

TWC USER MANUAL

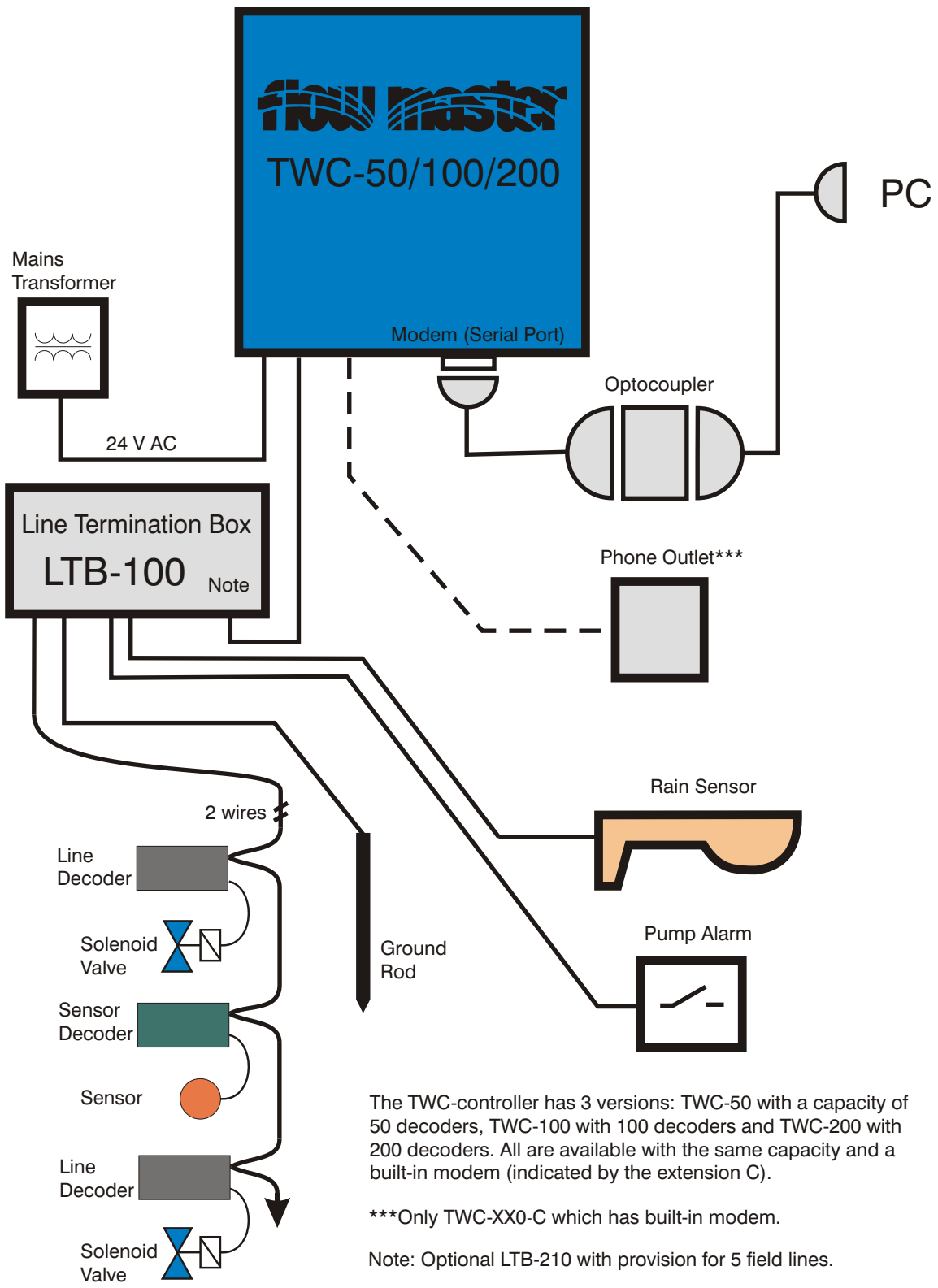
Rev.3/30NOV00

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System Layout



The TWC-controller has 3 versions: TWC-50 with a capacity of 50 decoders, TWC-100 with 100 decoders and TWC-200 with 200 decoders. All are available with the same capacity and a built-in modem (indicated by the extension C).

***Only TWC-XX0-C which has built-in modem.

Note: Optional LTB-210 with provision for 5 field lines.

Introduction

The 2-wire or decoder system uses one 2-wire line that runs from the controller to the nearest valve, from thereon to the next valve, etc. With all the valves "sitting" on the same line, a decoder is needed at each valve to interpret signals from the controller and to turn on or off the attached valve. The 2-wire line carries both signalling and power to operate the valve and is continuously powered.

The TUCOR 2-wire technology has been used for golf applications worldwide since 1987 and approximately 2000 systems are now installed and still in operation with a total of half a million decoder buried in the ground.

Main features of TUCOR 2-wire Technology:

- * Wire costs are lower.
- * The system may be expanded from any point of the 2-wire, just by splicing in further 2-wire paths.
- * Power requirement 10 times lower than conventional technology.
- * The low power directly translates into longer wire runs.
- * Electronic protection against corrosion of wires.
- * Two-way communication on 2-wire allows usage of Field Access Unit and Sensor Decoder (see options).



Options

- LTB-210 Line Termination Box. If your field installation needs more than 2 individual cables from the controller, you may use this box which has provisions for 5 cables.
- PD-100 Pump Decoder has a set of relay contacts instead of the usual power output. Both make- and break contacts are employed. The decoder is for dry environments only.
- FA-100 Field Access Unit, plugs directly into the 2-wire and operates any valve connected to the system.
- SD-100 Sensor Decoder may be installed anywhere on the 2-wire and will read and transmit to the controller the status of a sensor being it a switch (on/off) or an analog sensor (flow, temperature, etc.)

Help/support

Call TUCOR (724) 935-6850 or use our web site, www.tucor.com

Registration

Each controller must be registered with TUCOR to ensure warranty. A registration card is provided.

Warranty

TUCOR has a one year warranty on all products.

Getting started

Your TWC-XX control package comprises the following:

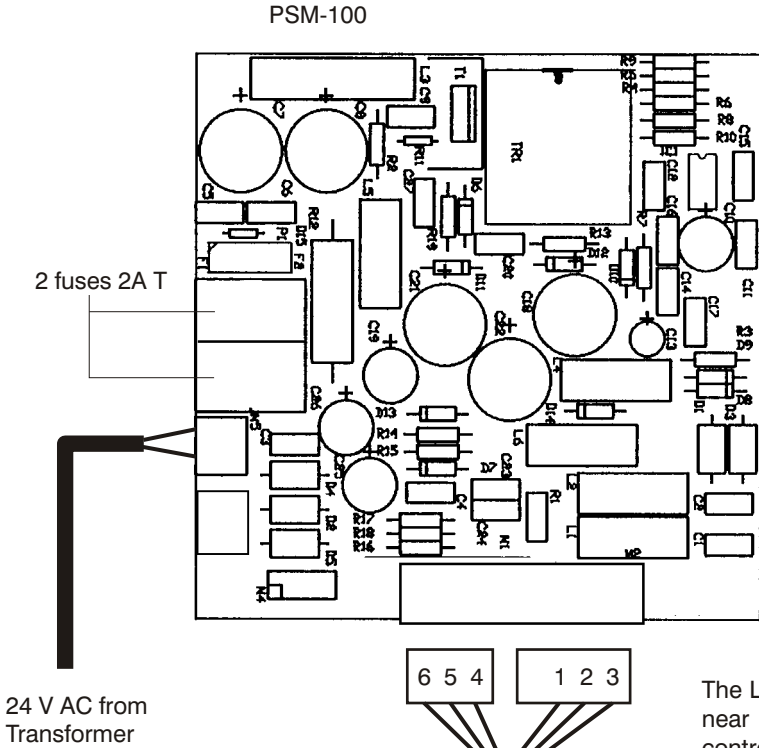
- TWC-XX Controller with built-in items:
 - Program Module
 - Memory Module
 - (Extra Memory Module (TWC-100 only))
 - (Modem (TWC-XX-C only))
- LTB-100 Line Termination Box
- Transformer 110/24 VAC
- TWC-RAS Software on CD-ROM
- Manual
- MOP-1, Modem Cable 1 ft.
- MOP-2, Modem Cable 6 ft.
- OC-200, Optocoupler

TWC-RAS program

This software package installs on a PC and allows you to communicate with the controller, either via modems remotely or directly using the supplied cable. The TWC can also be operated directly from the panel, but it is convenient to use the TWC-RAS when working with larger installations because it is easier and faster to input data this way.



External Connections, TWC-100/TWC-50

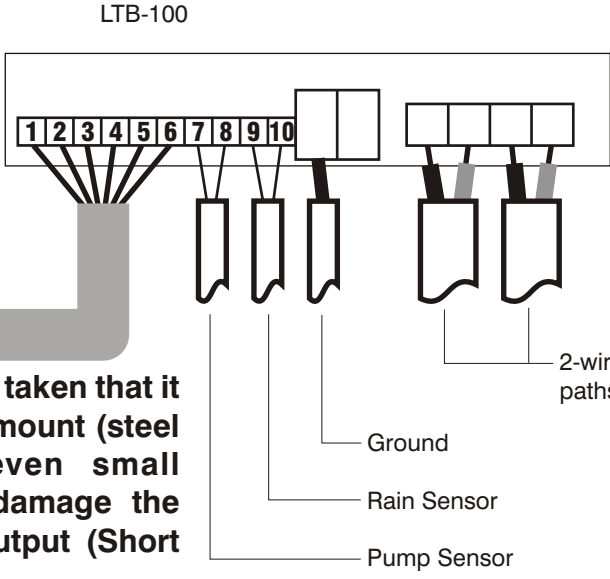


The Line termination Box should be located near the ground rod and not next to the controller because of the lightning damage possibility. The box is waterproof and designed for an outdoor mount. The cable between the controller and the box may be up to 100 feet.

24 V AC from Transformer



Multipart cable with 6 wires (max. dia. .4") Preferably multistranded (Flexible)



Warning:
When mounting the cabinet, care must be taken that it does not become grounded through the mount (steel structure etc.). If this happens, even small thunderstorms that do not otherwise damage the system, may result in a shorted Line output (Short Circuit).

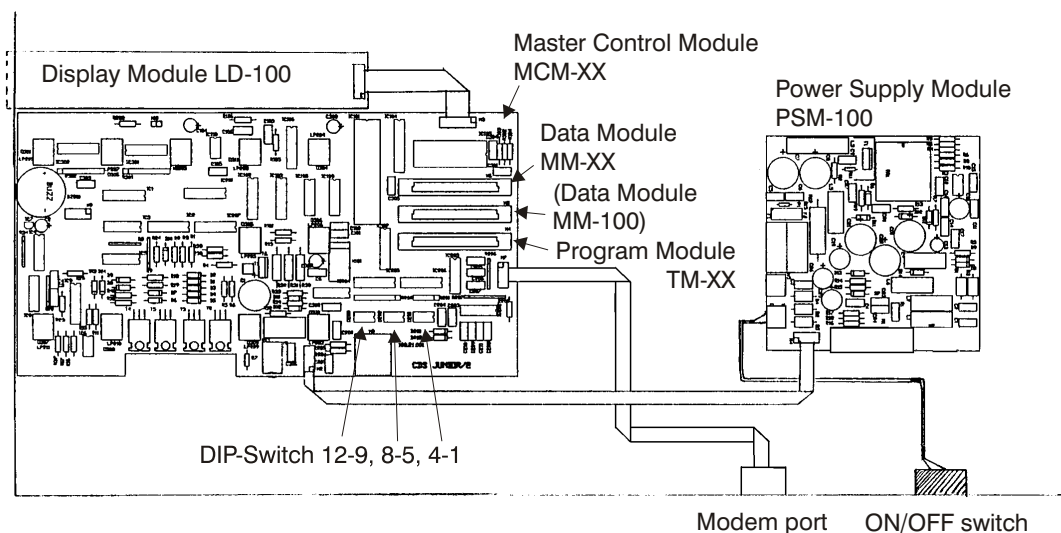
2-wire paths

Ground

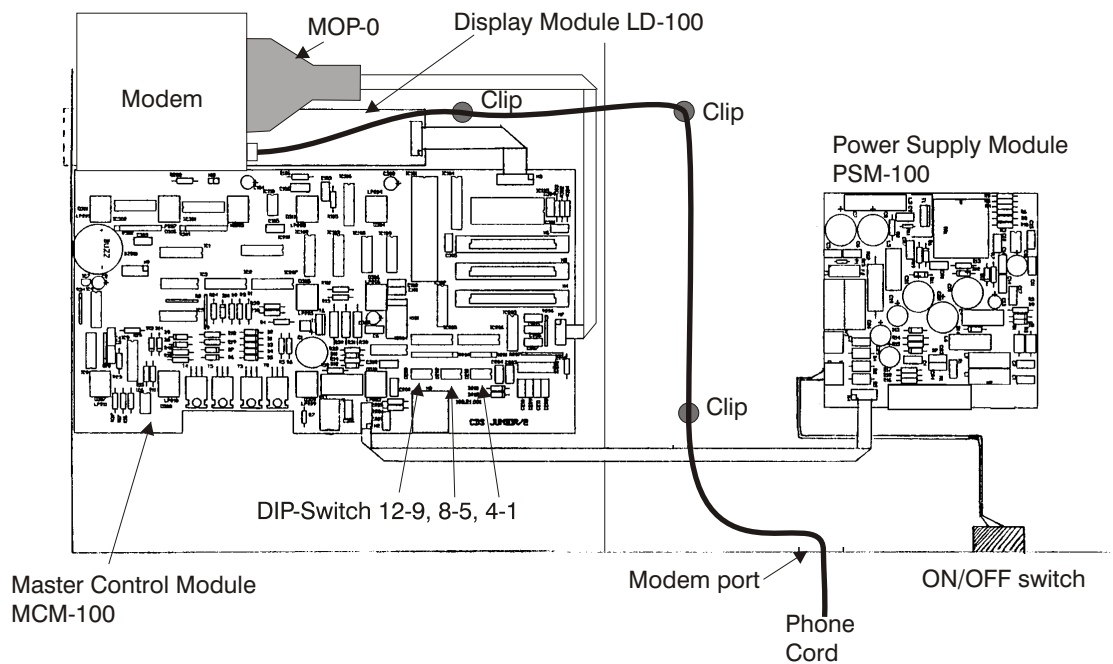
Rain Sensor

Pump Sensor

Internal Connections, TWC-XX



TWC-XX-C, installing the phone cable

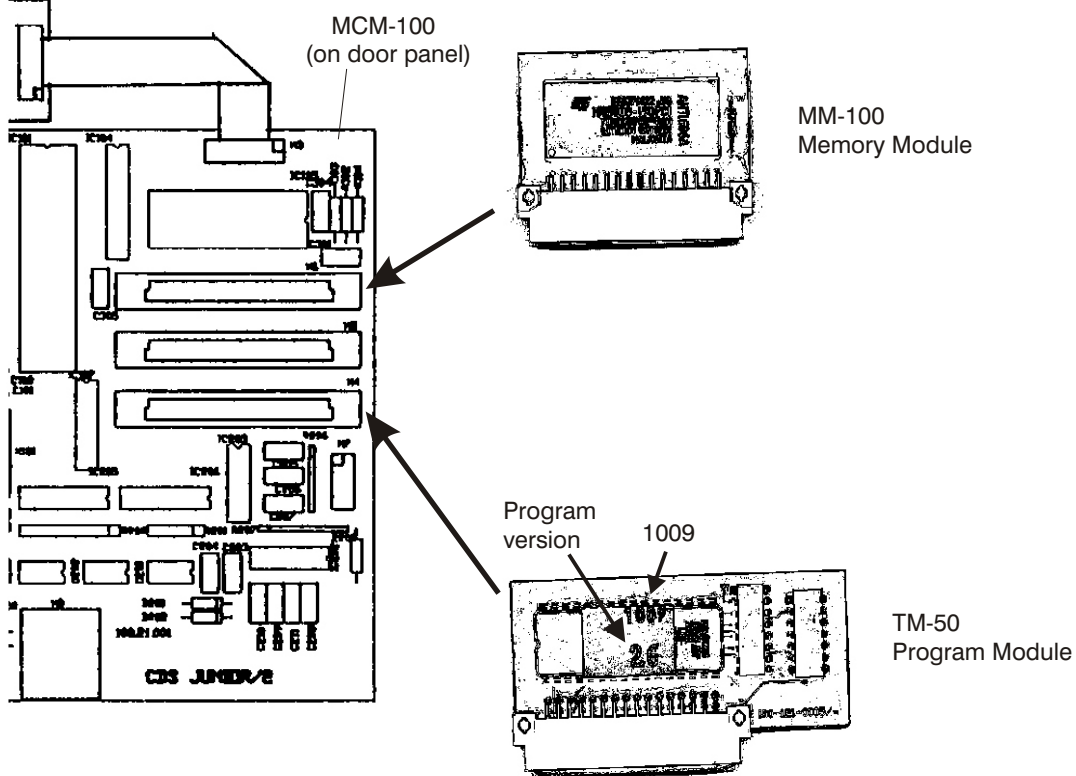


To eliminate disturbances from noise, it is essential to attach the phone cord to the 3 plastic clips.

