Rickard MLM PC based software User Manual

Main program features:

-to give a graphical representation of a diffuser network.

-to make changes to a diffuser network.

-to log selected diffusers to a database to later view in a chart.

1) Getting Started

1.1) Access control

1.2) Switch to Project Selector view to use project interface

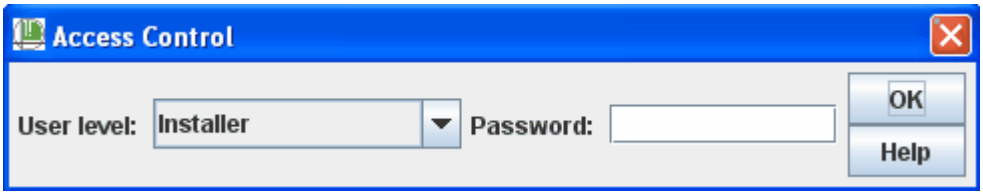
1.3) Connect to a diffuser network

1.4) Synchronize graphical display in views with current state of diffuser network

1.5) Use different views to make or view changes on network

1.6) Use logging of selected diffusers to database to view in chart view

1.1) Access Control



-Select user level:

-Installer

-no limitations on program use

-Building administrator

-only setpoints can be changed

-Viewer

-no changes can be made

-Enter password

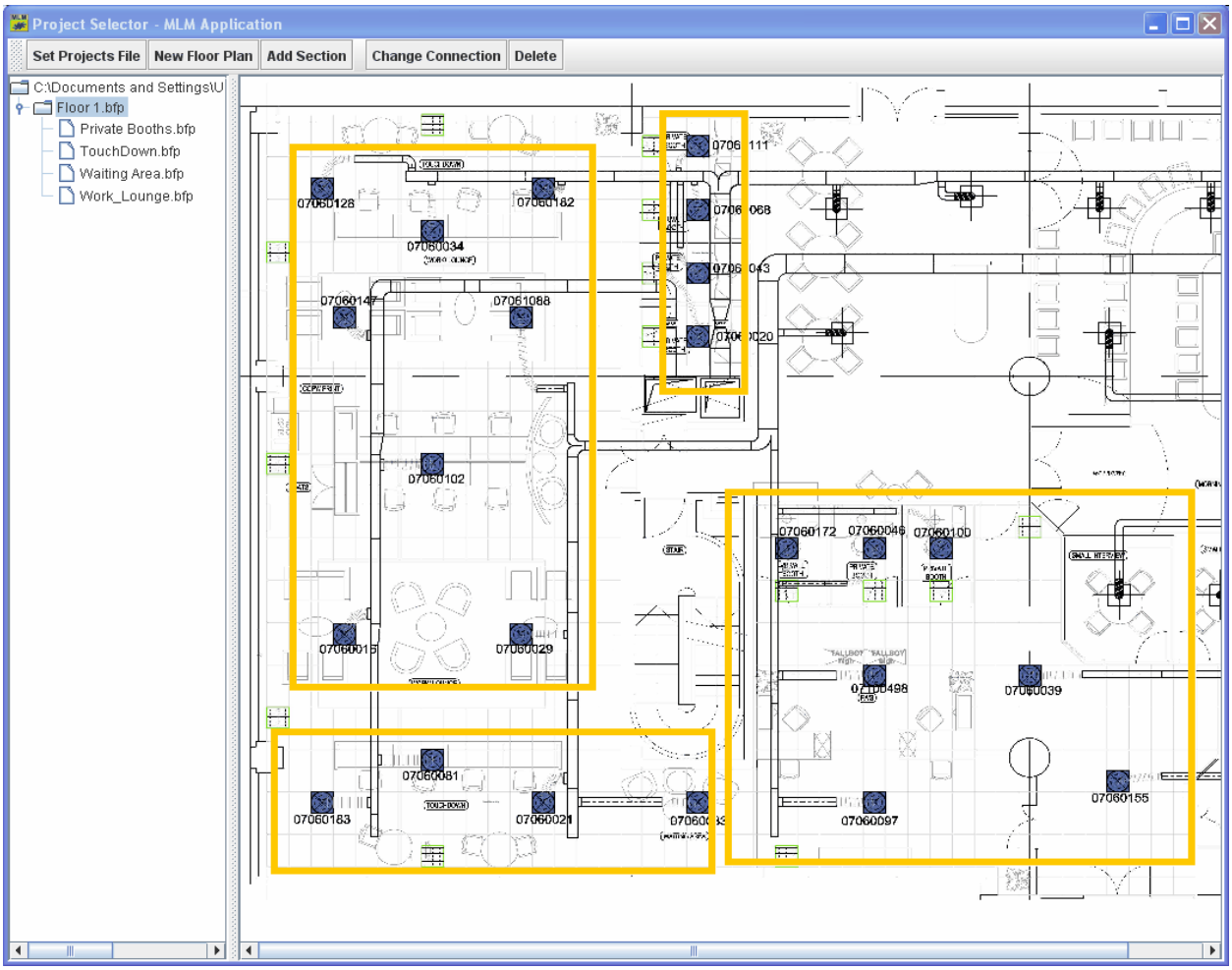
To change password:

-start program with user level to change password

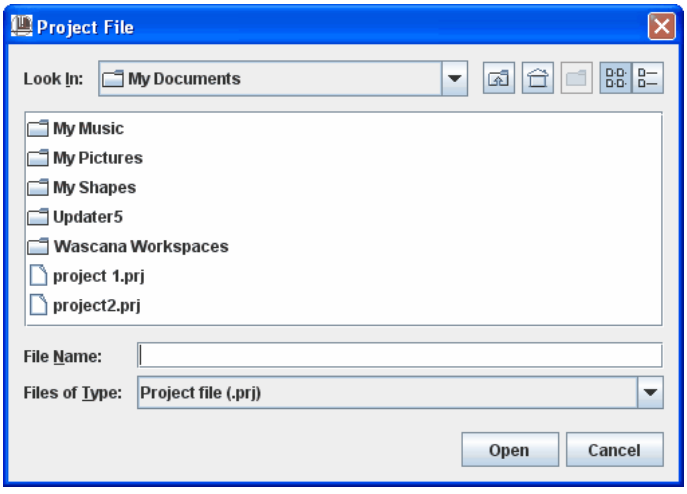
-Go to file menu, select Change Password

-Enter old password and the new password

1.2) Projects View



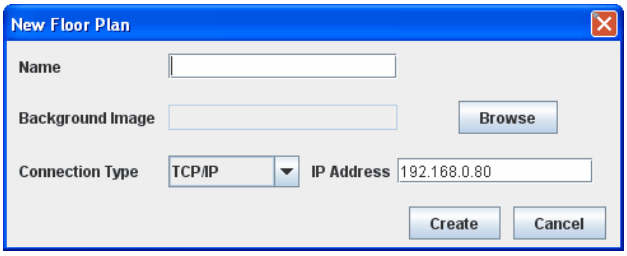
Set projects file:



-Click on "Set Projects File" to select path and name for projects file to use

-Always make BACKUP's of the created project file

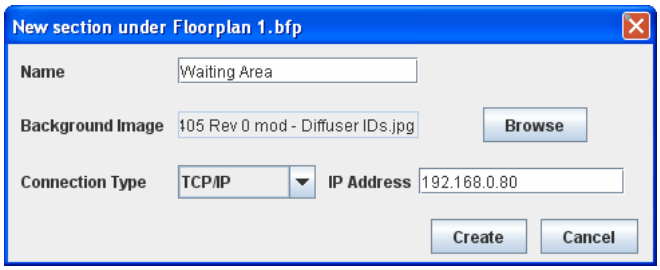
New Floor Plan:



-A floor plan can be any big area which can be subdivided into different logical connection areas, for example in a high rise building, each floor could be a floor plan

-The background image used for a floor plan should show all the different sections and do not need to be of high image quality.

Add Section:



-Each section area must relate to 1 connection device, for example 1 master comms unit connected to at most 60 diffusers or 1 usb device connected to at most 15 diffusers.

-Select background image to use for Physical view

-Setup different sections on the selected floor plan by moving and resizing the orange rectangle created in the top lefthand corner.

Connecting to a section:

-double click inside borders of section rectangle

-double click on section name in the project tree on the left

Changing connection of an existing section:

-click the "Change Connection" button

Deleting sections/floorplans:

-select the section/floorplan name in the project tree on the left

-press the "Delete" button

-Floor plans can only be deleted if no sections are left defined

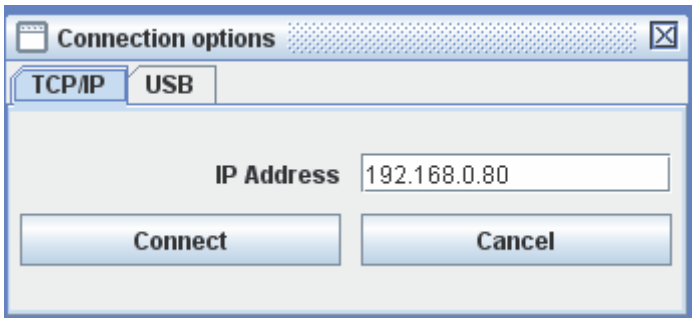
Zooming background image:

-click right mouse button, select zoom commands from popup list

OR use mousewheel to zoom in and zoom out

1.3) Connecting

Press the  button to open the connect frame.



-select type of connection:

USB

Enter Serial number located on usb device

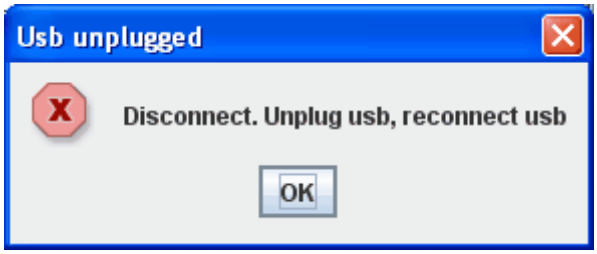
TCP/IP

Enter the IP address of master comms unit

-press Connect to start new connection

-after a successful connection is made, diffuser elements will appear in the different views of the net-workview frame. Wait until all the different modules (interface, analog and wallstat) are visible in the network view before starting with the synchronization process. This updating process may take a while, especially if wallstat modules are used.

-to disconnect the current connection, click on the  button and press on Disconnect or close the bacs program.



-this warning message will appear when the usb device was disconnected unexpectedly. Press on the disconnect button, unplug and reconnect the usb device, press the  button to reconnect

1.4) Synchronize

To see the current status of a connected diffuser network, press the  button to synchronize the graphical display with the diffuser network. The synchronization process will not start if changes to diffuser network still need to be saved. Due to the complexity of the diffuser network layout and the number of diffusers, the synchronization process may take a while to finish.

-When to synchronize

-after connecting to a diffuser network

-after resetting

-after making changes to diffuser network or any synchronization errors

-For an indication of the updating process

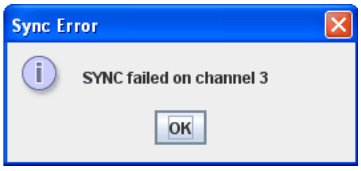
-see a graphical representation of the current number of messages queued in the Message Queue at the bottom of the screen.

-use the Node List view

-use the Log view

-in the network view, the dynamic updating of diffuser variables can be seen.

-any synchronization errors found will be displayed with pop up dialogues



-Possible causes:

-synchronization process started too soon after diffuser network reset.

-Next step of action

-check the network hardware setup

-reset network and restart synchronization process

-Possible causes:

-master comms unit channel dead, no response from diffuser network when sending requests on channel.

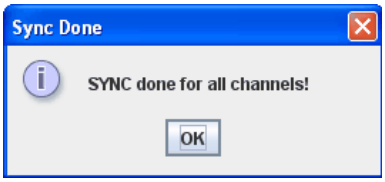
-Next step of action:

-check the network hardware setup

-click on the  button and disconnect connection. Reconnect and reset diffuser network followed by a synchronize.

-After the synchronization process finished,

-the "Sync done" dialogue should appear



-diffusers with loop edges should appear in the Logical and Physical views.

-Any errors found in verification of diffuser network should pop up.

1.5) Different views of Diffuser network

-3 views in network frame (physical, logical and network)

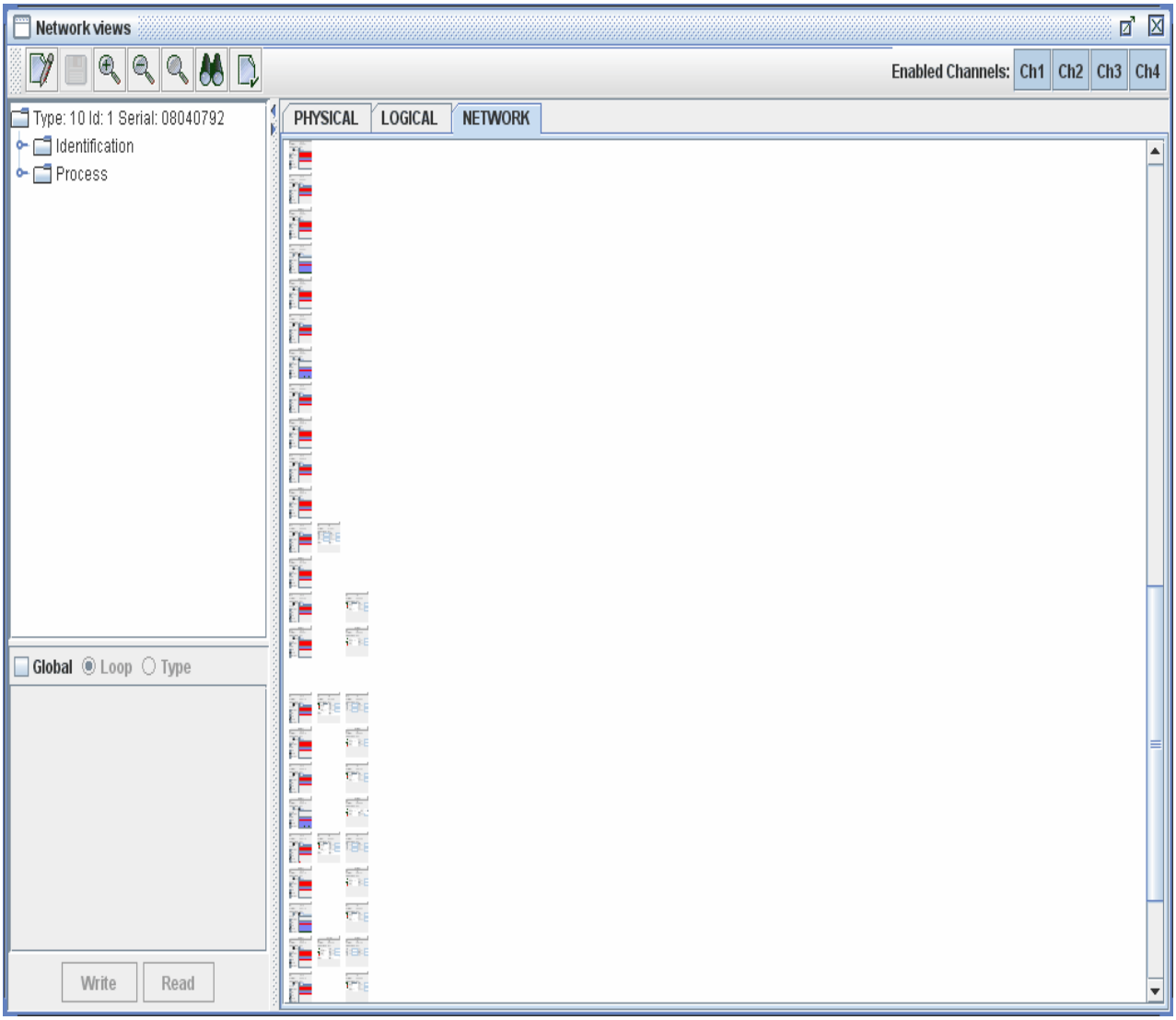
-Logged data views

-Nodelist

-Verifylist

-Chart View (See 1.7)

