normally it flashes every four second. When zeroing it flashes every third second.

How does the instrument operate

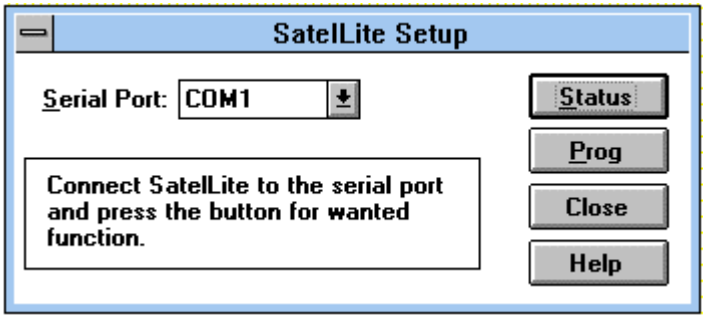
For fast information about the procedure and how the instrument operates the Mitec programs have the function STATUS. This function you find under menu ”SatelLite Setup”.

SatelLite Setup

The first box shown offers two alternatives Status and Programming.

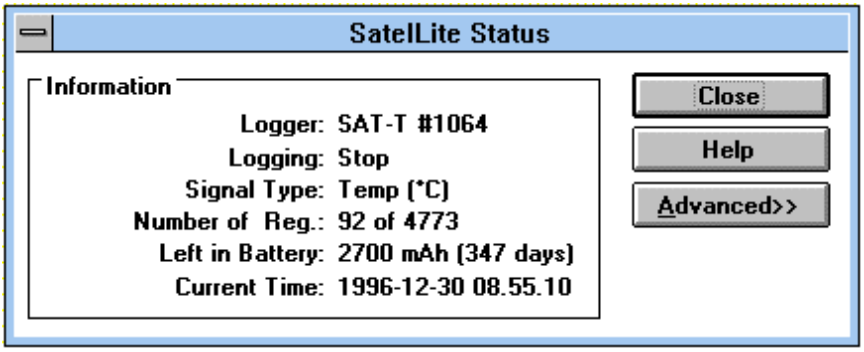
Status is used to show the instrument settings and what happens. Optional communication port can be used.

Prog is described in another place.

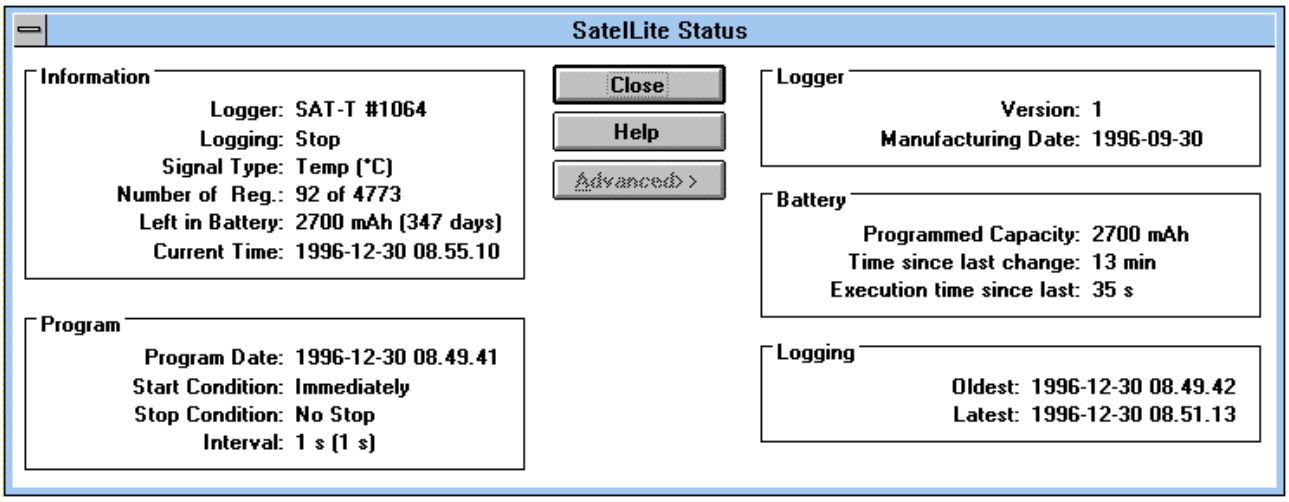


Status

When you push the”Status”key the information stored in SatelLite will be entered and displayed. The first box shown is the summary box shown below.