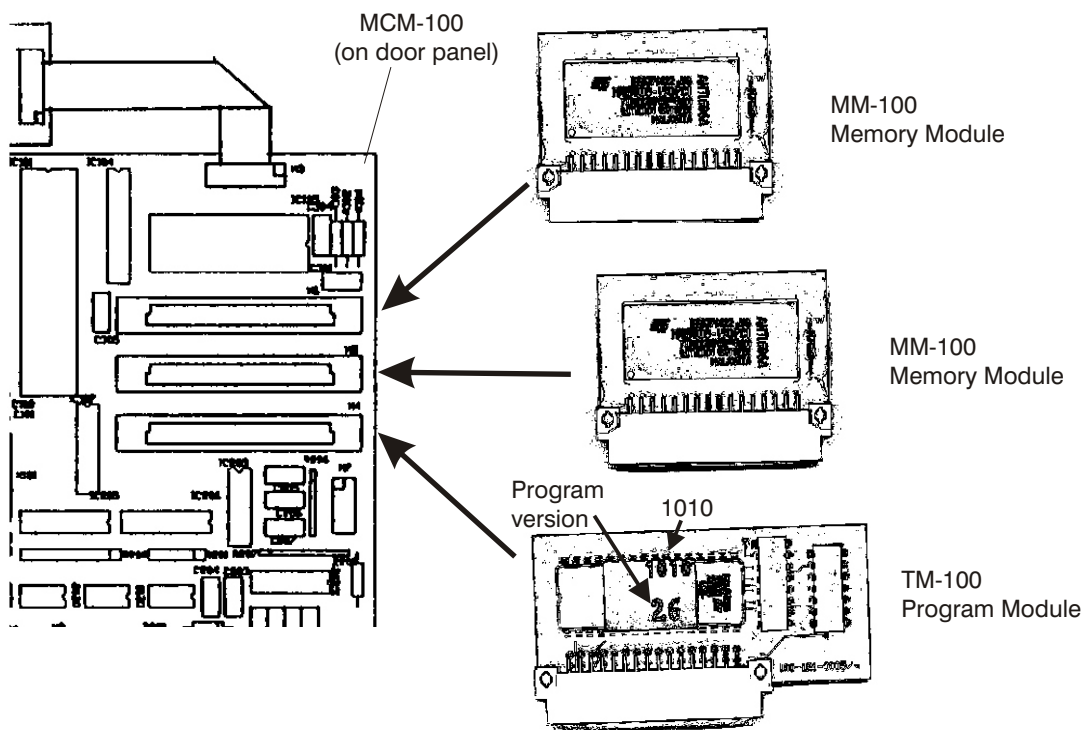
The Flowmaster Models, TWC-200/-100/-50

The 3 Flowmaster models, TWC-50, TWC-100 and TWC-200 consists of a base unit and some plug-in modules. It is the plug-in modules that determines the actual model. The following 3 pictures shows which modules goes with which model, what they look like and where they should be socketed.

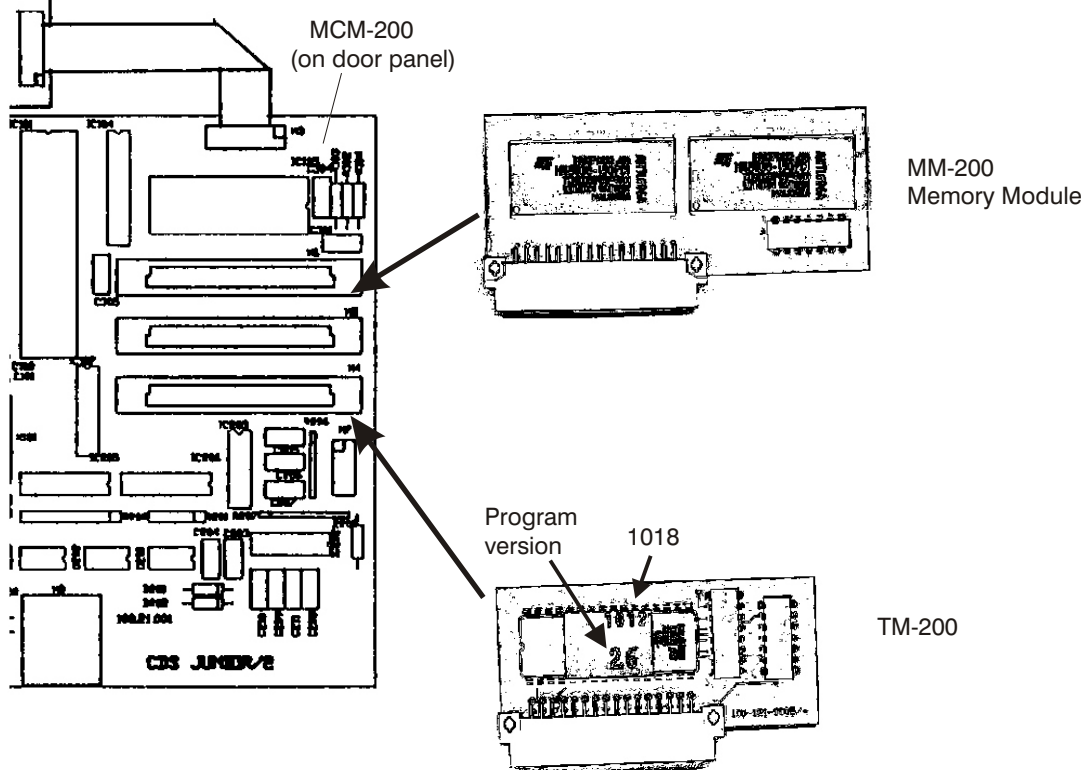
Plug-in Modules, TWC-50



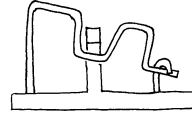
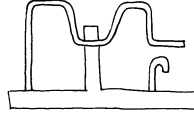
Plug-in Modules, TWC-100



Plug-in Modules, TWC-200



DIP-Switch settings



Switch No.	Function	Open	Closed
6	Serial Port	Modem	Direct connection
7	Pump Sensor	Normally Open (NO)	Normally Closed (NC)
8	Rain Sensor	Normally Open (NO)	Normally Closed (NC)
9	Max. valves/STEP	5	10
10	Valve Types	RB 1&2 valves/Decoder	1-5 variable
11	Number of days	15	14
12	Alphabet	full	1234567890SGLDB

Do not change switches with power on!

By default all switches are open from factory.

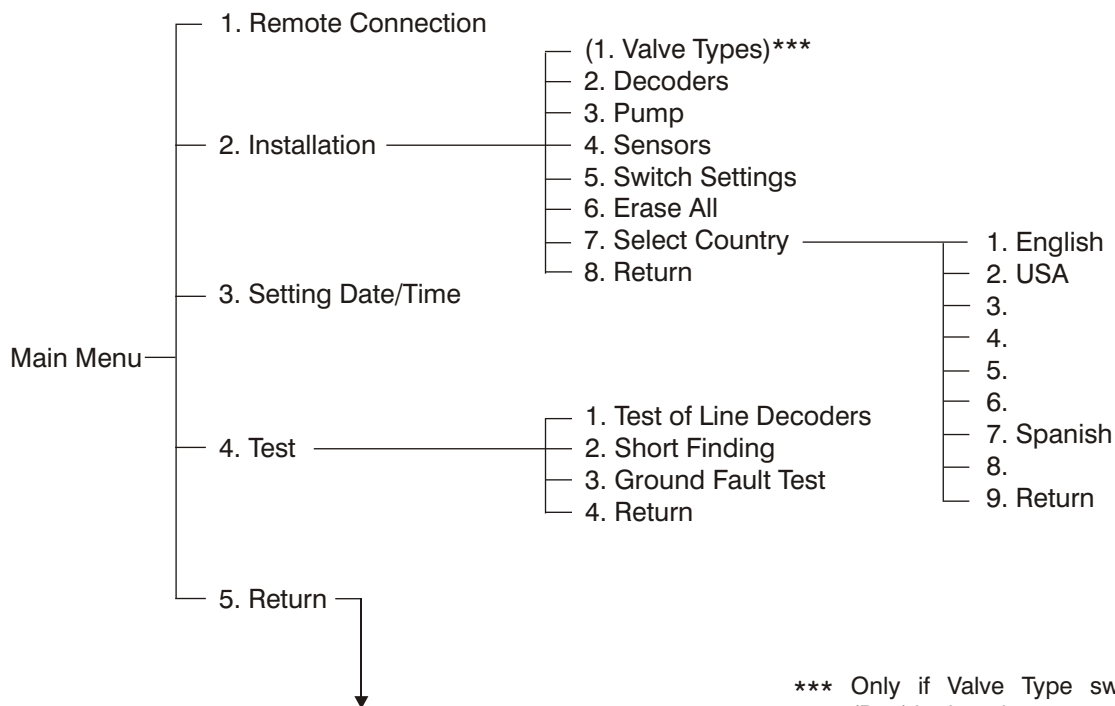
6	Serial Port	Leave this switch open: In this position it is also possible to upload/download data and schedules with a PC.
10	Valve Types	When the switch is open, the default switch code is used, which will work with most valves (see page 14).
11	Number of days	Unless an every third day mode of operation is needed, it is recommended to close the switch for 14-day operation.
12	Alphabet	If you plan to use the Field Access Unit, you have only a limited choice of characters when naming the valves. If the switch is closed only valid characters can be selected.

Installation (of Data)

The display normally shows information for irrigation/scheduling. Before any operation/scheduling can be done, it is necessary to enter Installation Data (decoders, pumps, sensors etc.) and to set the date and time.

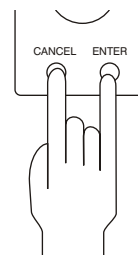
The Menu Tree below shows how to get to the various items. To enter the menu system, **press both ENTER and CANCEL buttons simultaneously.**

Menu Tree



Schedule 1	Total	2:07	14:36:05
12 M--T--S--W--S	(1)22:00		125% A

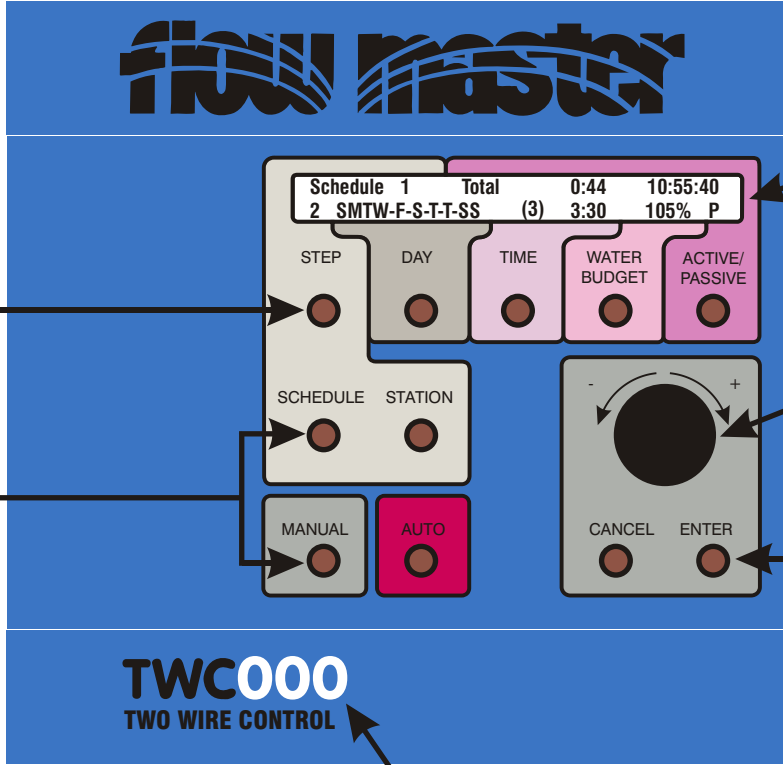
*** Only if Valve Type switch (D10) is closed



Press both ENTER- and CANCEL-button to go to Main Menu



The TWC Front Panel



The display gives an overview of the status and is used when installing data and writing schedules

This rotating knob (the selector) is used for variable input like minutes and for selecting from menus.

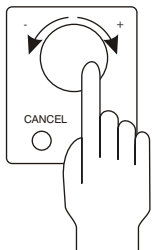
These 2 buttons are used to confirm or cancel selections.

The 5 buttons are used when writing schedules

The 4 buttons are used for manual operations and to start irrigation.

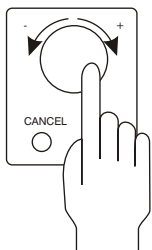
The number indicates the size of the controller (50, 100 or 200 decoders)

The Selector



The Selector has two speeds. If it is turned slowly it changes the target slowly. If it is turned more quickly, it changes the target very rapidly.

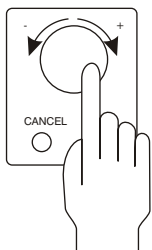
Select Field (STEP, STATION, MINUTES etc.)



Schedule 1	Total	0:00	14:18:40
1 B1	-----	>000Min<	OK Insert

The Selector is used to select the actual field. The field between > and < is the selected one. Finish selection with pressing the ENTER-button.

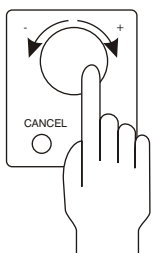
Select Field Input



Schedule 1	Total	0:00	14:18:44
1 B1	-----	008Min	OK Insert

When the ENTER-button has been pressed, the > and < turn into and which are now blinking to indicate that the field is ready for input. When the Selector is turned, the content of the field varies. Finish input by pressing the ENTER-button.

Select alphanumerically



...BLSGD 1234567890BLSGD
 or (in case of full alphabet):
 ..OPQRSTUVWXYZ 1234567890ABCDEFGH

Certain fields require alphanumerical input (f. inst. Decoder installation). In this case each position in the field may be entered separately. When a position is active and the selector is turned, the available selection of digits and letters passes the position. The position is like a "window" through which only one digit at a time can be seen.



Select Country

Following Languages are available:

- 1 English
- 2 USA
- 7 Spanish

This will change the language for all menu's. It also changes the flow units:

- | | |
|--------|------------|
| Gpm: | m/h: |
| 2. USA | 1. English |
| | 7. Spanish |

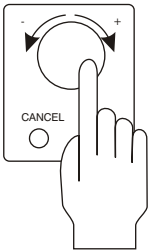
Select Country

-> 1. English

14:16:11

Valve Types

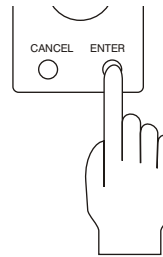
Only if Valve Type Switch (D10) is closed. See page 10.



Valve Types

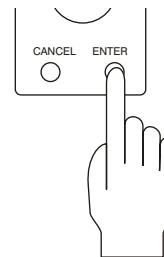
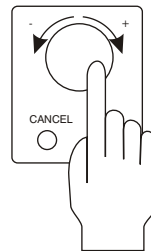
-> 1. 59F350 1

13:51:48



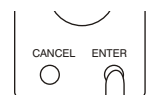
V.type	Switch	No. of valves	13:51:53
1.	59F350	1	

Select Switch (code) and No. of valves with:

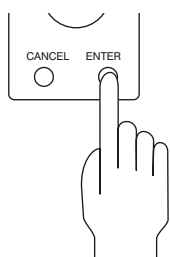
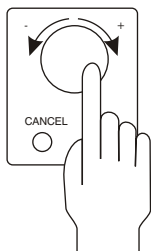
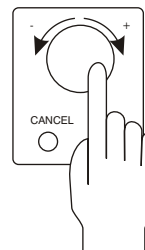


Decoders

Decoders				13:51:58
->	1.	--	1	0



Name	Type	Address	Booster	13:52:03
>-	<	1	0	OK Finish



Select names with up to 6 characters, and then select:

Type
Address
Booster (2-10)
OK (Select Finish when you have installed the last Decoder)

Name	Type	Address	Booster	13:52:03
B12345	1	60170	>Y<	OK Finish

All valves that have a number for the Booster will run that booster pump when they are active. (See below.)

Pump

Pump	Switch	Address	14:15:21
1.Master	4FFA20	284	

The Switch on the Pump Relay corresponds with the following addresses:

1	284
2	286
3	287
4	292
5	293
6	295

1.Master	4FFA20	284	14:15:21
2.Booster	4FFA20	286	

Pumps no. 2-10 are permanently assigned as Booster Pumps.



Sensors

Rain Sensor	Pump Sensor	14:16:06
Active	Passive	

Remember to set Sensor contact mode on Switch D8 for Rain Sensor and D7 for Pump Sensor. (See DIP-switches on page 10).

A Rain Sensor which gives a contact opening when it rains, should be installed as: Normally Closed (NC).

Flow Sensor (Sensor Decoder)

Schedule 1	Total	2:07	14:36:10
L13 16 Min	Remaining	1:24	8.1Gpm A

If a Sensor Decoder is connected to the system it must be set up with the Flow Sensor wizard (see page 31)

The flow will only be shown when the controller is in AUTO or in MANUAL mode. The flow will then be indicated instead of the WATER BUDGET.

The measurements from the Flow Sensor is stored in the monitoring file.

Flow Sensor, Flow Definition

The Sensor Decoder may be programmed to accommodate 2 different types of sensors: Digital (pulse output) and analog (4-20 mA).

For all the sensors it is necessary only to give a flow and the corresponding output from the sensor. This establishes the conversion ratio used by the program to calculate the flow. It is recommended however to use the max. flow because this determines which of the two pulse types to select. The resolution is given as soon as the type is selected.

Flow Sensor, Digital type

The Digital divides in two types depending on the pulse rate. For high pulse rates the number of pulses in 10 seconds are counted. For low pulse rates the time between the pulses in ms is measured.

Pulse/10s.

This type is used for sensors with high pulse rates. Fastest rate is 5 ms/pulse (200 Hz) with a pulse/pause ratio of 2.5 ms/2.5 ms. This allows up to 2000 pulses to be counted. At the highest pulse rate (5-10 ms) some pulses might be lost resulting in a reading 10 % too low.

ms/pulse.

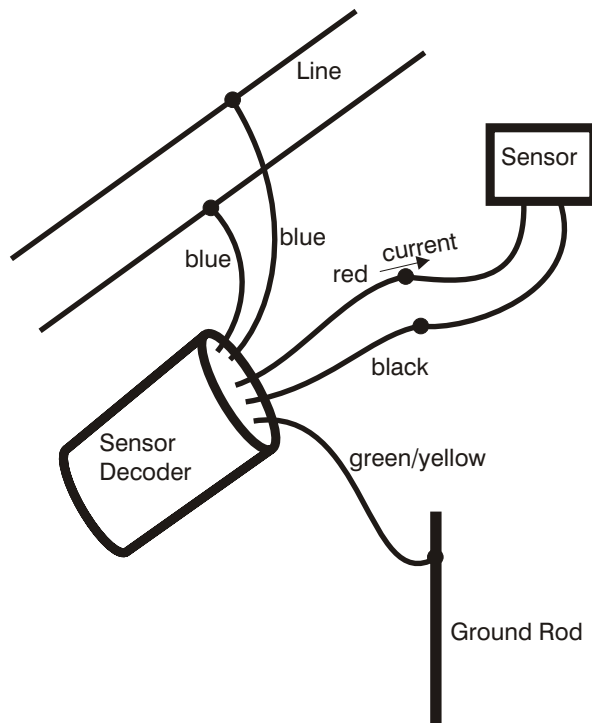
This type is used for sensors with low pulse rates. The shortest time that can be measured is 100 ms with a pulse/pause ratio of 50 ms/50 ms. The longest time is 655 sec's.

mA.