1.5.1) Network frame



-Click on the tabs to switch between the network, logical and physical views

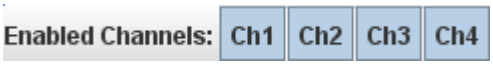
Use the view toolbar

-to start and stop editing mode

-to change the current zoom level

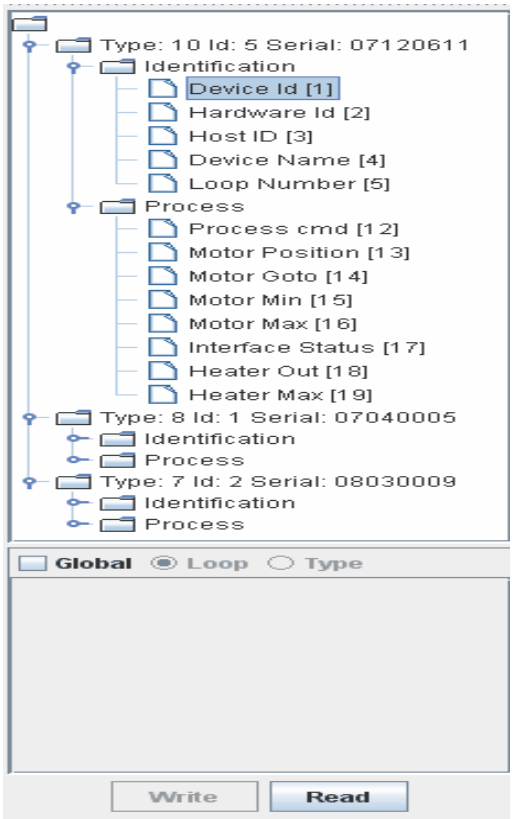
-to search in physical and logical view for a specific serial number

-to verify the current state of the diffuser network



Click on the channel buttons to deactivate specific channels

Node Editor Panel

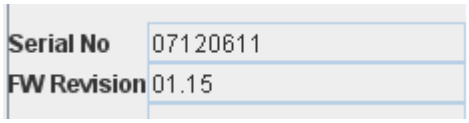


After selecting a graph cell in one of the views, the NodeEditorPanel (to the left of the screen) will display information that can be used to view or make changes.

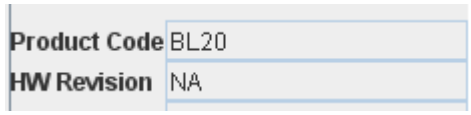
For each type of graph cell the following information will appear after collapsing the tree structure by clicking on it:

Identification

-Device id, giving the Serial Number and FW Revision number



-Hardware id, giving the Product Code and HW Revision number



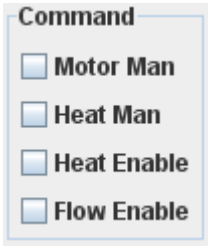
-Host Id

-Device Name, an unique name given to the device (up to 6 chars long)

-Loop Number

Process (For Interface modules (Type 10))

-Process cmd



-Motor Man, to enable/disable motor manual mode

-Heat Man, to enable/disable heater manual mode

-Heat Enable, to enable/disable heater

-Flow Enable, to enable/disable flow control

-Motor Position giving values for Goto, Max, Min and Pos settings

-Motor Goto

-motor goto setting

-Motor Min

-motor minimum setting

-Motor Max

-motor maximum setting

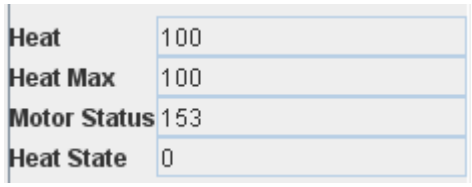
-Interface Status

-Heat

-Heat Max

-Motor Status

-Heat State



-Heater Out

-Heat setting

-Heater Max

-Max setting

Process (For Analog (Type 8) and Wallstat (Type 7) Modules)

-Temperature

-Space

-CO

-Setpoint

-Setpoint 1 and Setpoint 2 setting

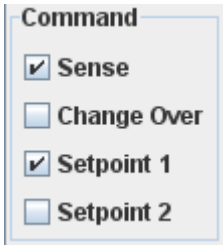
-Temp Command

-Sense, to enable/disable sensor

-Change Over, to enable/disable change over

-Setpoint 1, to enable/disable setpoint 1

-Setpoint 2, to enable/disable setpoint 2



-RTC

-Time

-Day of week

-Back off time

-Off

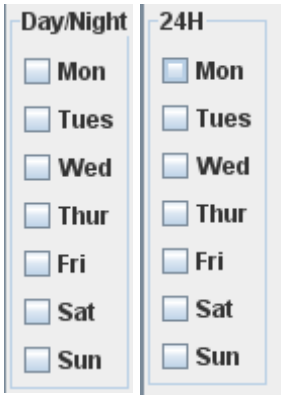
-Back on time

-On

-Back off days

-Day/Night/24h

-Enable/disable days of week



-Flow Address (only for analog modules)

-Type

Only for Wallstat (Type 7) Modules

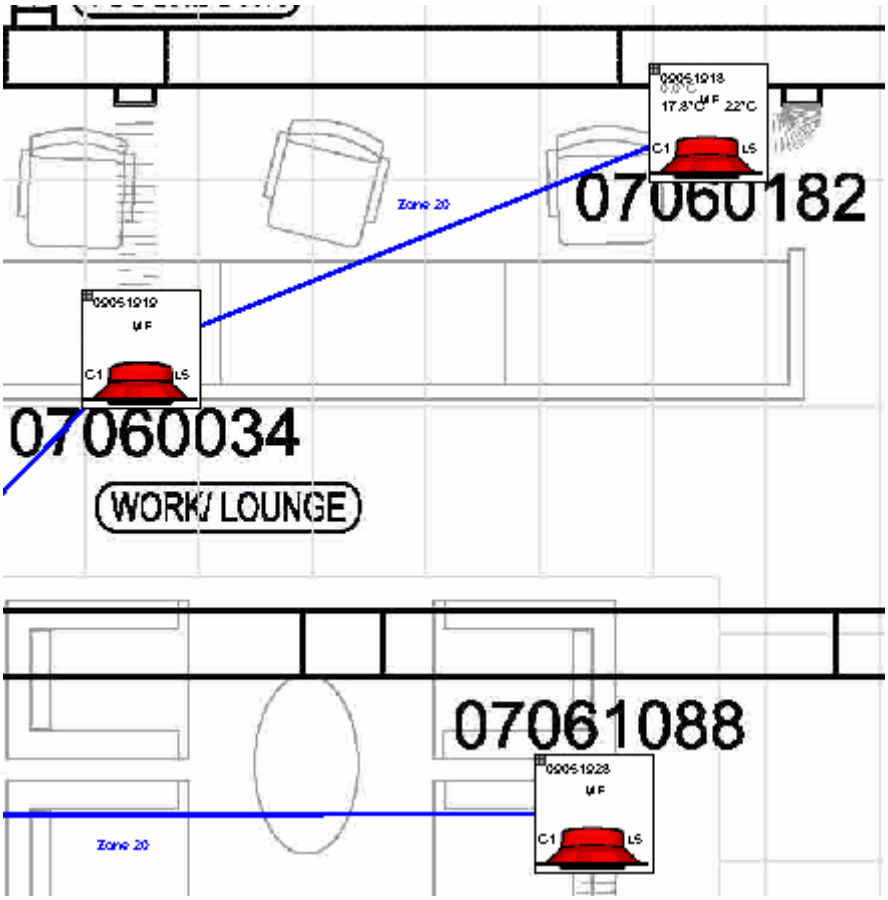
-Setup

-Edit mode

Tick the "Global" tick box to make changes to all graph cells of the same loop number or type.

Use the Write button to make changes and the Read button to update the displayed information of a selected graph cell.

1.5.1.1) Physical View



This view gives a graphical representation of the loop and zone relationships between the different diffusers on a diffuser network positioning each diffuser on a image background loaded using a project file.

-Connecting to a diffuser network for the first time, all the diffusers in this view will be organized the same as the logical view.

-After synchronizing and finding all the serial numbers, each diffuser will be positioned against the image background using the last position saved in the project file.

-using the edit mode, diffusers can be moved to new positions against the background image

-by left clicking on the diffuser

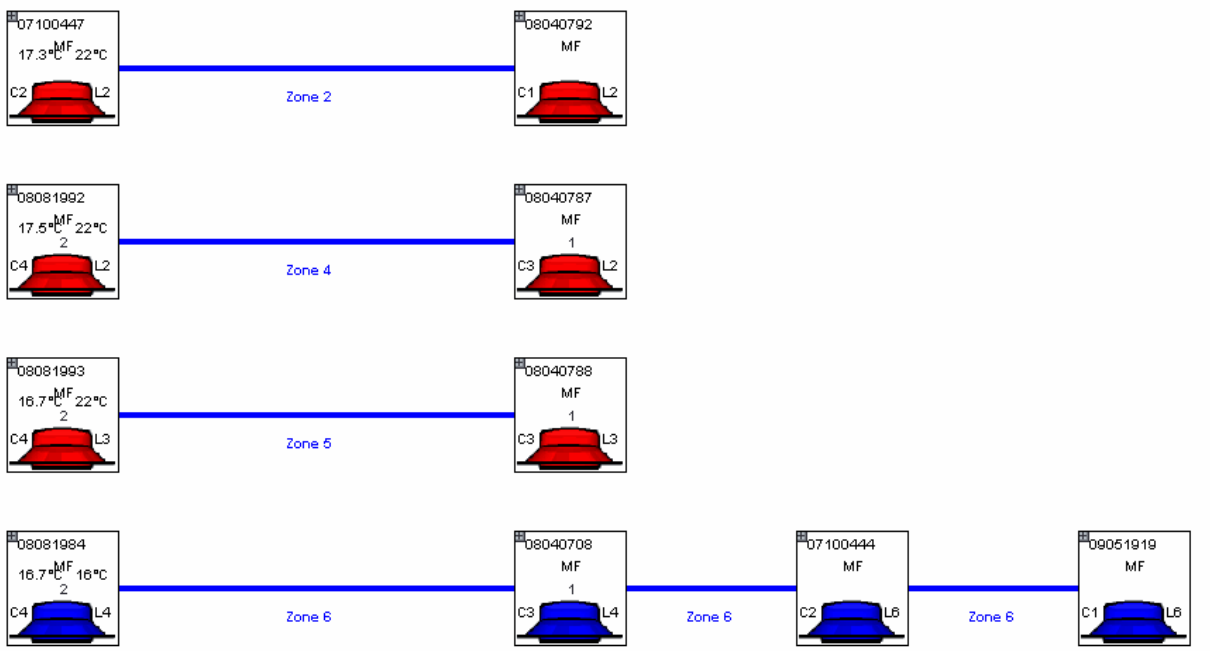
-keep holding in the mouse button and

-dragging the diffuser to the new position

-releasing the left mouse button

1.5.1.2) Logical View

The logical view gives a graphical representation of the zone or loop relationships between the different diffusers on a diffuser network.



TCP/IP connection

There can be upto 4 active channels. Each channel can have upto 15 diffusers where each diffuser have a specific channel and loop number assigned to it. To connect diffusers on different channels, the Zone concept is used. There are 60 possible zones.

Starting from the top, each row show all the diffusers in a zone, starting to the left with the master diffuser and continuing with all the slave diffusers

-starting with diffusers on zone zero at the top listing all the diffusers not forming part of a valid zone,

-continuing up to a row for zone 60

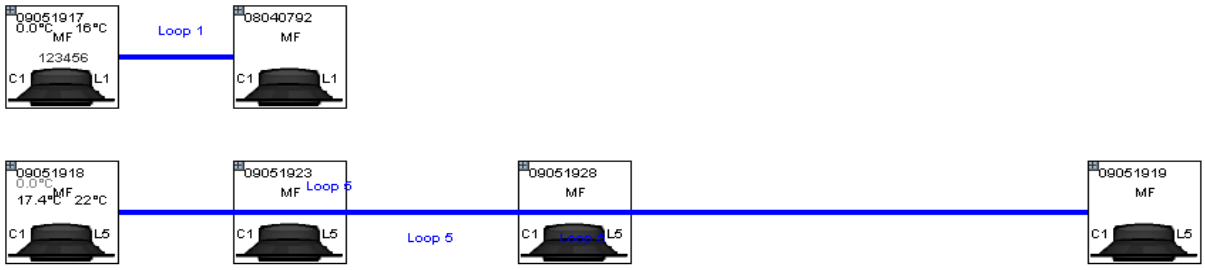
For example in Zone 6 the master diffuser with serial 08081984 on channel 4 and on loop 4 are connected to the following slave diffusers

-diffuser with serial 08040708 on channel 3 and loop 4

-diffuser with serial 07100444 on channel 2 and loop 6

-diffuser with serial 09051919 on channel 1 and loop 6

USB connection



For a usb connection there is only one channel with 15 possible diffusers and only make use of the loop concept.

Starting from the top each row consist of diffusers on the same loop

-starting with diffusers on loop zero at the top (listing all the diffusers not forming part of a valid loop 1-15),

- continuing up to a row for loop 15.

-Each loop row will start from the left with the assigned master diffuser (if any) and continue to position the other diffusers in the loop by higher ranked id number.

This view is ideal to group diffusers into different zones or loops or to make changes to an existing setup.

1.5.1.3) Network View

This view gives a graphical display of the relationships between the interface, analog and wall-stat modules of a diffuser network. Starting from the top of the screen, all the different channels are listed apart from each other. For example, using a tcp/ip connection there may be more than one channel grouping while a usb connection will always have only one channel.

-Each channel group consist of 3 columns,

-the first column from the left listing all the interface modules from the top by id number,

-the second column the analog modules and after a successful synchronize the position will reflect the interface parent

-the third column the wallstat modules and after a successful synchronize, the position will reflect the interface parent

1.5.2) Nodelist view

Node List

Channel	Type	ID	HID	Loop	ChLpMap	LonStr	Zone	Code	Serial Nr	Firmw	DeviceNa...
1	7	1	3	5	21	[1] 5	20	BL23	08030648	01.21	
1	8	1	3	5	21	[1] 5	20	BL21	07040016	01.07	Analog
1	8	2	2	1	17	[1] 1	1	BL21	08060033	01.07	
1	10	1	1	1	17	[1] 1	1	BL20	08040792	01.24	
1	10	2	2	1	17	[1] 1	1	BL20	09051917	01.24	123456
1	10	3	3	5	21	[1] 5	20	BL20	09051918	01.24	
1	10	4	4	5	21	[1] 5	20	BL20	09051919	01.24	
1	10	5	5	5	21	[1] 5	20	BL20	09051923	01.24	
1	10	6	6	5	21	[1] 5	20	BL20	09051928	01.24	

When connected, all the different modules of the diffuser network will be listed, the information in each column dynamically updated when changes occur.