By pushing key ”ADVANCED” you obtain further information:



Status *"Information"*

Logger: Shows type of instrument and its serial number. Each instrument has its own individual serial number given during the manufacturing.

Logging: Shows current activity. This can be Stop, Begin or Running. Se below for explanation.

Signal type: Shows the type of input signal to the logger.

Number of registrations: Apart from the number it also displays the total memory space available. ***Note 1.***

Remaining in battery: Consumed capacity is calculated. ***Note 2.***

Current time: Shows the time in the logger when the status key was pushed (+3 seconds).

Status *"Programming"*

Executed: Date and time of the programming.

Start condition: Set start condition.

Stop condition: Set stop condition

Interval: The registration interval. Within brackets it displays the time lapse between the measurements (the measuring interval).

Status *"Logger"*

Version: The instrument version number.

Manufacturing date: The date when the instrument software was loaded.

Status *"Battery"*

Stated battery capacity: The capacity figure entered by the operator at battery replacement. ***Note 3.***

Time elapsed since last battery replacement: Time elapsed since the latest power interruption and new statement regarding the battery capacity. (In practise the time elapsed since the battery was inserted).

Operation time since the battery was replaced: Time the instrument has been used for logging, i.e. active operation time. ***Note 4.***

Status *"Logging"*

Oldest: Time for the oldest registration stored in the memory at the status request.

Latest: Time for the youngest (latest) registration stored in the memory at the status request.

The table below explains the status information in box **"Information** / Logging".

STOP No registration is active. The memory contains information collected during the previous measuring period. (Or is empty if no measurement has been done since the zeroing.

BEGIN This means that you have chosen to start on an external condition. Measurement has been ordered but the start condition has not yet been met.

RUNNING Means that the start condition has been met and measurement is in progress. This is the normal condition at logging.

Note 1

Memory consumption. Note, the memory is full if the figures for number of registrations and available memory are equally large. Logging can still be in progress depending on the stop condition you have chosen.

Note 2.

Remaining in battery. This calculation is based on the capacity stated by the operator during programming. NOTE! The calculation is based on a typical power consumption and is not exact. SatelLite will remember how much has been consumed of the installed battery and will disregard a new statement for battery capacity. To change the capacity you must remove the battery and reinstall it.

Note 3.

Battery capacity. SatelLite will notice it the power has been disconnected and will give alarm for this at the next programming. The operator shall then enter a figure for the capacity of the battery that has just been installed. The capacity shall be entered in conjunction with the installation of the battery. This figure will be used by SatelLite until the battery is removed and installed again.

Read about power supply in chapter ”BASICS”.

Note 4.

Operation time. This time is the sum of the time that the instrument has been used for logging, i.e. the time for measuring. Standby with stopped logging is not counted. The operation time counter will be zeroed when the battery is replaced (when a new capacity is entered).

Download data to PC

Information from SatelLite can simply be downloaded to PC for further calculations.

The transmission is made by a serial communication via RS232. Normally you need make no settings on SatelLite and the transmission is started and controlled completely from the PC.

Connect the computer

The connection to the computer is done with a cable provided with suitable contact devices.

As an accessory to IBM PC and compatible units we carry cable LPC-7 in stock. This can be used both for 25 and 9-pole contact devices in a PC.

Connect the cable to the 4-pole modular contact on SatelLite and to a free COM: port on the PC.

NOTE! Do check that no other program, e.g. the mouse, uses that COM port on the PC!