This type is used for sensors which gives a 4-20 mA signal. The resolution is 200 steps.

Example: A sensor has max flow of 60 Gpm and at that flow outputs 78.4 Hz. 78.4 Hz equals 12.7 ms per pulse. The Sensor Decoder should be set up for Pulse/10s. 78.4 Hz (pulses per second) equals 784 pulses in 10 seconds.

Connecting an Analog Sensor



The Sensor Decoder is supplying the power for the sensor on the red wire (arrow shows current direction). The current is returned from the sensor on the black wire.

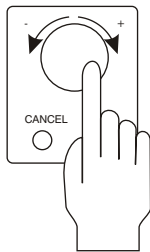
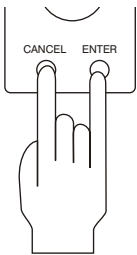
The Sensor Decoder is in direct contact with the line and the potential of the black wire is -20 V with respect to ground. The sensor must therefore be isolated from the surroundings (Potential free).

Erase All

OK to Erase All Data?
-> Use ' -- ' to Cancel

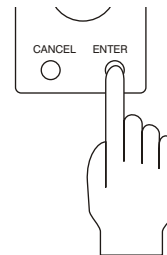
16:03:42

Setting Date/Time

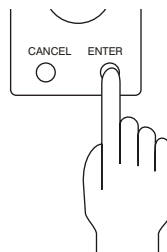
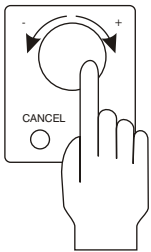


1. Installation
--> 2. Setting Date/Time

12:31:35



1991 03--29 12:31:40 12:31:45
Friday(4)



for Year
Month
Date
Hour
Minute
Seconds

Finish with selecting from Main menu: 4. Return

After setting Date/Time you must turn off the controller and on again to set the monitoring clock.



Operators Manual

TWC Remote Access System Software

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A. About the TWC-RAS Program

The system consists of the TWC-RAS program and the controller installed at the remote site.

The TWC-RAS program is a Windows 95/98 program, and it allows Remote Access of the Tucor family of controllers, the TWC-50, the TWC-100, the TWC-200, the COM-25, and the COM-50.

The program is set up to store information about the Modem and the COM port used by the system. To connect the operator simply clicks on the site information, and the program will establish the connection to the remote site.

Once connection has been established a picture of the remote controller will appear on the screen, and operation is made by clicking the push-buttons of the controller with the mouse. The picture of the controller is constantly updated to reflect the real appearance of the remote controller, to the extent that the text of the controller display is pictured on the screen of the PC, and the pictures of the push-buttons of the controller blink exactly as the buttons on the remote controller.

The TWC-RAS program also allows you to Enter/Edit Installation Data and Irrigation Schedules off-line and transfer the Data to the Controller.

We hope that you will find the program relatively easy to operate.

Supplied by

Tucor Inc.
518 Wallace Road
Wexford
PA 15090-8642

Phone: 724-935-6850
Fax: 724-935-8233
e-mail: mail@tucor.com
www: <http://www.tucor.com>

B. Installing the TWC-RAS:

The **Tucor TWC Remote Access Software** package has to be installed on the Harddisk of your PC.


Approx. 10 Mb free Harddisk space is required.

To Install:

- Insert Distribution CD ROM
- From program manager RUN E:SETUPEXE
(Your CD ROM drive name may not be "E" !)

The installation program will lead you through a number of windows and will end by copying the files from the CD-ROM to the Hard Drive

Welcome



Welcome to the TUCOR RAS Setup program. This program will install TUCOR RAS on your computer.

It is strongly recommended that you exit all Windows programs before running this Setup program.


Click Cancel to quit Setup and then close any programs you have running. Click Next to continue with the Setup program.

WARNING: This program is protected by copyright law and international treaties.

Unauthorized reproduction or distribution of this program, or any portion of it, may result in severe civil and criminal penalties, and will be prosecuted to the maximum extent possible under law.

Next > Cancel

User Information

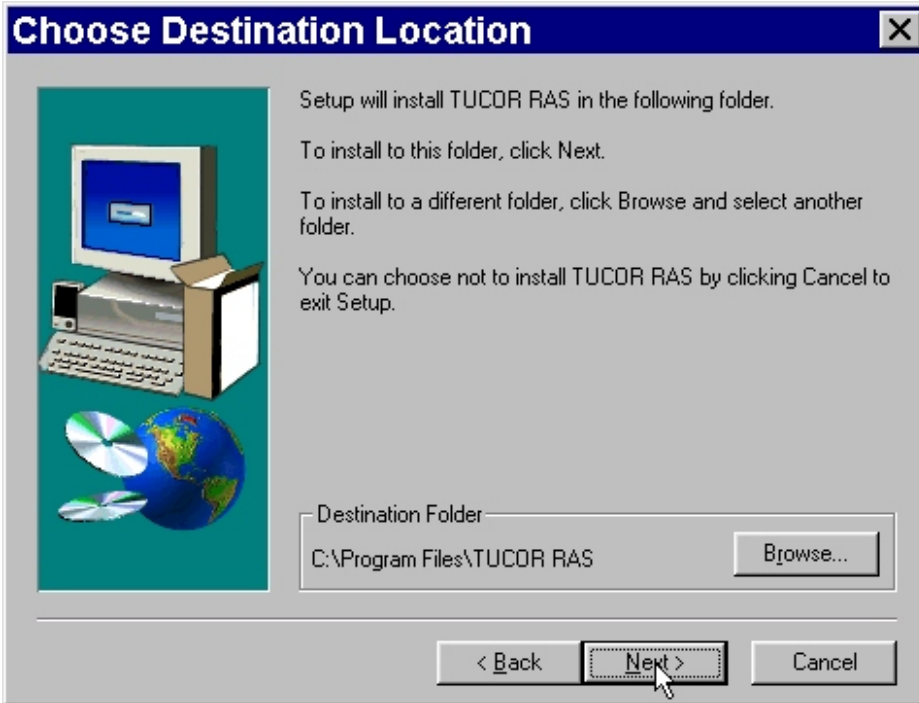


Please enter your name and the name of the company for whom you work.

Name:

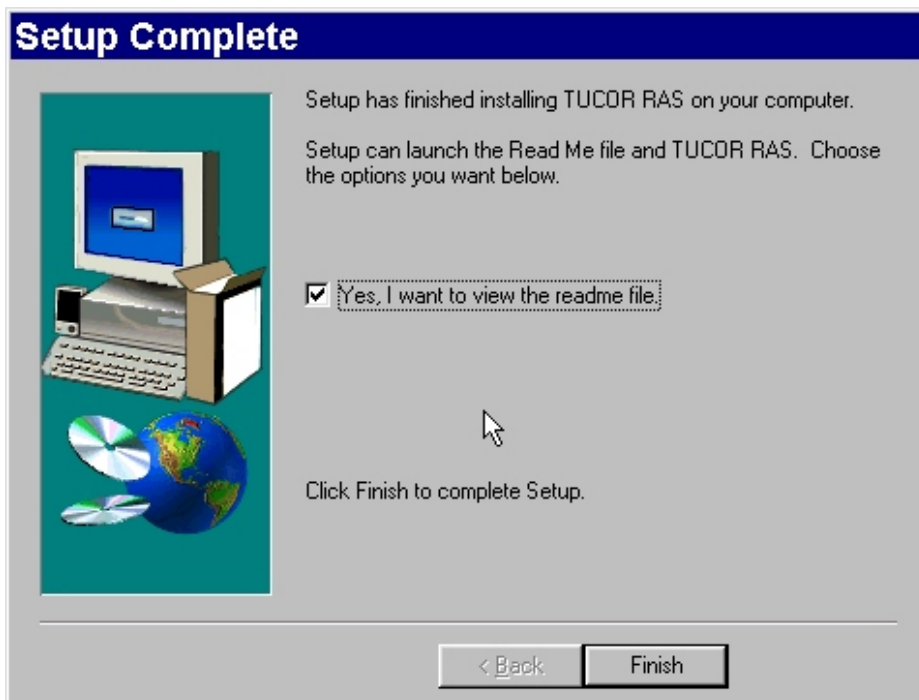
Company:

< Back Next > Cancel



The installation program will suggest that the Software is to be installed on the "C:" Harddisk in the "\Program Files\Tucor RMS" directory. Naturally you can change these parameters during the installation.

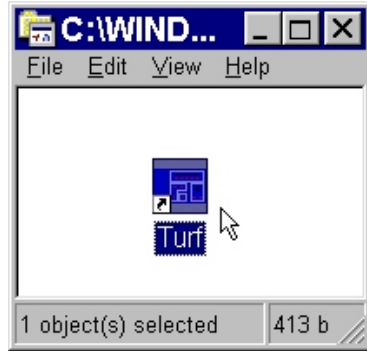
When you have entered the information requested by the installation program the files will be copied to your Hard Drive.



And you will get this "Setup Complete" window.

Note: The TWC-RAS software requires the "TCP/IP" protocol to communicate between the various programs in the package and it is typically installed on your PC already when an Internet Service Copnnection or a Local Area Network is configured. Should this not be the case, you will be guided through the installation. The Windows CD-ROM will be required for this.

Start the TWC-RAS Program



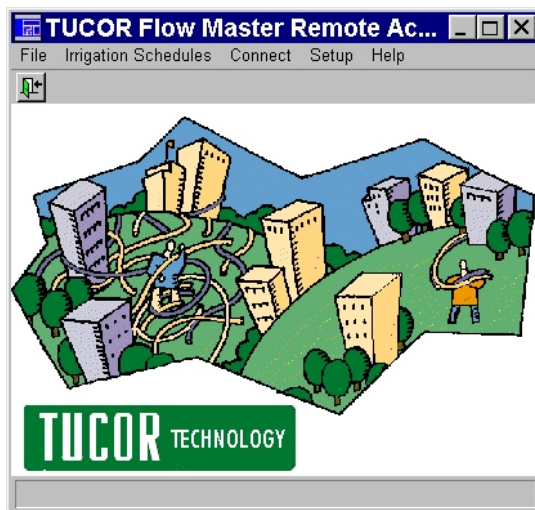
To start the program, double-click the icon.

or

use the Windows Explorer to go to the RAS folder and double click the Turf.exe program

Uninst.isu	22KB	ISU File	11/23/99 9:39 A...
readme.bt	1KB	Text Document	10/1/99 11:06 A...
turf.exe	1,263KB	Application	10/1/99 10:38 A...
turf_ser.exe	1,020KB	Application	10/1/99 10:00 A...
twc.ldb	8KB	Microsoft Access Record-Lo...	10/1/99 9:48 AM
tcpipinst.txt	2KB	Text Document	4/15/99 8:07 AM
turfq.ini	1KB	Configuration Settings	4/14/99 5:01 PM

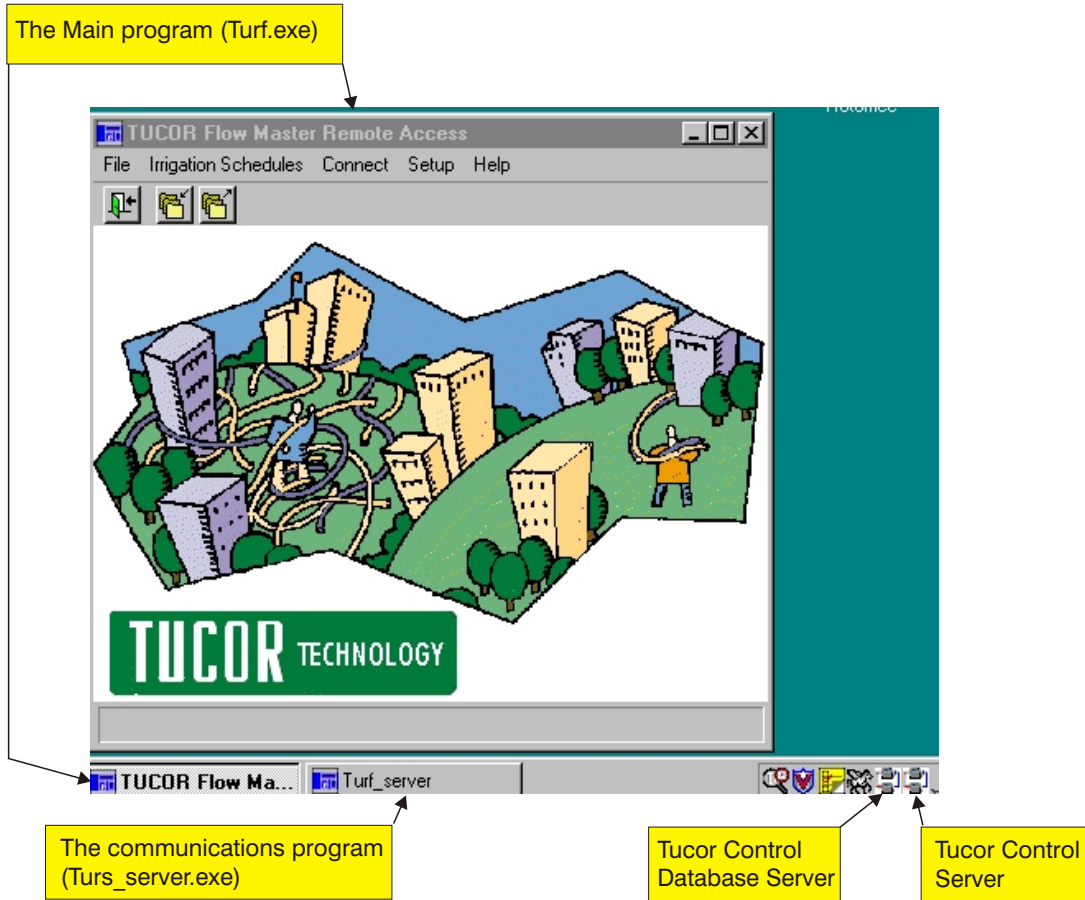
The program and the related subprograms will now start loading.....
The main Menu is shown on the top Line and consists of five main Functions



Functions:

- File
- Irrigation Schedules
- Connect
- Setup
- Help

The TWC-RAS program actually consists of four separate programs:



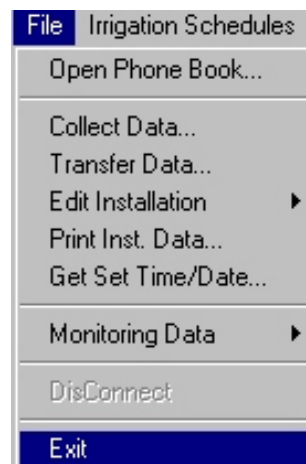
To exit the TWC-RAS program you may use



Or



Or



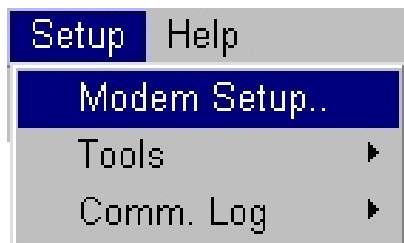
The three "server" programs may be left running to ensure a faster start-up. If you need to close them, use the mouse and point to each one and right click and then select Exit or Quit.

C. Getting Started

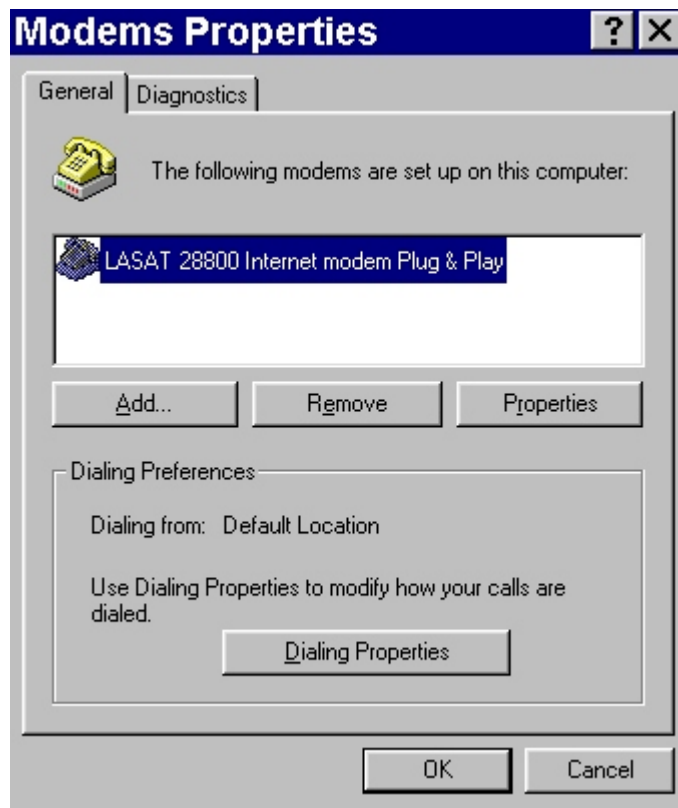
You need to set up a few parameters prior to making the first connection to the remote controller.

1. Setup the Modem

The program uses the Windows Modem setup feature. To install the Modem under Windows 95/98 please refer to your Windows and/or Modem Manual. In most cases the Plug-and-Play installation of new hardware should work well. If you click the Modem Setup



you will be taken to the Modem Properties window:

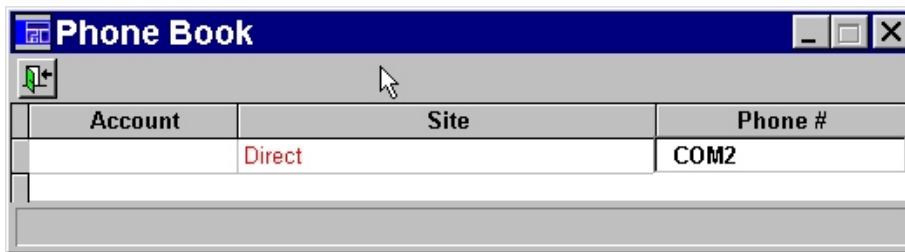


2. Setup the Telephone Book



Select the "**Open Phone Book**" function in the File menu and the Telephone List will be displayed:

The Phone Book allows you to enter data for the site, i.e. you can enter Site Name and Telephone Number.