How to view a diffuser with a certain serial number in physical and logical view

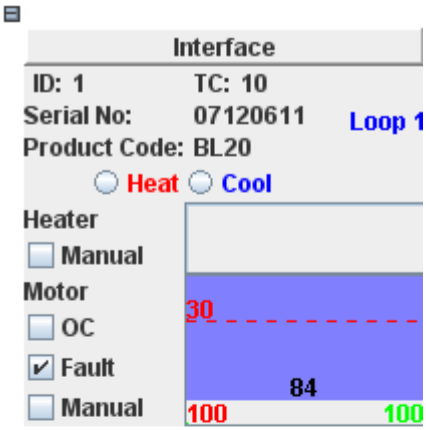
-select in nodelist the module with correct serial number

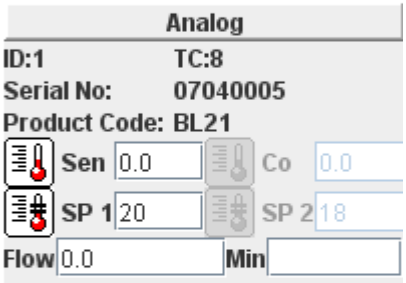
-right click mouse button and choose between

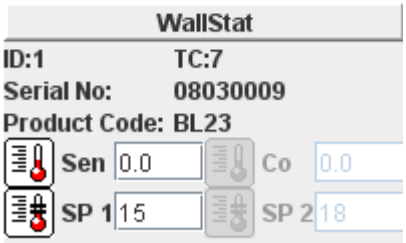
-Show in physical view

-Show in logical view

-close the nodelist to view the diffuser that was searched for







Meaning of different type codes:

-Type 7: Wallstat module

-Type 8: Analog module

-ID, reassigned when resetting hardware

-TC, type code = 8

-Serial Number

-Product Code: BL21

-Sen

-Co

-SP 1

-SP 2

-Flow

-Min

-Type 10: Interface module-ID:

-TC:

-Serial No:

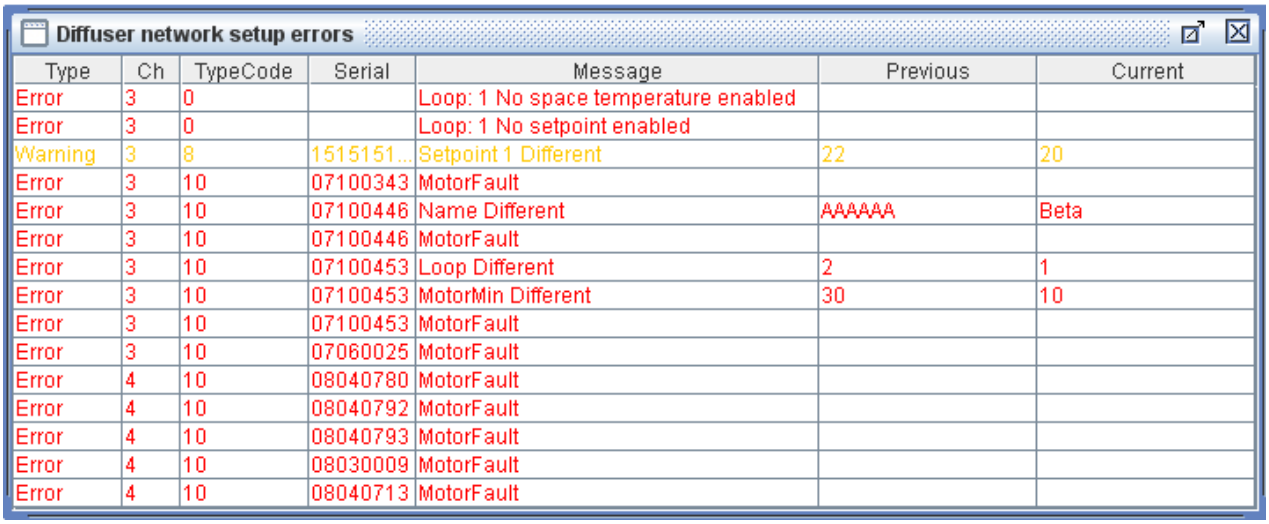
-Product Code:

-Heat/Cool

-Heater: Manual

-Motor: OC, Fault, Manual

1.5.3) Verifylist view



Diffuser network setup errors

Type	Ch	TypeCode	Serial	Message	Previous	Current
Error	3	0		Loop: 1 No space temperature enabled		
Error	3	0		Loop: 1 No setpoint enabled		
Warning	3	8	1515151...	Setpoint 1 Different	22	20
Error	3	10	07100343	MotorFault		
Error	3	10	07100446	Name Different	AAAAAA	Beta
Error	3	10	07100446	MotorFault		
Error	3	10	07100453	Loop Different	2	1
Error	3	10	07100453	MotorMin Different	30	10
Error	3	10	07100453	MotorFault		
Error	3	10	07060025	MotorFault		
Error	4	10	08040780	MotorFault		
Error	4	10	08040792	MotorFault		
Error	4	10	08040793	MotorFault		
Error	4	10	08030009	MotorFault		
Error	4	10	08040713	MotorFault		

After synchronizing the diffuser network will be verified for any setup errors and it will be listed in this view. To show and update this view, press the  button.

To view diffuser with setup error:

-Select row with valid serial number

-right click mouse button and select Show in physical/logical view

-minimize/close verifylist view

1.5.3.1) Verify process of diffuser network

After the synchronization process finished, the diffuser network are verified for the following error or warning conditions.

-Diffusers not part of a loop

-Conflicting setup for analog and wallstat connected to diffuser

-No space temperature enabled for loop

-More than one space temperature enabled for loop

-No setpoint enabled for loop

-More than one setpoint enabled for loop

-More than one change over enabled for loop

-Nodes not updated

-Unresolved host issues

-Loop Different

-Name Different

-Command Different

-Setpoint 1,2 Different

-BackoffDN Different

-Backoff24 Different

-Time off Different

-Time on Different

-MotorMin Different

-MotorMax Different

-Diffuser in manual mode

-MotorFault

-OverCurrent

1.6) Making changes to a diffuser network

-in the networkview frame, select the view (Physical, Logical) where changes need to be made.

-start the edit mode by pressing the  button in the networkview frame toolbar.

-make changes to diffuser network

-to save the changes press the  button.

-wait until the  button has grayed out  to show that save process has finished

-Any errors found in verification of diffuser network should pop up.

Changes in networkview frames

Zone or loop changes

-enable the edit mode by pressing the  button

-creating new zone edges

Method 1:

-click on the source port  of a diffuser,

-left click on the source diffuser port and drag towards the destination diffuser and releasing the mouse button over the destination diffuser port

-select (if needed) the correct zone number (1-60)

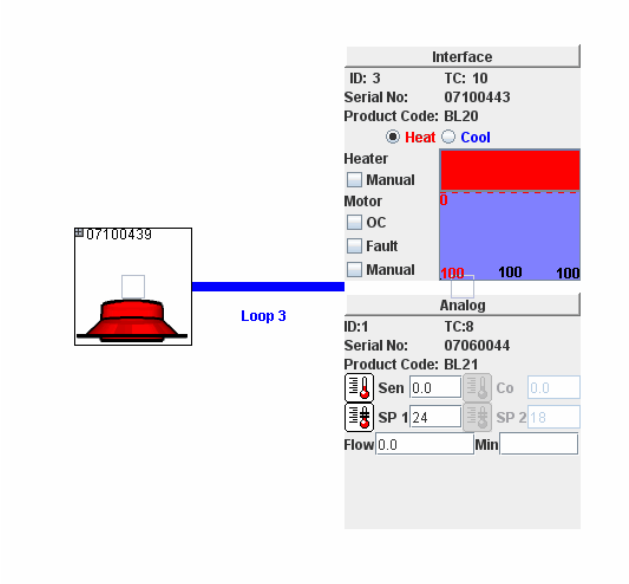
OR

Method 2:

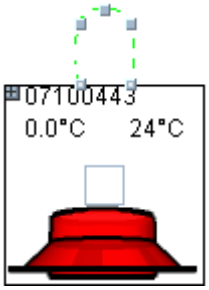
-click on source diffuser port

-click on destination diffuser port

-select (if needed) the correct zone number (1-60)



-adding an unconnected diffuser unit in its own zone



-click at the top of the diffuser unit on the self zone

-select the correct zone number

-deleting existing zone edges

-select the zone edge to delete

-press the delete button on the keyboard

-renaming existing zone edges

-double click on a zone number

-select in the drop down the correct zone number

-WARNING: any other zone edges with the same zone number will also be changed

-Moving diffusers around in the physical view

-enable the edit mode by pressing the  button

-left click and drag diffuser unit to new location

-Master Diffuser setpoint change

-double click on a master diffuser unit

-Change the setpoint value

A Master Diffuser Unit is defined as:

-diffuser with an analog and wallstat module

Analog

-not enabled

Wallstat

-Enabled

-Temperature reading 17.8 in degrees Celsius

-Setpoint: 22 in degrees Celsius

-Expanding or collapsing Diffuser units

-select the diffuser unit by clicking on it

-press right mouse button to expand or collapse current selected diffuser view

Mouse Interface

In the different network views

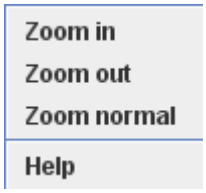
-the mouse wheel can be used to

-scroll up and down

-zoom in and out by holding in the Ctrl key while logical, physical or network view have current keyboard focus

-scroll left and right by holding in the Shift key while logical, physical or network view have current keyboard focus

-right click to get pop up

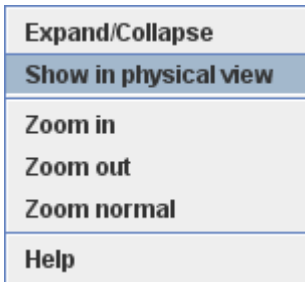


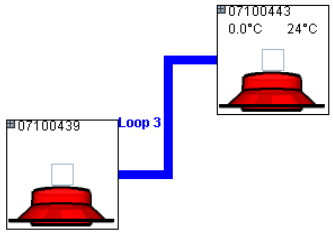
-select zoom in/out/normal

-launch help

Current selected diffuser

-right click to get pop up

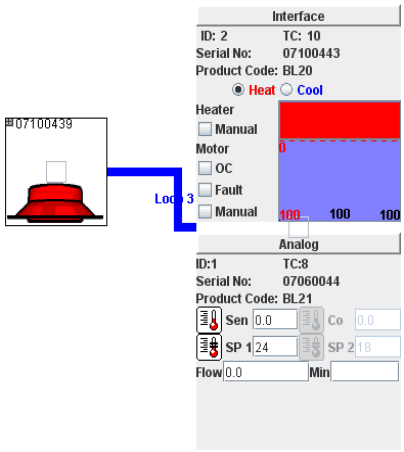




-to expand/collapse the view of the diffuser

-click on 'Show in physical/logical view' to view selected diffuser in other view

-to zoom selected diffuser to normal zoom level, click on zoom in



Current focused zone or loop edge

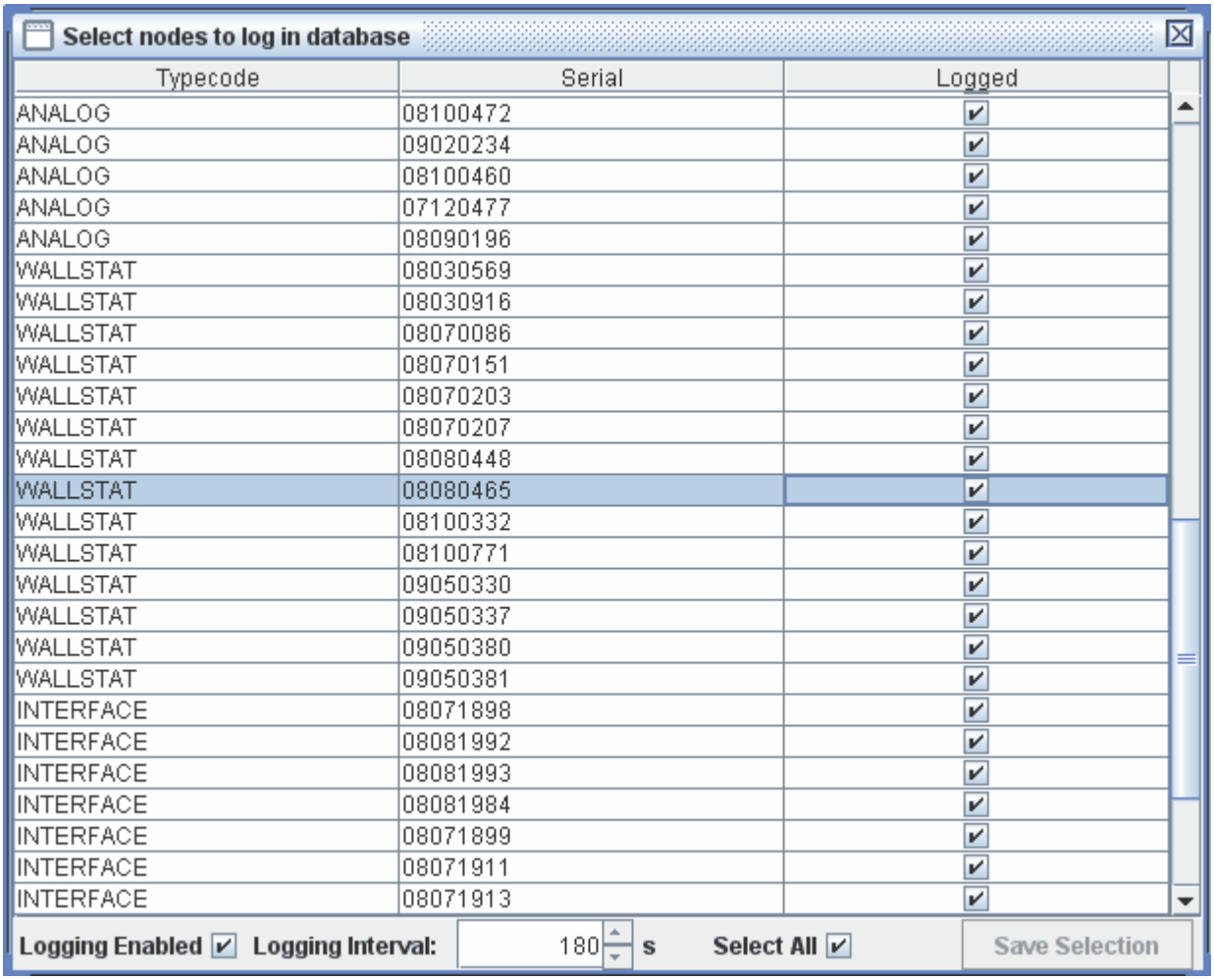
-double click to get rename pop up

-select new zone or loop number

1.7) How to log diffuser network variables to a database

Connect to the diffuser network to be logged using the project view.

After synchronizing goto Window menu and open the "Select nodes to log in database" view.