TXD	----------	3	RXD
RXD	----------	2	TXD
CTS	----------	20	DTR
Gnd	----------	7	Gnd
SatelLite contact			***PC 25-pole contact***

Cable LPC-7

At startup of SatelLite you get a standard setting of the serial inport, which is 9600 baud, 8 bits, 1 stop-bit, no parity. WinSat and WinLog will automatically adjust to this.

Readout of measured data

Readout of the measured data differs somewhat between the programs. SatelLite shall be handled in the same manner as other products from Mitec in the handling of the readout.

Data is stored in the same manner and measured data from SatelLite can at the presentation and calculation be mixed with data from e.g. AT40 or other loggers.

See the manual for each program!

TRANSMISSION SPEED

The speed of the data transmission is in baud and this can be translated as bits/second. One character is made up of 10 bit. With a speed of 9600 baud you can transfer 960 characters per second and in SatelLite this means 500-700 measured values per second. In practice the speed is lower due to control characters, etc.

Program in PC

A program that can communicate with binary numbers is required to receive information from SatelLite.

The program WinSat is an accessory to SatelLite. This program can be used to transmit data to a PC for a simple presentation or for transmission to a calculation program type Excel or Lotus 1-2-3.

Mitec can also provide complete communication and analysis programs for Windows. **Mitec WinLog** is a powerful program for communication, storage of data, calculation and presentation.

Mitec Monitor is an extended version of WinLog and this program includes automatic communication via modem.

Programs with version 1.51 or later has to be used.

WinSat as well as Monitor and WinLog require Windows 3.1 and at least a 386-PC with 4 Mbit RAM.

Series and Revision number

The Status function can provide information about instrument type and serial number.

You will also find a space for the instrument number on the label stuck to the instrument end piece. Check the series number with the ”Status” function in the program and write down this number on the label using a ball-point pen.

WinSat introduction

General information about WinSat

WinSat is a program in the same series as Mitec Monitor and WinLog.

WinSat can only be used with the Mitec SatelLite series, while the other programs also can be used together with other Mitec instruments.

How to Install

Insert the diskette in A:

- Select ”Run” in the program manager ”File” menu.
- Write A:\install

  The program will now be automatically installed. Answer to the questions as needed. Program group **Mitec WinSat** will be created.

Start the program

Double click on the SatelLite icon. This will start the program and display the welcome page.

The top part of the menu looks as the picture below.

Program function

The program is very simple to use and has been made so it is ”selfinstructing”. The handling of WinSat is only described in the **program help text**. You find this text under ”?” on the menu.

Quick start

Click ”File” and select ”Setup”. Here you do all the configurations needed to start up SatelLite. See previous sections in this manual.

Collect the measured data under ”File” and ”Collect Data”.

Diagrams will be created automatically as soon as the sampling is completed.

Structure

The measurement is performed on an **Object.** Enter the name of the object when starting the sampling.

You will find the measured data under the object name when you select ”Open” and a diagram will be displayed.

In WinSat a measurement and a diagram is the same thing. Do note that you can ”add” data to an already existing object.

The measured data will be stored in the same format as in the other programs from Mitec, Monitor and WinLog, and can be transferred to these programs.

Analysis

Measured data displayed in the diagram can be studied using the different tools.

Put the cursor in the diagram and click the **right mouse key**. Test!

Also test the zooming function by using the flexible axis’s. Point to a value on the time or Y-axis and drag the value to a new position. Ready!

The menu has scrolling arrows  and zoom keys  .

And a key that restores everything. 

Use the keys below to print out the diagram or to export it to the editing board.  .

No calculations can be made in WinSat. Instead use WinLog or Monitor that both are equipped with an advanced and easy to use formula language.

Test all the program functions and search through the help text.  .

Additional Information

What is a Data logger?

Background

The term data logger we have, as with many other technical terms, borrowed from the English language. Log comes from the naval term *to log* meaning in a logbook, i.e. to make careful notes about events.

With data logger we then mean careful ”notes” of measured data in a mass memory.

We prefer the term *measured value collector*, but it is of course more international to use the term *data logger*.