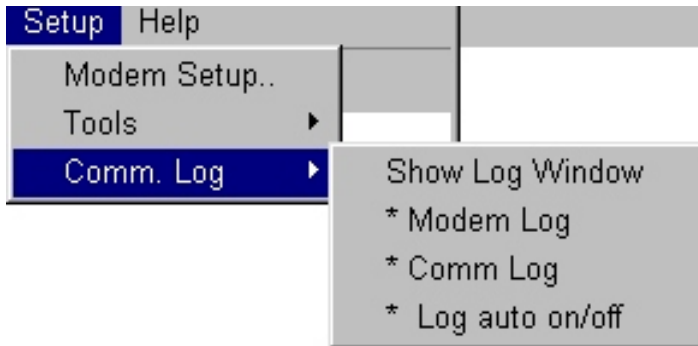


If you have a direct connection to the controller (Serial Cable with Optocoupler) you must enter the COM-port in the phone number field.

If you are using a Modem/telephone line to connect to the controller you enter the phone number here.

If you have to dial through a switch-board you will probably have to enter a prefix (such as 0 or 9). The prefix should be followed by a "," or a "w". The "," will give a pause of 1 second whereas the "w" will force the Modem to wait until it gets a dial tone before dialing the next digits. (Examples: 0,8123422 or 0w8123422)

3. Setup Communications Log



These functions are mostly of interest in case of communication problems.

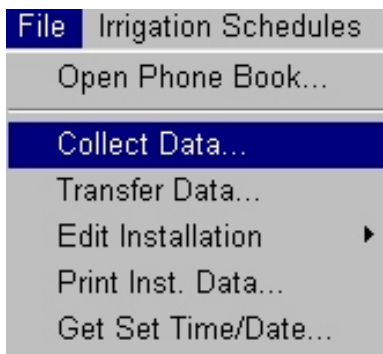
They will show all data transmissions (commands to/from the Modem) to allow trouble shooting, mostly during setup of your system. You will not need to be concerned about this once your system is properly setup.

D. Setup Controller/Installation Data

The TWC-RAS program can be used to program or edit the Installation Data in the Controller.

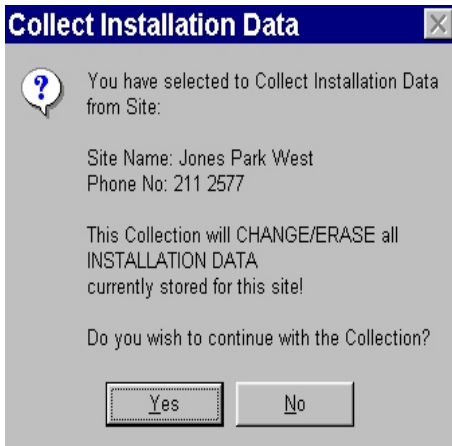
This is done in three steps (you should take care to go through the process by following the steps carefully):

1. Collect Data



When this function is activated the program will dial up the Controller and retrieve the Installation Data and the Irrigation Schedules.

Before the call to the Site is made you will be asked if you want to make the call:

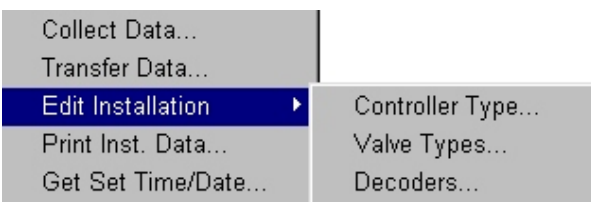


You are asked to confirm that you want to make the call, because the Data that you collect from the Site will replace the Data that is currently stored in the PC.

If you confirm ("Yes") the call will start and during the collection this message will be displayed:

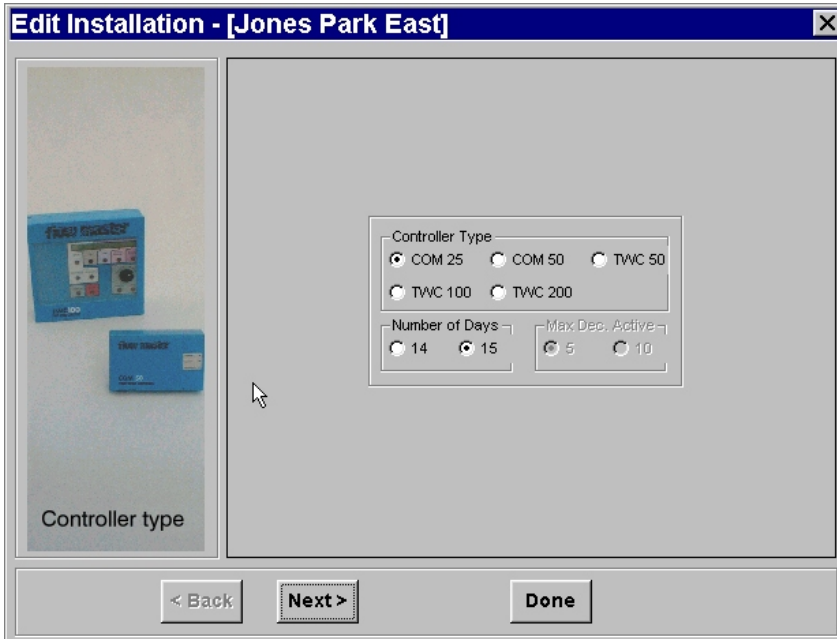


2. Edit Installation



This will open the "Edit Installation Wizzard"

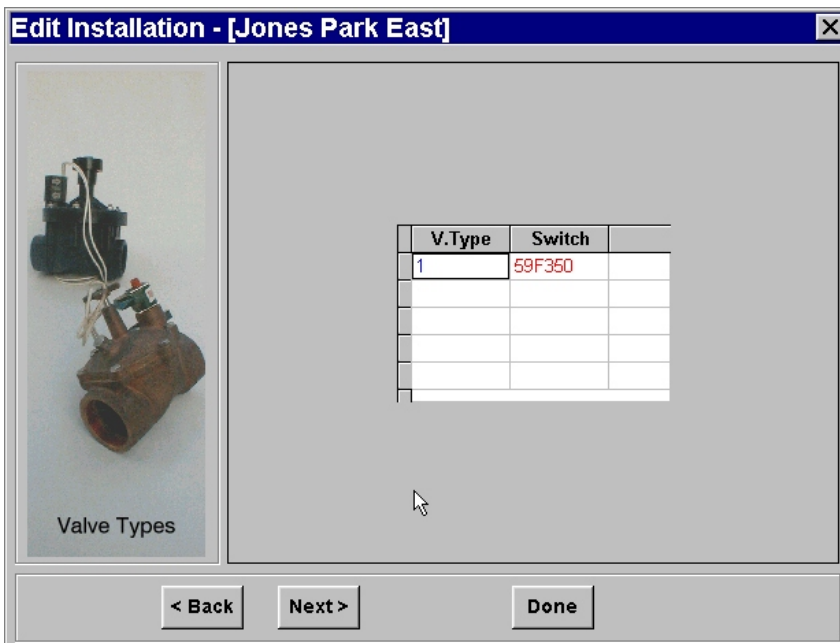
First you must indicate the type of controller:



If you are uncertain about the Controller Type, you can get the information if your connect to the Controller on Site via the direct connection feature.



The top bar displays the controller type and the on-board software version:




When you have entered the data for the controller type, simply press "Next" and you will be taken to the Valve Type Window.

For details about the valve types please refer to the Controller Operation Manual.

To move on press "Next" to enter the information about the Decoders.



Edit Installation



Decoders

Name	Address	V.Type	Booster	
L1	2322	1	Booster 1	Lawn South
L2	2552	1	Not used	Lawn East
	0	1	Not used	

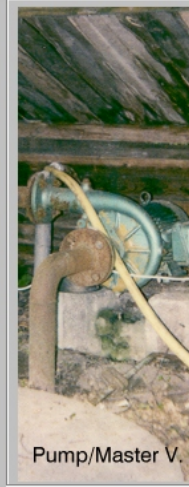
< Back Next > Done

The table allows you to enter Name of decoder (Valve), the address of the decoder, the type of valve connected to the Decoder, and a description of the valve.

(The description will not be transferred to the controller.)

When all decoders have been entered, you can move on to the Pump decoder definition by pressing "Next".

Edit Installation



Pump/Master V.

Pump	Address	Switch	
Master Valve	284	4FFA20	
Booster 1	0	4FFA20	
Booster 2	0	4FFA20	
Booster 3	0	4FFA20	
Booster 4	0	4FFA20	
Booster 5	0	4FFA20	
Booster 6	0	4FFA20	
Booster 7	0	4FFA20	
Booster 8	0	4FFA20	
Booster 9	0	4FFA20	

< Back Next > Done

Now you can move to the final step in the "Installation Setiup Wizzard" by pressing "Next"

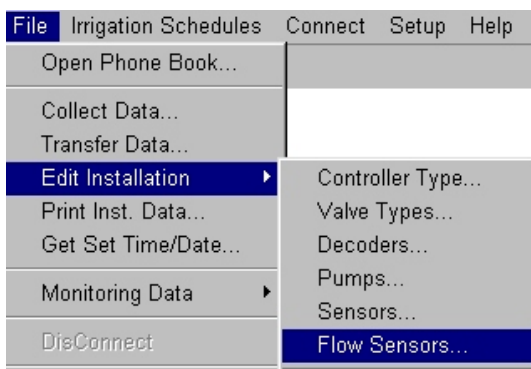


When you press “Done” the setup wizard will close.

Flowmeter/Sensor Decoder.

If a flowmeter/sensor Decoder is connected to the controller, you need to set up the sensor decoder.

Go to File, Edit Installation, and Flow Sensors





Flow Sensor Edit V1.0 - [X]

Flow sensor

Sensor # Address Name

Definition

Flow @ Units Log flow to file

Alarm - high

Stop irrigation when flow is above

Call #, followed by message

Alarm - leak

decoder when flow is above

Call #, followed by message

Now you have to key in the information needed to set up the flow sensor.

Sensor Decoder

Flow sensor

Sensor # Address Name

The address of the Sensor Decoder is printed on the decoder label.

Calibration Data

Definition

Flow @ Units Log flow to file

This information is needed to enable the Controller to convert the measurement into GPM.

Here we have defined that 784 pulses counted by the sensor over a 10 second period correspond to 60 GPM.

The actual numbers depends on the flow meter and the pipe size.

Different types of flow meters can be used and you can set up the sensor decoder to measure in various ways:



Units Pulse/10s ▼
 Not installed
 Pulse/10s
 ms/pulse
 mA

Pulse/10 seconds are mostly used with impeller type flow meters.

ms/pulse (milli-seconds between pulses is used with sensors that give a small number of pulses per second.

MA (4-20 mA) is an industrial type of sensor.

For more information about the calibration of the Flow Sensor see appendix A.

If you check this box Log flow to file all flow measurements will be logged in the monitor file.

Alarms

You may set two different types of alarms:

Alarm when an Irrigation Schedule is running:

Alarm - high
 Stop irrigation when flow is above
 Call #, followed by message

If the flow exceeds 50 GPM for more than 2 minutes, we will get an alarm. When this happens the controller will stop all decoders in the current step and call the pager (phone) 712 223 1221 to display the message 1111.

Alarm when the controller is in "Auto" mode, but no Irrigation Schedule is running:

Alarm - leak
 decoder when flow is above
 Call #, followed by message

If the flow exceeds 5 GPM for more than 2 minutes the Controller will activate the decoder "MV" and call the pager at 712 223 1221 to display the message 0000.

The "action" can be "Activate" or "Deactivate" and the "decoder" can be any decoder in the installation or all decoders.

The "Alarm-leak" function will typically be used to close a Master Valve.

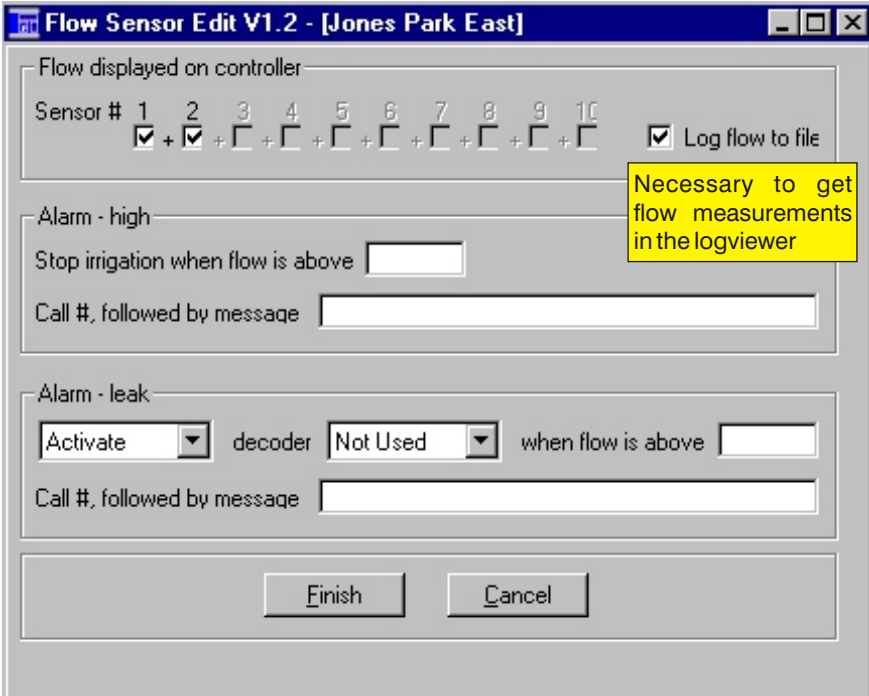
Note: The function Call #... Is intended for used with a paging service. The controller will dial the number indicated, and transmit a series of number plus # and *. Characters are not supported. A "w" or "," may be inserted after the phone number ("w" = wait for ting tone and "," = wait one second).

The format for the pager call depends on the service you are subscribing to.

If your controller is connected to more than one Flow sensor you can set up the others in the same way by pressing "Next".



When you have defines all Flow Sensors, press “Done” and the following window will appear:



This window allows you to sum the measurements from all sensors and set up the total flow to trigger alarms and log the measurements to the monitor file in the same way as for the individual flows.

When you press “Finish” the data setup for the sensor decoders will be stored in the data file on the PC.

For more details on the Flow Sensor please refer to the installation section of this manual.

Flow measurements in the Monitor file

Measurements from the Sensor Decoders are used in two different ways:

As an alarm trigger, i.e. if a certain event happens the controller will react in a certain way. (Refer to the previous pages)

As a means of **monitoring the system**, i.e. monitoring the water flow

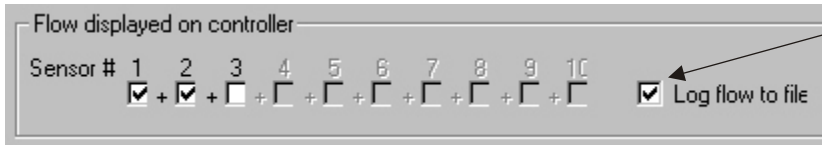
The monitoring is used as follows:

The controller stores in memory all events (e.g. start a Decoder, stop a Decoder, get a measurement from a flow sensor)

The flow measurements made by a specific Flow sensor is stored in the monitor file only if you check this box



This is useful if you have several water sources and you want to keep track of the flow rates from each water source. The measurements are stored in the monitor file and can be seen in the “raw” monitor data. If you use the “**Extract and View**” can be found in the “**Show Data**” function.



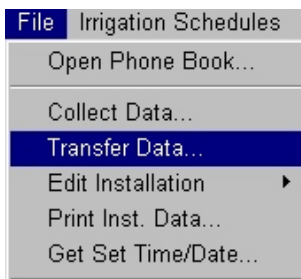
If you want to use the flow measurements to calculate the water consumption, you must check this box

Using this allows you to monitor the sum of several flow meters (in the above example we have 3 flow meters installed but we only want to sum number 2 and 3).

The total, as defined above, is shown in the display of the controller and is also stored in the Monitor file, where it is used to calculate the water consumption. Can be viewed in “Extract and view” using the “Show Overview” function (Refer to page xx **Monitoring Data** for more details).

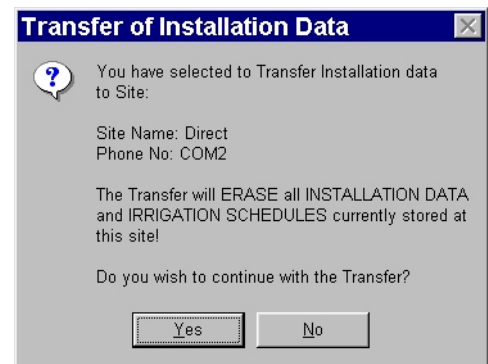
3. Transfer of Installation Data

When you have edited the Installation Data and the Irrigation Schedules you can transfer the Data to the Controller.



Before the actual transfer of Data from the PC to the chosen Site you will be asked if you really want to proceed.

If you accept to transfer Data, the program will call the Controller and automatically transfer Data.



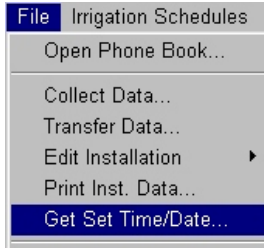
On completion of the transfer an automatic disconnection will be made.

The Controller must be in a state where it is not Irrigating or waiting to automatically start Irrigation ("Auto Mode") in order to transfer and update Installation Data.

If the Controller is not ready to accept the update of Installation Data an error Message will appear:

If this Message appears you must connect to the Controller by selecting the Connect function and change the Controller (i.e. Stop Irrigation or disable "Auto" mode).

4. Set Controller Time



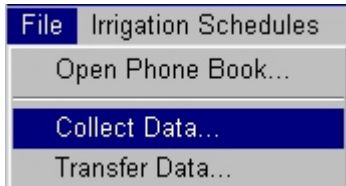
The Controller runs on its built-in clock and it is necessary to verify that the time and date used by the controller are correct.

You start the procedure by using “Get Controller Time”. This will establish a connection to the controller and retrieve the date and time of the controller.

If you need to change this you enter the correct data in the section “Set controller Time” and when you press “Send time to Controller” a connection will be made and the date and time transferred to the controller.