-tick the tickboxes next to the nodes to log or use the "Select All" tickbox at the bottom to select all the nodes

-click the "Save Selection" button to save the current selected nodes to the project file

-change the Logging interval from the default 3 minutes using the up/down arrows or by entering a new value in seconds

-to start logging to the database, tick once the "Logging Enabled" tickbox and wait for the database to be created or opened after which the tick mark will appear

How to show logged information in Chart view

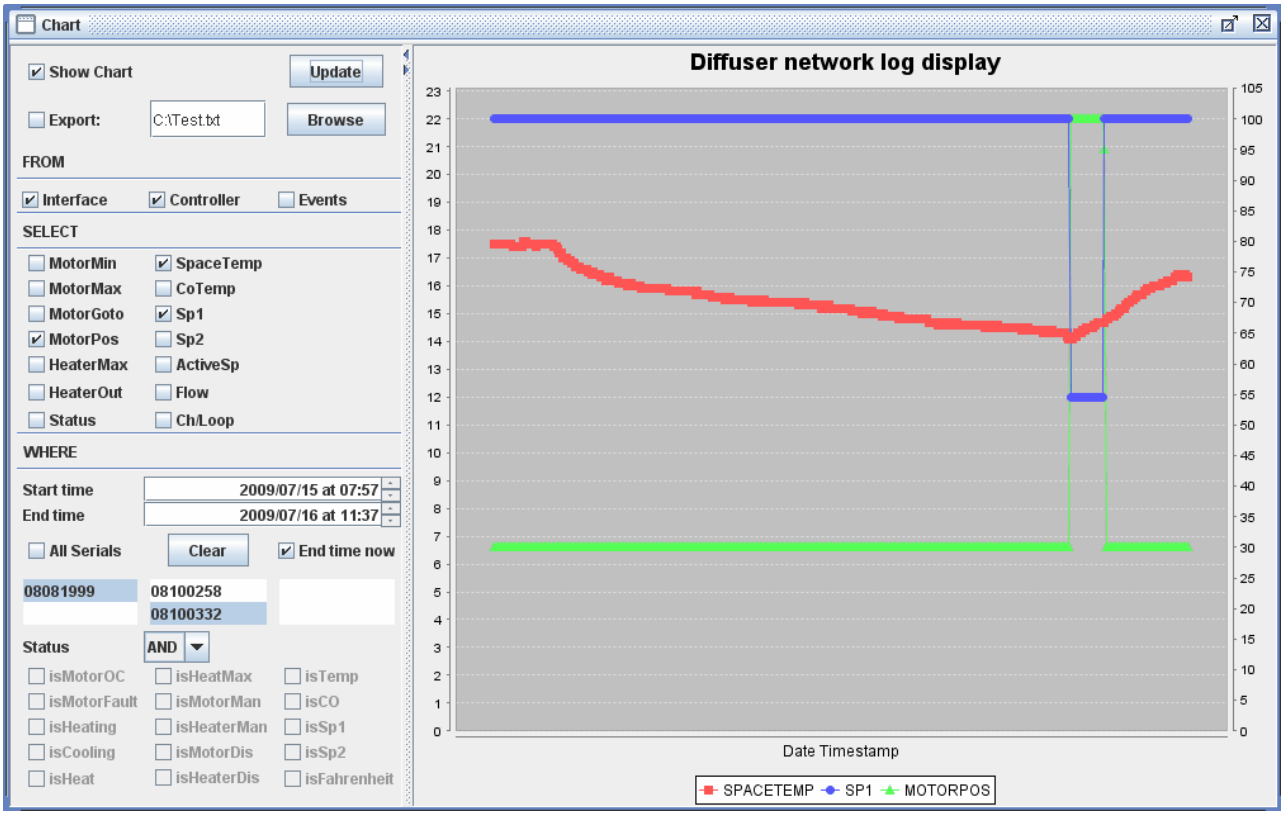
Select the diffuser in the logical or physical view to show in Chart view

Right click and select "Show in Chart" in the popup dialogue

The selected diffuser serial numbers of all the modules will appear in the Chart view

Multiple diffusers can be selected in this way to compare network variables between different diffusers in the Chart view

Goto Window menu and select "Chart view"



Starting from the top

Output format

Tick the "Show Chart" tickbox to show the output in a chart form

OR

Tick the "Export" tickbox to redirect output to a tab delimited text file

-click the Browse button,

-select the folder to save the export text file

-enter a name for the text file

-finish by clicking on the open button

-the name and path to the text export file should now appear in the edit box next to the Browse button

-this edit box can also be manually edited, however no valid file and path checking will be done

FROM

Select Modules

Beneath the "From" heading select the different modules of the diffuser to show in chart or export

-tick the **Interface tickbox**

-under the "SELECT" heading put ticks next to the following network variables to view or export

-MotorMin, MotorMax, MotorGoto, MotorPos, HeaterMax, HeaterOut

-tick the **Controller tickbox**

-under the "SELECT" heading put ticks next to the following network variables to view or export

-SpaceTemp, CoTemp, Sp1, Sp2, ActiveSp, Flow

-tick the **Event tickbox** to view or export the following events

-Motor Fault

-Overcurrent

-Reset

WHERE

Set Start and End time

-select the digit to change with mouse click and use spin controls to change or enter manually the correct value

-by default the Start time will be 24 hours back from the current time

-tick "End time now" to get output upto the current time

Serial numbers of selected diffusers

Beneath the "End time now" tickbox the selected diffusers serial numbers will be located for each module.

By default all the serials will be selected. To unselect/reselect specific serials, press and hold the Ctrl button and click on the serial number to change.

Use of "All Serials" tickbox

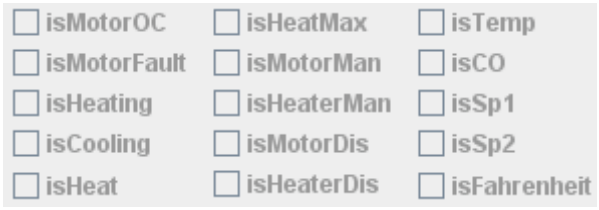
Tick the "All Serials" tickbox to disable the current selected serial numbers and select all existing serials in database.

It can be used to export the whole database to a tab delimited text file for all existing serials in the database.

Clear all tickboxes, serial number fields

Use the "Clear" button to clear all the selected tickbox fields and remove all the selected serials.

Use of Status tickbox



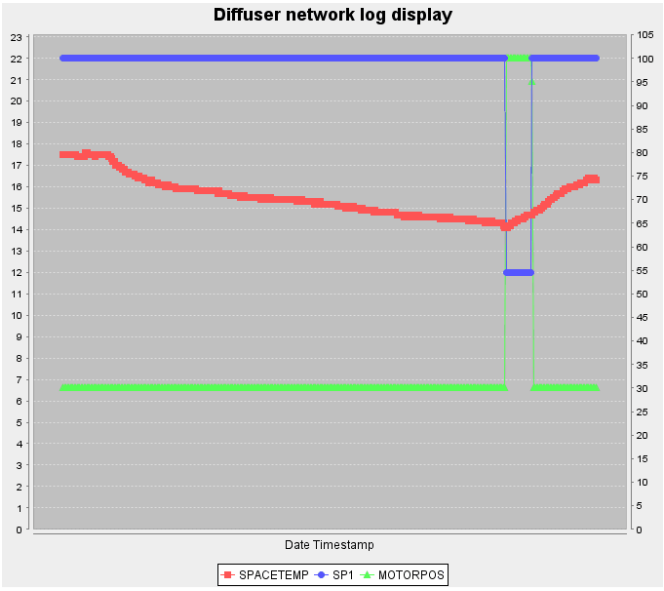
-

For the Interface and Controller module there is a status network variable that is a word value. Each of the bits in the word value relate to the following states that can be set.

Bit	Interface Status	Controller Status
0	MotorUpLimit	Temp selected
1	MotorDownLimit	CO selected
2	MotorInit	SP1 in use
3	MotorStop	SP2 in use
4	MotorMovingUp	
5	MotorMovingDown	
6	MotorOverCurrent	
7	MotorFault	
8	HeatMode	
9	CoolMode	
10	HeaterOn	
11	HeaterMax/ID PB Switch	
12	Motor Auto/Man (0/1)	
13	Heater Auto/Man (0/1)	
14	Motor Enable/Dis (0/1)	
15	Heater Enable/Dis (0/1)	

-Use the AND/OR bit operator to include and exclude the selected states

How to understand Chart view



-Start at the bottom of the chart by looking at the different colour and shape schemes of the selected network variables

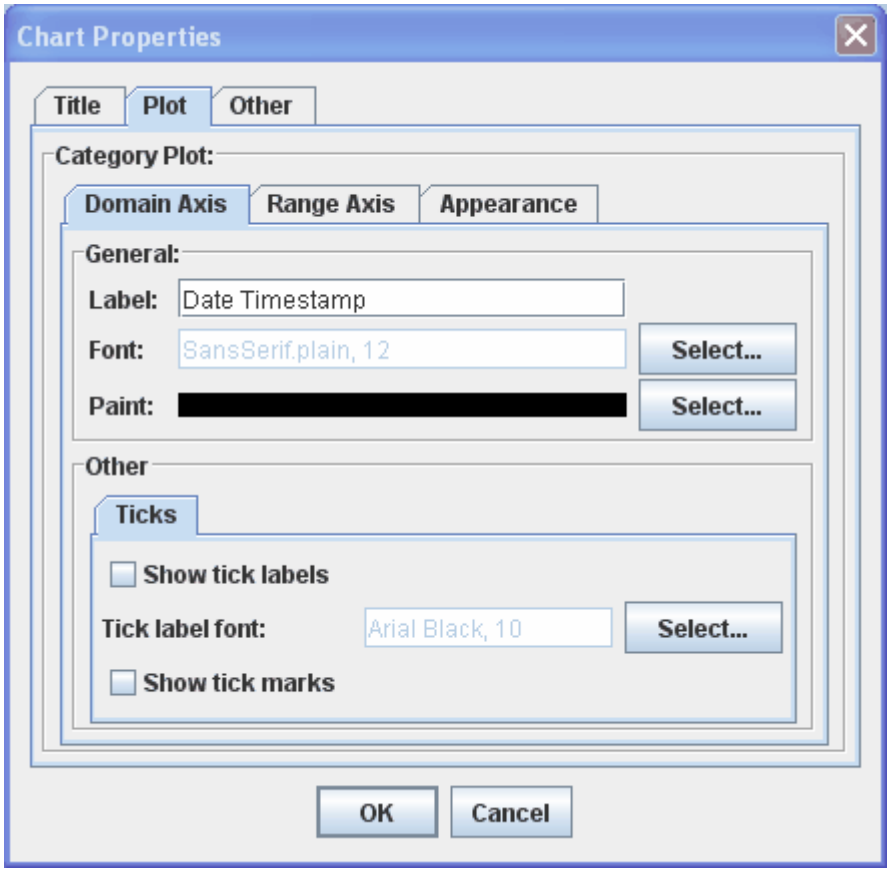
-The Domain-axis start from the left with the entered "Start time" Date Timestamp and continue upto the "End time" Date Timestamp

-The Range-axis of the different network variables is located to the left and right of the chart

-Hover the mouse curser over plot points to display the specific network variable, Date Timestamp and Range value in a popup

Right click in the general chart area

-select **Properties...**, to change chart specific properties



-select **Save as...**, to save the current chart view to a PNG image

-select **Print..**, to print the current chart

-select Zoom in, Zoom Out and Auto Range

2) Program Layout

The Bacs program is organized in the following areas

2.1) a Menu bar at the top of the screen

2.2) Main Toolbar just beneath the Menu bar

2.3) a general view area for Diffuser network views and logging views

2.1) Menu Bar

2.1.1) File

2.1.2) Help

2.1.3) Window

2.1.1) File Menu

Export Setup

-to export network information after synchronization finished

-to a jpg of physical view

-to a text file, use tick mark to select only masters export

Properties

Tick boxes:

-AutoSync (automatic network synchronization after any reset/connect event)

-Start with Projects View (when executing program)

-Enable Grid in Physical View

Lon Auto MappingTable

To send command to mcu with lon module to start auto updating of mapping table on lon module

BACnet MappingTable Update

To send current channel/loop setup of masters to mcu with BACnet module to update the mapping table

Change Password

To change password for access control to program for each user

Update Flash

To upload new firmware on hardware

-AutoSync under properties should be turned off

Exit

-Quit the bacs program

2.1.2) Help Menu

Launch Help

-open help interface with index to help topics

Open Log File

To view log of special events while connected to diffuser network

Save Log...

About

-open the About information box

How to use help

The context-sensitive help system can be activated in the following ways:

Window-Level

-Press F1 (or Help) key, get help for window with current focus

Field-Level

-Activate field-level help by pressing helpicon button in main toolbar

-Navigate with mouse or keyboard and select object to get help on

Help Menu Item

-In the menu bar, go to Help and select Contents

2.1.3) Window Menu

2.1.3.1) Network view

-tab support for Network, Logical and Physical views (See 1.5.1.1 to 1.5.1.3)

2.1.3.2) **Log**

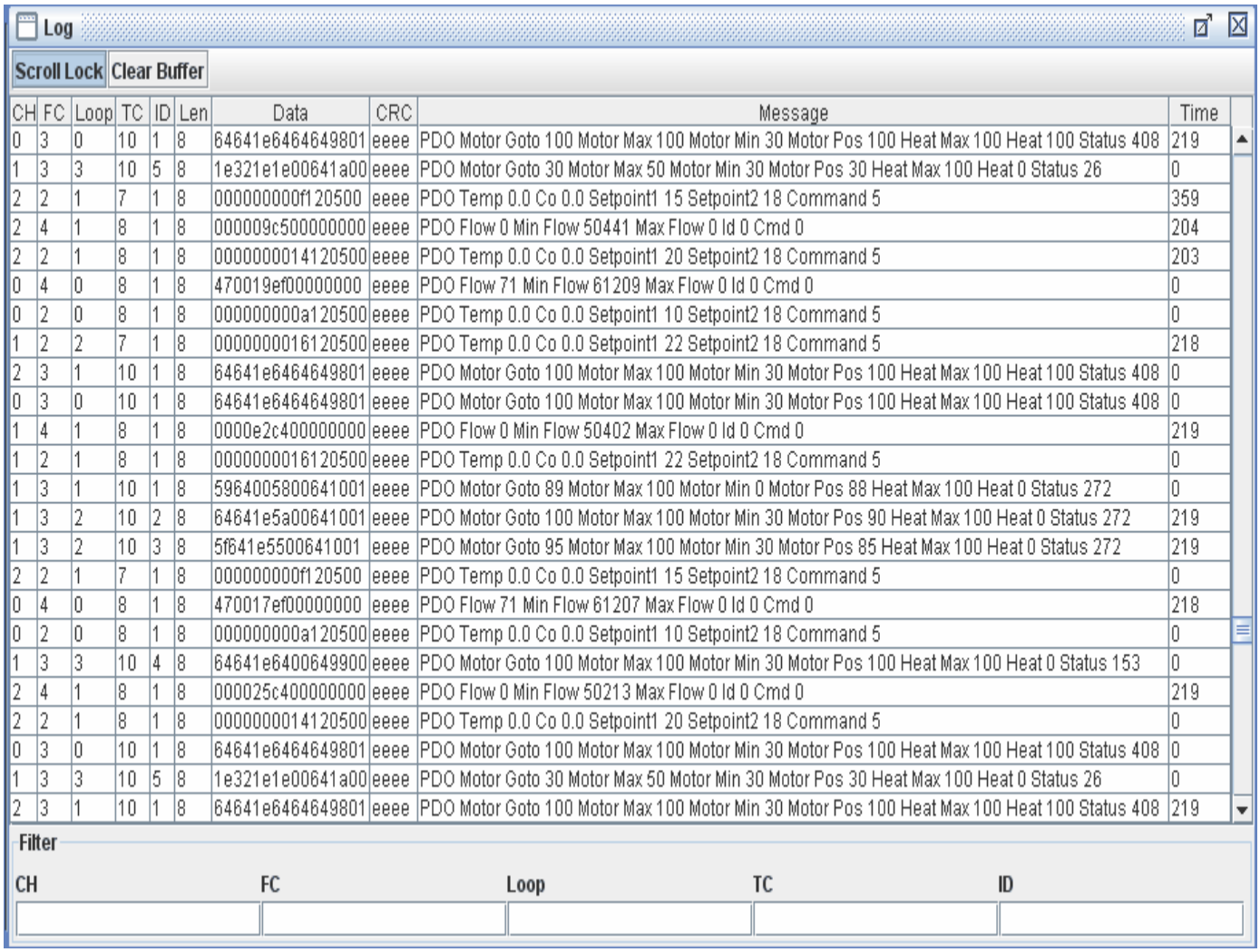
2.1.3.3) **Nodelist** (See 1.5.2)