Mitec introduced its first data logger on the market in 1984. It was the 4-channel logger MTM20 that we called a TEMP-recorder. Shortly afterwards we introduced its sister instrument, the PULSE-recorder PM20. The next generation was the ANALOG-recorder AT30 and now we have come to the third generation, the UNIVERSAL-recorders SatelLite and AT31.

Our product names have made their mark. In Sweden you can e.g. look in the " Buyers Guide for Engineers " (Ekonomisk Litteratur AB) under "Recorder" where out product names have been used as headlines in the product index. We can only say Thank You! for that.

The data logger is not a new invention. You can find old literature references, such as e.g. "Airborne recorder and Computer Speed flight-test Data Processing System" from 1958.

The loggers were developed in step with the development of the semi-conductors. The microprocessor plays a very important role here.

The real and major break-through came in the beginning of the 90’s after the logger had gained its general acceptance.

How does it work?

The principle is rather simple. The main parts of a modern logger are the microprocessor, the semi-conductor memory and an analogue/digital converter.

A sensor gives an analogue signal, e.g. 4-20mA. The micro processor that has a built-in clock controls the process. The sensor is read at set time intervals and the measured values are stored in the memory.

Eventually it has collected a number of measured values that form a *time series*. The time series can be printed out as a diagram on a printer or on a computer screen

Modern data loggers are rather sophisticated and offer different possibilities on how to treat the information. Below we have described some of the more common terms.

Memory is of course quite important. Common sizes are for approx.1000 values up to several 100 000. There are non-volatile memories available with a built-in battery so they will not lose data in case of a power failure.

Measuring channels will tell you how many sensors that can be connected at the same time. Handheld professional loggers generally have 2 to 8 channels.

Type of input tells you about the type of sensor that can be connected. Most sensors can measure temperature or a voltage signal e.g. 0-10V. Different types of sensors can be connected to the more advanced loggers.

Registration interval is the time between two storages in the memory. It is usually adjustable in steps between 1 s and 24 hours. The registration interval determines how fast processes you can measure on. A rule of thumb is to make at least two registrations per period for the measuring signal.

Measuring interval is the time between two measurements. The most modern loggers measure several times per registration to make sure of a more accurate value. The measuring interval can be adjustable.

A clock is required. A modern logger has a calendar clock (crystal clock) with date and time.

Start condition is the condition that must be met before measurement can start and data be stored in the memory. It can be manual start, time start

or start on external condition, (e.g. when a temperature is exceeded).

Stop condition determines when the measurement shall stop. It can be manual, on time, or when the memory is full.

Storing conditions can be set on some loggers. It is e.g. possible to store only the mean value during a registration or *several values*. e.g. min, mean and max.

How to take care of the measured data

The collected measured values are stored in digital form as data words. Before you can use the information it must be treated.

Older loggers only printed out the information as numeric values on a printer. This resulted in long and cumbersome tables that were hard to interprete.

The best way is to present the information in the shape of a curve. Some loggers can draw curves directly on a printer or a plotter, and this is acceptable if you are satisfied with unprocessed data.

The most common method is to transmit the information to a PC for analysis in a program.

The main advantages with this are that the information then can be stored on a magnet media for later analysis and that the work involved with the analysis has been made easier as the calculation and presentation capacity of the computer can be used.

Modern personal computers using Windows have made possible a very efficient handling due to the graphical interface using the mouse as a pointer.

What must be considered.

One of the first items is to make sure that you have an instrument that is up to the present work situation, in other words it must be ”good enough”.

Type.

You must first decide if the instrument shall be portable or have a fixed installation. For field measurements the requirements are low weight and battery operation.

Some suppliers use the PC also in the field. Don’t forget that the PC is attractive to thieves, never leave it unguarded!

Some of the cheaper loggers are made as ”black boxes” without keys and display. These leave you completely dependent on the PC for configurations and control of the operation, even in the field. These loggers often have a fixed built-in battery and the instrument will be dumped when the battery runs out.