Note: The time and date can be corrected even if the controller is in “Auto” mode and even if one or more schedules are in fact irrigating. If you change the time while irrigation is taking place the running Schedule(s) will continue unchanged, so you may want to take the controller out of “Auto” mode prior to changing the date and time.

E. Setup Controller/Irrigation Schedules



The TWC-RAS program can be used to change the Irrigation Programs in the controller.

Three steps are used to retrieve, edit and transfer the Irrigation Programs to the Controller. First Step is to Get the Irrigation Programs from the Controller

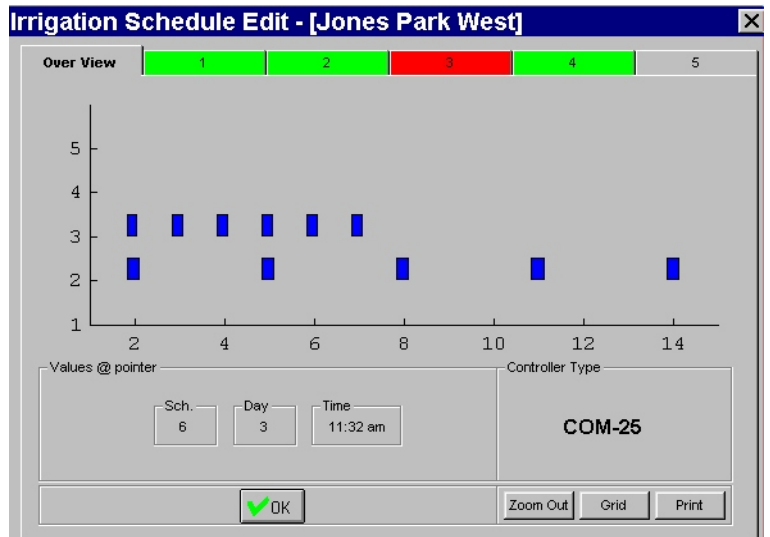


If you decide to start the collection, the program will call the Site and retrieve the Data related to the Irrigation Programs, and you will see a message during the transfer of Data:

When the Data has successfully been retrieved, the Program will automatically disconnect.

Second Step is the editing of the Irrigation Data.

The FlowMaster Controllers can operate 5 Irrigation Programs, and the editing can be made in the **Edit Irr. Schedules::**





The Edit Window contains the following elements:

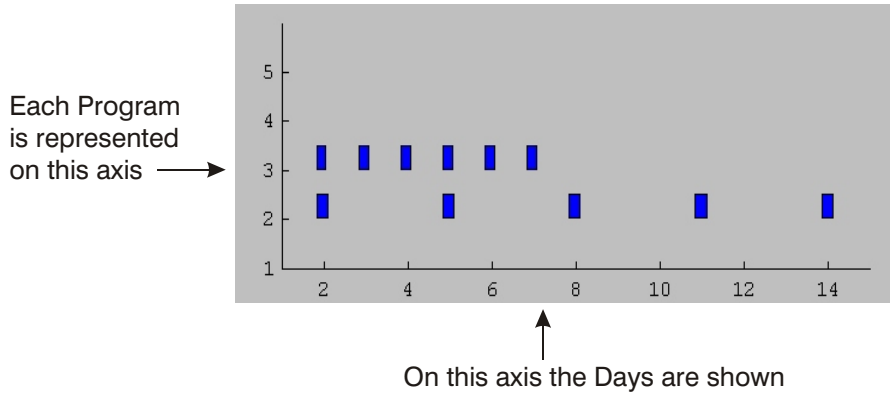


The Top Line shows the Name of the Site. The "Overview" shows when Irrigation will take place, and each of the 5 Irrigation Programs are shown on the 5 index cards, that can be accessed by clicking the corresponding tab number. The tabs are colour-coded:

- Green Tab = Program is active
- Red Tab = Program is passive
- Grey Tab = Program does not contain Data

In the above example Programs 2 & 3 are both active, Programs 1 & 4 are passive and Program 5 does not contain Data.

The main part of the "Overview" shows when Irrigation is scheduled to take place. The Irrigation is shown by the Blue bars.....this will be helpful to avoid Schedule overlap.:



The lower part of the "Overview" shows at the left side the values under the cursor (Irrigation Schedule, Day and Time).

The right part shows the Controller type.



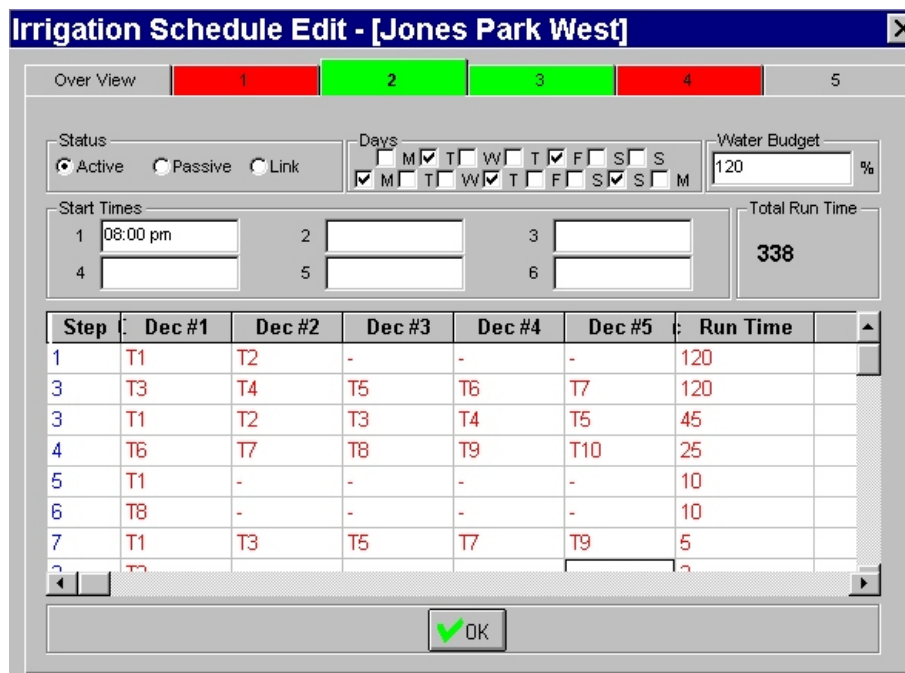
and the bottom holds the functions:



Zoom: If you place the Cursor in the display of Schedules and hold down the right mouse button you can "draw" a rectangle, and when you release the mouse button, the time scale will be Zoomed In. To get back to the full display you click the Zoom Out button.

Grid: This will toggle a grid on/off.

When you want to **Edit an Irrigation Schedule** you click the relevant Tab:



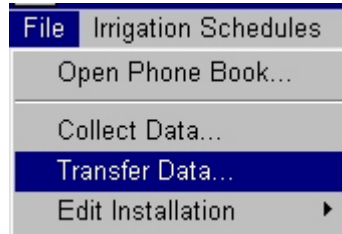
In this Window you can enter Data about Mode (Active/Passive/Link), Days of Irrigation, up to 6 start Times and Water Budget (0 to 250 %). For full details of the Irrigation Schedules, please refer to the Controller Manual.

When you have edited all Irrigation Schedules, click





You can now transfer the Irrigation Schedules to the Controller:



Transfer of Irrigation Schedules



You have selected to Transfer Irrigation Schedules and Irrigation Schedule Contents to Site:

Site Name: Jones Park West
Phone No: 211 2577

The Transfer will ERASE all IRRIGATION SCHEDULES and IRRIGATION SCHEDULE CONTENTS currently stored at this site!

Do you wish to continue with the Transfer?

Before the actual transfer starts, you will be asked if you really want to transfer Data to the Site. When the transfer takes place the Data will overwrite the Irrigation Schedules already stored in the Controller.

F. Connecting

1. Call a Controller:

When you select the Connect function

the Phone Book will appear:

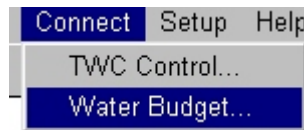
Account	Site	Phone #	Call
	Direct	COM2	

To call the Controller: Simply click the telephone picture: in the Call column. As soon as you have clicked, the TWC-RAS program will start dialing the telephone number of the Site or use the serial connection of the COM port.

2. Update the Water Budget

All Tucor Irrigation Controllers include functions for adjusting daily irrigation by use of a Water Budget (0 to 250 %). In order to adjust the controller in the Phone Book a function for updating of the Water Budget has been included in the TWC-RAS program.

In the Main Menu click "Connect" and "Water Budget"



This will open the Water Budget table:

Account	Site	Phone #	Budget %
	Direct	COM2	100

In this table you can adjust the WB by entering the appropriate figure in the "Budget %" column.

Once this has been done you click the button in the top left had corner.

The TWC-RAS will now call the site and transfer today's Water Budget to the controller.

If the Water Budget is updated while the controller is irrigating, the new Water Budget will be effective on execution of the next Irrigation Schedule, i. e. it will not effect the currently running Schedule.

Should a call not be successful the program will stop and display an error message:



This indicates that the phone line is busy



This indicates that the remote Controller does not respond, possibly because the Controller has been switched off (Power Failure).

When you have clicked OK in any of these messages, the box will disappear. You can then later try to connect manually and if you can get contact you can set the Water Budget by using the Controller functions.

G. Working with the Data

1. Backup/Restore Data



In the Setup Menu you select the function Tools to see the Backup and Restore functions

When you activate the Backup function you will be prompted to insert a Floppy Disk in drive A.

And after the backup is performed:



The backup function copies the file TWC.LDB which holds the Installation Data and Irrigation Schedules (i.e. All the data required by the controller). On the floppy disk you will see two files:

Twc.lbk is the data file



twc.lbk

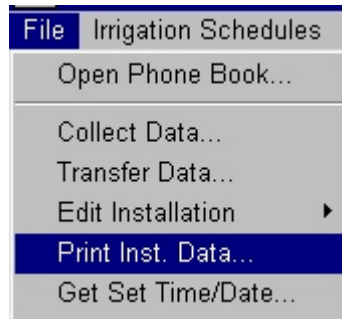
Restore.bat is a program that will allow you to restore the data from the Floppy Disk (double click the restore.bat).



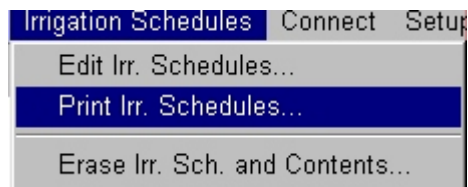
restore....

2. Print Functions

To print the Installation Data you must access the function **Print Inst. Data**



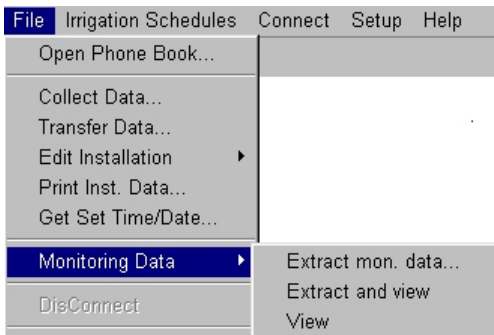
To print the IRRIGATION Schedules you must access the function **Print Irr. Schedules**



3. Monitoring Data

The controller stores information about activities, such as activation/de-activation of the valves. The monitoring data can be retrieved and viewed in different ways.

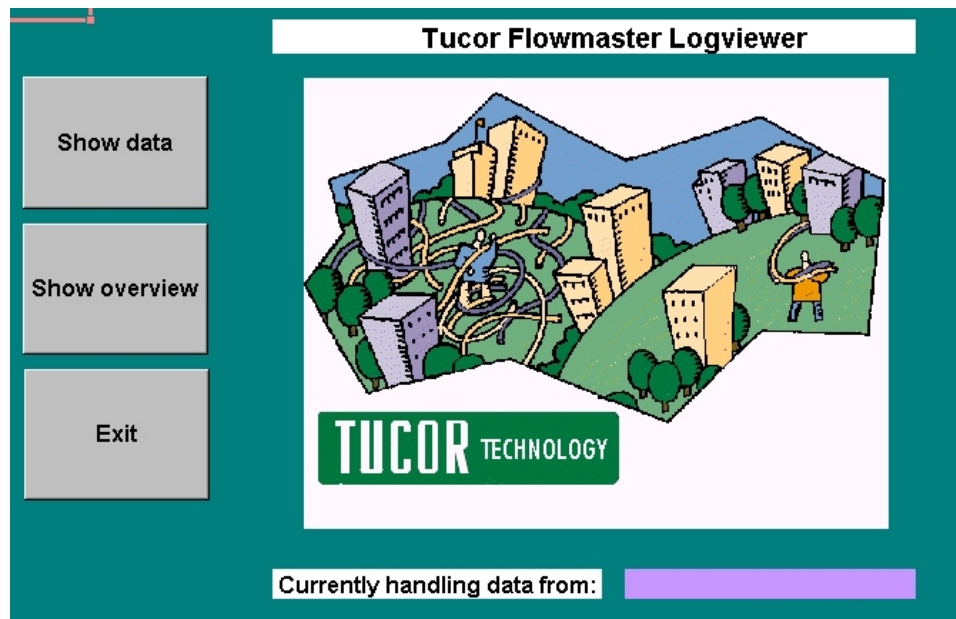
To work with the Monitoring Data you must use the function Monitoring Data:



Extract and View Monitoring Data

The **Extract and View** function will also ask if you want to connect to the controller and collect Monitoring Data. Note: **For this to run properly you need Excel 7 or later and Windows 98 or later.**

Having answered this question the data will be extracted and the TWC-RAS program will now look for the spreadsheet program Excel. If Excel is found to be installed on your PC the spreadsheet program will be started and the Monitoring data will automatically be imported into Excel. You will see a screen like this:



The two functions above (**Show data** and **Show overview**) will open two different ways of viewing the Monitoring data.

Show data: Displays the “raw” data

test	Direct	20000327	013200	L2	D	Stopped
test	Direct	20000327	013200	L3	D	Stopped
test	Direct	20000327	013200	L4	D	Stopped
test	Direct	20000327	013200	L5	D	Stopped
test	Direct	20000327	013200	L6	D	Started
test	Direct	20000327	013200	L7	D	Started
test	Direct	20000327	013200	L8	D	Started

As you can see this is very similar to the comma delimited file you get from the **Extract Mon. Data** function.

The software remembers the last time you extracted data and it only works with the latest data set which is added to the old data.

Of course you can use the raw data like any other spreadsheet, i.e. you can work with the data by sorting, filtering, summing, and so on.

Show overview: Displays Data by steps

1	Alarm	Date	Sitename	Schedules	On	Valve										Off	Gallons	Run	GpM		
2						1	2	3	4	5	6	7	8	9	10			Time			
3			Test	1 Start	10:29 AM																
4			Test		10:29 AM	D1	A1	A2	A3	A4	A5	A6	A8	A9	A7			10:31 AM	323,2	2	161,6
5			Test		10:31 AM	B1	B2	B3	B4	B5	B7	B8	B9	D2				10:33 AM	179,2	2	89,6
6			Test		10:33 AM	G1	G2	G3	G4	G5	G6	G7	G8	G9	D3			10:35 AM	418,6	2	209,3
7			Test		10:35 AM	L1	L2	L3	L4	L5	L6	L7	L8	L9	D4			10:36 AM	210,7	1	210,7
8			Test		10:36 AM	M1	M2	M3	M4	M5	M6	M7	M8	M9	D5			10:37 AM	49,8	1	49,8
9			Test		10:37 AM	N1	N2	N3	N4	N5	N6	N7	N8	N9	D6			10:38 AM	212,3	1	212,3
10			Test		10:38 AM	O1	O2	O3	O4	O5	O6	O7	O8	O9	D1			10:39 AM	59,9	1	59,9
11			Test		10:39 AM	P1	P2	P3	P4	P5	P6	P7	P8	P9	D2			10:40 AM	48,5	1	48,5
12			Test	1 Stop	10:40 AM																
13																					
14																					
15		15-08-00			Total													1502,2	Gallons		
16																					

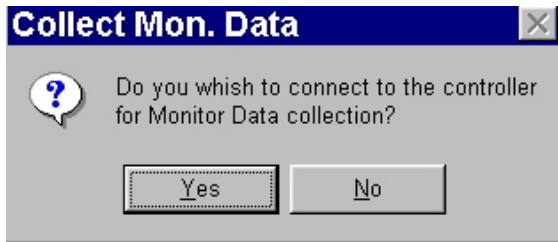
As you can see the **overview** gives details of start/stop time for each step and if you have a Flowmeter/Sensor decoder installed, it will also give you the water consumption per step and per day....

The **overview** is calculated from the raw data (**Show Data**)

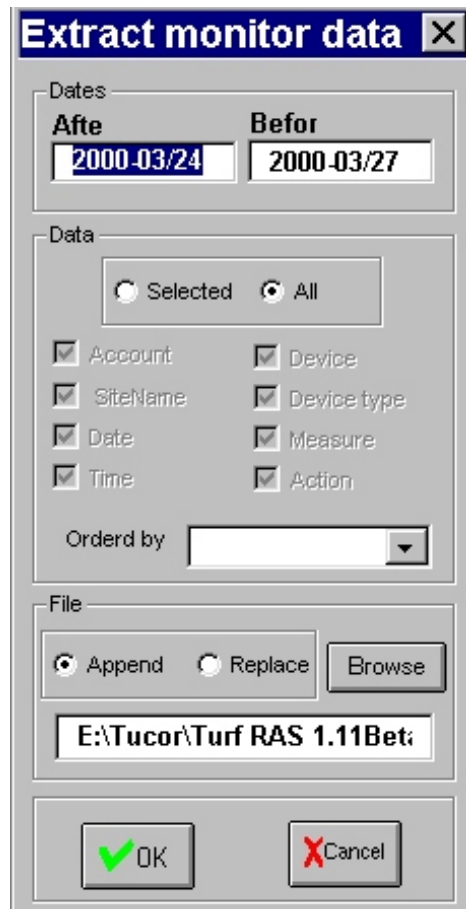
View Monitoring Data

The **View** function performs the same function as the **Extract and View** function but it does not extract new data.... It will open the Excel spreadsheet for viewing.

Extract Mon. Data (Extract Monitoring Data) will ask you if you want to connect to the controller to collect monitoring data:



If you answer Yes to the question the connection to the controller will be established and monitoring data will be collected from the Controller and you will be asked to specify the data you want to extract:



Specify the date interval

Specify the data you want to see. Typically all.