2.1.3.4) Verify Error List (See 1.5.3)

2.1.3.5) Select nodes to log in database (See 1.5.4)

2.1.3.6) Chart View (See 1.5.4)

2.1.3.2) Log view



CH	FC	Loop	TC	ID	Len	Data	CRC	Message	Time
0	3	0	10	1	8	64641e6464649801	eeee	PDO Motor Goto 100 Motor Max 100 Motor Min 30 Motor Pos 100 Heat Max 100 Heat 100 Status 408	219
1	3	3	10	5	8	1e321e1e00641a00	eeee	PDO Motor Goto 30 Motor Max 50 Motor Min 30 Motor Pos 30 Heat Max 100 Heat 0 Status 26	0
2	2	1	7	1	8	000000000f120500	eeee	PDO Temp 0.0 Co 0.0 Setpoint1 15 Setpoint2 18 Command 5	359
2	4	1	8	1	8	000009c500000000	eeee	PDO Flow 0 Min Flow 50441 Max Flow 0 Id 0 Cmd 0	204
2	2	1	8	1	8	0000000014120500	eeee	PDO Temp 0.0 Co 0.0 Setpoint1 20 Setpoint2 18 Command 5	203
0	4	0	8	1	8	470019ef00000000	eeee	PDO Flow 71 Min Flow 61209 Max Flow 0 Id 0 Cmd 0	0
0	2	0	8	1	8	000000000a120500	eeee	PDO Temp 0.0 Co 0.0 Setpoint1 10 Setpoint2 18 Command 5	0
1	2	2	7	1	8	0000000016120500	eeee	PDO Temp 0.0 Co 0.0 Setpoint1 22 Setpoint2 18 Command 5	218
2	3	1	10	1	8	64641e6464649801	eeee	PDO Motor Goto 100 Motor Max 100 Motor Min 30 Motor Pos 100 Heat Max 100 Heat 100 Status 408	0
0	3	0	10	1	8	64641e6464649801	eeee	PDO Motor Goto 100 Motor Max 100 Motor Min 30 Motor Pos 100 Heat Max 100 Heat 100 Status 408	0
1	4	1	8	1	8	0000e2c400000000	eeee	PDO Flow 0 Min Flow 50402 Max Flow 0 Id 0 Cmd 0	219
1	2	1	8	1	8	0000000016120500	eeee	PDO Temp 0.0 Co 0.0 Setpoint1 22 Setpoint2 18 Command 5	0
1	3	1	10	1	8	5964005800641001	eeee	PDO Motor Goto 89 Motor Max 100 Motor Min 0 Motor Pos 88 Heat Max 100 Heat 0 Status 272	0
1	3	2	10	2	8	64641e5a00641001	eeee	PDO Motor Goto 100 Motor Max 100 Motor Min 30 Motor Pos 90 Heat Max 100 Heat 0 Status 272	219
1	3	2	10	3	8	5f641e5500641001	eeee	PDO Motor Goto 95 Motor Max 100 Motor Min 30 Motor Pos 85 Heat Max 100 Heat 0 Status 272	219
2	2	1	7	1	8	000000000f120500	eeee	PDO Temp 0.0 Co 0.0 Setpoint1 15 Setpoint2 18 Command 5	0
0	4	0	8	1	8	470017ef00000000	eeee	PDO Flow 71 Min Flow 61207 Max Flow 0 Id 0 Cmd 0	218
0	2	0	8	1	8	000000000a120500	eeee	PDO Temp 0.0 Co 0.0 Setpoint1 10 Setpoint2 18 Command 5	0
1	3	3	10	4	8	64641e6400649900	eeee	PDO Motor Goto 100 Motor Max 100 Motor Min 30 Motor Pos 100 Heat Max 100 Heat 0 Status 153	0
2	4	1	8	1	8	000025c400000000	eeee	PDO Flow 0 Min Flow 50213 Max Flow 0 Id 0 Cmd 0	219
2	2	1	8	1	8	0000000014120500	eeee	PDO Temp 0.0 Co 0.0 Setpoint1 20 Setpoint2 18 Command 5	0
0	3	0	10	1	8	64641e6464649801	eeee	PDO Motor Goto 100 Motor Max 100 Motor Min 30 Motor Pos 100 Heat Max 100 Heat 100 Status 408	0
1	3	3	10	5	8	1e321e1e00641a00	eeee	PDO Motor Goto 30 Motor Max 50 Motor Min 30 Motor Pos 30 Heat Max 100 Heat 0 Status 26	0
2	3	1	10	1	8	64641e6464649801	eeee	PDO Motor Goto 100 Motor Max 100 Motor Min 30 Motor Pos 100 Heat Max 100 Heat 100 Status 408	219

-Tabs

Scroll Lock - to stop auto scrolling to new logged messages

Clear Buffer - clear existing logged messages

-Columns

CH - channel

FC - function code

-Loop

TC - type code

-ID

Len - data length

-Data

CRC - code redundancy check

Message - description of logged data

-Time

-Filter

-enter channel, function code, loop number, type code and id to filter displayed log data

2.2) MLM Software Main Toolbar

Connect **(See 1.3)**

Synchronize **(See 1.4)**

Reset

Press the  button to reset the diffuser network.

To reset only the Master Comms Unit, press the disconnect button in the connect frame while connected

Help

2.3) Networkview Toolbar

Edit

-to start an editing session.

Save

-to start the process of propagating the changes made in the networkview to the physical diffuser network.

-the button will be greyed out  when the save process finished

Zoom in

-to zoom into current networkview frame, used when the mouse does not have a mousewheel button.

Zoom out

-to zoom out of current networkview

Zoom normal

-to return to the normal 1:1 zoom level after zooming in or out of a networkview frame.

Find Diffuser

-to zoom into and focus on a diffuser in current view with entered serial number.

Verify

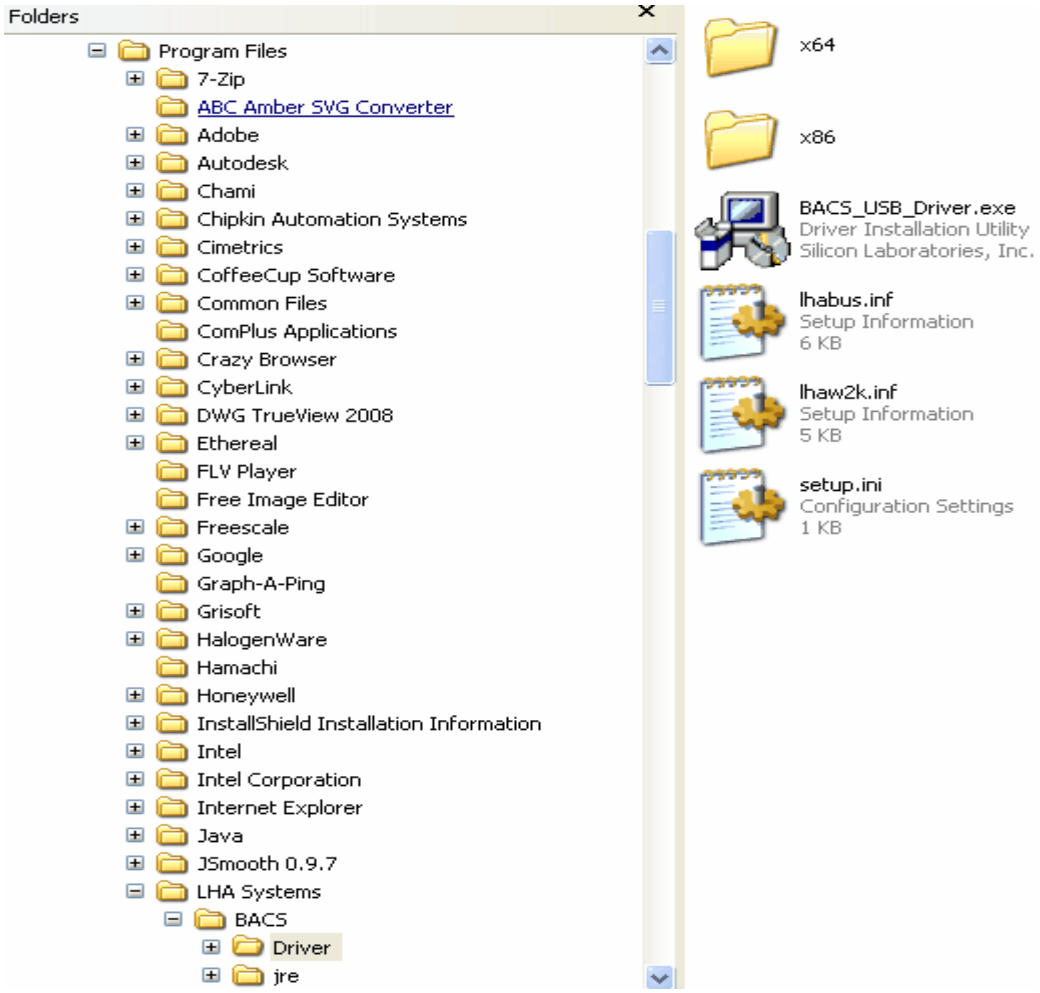
-to verify after a synchronize that the current diffuser network setup is valid.

-the button is disabled until synchronization process finished successfully

3) How to install usb module drivers

Version 1 driver install (MLM application v1)

-browse to Program Files\LHA Systems\BACS\Driver\ directory



-run BACS_USB_Driver.exe, (no popup indication that driver was installed)

-open Control Panel and open Add or remove Programs

-press F5 to refresh display of installed programs

-scroll down to LHA Systems BACS USB Driver (Driver removal) to verify driver v1 installation

Version 2 driver install (MLM application v2 - v4)

-browse to Program Files\Rickard Air\MLM Application\Driver\ directory

-run BACSUsbDriverV2Install.exe

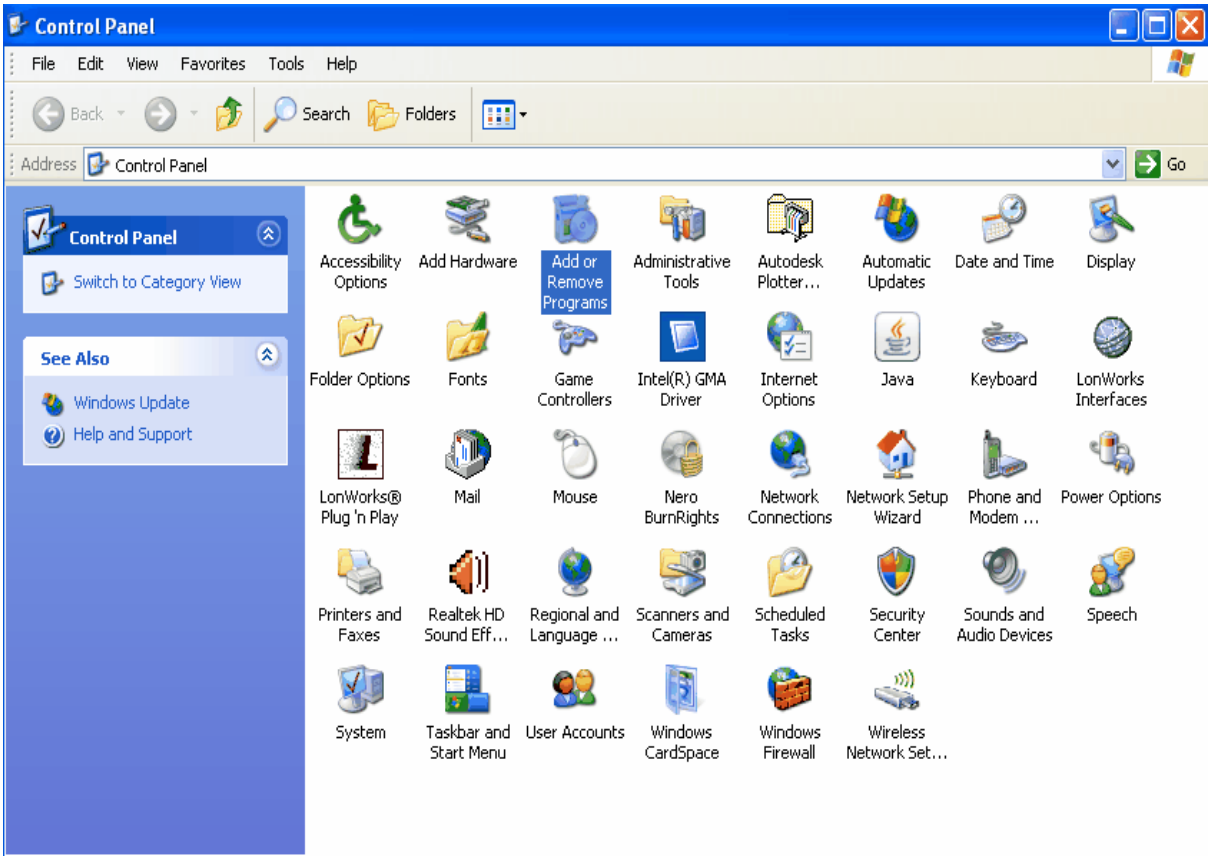
-open Control Panel and open Add or remove Programs

-press F5 to refresh display of installed programs

-scroll down to LHA Systems BACS Device Driver V2 (Driver removal) to verify driver v2 installation

4) How to remove usb module drivers from windows

-open Control Panel and open Add or Remove Programs



-scroll down to LHA Systems....