Ergonomics

Unfortunately this area has been very "high-tech"-inspired. Many instruments are difficult to overview and have a number of keys for different functions. Select an instrument that has a logical construction. It should also have a display with letters and figures and some clearly marked keys.

Extension.

Also check the procedure for connection of sensors of different types and to extend the equipment. Some instruments are only constructed for certain types of sensors. If you want to connect other sensors you then either have to purchase a new instrument or special circuit cards.

Battery life time.

It is important to check the power consumption. A modern battery driven logger should not in stand-by position consume more than 0.1 mA. When measuring it may consume a lot more, approx. 30-40 mA. Do note that short registration intervals (1-30 secs.) increases the consumption sharply.

Input signal.

You get maximum flexibility if you select an instrument with universal inputs. To these you can, with a suitable cable and connection, directly connect different types of sensors.

Some loggers require external signal transducers to adjust the sensors. Consider that these generally use a lot of power and that they also take up space.

A very important aspect is the power supply to the sensors. If you have to arrange for an external supply it will mean a hazzle with extra cables.

Quality loggers have a built-in supply directly via the sensor cable.

Watch out for the power consumption here! E.g. a humidity sensor can exhaust a 9 V battery in 24 hours if connected the whole time. Select a logger that can control the power supply to the sensor.

Accuracy.

Many suppliers make no difference between resolution and accuracy and yet they are two different things. The resolution indicates how ”small” the parts of the signal are that can be spotted. Many suppliers have for reason of cost only used 8 bits and this can give a resolution of 1/256. With a measuring range of e.g. 300°C / 572°F this means a resolution of just over 1°C / 1.8°F. You should ask for at least 10-12 bits (a resolution of 1/1000 to 1/4000).

Accuracy is an indication of how well everything works together. This should be specified in a technical unit, e.g. °C or in %. You should also require that the supplier can show a traceability for the calibration, i.e. that he can show that the instrument measures correctly.

Memory.

These days the memory capacity is no limitation. 25-50 000 measured values is standard. Do note! Some suppliers show the memory in kbyte (kilobyte = 1000 byte). To store a measured value with an acceptable resolution you need 2 byte i.e. 128 kbyte is sufficient for 64000 measured values. Most memories can also be delivered with a power failure protection.

Manuals.

Make sure you get manuals in your own language. Check that the supplier can give service!

Mitec data loggers.

The Mitec data loggers are designed and manufactured by Mitec in Säffle, Sweden. As a customer you are always close to the source. You can get help and advice if you have a measurement problem.

We deliver instruments for physical measuring signals, i.e. we don’t leave you with a 0-10 V input. We also deliver the sensor or a cable that directly fits the sensor you already have.

Field adjusted.

Our instruments are made for the user. We put great emphasis on simple handling and on flexibility. SatelLite, our latest logger is based on our 10 year long manufacturing experience of data loggers for use in the field

Simple handling.

A display in English will tell you exactly how to make the configuration. The simple and clear structure of settings and readings ensures that you learn to master the instrument in your first tryout.

Flexible.

Universal inputs for volt, mA, electricity meters, temperature sensors, current clamps, flowmeters, etc. ensure that our instruments can be used for a great number of applications. Without reconstruction or additions. Our concept with ”smart cables” see to it that you directly can se signal type and unit in the display without any programming.

Technical performance.

State-of-the art technology of the microprocessors provide us all with the possibility to build "high-tech-Christmas trees". However, our long experience has taught us that technology is not an end in itself. Our instruments have a ”sufficient” capacity, to quote a known English car manufacturer.

You still do not believe us? Ask a colleague who already has a Mitec instrument.