You can sort by Account, Site Name and date

The data will be extracted to a file and you can specify the location and name of the extraction file.

Select if you want to append to an existing file or you want to replace data (overwrite).

The extraction file created by the above is a comma delimited text file which looks like this:

The extraction file may be imported into your favorite spreadsheet or you may simply view it in a text editor (e.g. Notepad).

Annex: Main Files

The TWC-RAS needs/creates the following main Files:

Turf.exe	Main Program
Ctrlserv.exe	Server Program
Odbcserv.exe	Database control Program
Turf_ser.exe	Server Program
Flowsense.exe	Flow Sensor setup Program

The above files are all loaded into memory when you start "Turf.exe"

twc.ldd	Setup file
Monitor.ldd	Monitoring data file
Turf.cfg	Configuration File, stores the setup of windows sizes, and location.
Turf.hlp	Helpfile (about the TWC-RAS program)
Twc.hlp	Helpfile (About operating the controller)

During operation the program creates some "Log-files":

Connect.log	Show the calls (connections) made from the PC
SQL.log	Show details about how the database has been called
Turf.ser.log	Show details about the communication (modem data)
Turf.log	Information from the turf program

The 3 last files are cleared whenever the TWC-RAS program is started, and the Log files are intended for trouble shooting only.

Software version: 1.14



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Irrigation Schedules

The Flowmaster can store 5 (TWC-200: 10) irrigation schedules. Each schedule is identified by a number as follows:

- Schedule 1
- Schedule 2
- Schedule 3
- Schedule 4
- Schedule 5
- .
- (Schedule 10)

Schedule 1	Total	0:44	10:55:40
2	SMTW-F-S-T-T-SS	(3)	3:30
	105%	P	

Each Schedule consists of:

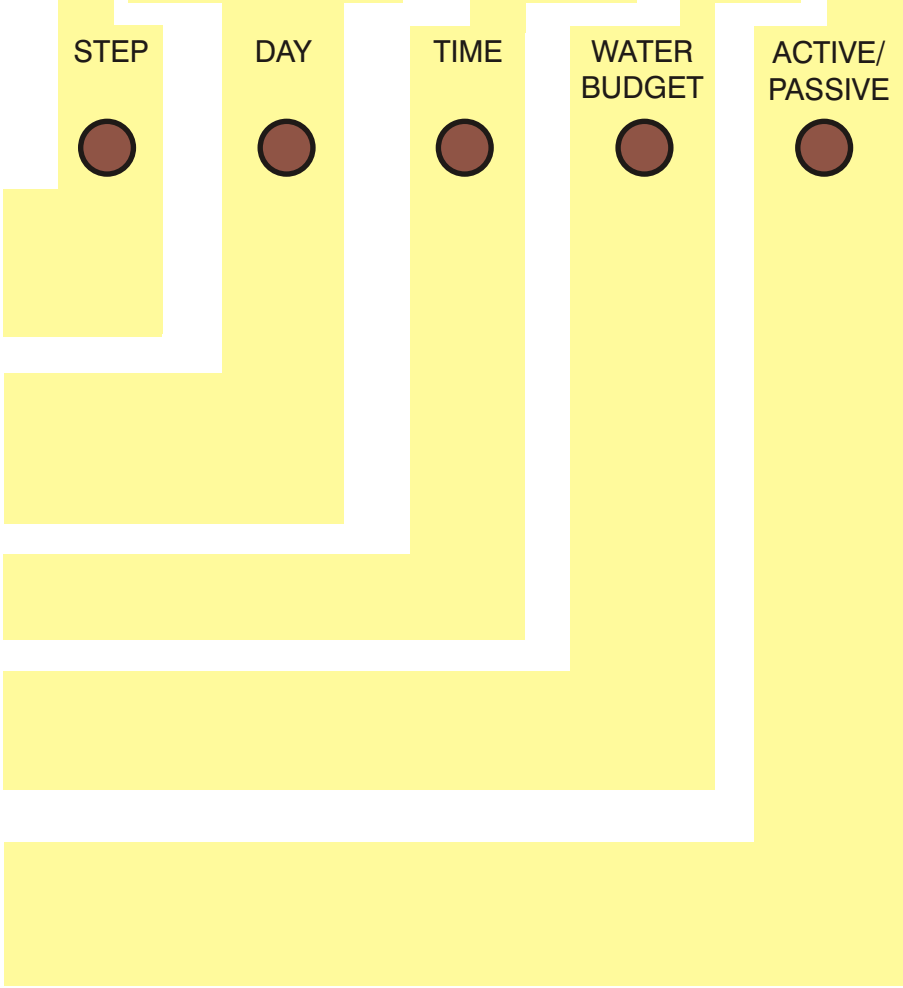
1-60 STEPS (Zones) (TWC-200 has 100 STEPS) defined by step number, Decoders (Valves) and Run time.

DAYS when irrigation shall take place. During the installation the calendar is set to either 14 or 15 days cycle.

Each Schedule can start automatically up to 6 TIME's per day.

WATERBUDGET may be set from 0-250 %. This adjusts the run time of all steps in a Schedule.

A schedule can be set to either ACTIVE or PASSIVE. When in AUTO only active schedules will start. For L (Link) see page 13.





Steps

Each step contains Decoders (Valves) and Run Time. The maximum number of valves running at the same time is 10 valves (COM-50: 5 valves only). This means that you may include up to **10 (5) valves** in each step, **provided your hydraulics can handle this**. The controller checks out the number of valves and it will prevent you from including too many!

Max. 10 valves per step

The FLOWMASTER executes an irrigation schedule by **running one step at a time**.

One step at a time

Lawns Schedule

You want to irrigate each valve for 10 minutes, and your pipes and pump will allow you to run 3 valves at the same time.

Example 1

The program could look like this:

STEP	DECODERS	RUN TIME
1	L1, L2, L3	10
2	L4, L5, L6	10
3	L7, L8, L9	10
4	L10, L11, L12	10
5	L13, L14, L15	10
6	L16, L17, L18	10

When the above program is started, it will begin with step 1 where L1, L2, L3 will all be activated and run for 10 minutes. After the 10 minutes, valves L1, L2, L3 will be switched off and step 2 (L4, L5, L6) will be started and so on.

Alternatively you may want to run only one valve at a time, in which case you could write your schedule like this:

Example 2

STEP	DECODERS	RUN TIME
1	L1	10
2	L2	10
-		
-		
-		
18	L18	10

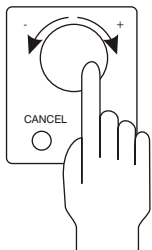
As can be seen from the above the STEPS will allow you to have full control. You may even include steps without decoders, which would then just give a pause in the schedule execution.

Schedule pause

You may also include the same decoder in as many steps as you wish.

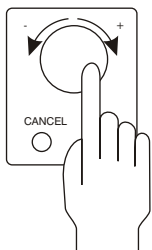
"Cycle and Soak"

The Selector



The Selector has two speeds. If it is turned slowly it changes the target slowly. If it is turned more quickly, it changes the target very rapidly.

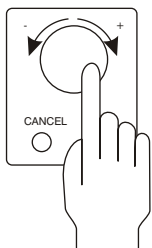
Select Field



Schedule 1	Total	0:00	14:18:40
1 L1	-----	>000Min<	OK Insert

The Selector is used to select the actual field. The field between > and < is the selected one. Finish selection with pressing the ENTER-button.

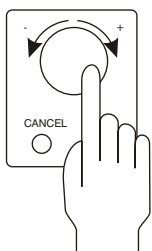
Select Field Input



Schedule 1	Total	0:00	14:18:44
1 L1	-----	008Min	OK Insert

When the ENTER-button has been pressed, the > and < turn into and which are now blinking to indicate that the field is ready for input. When the Selector is turned, the content of the field varies. Finish input by pressing the ENTER-button.

Select alphanumerically

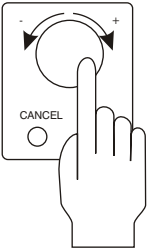


...BLSGD 1234567890BLSGD
 or (in case of full alphabet):
 ..OPQRSTUVWXYZ 1234567890ABCDEFGH

Certain fields require alphanumerical input (f. inst. Decoder installation). In this case each position in the field may be entered separately. When a position is active and the selector is turned, the available selection of digits and letters passes the position. The position is like a "window" through which only one digit at a time can be seen.

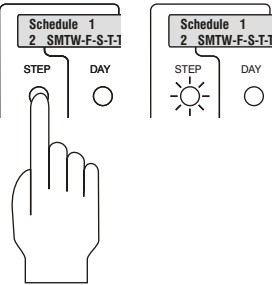


Make/Modify schedule (Step:Valves)



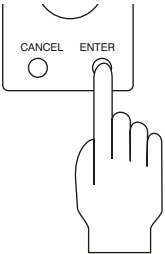
Schedule 1	Total	0:00	14:18:14
0 MTWTFSSMTWFSS	(0) :-	100%	P

Use selector to move to the right schedule and press STEP-button to enter the schedule.

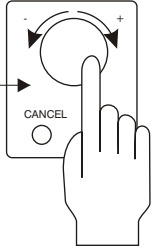
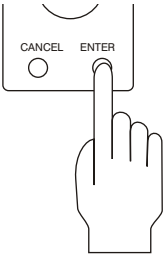


Schedule 1	Total	0:00	14:18:20
1 ----- 000Min	OK Insert Delete		

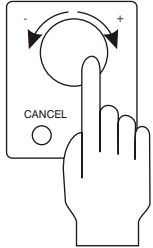
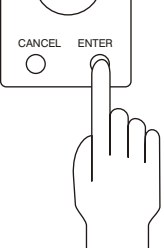
If you are writing a new schedule, step number 1 will be "active". Otherwise use selector to get to the right one. Confirm by pressing ENTER-button.



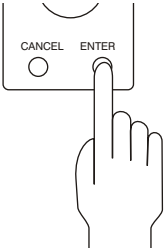
Schedule 1	Total	0:00	14:18:25
1 >-----< 000Min	OK Insert Delete		



Schedule 1	Total	0:00	14:18:30
1 L1 ----- 000Min	OK Insert		

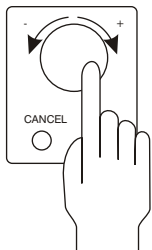


Schedule 1	Total	0:00	14:18:40
1 L1 >-----< 000Min	OK Insert		

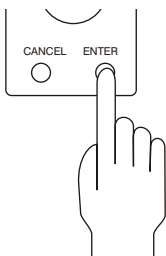


You may enter up to 10 Decoders (valves).

Make/Modify schedule (Insert step)



Schedule 1	Total	1:52	12:23:37
3 L1	----- 010Min	OK	>Insert<

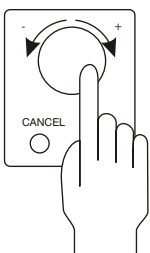


Schedule 1	Total	1:52	12:23:39
3	----- 000Min	OK	Insert Delete

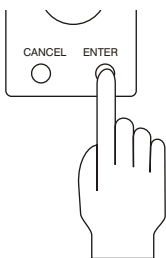
If you want to "squeeze in" a step between two steps you must select the Insert function.

In this example you want to insert a step between step 3 and 4. First select step 3 and press ENTER-button. Then select Insert and press ENTER-button. The action of step 3 and all successive steps are moved one step (3 to 4 and so on). The new (empty) step is inserted in step 3 as can be seen on the next display.

Make/Modify schedule (Delete step)



Schedule 1	Total	1:52	12:33:45
13	----- 013Min	OK	Insert>Delete<



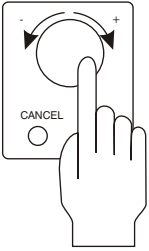
Schedule 1	Total	1:39	12:33:47
12 B12	012Min	OK	Insert Delete

Schedule 1	Total	1:39	12:33:49
13 B14	014Min	OK	Insert Delete

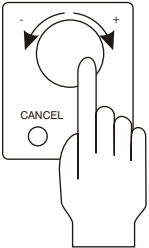
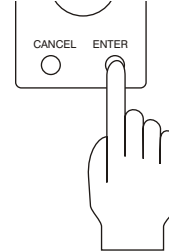
If you want to delete a step, you must use the Delete function.

In this example you want to delete step 13. First select step 13, then select Delete and finish by pressing the ENTER-button. The actions of step 13 are now removed and you get step 12 displayed. What was previously in step 14 is now found in step 13 and all following steps are moved one step too. Note that also the total time has changed.

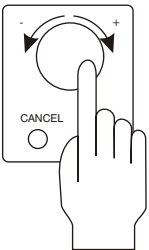
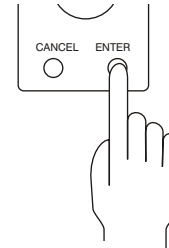
Make/Modify schedule (Step: Min)



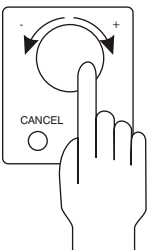
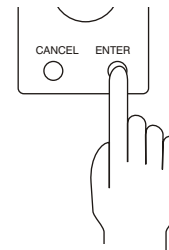
Schedule 1	Total	0:00	14:18:40
1 L1	-----	>000Min<	OK Insert



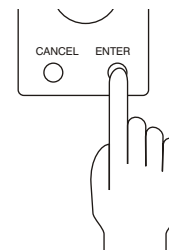
Schedule 1	Total	0:00	14:18:45
1 L1	-----	010Min	OK Insert



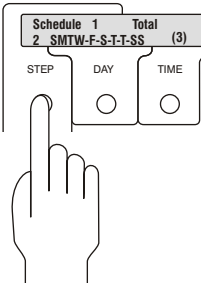
Schedule 1	Total	0:10	14:18:50
1 L1	-----	010Min	>OK< Insert



Schedule 1	Total	0:10	14:18:55
2	-----	000Min	OK Insert Delete

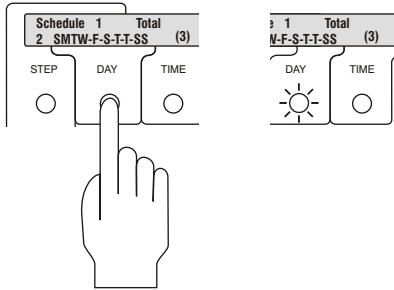


You may repeat up to 60 STEPS (TWC-200: 100 STEPS).
When finished with STEPS:





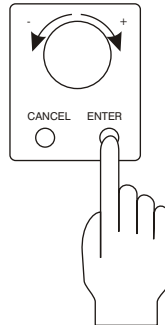
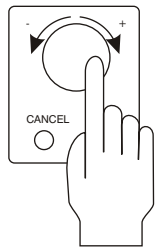
Make/Modify schedule (Day)



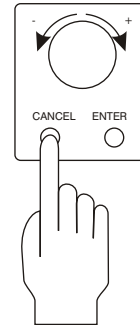
Schedule 1	Total	2:07	14:35:15
12	MTWTFSSMTWTFSS	(0)--:--	100% P

Press the DAY-button. When the light flashes, you may begin to select the day or days of the week, you want to water. When you push ENTER, the day of the week stays and the cursor moves to the next day. When you press CANCEL the day will be blanked out. Press DAY-button to end session

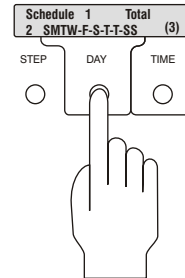
HINT:
When you first press the DAY-button, the current day of week will be your starting point.



or

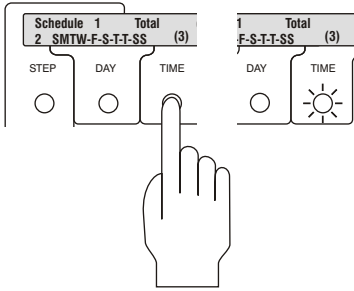


Schedule 1	Total	2:07	14:35:15
12	M--T--S--W--S	(0)--:--	100% P

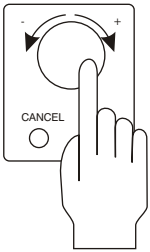
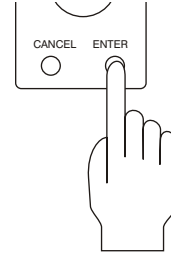




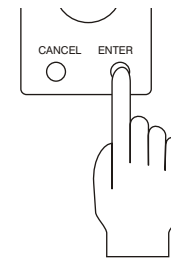
Make/Modify schedule (Time)



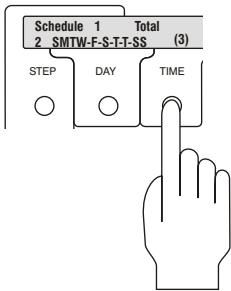
Schedule 1	Total	2:07	14:35:15
12 M--T--S--W--S	1	--:--	100% P



Schedule 1	Total	2:07	14:35:15
12 M--T--S--W--S	(1)	22:00	100% P



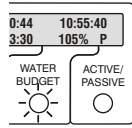
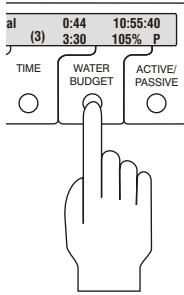
You may set up to 6 TIME's per day. When finished:



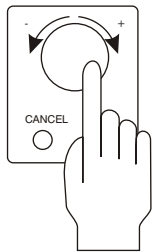
To enter a start time, press the TIME-button. When the light flashes, you are ready to begin programming a start time. Select start time (1 through 6) and press the ENTER- button. When the curso is blinking, rotate the dial to your desired time. Press ENTER. To en your session, press TIME-button.

HINT:
Remember the controller is set to Military Time.