Version 1 driver removal (MLM application v1)

-select LHA Systems BACS USB Driver (Driver removal) and click on Change/Remove button to uninstall driver

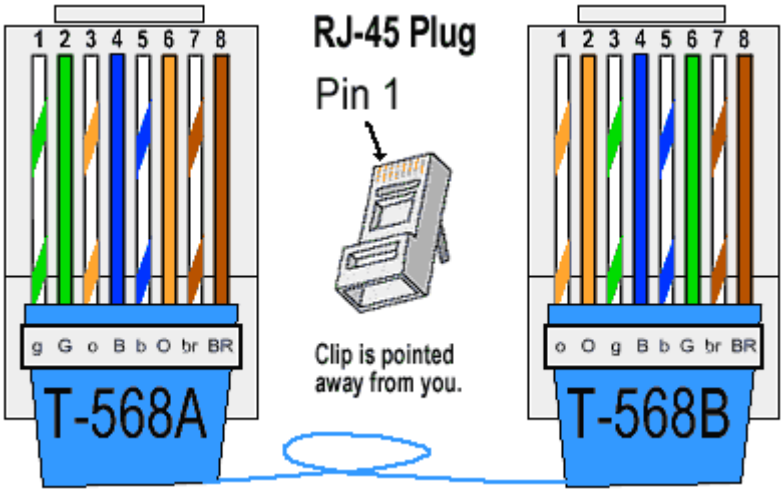
Version 2 driver removal (MLM application v2 - v4)

-select LHA Systems BACS Device Driver V2 (Driver removal) and click on Change/Remove button to uninstall driver

5) How to setup PC to connect to Master Comms Unit

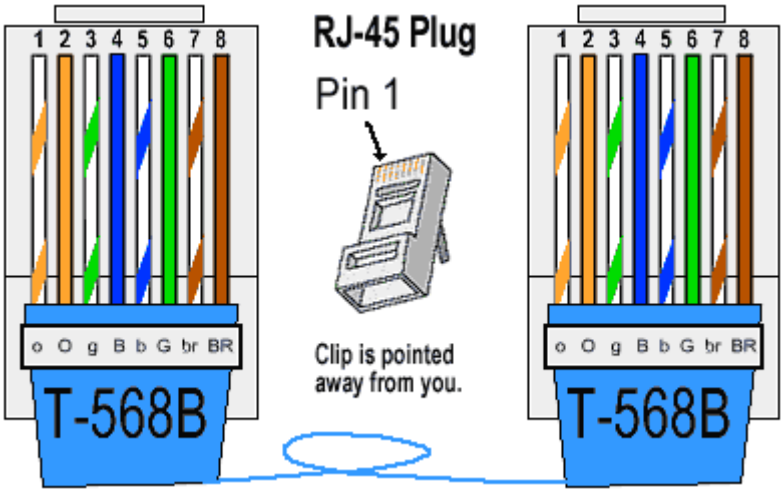
Connect the PC directly to the Master Comms Unit by using a crossover cable with the following color coding scheme

Crossover Ethernet cable



If connecting a PC to a Master Comms Unit through a switch or hub a normal straight-through cable can be used

Straight-through Ethernet cable

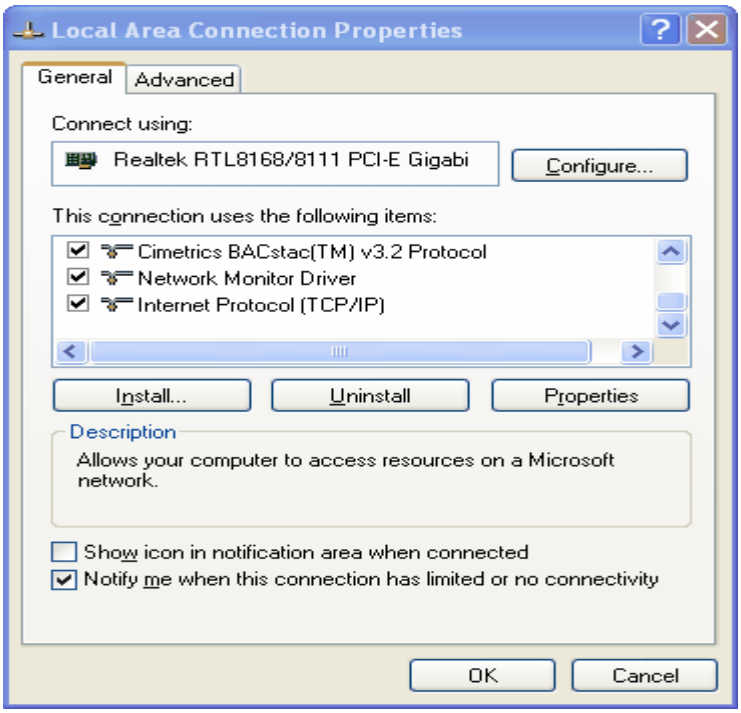


TCP/IP static address setup on Windows PC

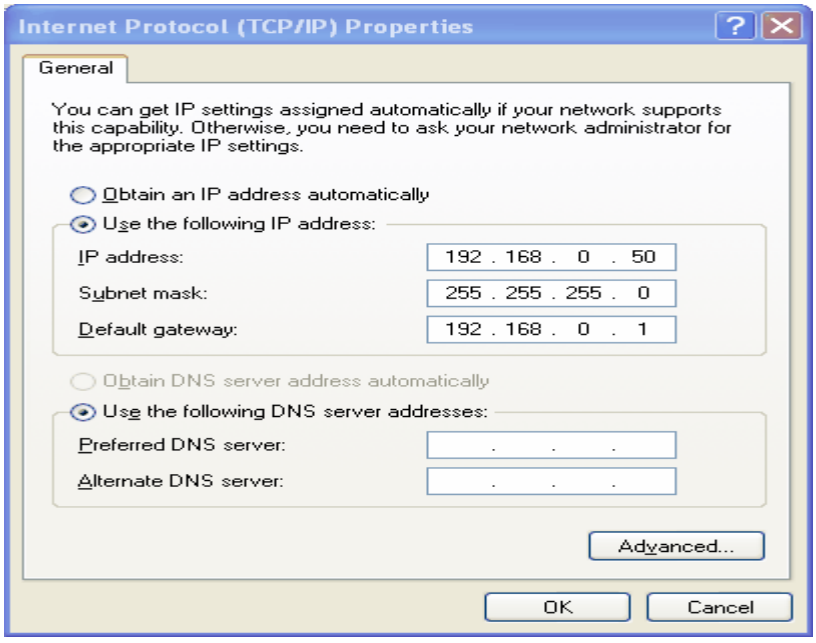
- open Control Panel and double click on Network Connections

- right click on Local Area Connection and select Properties

- scroll down and select Internet Protocol (TCP/IP) on XP PC or TCP/IPv4 on Vista PC



- click on properties



- IP address: enter an ip address different from any IP address already used on ethernet network

- Subnet mask: 255.255.255.0

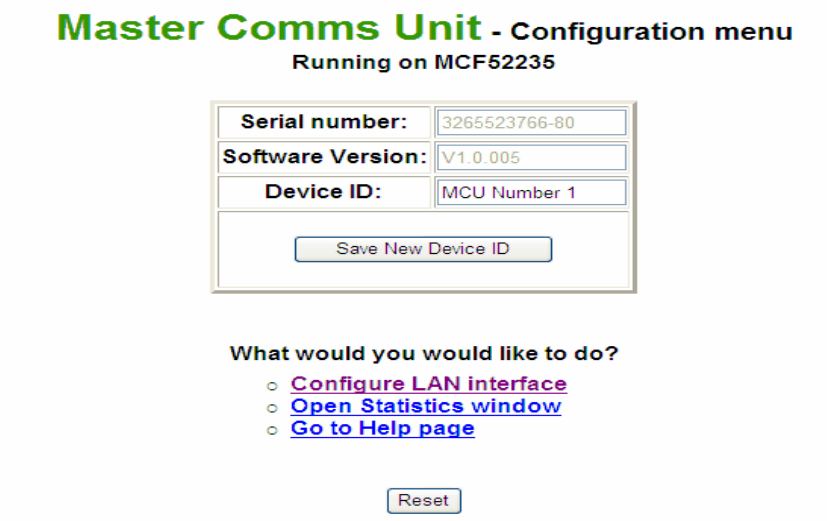
- Default Gateway: for example 192.168.0.1

- click on Ok button

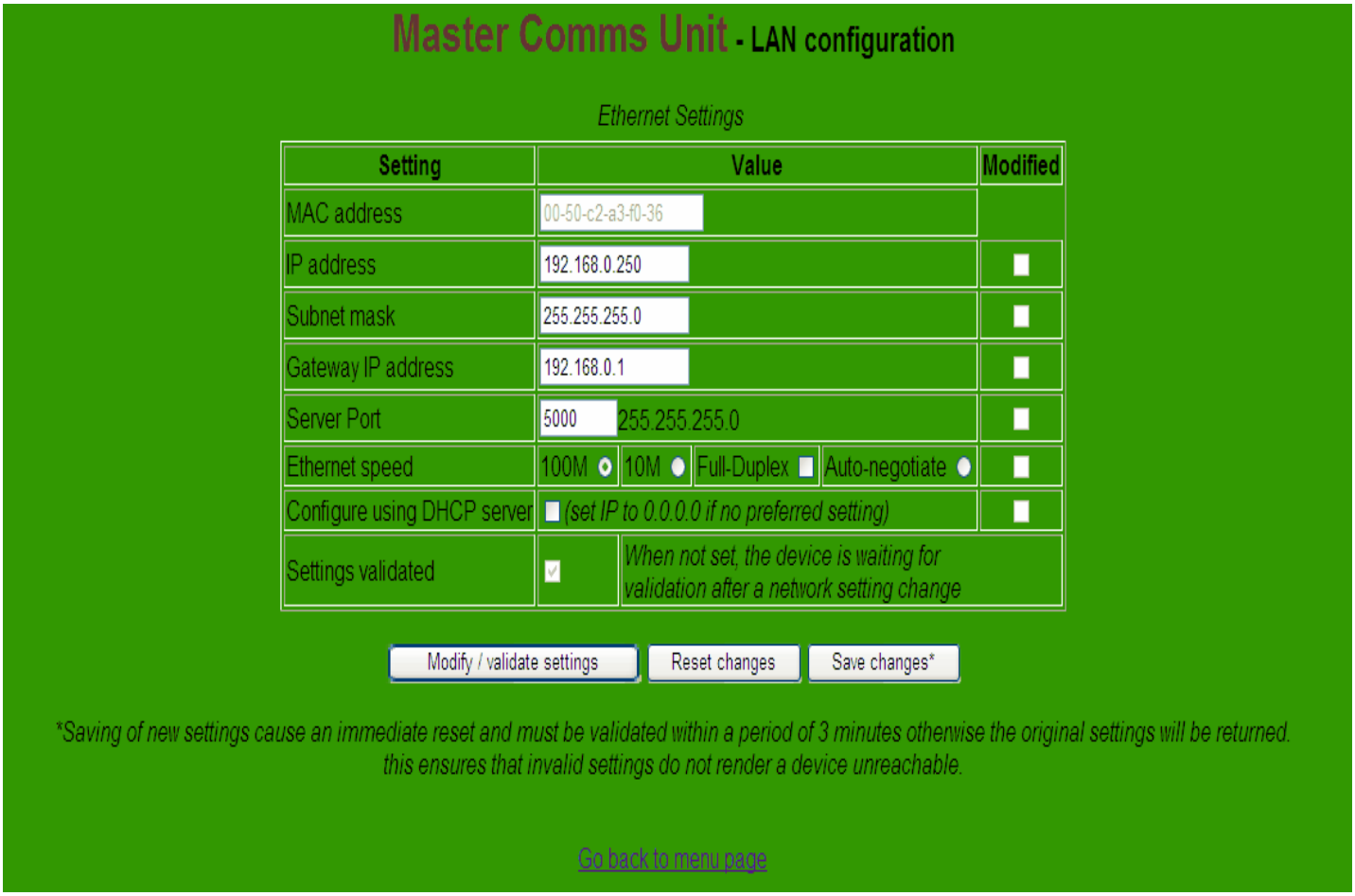
  - also change the ip address of Master Comms Unit from default 192.168.0.251 to an unique address on the network

6) How to change ip address on Master Comms Unit

- open a web browser and enter the ip address in the address bar (factory setting: http://192.168.0.251/)



- click on Configure LAN interface



in IP address field enter new ip address

- click on Save changes button

Within a period of 3 minutes

- enter in web browser address bar the new ip address and press enter

- click again on Configure LAN Interface

- click on the **Modify/validate** settings button **to make** the IP address **changes permanent**

If last 3 steps fail: reenter the initial ip address in the web browser address bar and start all over again

7) How to change Ethernet speed setup

- it is recommended **not to use Auto-negotiate** due to some routers that are incompatible with this setting turned on.

- open a web browser and enter the ip address in the address bar (factory setting: http://192.168.0.251/)

- click on Configure LAN interface

- select the Ethernet speed tick box, for example 100M

- click on the Modify/validate settings button

- click on Save Changes

- click on Go back to menu page button at the bottom of the page

- click again on Configure LAN interface. The Settings validated tick box will not be ticked.

- click again on the Modify/validate settings button and the Settings validated tick box will be set again

8) Integration with other BMS network protocols

The following network variables of the MLM Proprietary network are visible to other BMS network protocols like BACnet and LonTalk.

-Space temperature

-Temperature Setpoint

-Heater output temperature

-Diffuser plate motor position

-Heating or Cooling mode

-Change Over Sensor (Supply air temperature)

Mapping and binding of network variables to other network protocols

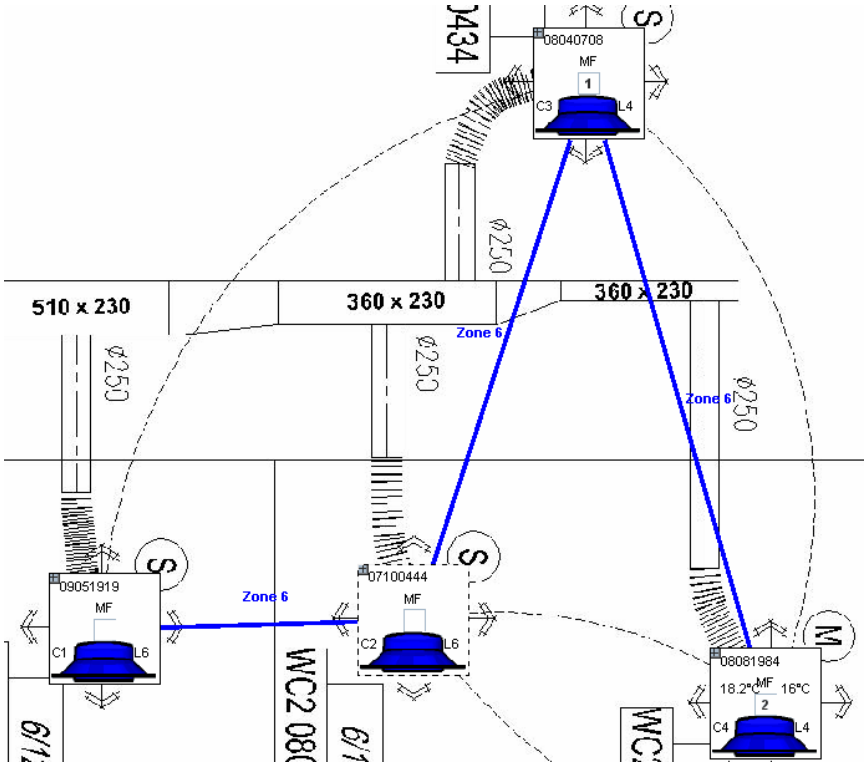
Master Diffuser concept

On the MLM Proprietary network there can be upto 60 diffusers installed on 4 different channels, each channel with a maximum of 15 different diffusers. They can be arranged in zones where each zone have one master diffuser that control the other slave diffusers.