Technical specifications

GENERAL	
Number of measuring channels	1
Memory size	8k or 32k byte. 8k memory is standard, the others are options
Resolution storage	12 bits
Number of measured values	4,500 or 20,000.
Clock	Crystal controlled, date and time.
Registration interval	On time: 0.25, 0.5, 1.2, 5, 10, 15 or 30 sec. 1, 2, 5, 10, 15 or 30 min. 1, 2, 4, 6, 8, 12, or 24 hours
Measuring frequency	Optional for each registration interval
Power Supply	1.5 V battery LR6 (alkali) or Lithium size AA
Battery life span	1 month up to 1 year. (Depending on registration interval, measuring time and ambient temperature)
Ambient temperature	-20 °C to +50 °C / -4° to +122°F. No condense.
EU standard	EN50081-1, EN50081-2, EN50082-1
INPUTS	
Types	Voltage DC, Current DC, pulses
Input selection	Automatic detection.
Linearising	Automatic
Measuring ranges analogue inputs	0-1V DC, 0-10V DC, 0-20 / 4-20 mA DC
Inaccuracy	0-1V range ±0.4%, range 4-20mA and 0-10V ±0.6%
Input type pulse	potentialfree contact, open collector or voltage 4-24V DC
Measuring range pulses	0-4 Hz
Minimum pulse length	30 ms
FUNCTIONS	
Start and stop conditions	Adjustable, time and manual start. Time, manual and memory full stop
Storage method	Mean value, adjustable number of measurements per registration.
Reading and setting	Via PC and one of the Mitec programs WinSat, WinLog or Monitor.
COMMUNICATION	
Computer	RS232, 9600 baud. Control signal from the computer.
Indication	LED. One flash every 4:th second while logging is in progress.
MECHANICS	
Contact device	4 pole modular contact, 4/4 and 6 pole modular contact, 6/6
Box	Aluminium 60 x 50 x 30 mm / 2.36 x 2 x 1.2 in.
Weight	80 g / 0.18 lbs including battery.

We reserve the right to make technical improvements without prior notice.

Connectors

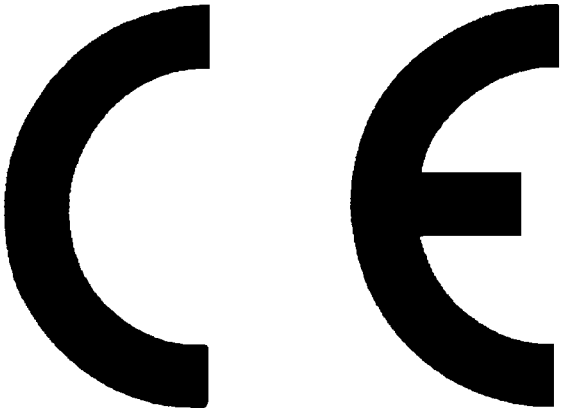
Modular connectors

The 4-pin contact is used for communication with external units.

Mitec cables LPC-7 are used for connection to PC. See the chapter above.

The 6-pin connector is used for connecting input signals. An signal cable wired as described in chapter above has to be used.

CE-marking



Declaration of conformity

Manufacturer:	Mitec Instrument AB Västra Storgatan 18, P.O.Box 91, S-66122 Säffle, Sweden
Equipment type number:	SatelLite
Description of Equipment:	Portable Data Logger
European standards:	EN50081-1, EN50081-2, EN50082-1

We certify that the apparatus identified above conforms with the requirements of Council Directive 89/336/EEC as amended by Directives 91/263/EEC and 92/31/EEC.

September 9 1996
Mitec Instrument AB

Bertil Olsson
Managing Director

Service and Support

Telephone support

The Mitec products are constructed and manufactured by Mitec Instrument AB in Säffle, Sweden.

We offer full service of the equipment in our work shop. In case of a problem, please contact us on our telephone number **+46 533 16050**.

Fax & E-mail

Our fax number is **+ 46 533 16045**.

Our E-mail address is **info@mitec.se.**

Homepage

You find our homepage on: **http://www.mitec.se**

There you find Demo-versions of our programs, a listing of the latest probes and a variety of help-programs.

Goods

Equipment sent in for service and calibration should be sent to:

Mitec Instrument AB

Västra Storgatan 18

S-661 30 Säffle, Sweden

Always include an accompanying note and a simple description of what you want done.

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