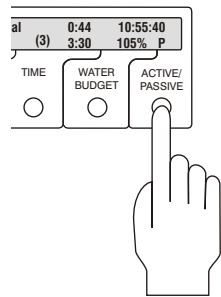
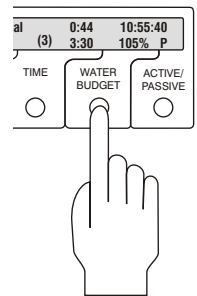
Make/Modify schedule (WaterBudget & A/P)



Schedule 1	Total	2:07	14:35:55
12 M--T--S--W--S	(1)22:00	100%	P

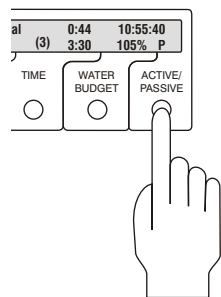


Schedule 1	Total	2:07	14:36:00
12 M--T--S--W--S	(1)22:00	125%	P



Schedule 1	Total	2:07	14:36:05
12 M--T--S--W--S	(1)22:00	125%	A

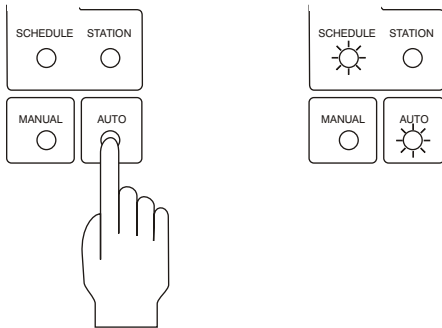
An Active schedule will run as programmed if controller is set to AUTO.



Schedule 1	Total	2:07	14:36:10
12 M--T--S--W--S	(1)22:00	125%	P

A Passive schedule will not run when controller is set to AUTO.

Start irrigation (AUTO)



Schedule 2 @ 3 23:00
**** Schedule Overlap ****

14:41:10

If you have programmed two schedules to run at the same time, the display will show a message as shown below. The number after @ is the day.

When the controller is set to AUTO, the sensor system is active.

Simultaneous Schedules

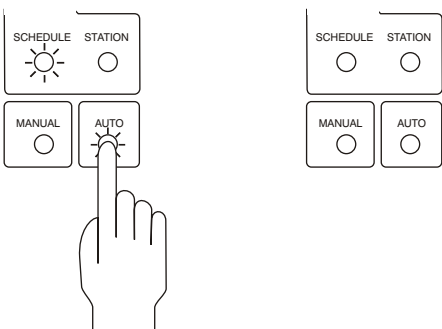
The controller allows all schedules to run simultaneously. The only limitation is the maximum number of valves that can be open at the same time.

Depending on the setting of DIP-switch no 9 the max. Number will be $5+2=7$ or $10+2=12$. (For this type of operation 2 more are allowed than the step maximum.)

There is no warning that the limit has been passed. It is up to the user to take care of not programming too many to run at the same time.

For that reason the controller still reports "Schedule overlap".

Stop irrigation

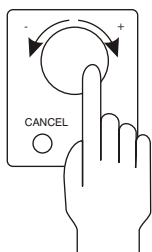


LINK-start

The Flowmaster can operate in two modes:

- DAY & TIME (DT)
- LINK-mode (LINK)

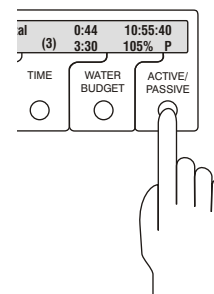
The mode is selected like this:



Schedule 1	Total	4:23	15:29:59
27	WTFSSMTWTFSSMT	(1)21:15	100% P

Schedule 1	Total	4:23	15:29:59
27	WTFSSMTWTFSSMT	(1)21:15	100% L

When display shows "L" the system is in LINK-mode.



LINK-mode

- Schedule 1 is a DT start schedule (The MASTER)
- Schedules 2-5 are slaves:

i.e. Schedule 2	links	to	1
" 3	"	"	2
" 4	"	"	3
" 5	"	"	4

A linked schedule only runs on the days programmed. If a day is not programmed for a linked schedule, it will be skipped and the next (in numerical order) will be started instead.

Other schedules can only toggle status between "A" and "P". If a linked schedule has status "P", it will be skipped and the next (in numerical order) will be started instead.

Time field for linked schedules always shows "--:--".



Schedule 4 @ 1 23:00 16:06:02
**** Schedule Overlap ****

If any schedule overlaps a MASTER schedule, this message appears.

*****ERROR*** Run time overflow -**
reduce one or more schedules

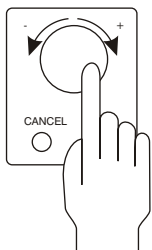
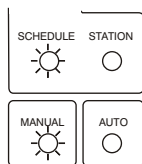
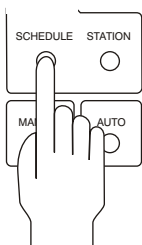
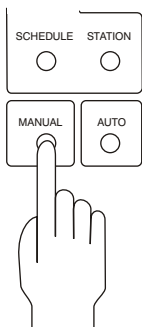
The total sum of schedule run times (and calculation time) must be less than the programming period (14 or 15 days). If the sum is in excess this message is displayed.

DT-mode

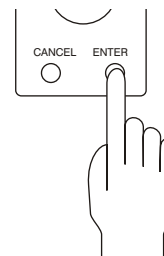
Schedule 1	Total	4:23	15:29:59
27 WTFSSMTWTFSSMT	(1)21:15	100%	A

If Schedule 1 has status "A" or "P", schedules 2-5 will run as programmed (DAY & TIME).

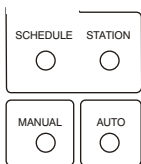
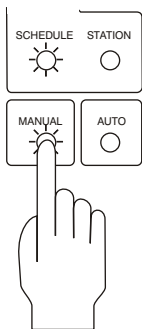
Start Schedule Manually



Schedule 1	Total	2:07	14:36:05
12	Wednesday	0:00	125% A

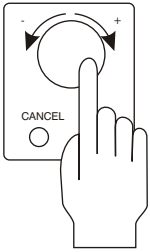
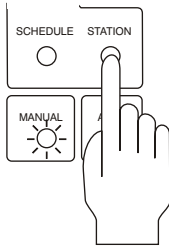
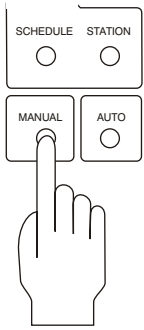


Stop Manually started Schedule

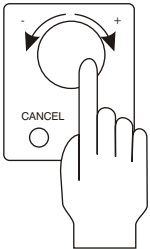
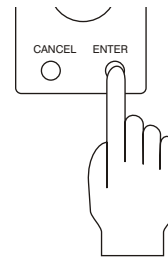




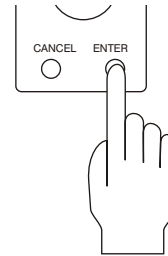
Start Station (Decoder) manually



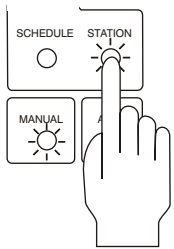
0 Active Decoders **11:25:28**
L1 000 Min



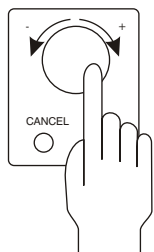
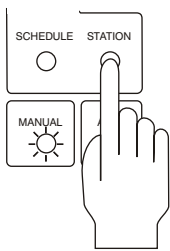
0 Active Decoders **11:25:37**
L1 010 Min



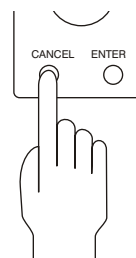
To start another Decoder:



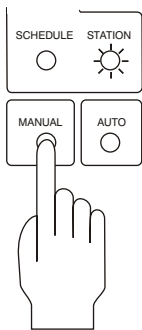
Stop manually started Decoder



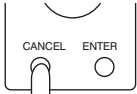
D3 000 Min 11:59:48



Stop all manually started Decoders

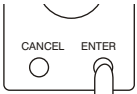


Pause Schedule



Enter to Pause current Schedule 14:06:11
Use Cancel to Abort

When you press the Cancel button you have the possibility to regret and cancel. To proceed, press Enter.



Schedule 5 Total 0:45 14:06:12
D3 008 Min Pausing 0:38 100% P

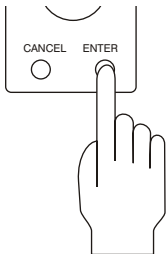
The irrigation continues until the next full minute, and the display states "Pausing" to indicate that your command was registered.



Schedule 5 Total 0:45 14:07:01
D3 008 Min Paused 0:38 100% P

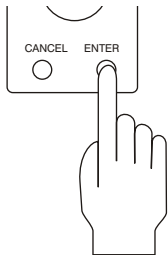
At the full minute all activated sprinklers will stop and the display states "Paused".

Resume Schedule



Schedule 5	Total	0:45	14:22:31
D3 008	Min Paused	0:38	100% P

When you press the Cancel button you have the possibility to regret and cancel. To proceed press Enter.



Schedule 5	Total	0:45	14:22:31
D3 008	Min Paused	0:38	100% P

When you press the Cancel button you have the possibility to regret and cancel. To proceed press Enter.



Sensors, generally

Xxxx Sensor 11:37:13
In: 2. 23:21, Out: 3. 04:00

If a Sensor becomes active a message like this will be displayed. The digit "2." after "In:" is the number of the day where the Sensor went active. If the Sensor is still active, there is no Out-time. Press any button to remove the message. As long as the Sensor is active, the message will be redisplayed every time a function is selected (Manual or Auto).

If more than one Sensor is active, only the first one will be displayed. When this first Sensor is deactivated, the next will be displayed.

Rain Sensor

Rain Sensor 11:37:13
In: 2. 23:21, Out: 3. 04:00

When the Rain Sensor is activated, irrigation stops, but the Schedule keeps running. If the Rain Sensor is of the self-emptying type, irrigation will continue as programmed, when the Sensor changes to non-active.

Pump Sensor

Pump Sensor 11:41:27
In: 3. 11:40, Out:

The Pump Sensor acts in the same way as the Rain Sensor.

Short Circuit

Short Circuit ('CANCEL' to Finish) 11:12:37
In: 2. 23:21, Out:

If there is a short on the Lines, the Flowmaster will cut off Line power and display this message. The cabinet will get a little hot on the front, but that is OK. As you can do nothing but programming, you may as well turn off the Flowmaster.



Power Failure

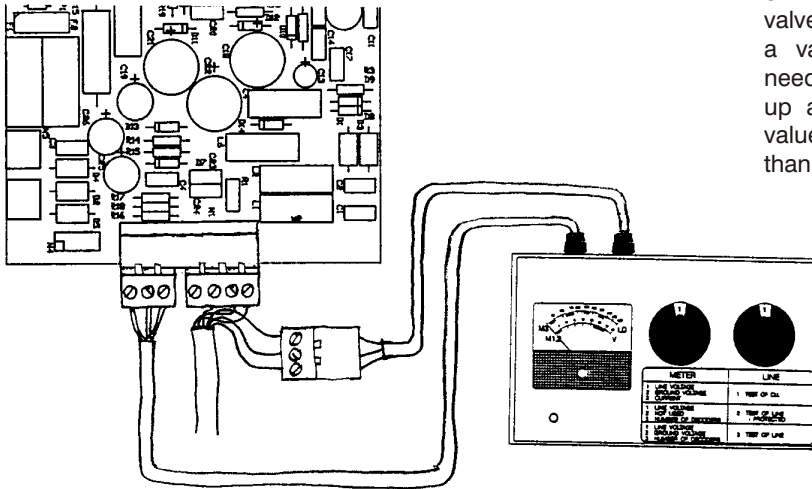
Power Returned (Hit ENTER) 07:41:10
1991-12-11 05:38:56

If a Power Failure has occurred, a message will stay on the display until you press the ENTER-button. (In some cases you must press it two times.)

When the Controller is turned ON, this message also appears.

Test of Line Decoders

Dec. Test, OK: Next, --: Finish 16:42:46
L1 999 Min



Press ENTER-button to start the first valve, press ENTER again to stop it. Press ENTER to start the next and so on. The valves are taken in the order they are installed.

Use Line Tester LT-100 to check proper electrical operation of the valves. The upper scale on the meter shows the current in number of Line Decoders when no valve is opened. Every time a valve is activated, the needle on the meter "kicks" up and then settles on a value 30 decoders more than before activation.

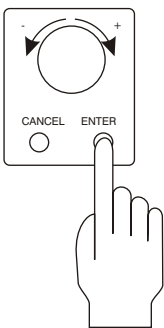
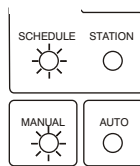
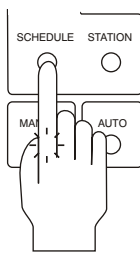
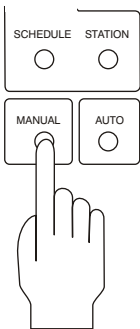
Short finding

Short Finding 16:47:13

In this state the Flowmaster changes the frequency of the Line Voltage to 50 Hz. With this frequency a meter will give correct reading. If the short is taking a high current, the Flowmaster will automatically limit the current to a safe value (200 mA).

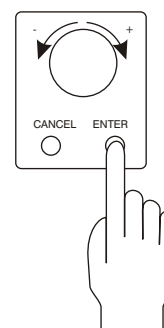
Use a Clamp Amperemeter to trace shorts on the lines. Put the clamp around one wire and follow the current from the controller and out. When the reading disappears you have passed the short.

Test Schedule

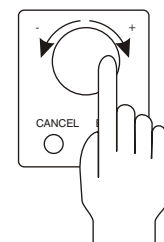


Test	Total	0:00	14:43:13
L1 001 Min	Remaining	0:14	100% P

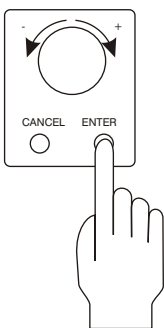
Select counterclockwise until the Test schedule is found. It is located just before Schedule 1.



Station Active Time	->120<-	Seconds	14:33:55
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Time may be adjusted from 1 to 240 seconds



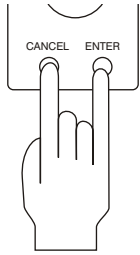
Test	Total	0:00	14:43:13
SUNDAY	14:44	100% P	

Test	Total	0:00	14:43:13
L1 001 Min	Remaining	0:14	100% P

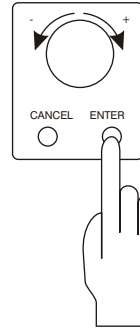
The Test Schedule will run the Stations (valves) one by one in the order they are listed in the database. Time per Station will be as selected.



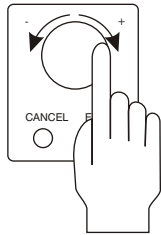
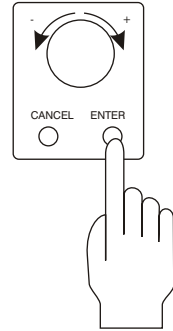
Remote Connection



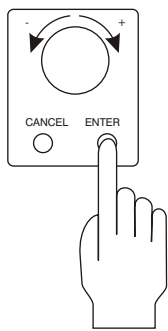
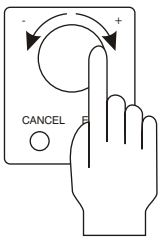
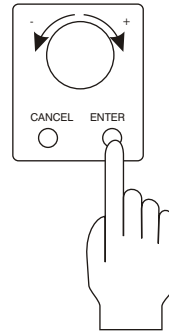
*** Main Menu *** 13:51:42
-> 1. Remote Connection



Remote Connection 13:51:44
-> 1. -



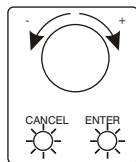
Site Phone # 13:51:47
Call> - < - Finish



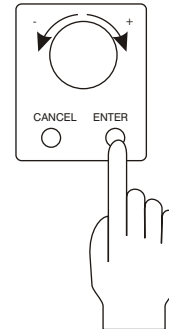
Site Phone # 13:52:53
Call Bellevue > 41293568 < <- Finish

Up to 20 sites may be entered

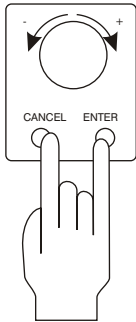
Site Phone # 13:53:04
> Call < Bellevue 4129356850 - Finish



When connected both buttons will flash



Remote Connection, disconnect



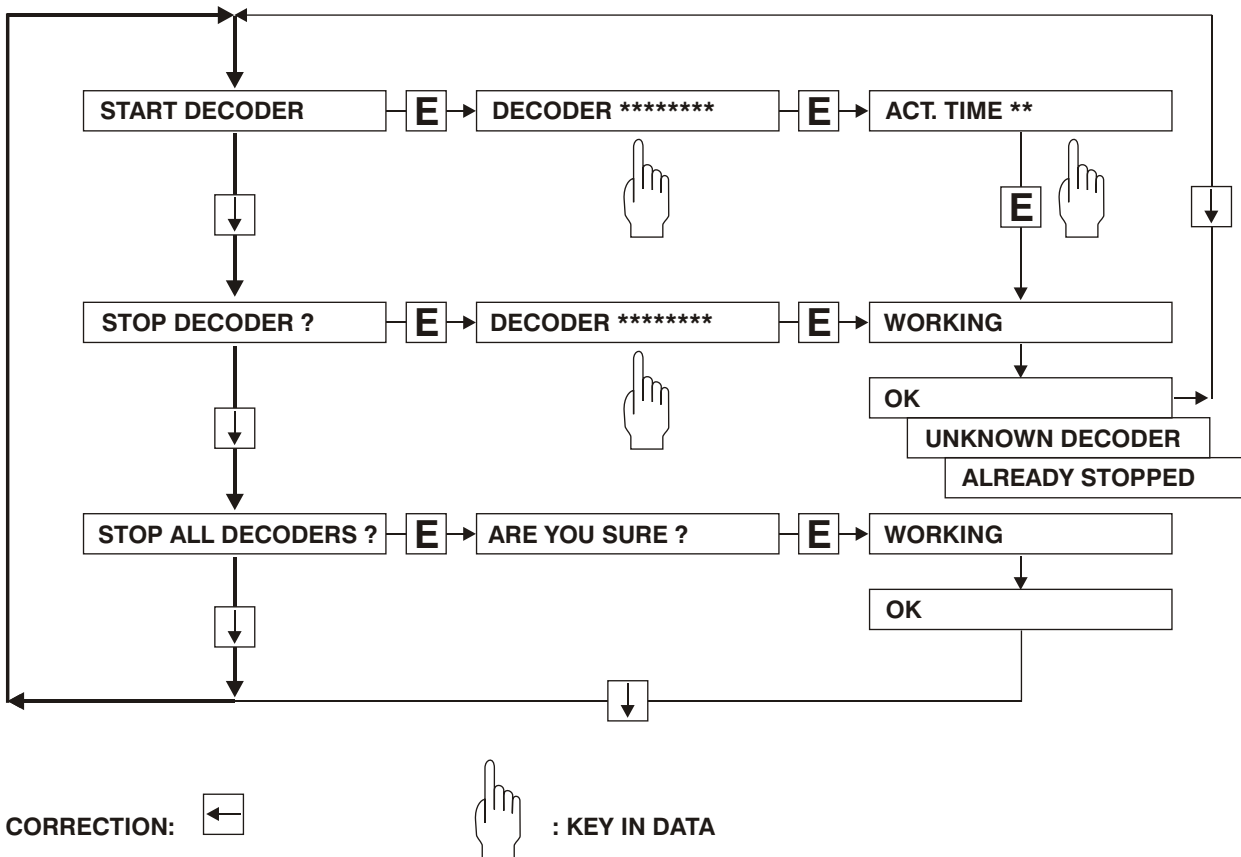
*** Main Menu *** 14:33:55
-> 1. Disconnect