For example, in the layout:

-Zone 6

Diffuser with serial 08081984 and on channel 4 and loop 4 is set as the master and control the slave diffusers with serials



08040708,07100444,09051919

Therefor it is only necessary to do a mapping of all the masters on the MLM proprietary network to another BMS network protocol by using the channel and loop number as reference.

Mapping Table Setup

By using the MLM application File/Export Setup command, a list can be exported to a tab delimited text file of all the master diffusers on the MLM proprietary network.

Connection Address: 192.168.0.251
Master Comms Device ID: 04CC68C40201
Exporting only masters

Channel	Type	ID	HID	Loop	ChLpMap	LonStr	Zone	Code	Serial Nr	Firmw	DeviceName
1	Interf	5	5	5	21	[1] 5	20	BL20	09051918	01.24	
2	Interf	2	2	2	34	[2] 2	18	BL20	07100447	01.24	
3	Interf	15	15	14	62	[3] 14	25	BL20	08030009	01.24	
4	Interf	4	4	4	68	[4] 4	6	BL20	08081984	01.24	Office

Using the ChLpMap and LonStr columns a mapping table can be build up

String	Decimal
[1] 5	21
[2] 2	34
[3] 14	62
[4] 4	68

Depending on which protocol is used a String or Decimal presentation of the channel and loop number may be needed to setup the mapping table

Table 1

String

Channel \ Loop	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	[1] 1	[1] 2	[1] 3	[1] 4	[1] 5	[1] 6	[1] 7	[1] 8	[1] 9	[1] 10	[1] 11	[1] 12	[1] 13	[1] 14	[1] 15
2	[2] 1	[2] 2	[2] 3	[2] 4	[2] 5	[2] 6	[2] 7	[2] 8	[2] 9	[2] 10	[2] 11	[2] 12	[2] 13	[2] 14	[2] 15
3	[3] 1	[3] 2	[3] 3	[3] 4	[3] 5	[3] 6	[3] 7	[3] 8	[3] 9	[3] 10	[3] 11	[3] 12	[3] 13	[3] 14	[3] 15
4	[4] 1	[4] 2	[4] 3	[4] 4	[4] 5	[4] 6	[4] 7	[4] 8	[4] 9	[4] 10	[4] 11	[4] 12	[4] 13	[4] 14	[4] 15

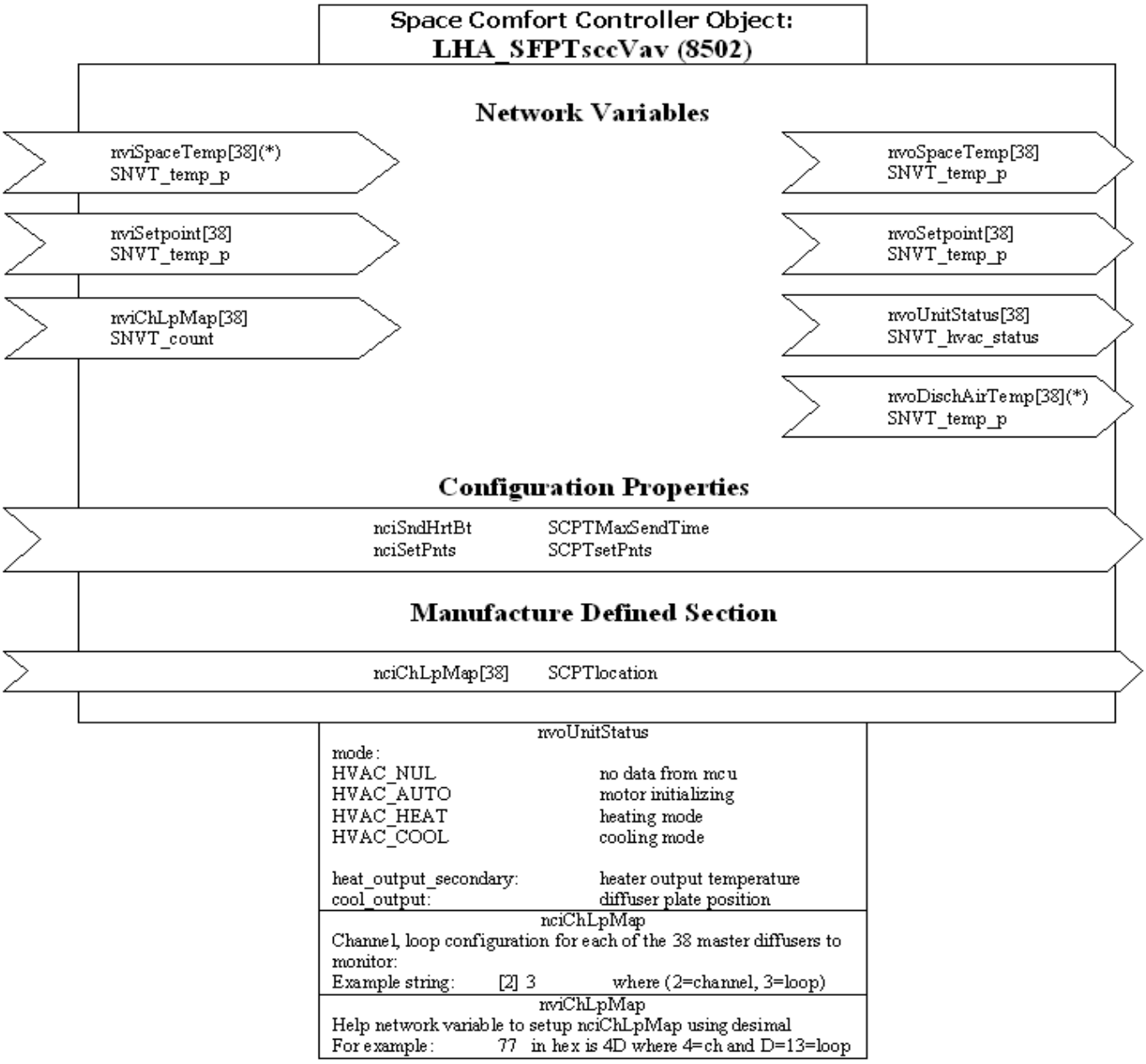
Hex

Channel \ Loop	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
1	0x11	0x12	0x13	0x14	0x15	0x16	0x17	0x18	0x19	0x1A	0x1B	0x1C	0x1D	0x1E	0x1F
2	0x21	0x22	0x23	0x24	0x25	0x26	0x27	0x28	0x29	0x2A	0x2B	0x2C	0x2D	0x2E	0x2F
3	0x31	0x32	0x33	0x34	0x35	0x36	0x37	0x38	0x39	0x3A	0x3B	0x3C	0x3D	0x3E	0x3F
4	0x41	0x42	0x43	0x44	0x45	0x46	0x47	0x48	0x49	0x4A	0x4B	0x4C	0x4D	0x4E	0x4F

Decimal

Channel \ Loop	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
2	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47
3	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63
4	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79

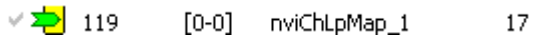
MCU Lon module setup



There are 38 functional blocks in the functional profile of the MCU Lon module that can be setup to bind with 38 master diffuser units on the MLM Proprietary network. The nciChLpMap configuration property string value (for example [2] 3) can be changed from the default value by using network tools like LonMaker.

Poll/Index	Node	NV Name	Value
3	[0-0]	nciChLpMap_1	[1] 1
4	[0-0]	nciChLpMap_2	[1] 5
5	[0-0]	nciChLpMap_3	[2] 2
6	[0-0]	nciChLpMap_4	[3] 14
7	[0-0]	nciChLpMap_5	[3] 15
8	[0-0]	nciChLpMap_6	[4] 1
9	[0-0]	nciChLpMap_7	[4] 2
10	[0-0]	nciChLpMap_8	[4] 3
11	[0-0]	nciChLpMap_9	[4] 4
12	[0-0]	nciChLpMap_10	[4] 5
13	[0-0]	nciChLpMap_11	[4] 6
14	[0-0]	nciChLpMap_12	[4] 7
15	[0-0]	nciChLpMap_13	[4] 8
16	[0-0]	nciChLpMap_14	[4] 9
17	[0-0]	nciChLpMap_15	[4] 10
18	[0-0]	nciChLpMap_16	[4] 11
19	[0-0]	nciChLpMap_17	[4] 12
20	[0-0]	nciChLpMap_18	[4] 13
21	[0-0]	nciChLpMap_19	[4] 14
22	[0-0]	nciChLpMap_20	[4] 15
23	[0-0]	nciChLpMap_21	[3] 3
24	[0-0]	nciChLpMap_22	[3] 4
25	[0-0]	nciChLpMap_23	[3] 5
26	[0-0]	nciChLpMap_24	[3] 6
27	[0-0]	nciChLpMap_25	[3] 7
28	[0-0]	nciChLpMap_26	[3] 8
29	[0-0]	nciChLpMap_27	[3] 9
30	[0-0]	nciChLpMap_28	[4] 1
31	[0-0]	nciChLpMap_29	[4] 2
32	[0-0]	nciChLpMap_30	[4] 3
33	[0-0]	nciChLpMap_31	[4] 4

The nviChLpMap network variable that use a decimal value (see Table 1) of the channel/loop binding may also be used with networks tools.



Automatic mapping table update

With the latest Master Comms Unit with LON module the mapping table can also be automatically updated using the following procedure:

1. insert different channels into mcu
2. After final commisioning, switch off mcu and switch on again
3. waite for 1-2minutes for all temperature pdo's to be routed through to lon module
4. press service pin on lon module
5. For the next 3 minutes, WAITE
6. In 3 minutes, new mapping table will be build
7. After 3 minutes, new mapping table will be written into nviChlpMap1-38 and nciChLpmap1-38
8. First 38 masters will be mapped, above 38 will be ignored and must be manually switched with first 38 channel/loop mappings using lon commissioning tool.
9. This need only to be done once to setup channel/loop mapping
10. Use lonmaker/honeywell commissioning tools
11. To update serial string field, wink device.
12. For the next 1.5 minutes serial numbers will be updated for each valid Channel/Loop mapping
13. When changing any channel/loop mapping, all the serial number fields will reset, use wink to update serial fields again.

MCU BACnet module setup

Using a BACnet commissioning tool one can see a list of all the objects and their properties on the MCU BACnet device. These objects can be setup to bind with 20 master diffuser units on the MLM Proprietary network and are organized in the following layout of the Analog Input, Analog Output and Multistate Output objects.

A Device Object with device properties

Name: Device Object

Value:

Property Name	Property Value
apdu-timeout	3000
application-software-version	RouteBACnet_G
database-revision	0
daylight-savings-status	F
description	Server
firmware-revision	0.4.6
local-date	(Saturday,01-April-2006)
local-time	07:00:03.01
max-apdu-length-accepted	480
model-name	LHA
number-of-apdu-retries	3
object-identifier	(device,2355375)
object-name	MCU Number 1
object-type	device (8)
protocol-conformance-class	1
protocol-object-types-supported	(T,T,F,F,F,F,F,F,T,F,F,F,F,F,F,T,F,F,F,F,F,F,F,F,F,F,F,F,F,F,F,F,F,F,F,F,F,F,F,F,F,F,F,F) (analog-input|analog-output|device|multistate-output)
protocol-revision	5
protocol-services-supported	(F,F,F,F,F,F,F,F,F,F,F,F,T,F,F,T,F,F,F,F,F,F,F,F,F,F,F,F,F,F,F,F,F,F,F,F,F,F,F,F,T,F,F,F,F,F) (read-property|write-property|who-is)
protocol-version	1
segmentation-supported	no-segmentation (3)
system-status	operational (0)
utc-offset	5
vendor-identifier	336
vendor-name	LHA Systems

Look in the object-identifier property for the device instance number, 2355375. It relates to the MCU BACnet device MAC-address that one can view entering the IP address in a webbrowser and going to the LAN configuration page.

Master Comms Unit - LAN configuration

Ethernet Settings

Setting	Value	Modified
MAC address	00-50-c2-a3-f0-af	
IP address	192.168.0.250	☐
Subnet mask	255.255.255.0	☐
Gateway IP address	192.168.0.1	☐
Server Port	5000 255.255.255.0	☐
Ethernet speed	100M ◉ 10M ○ Full-Duplex ☐ Auto-negotiate ○	☐
Configure using DHCP server	☐ *(set IP to 0.0.0.0 if no preferred setting)*	☐
Settings validated	☑ *When not set, the device is waiting for validation after a network setting change*	

Open the windows calculator program under accessories and enter in hex the MAC address

50c2a3f0af

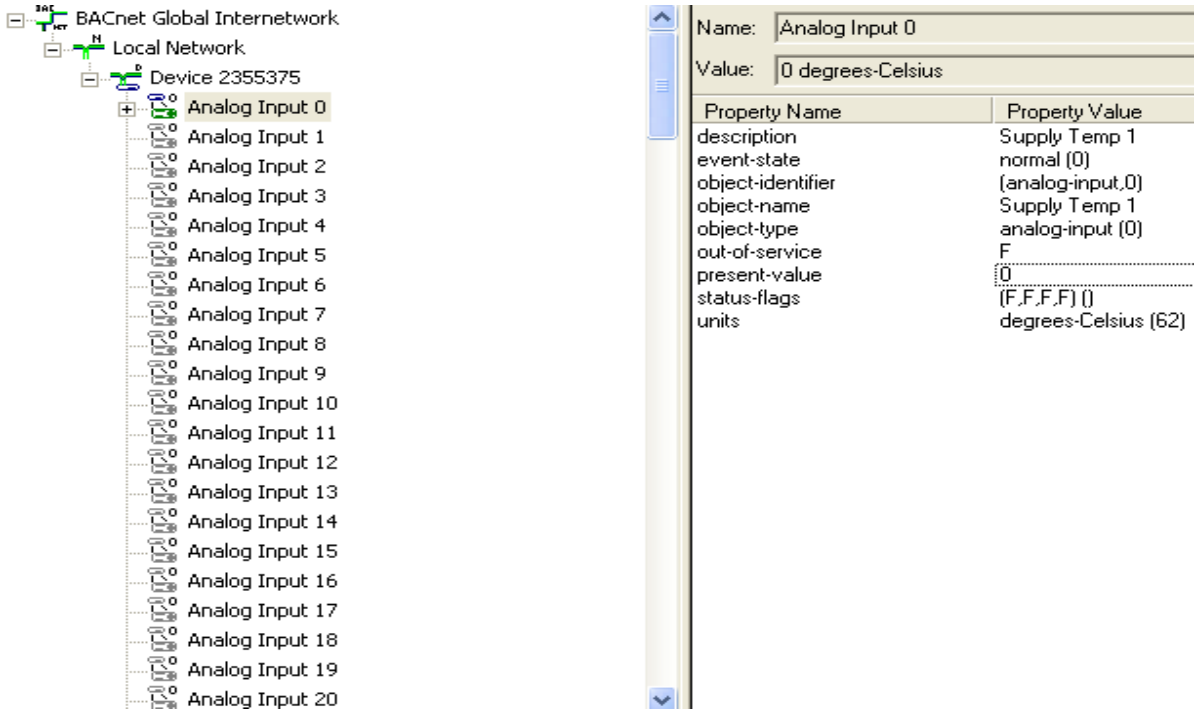
Switch the calculator to binary mode to get