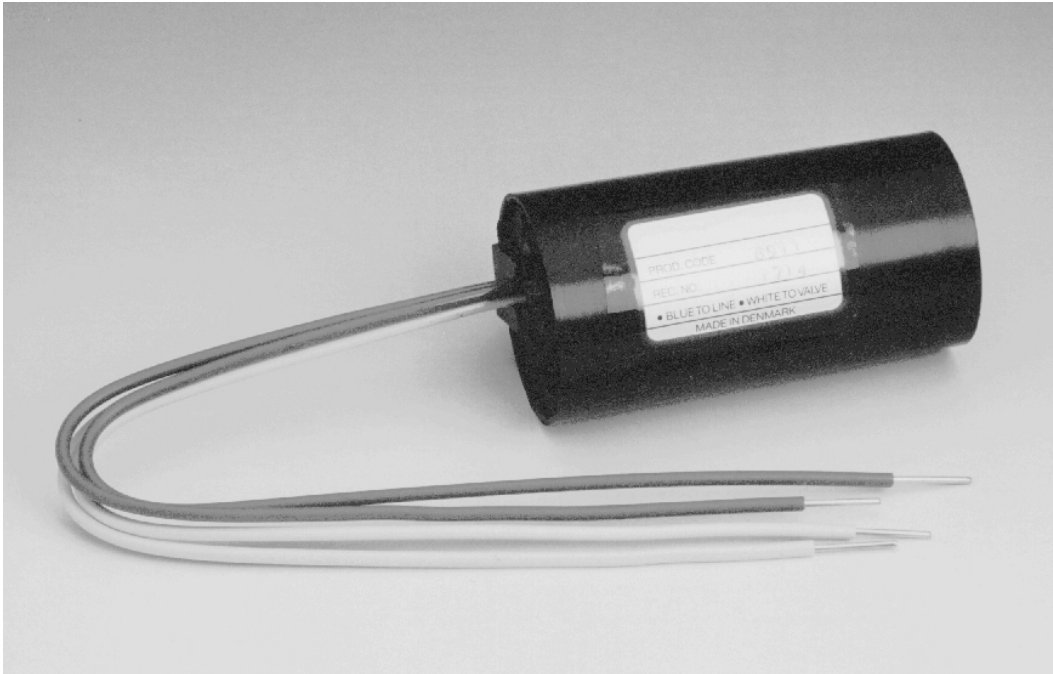
ENTER to Disconnect 14:33:57
(Cancel to resume)

Field Access Unit FA-100

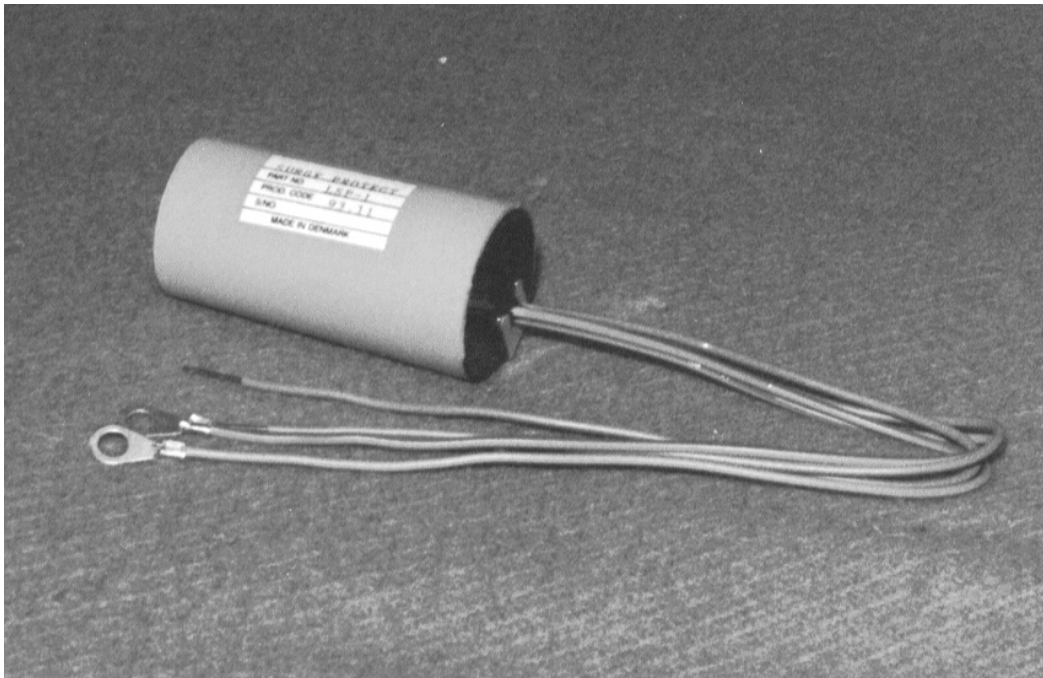
Field Access Unit may be used to start valves non regarding which state the Central Unit actually is in. If the Central Unit is in the Standby state, usage of the Field Access Unit will result in it changing to Manual State.

When the Field Access Unit is connected, it first shows the version of the built-in software. After that it goes into the menu system shown below:

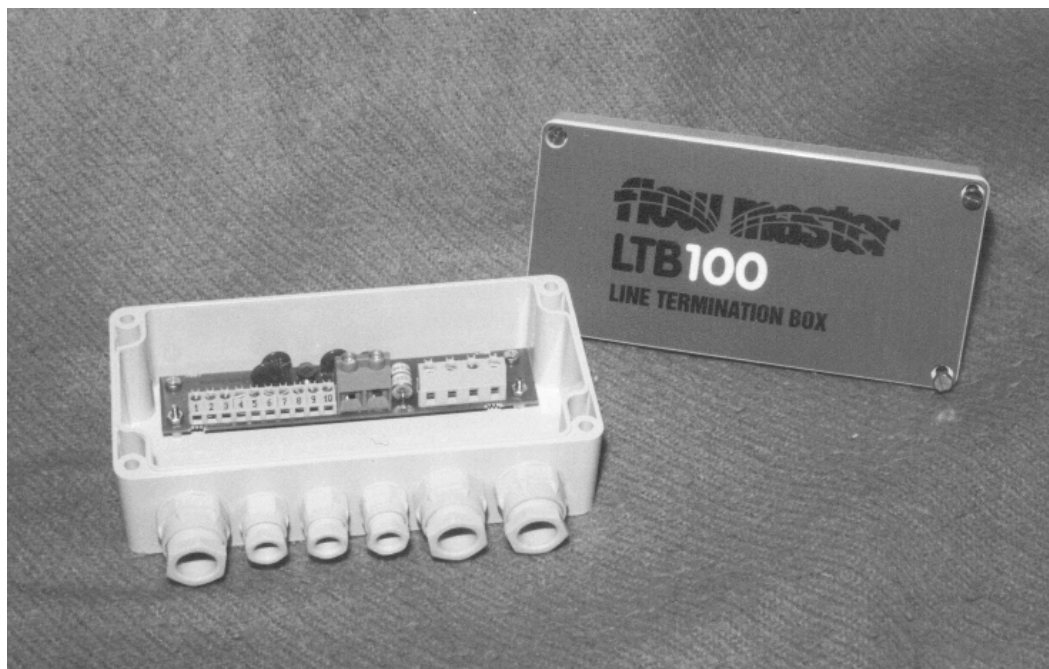




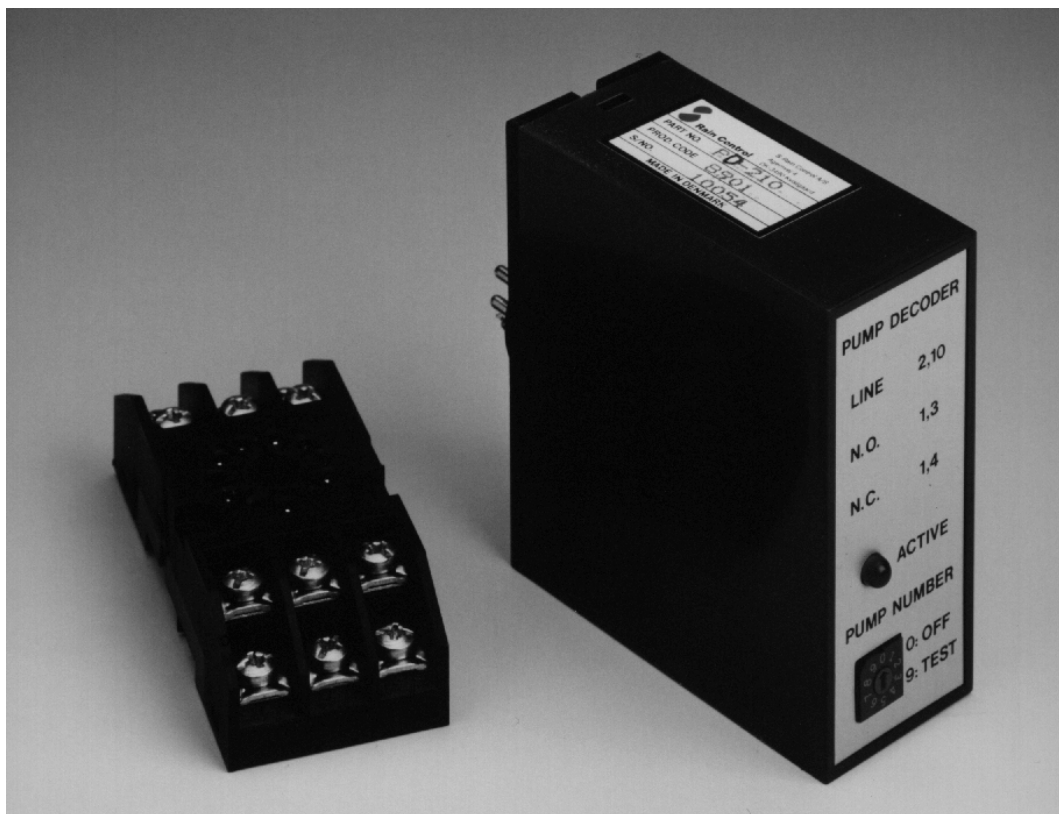
Line Decoder LD-100



Surge Protection SP-100



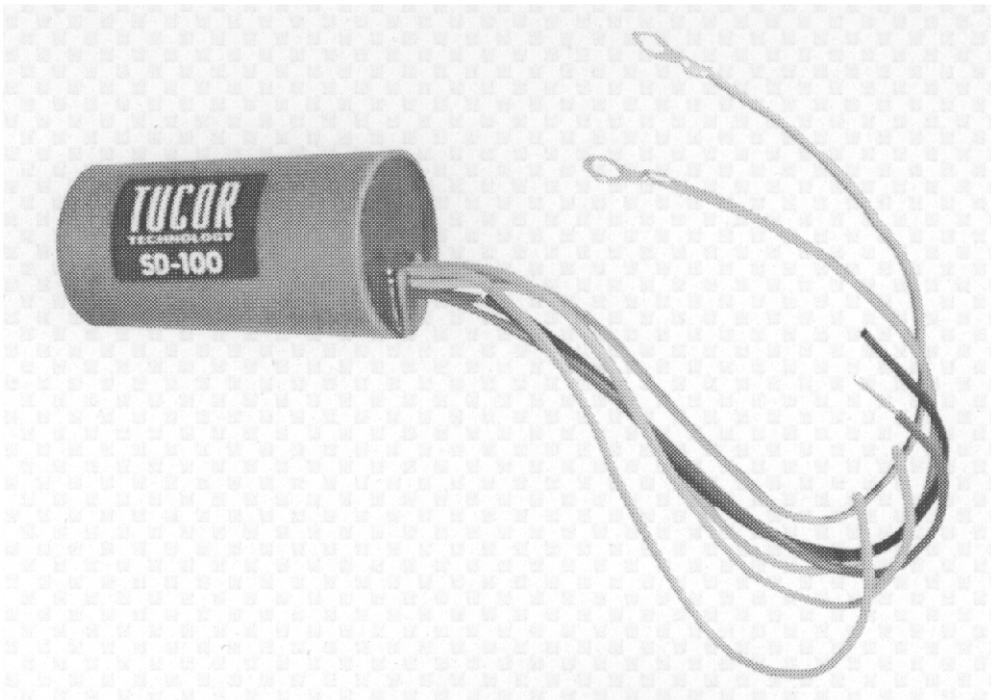
Line Termination Box LTB-100



Pump Decoder (with socket) PD-100



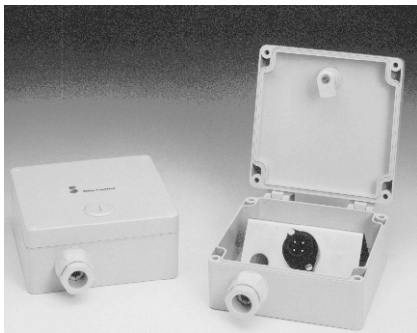
Remote Controller COM-50



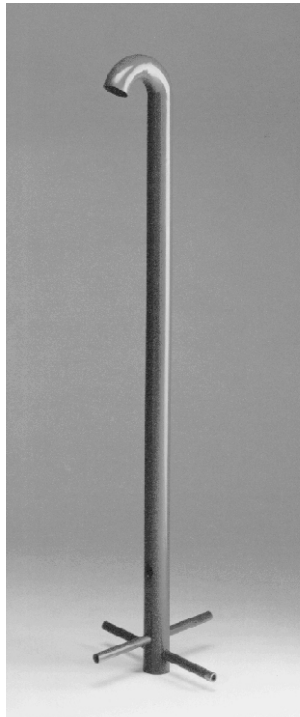
Sensor Decoder SD-100



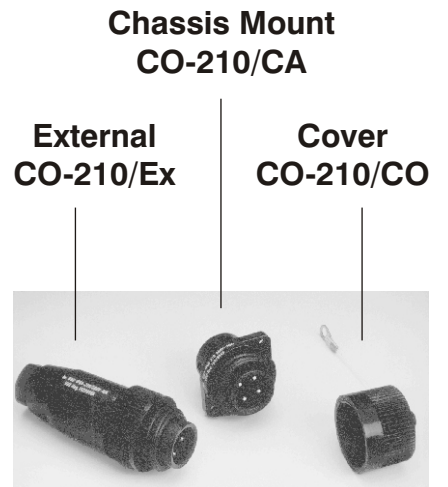
Field Access Unit FA-100



**Field Access Unit
Connection Box FAB-100**



**Pedestal
PED-100**



**Connectors for
Field Access Unit**


FLOWMASTER TWC-100/(TWC-50) (-100C/(-50C))
**Version 2.31
& higher**

Input voltage:	24 volts, 50/60 Hz, 50 VA
Output:	34 VAC
Max. number of Decoders:	100 (50)
Max. number of Sensor Decoders:	10
Decoder names:	Reduced or full alphabet. Max length 6 characters
Max. number of simultaneous valves:	5(+2) or 10(+2) as defined during installation*
Schedules:	5 + 1 Test schedule, 5 may operate simultaneously*
Schedule pausing:	Yes
Irrigation methods:	Steps
Days:	14 or 15 as defined during installation
Start times:	6 per program
Start methods:	Day & Time start Linked schedule start
Run time:	0 to 999 min
Water budget:	0 to 250 %
Pump control:	10 pumps (1 Master + 9 Boosters)
Manual operation:	Individual Decoders or schedules
Sensors:	Raincheck + 1 extra
Overload protection:	Electronic
Test:	Using Line Tester LT-100
Dry run:	No, total time for a schedule is shown
Monitoring:	Active Decoders shown with remaining time Remote program uploads all actions to a PC Flow Sensors may supervise maximums and leaks
Field Access Unit:	Yes
Remote operation:	From another Flowmaster via serial cable or modem** From PC via serial cable or modem**

* No more than 5(10) in one step in one schedule. With simultaneously operation of more schedules the limit is 7(12). If more valves are scheduled the superfluous are neglected with no warning. Start and ending of schedules must differ with at least one minute.

** TWC-50C & TWC-100C has built-in modem



FLOWMASTER TWC-200/TWC-200C

**Version 2.31
& higher**

Input voltage:	24 volts, 50/60 Hz, 100 VA
Output:	34 VAC
Max. number of Decoders:	200
Max. number of Sensor Decoders:	10
Decoder names:	Reduced or full alphabet. Max length 6 characters
Max. number of simultaneous valves:	5(+2) or 10(+2) as defined during installation*
Schedules:	10 + 1 Test schedule, 10 may operate simultaneously*
Schedule pausing:	Yes
Irrigation methods:	Steps
Days:	14 or 15 as defined during installation
Start times:	6 per program
Start methods:	Day & Time start Linked schedule start
Run time:	0 to 999 min
Water budget:	0 to 250 %
Pump control:	10 pumps (1 Master + 9 Boosters)
Manual operation:	Individual Decoders or schedules
Sensors:	Raincheck + 1 extra
Overload protection:	Electronic
Test:	Using Line Tester LT-100 & built-in tests
Dry run:	No, total time for a schedule is shown
Monitoring:	Active Decoders shown with remaining time Remote program uploads all actions to a PC Flow Sensors may supervise maximum and leaks
Field Access Unit:	Yes
Remote operation:	From another Flowmaster via serial cable or modem** From PC via serial cable or modem**

* No more than 5(10) in one step in one schedule. With simultaneously operation of more schedules the limit is 7(12). If more valves are scheduled the superfluous are neglected with no warning. Start and ending of schedules must differ with at least one minute.

** TWC-200C has built-in modem



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