10100001100001010100011111100001010111 1

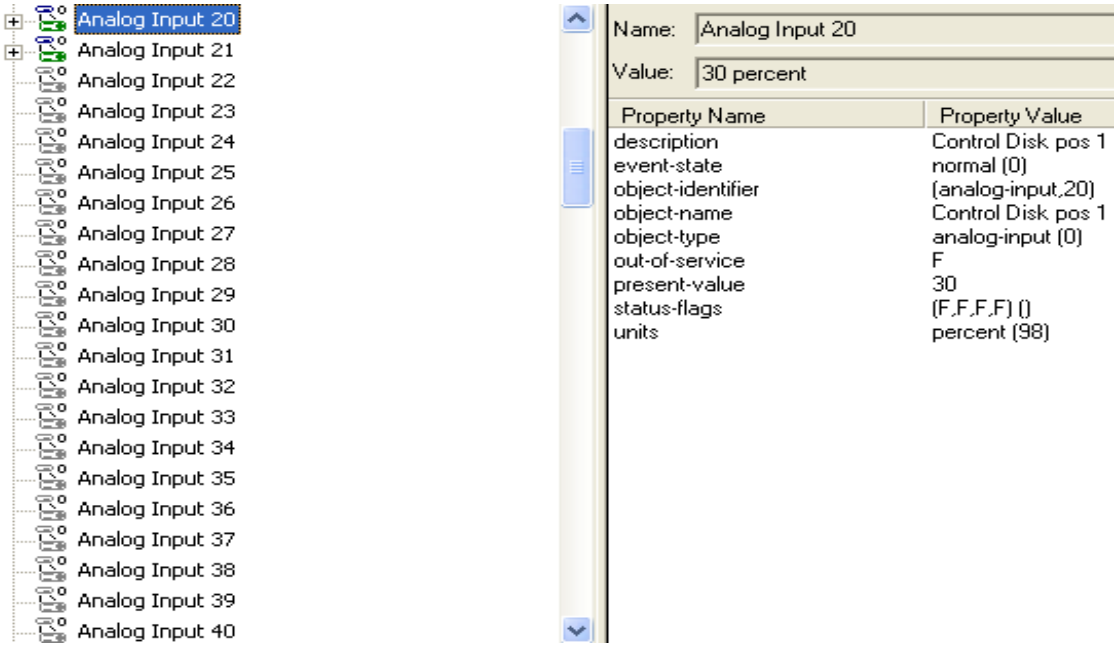
Count the first 22 bits from the right and copy back into the calculator and switch to decimal to get the instance number

2355375

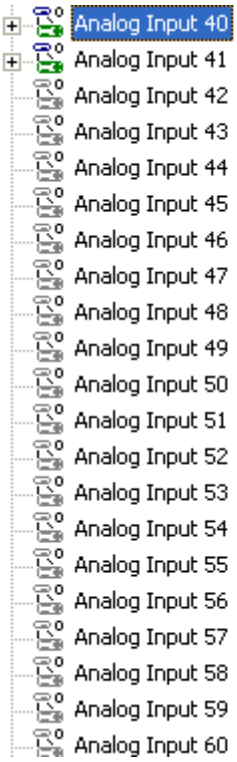
20 Analog Inputs with description Supply Temp

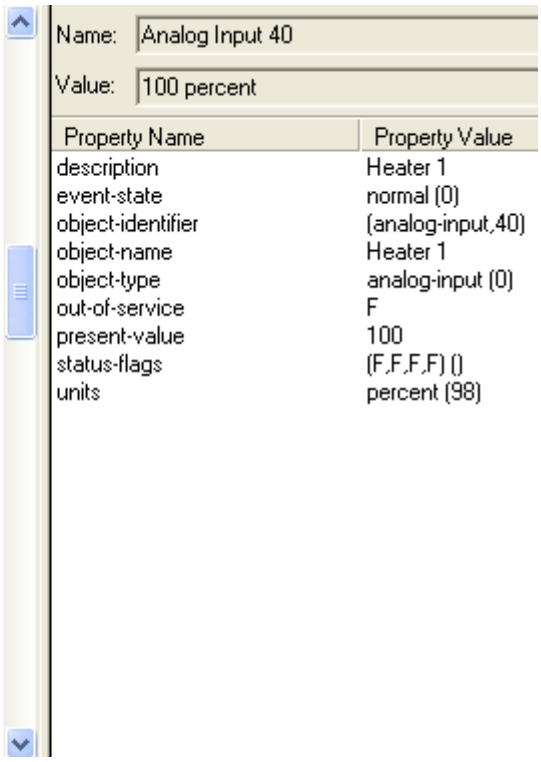


20 Analog Inputs with description Control Disk pos

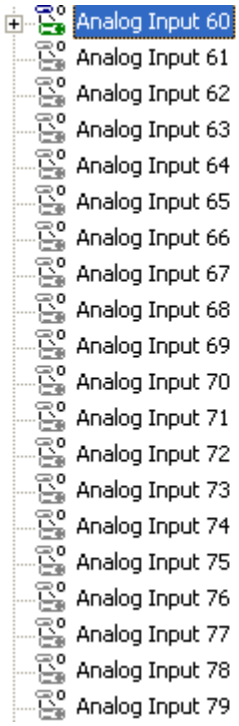


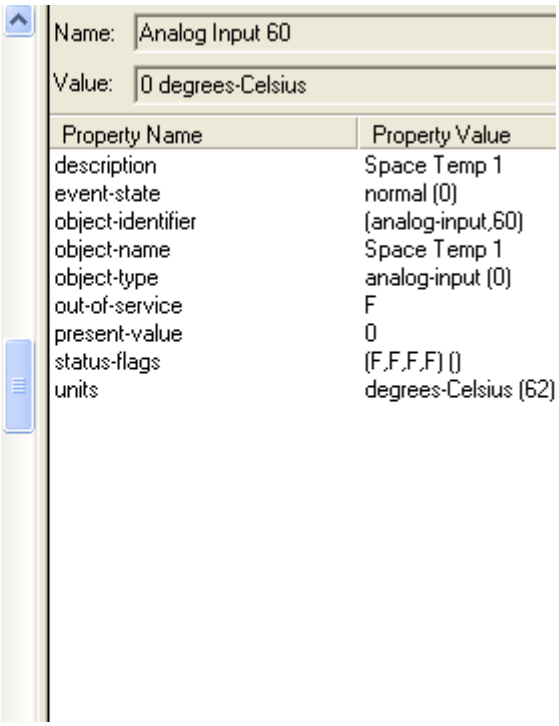
20 Analog Inputs with description Heater



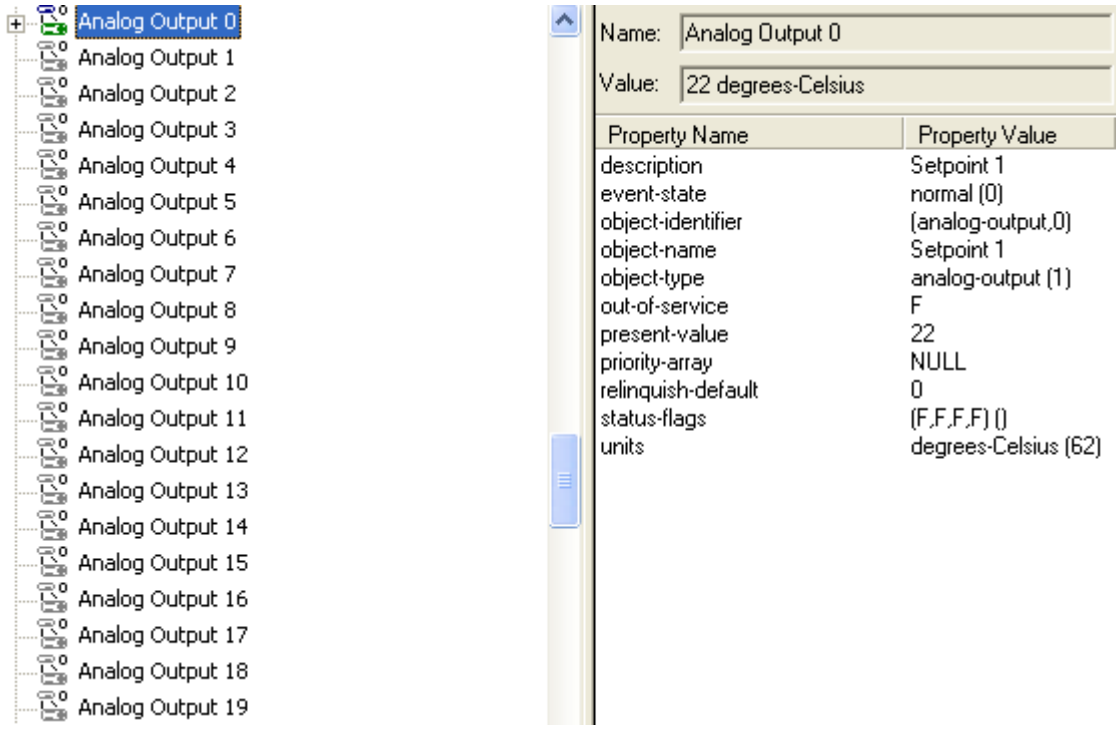


20 Analog Inputs with description Space Temp

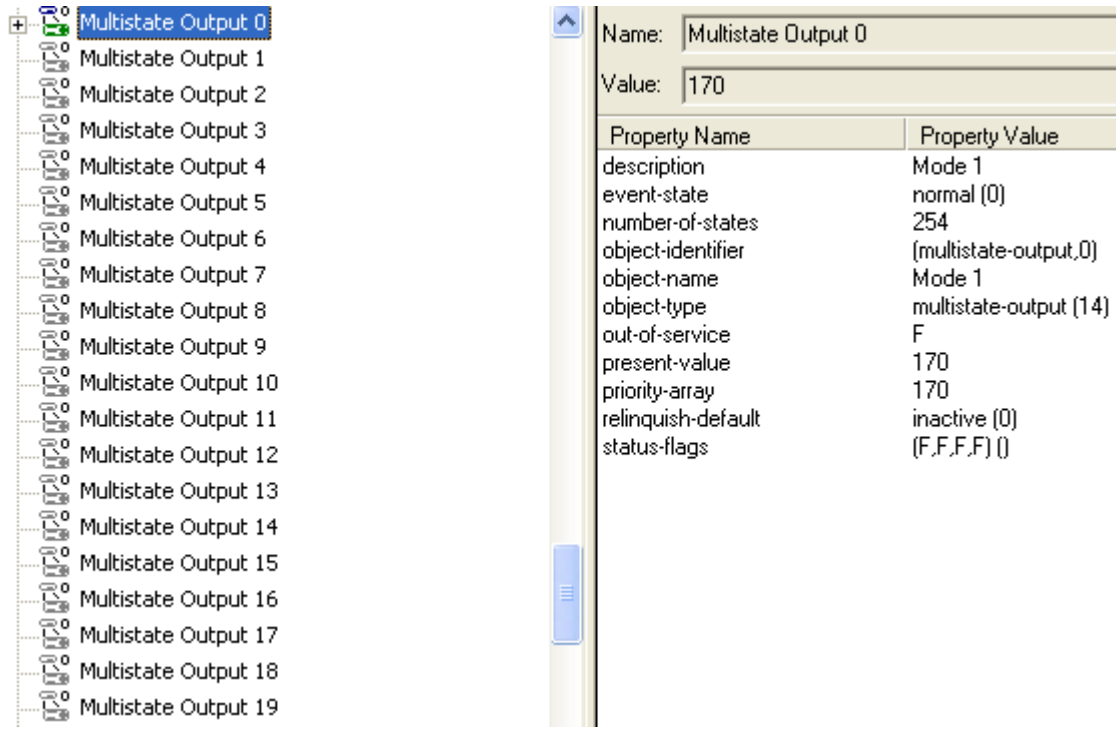




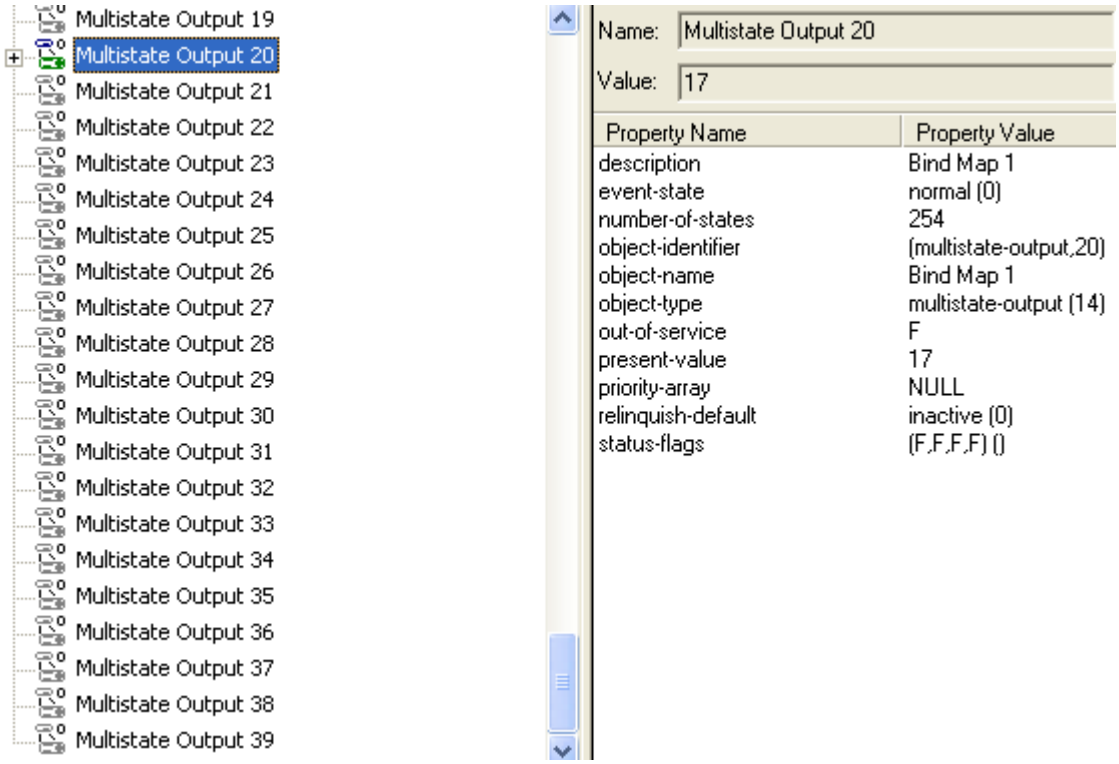
20 Analog Outputs with description Setpoint



20 Multistate Outputs 1-20 with description Mode



20 Multistate Outputs 1-20 with description Bind Map



Taking the first entry in the array of 20 Supply Temp, Control Disk pos, Heater, Space Temp, Setpoint, Mode and Bind Map, together form a functional block and the same with the other items in the array structures.

Each of these functional blocks are bind to a potential master diffuser unit on the MLM Proprietary network by the channel loop decimal value specified in the Multistate output Bind Map object present value property.

Taking the first functional block as example:

Supply Temp 1

Control Disk pos 1

Heater 1

Space Temp 1

Setpoint 1

Mode 1

Bind map 1 = 17

Use Table 1 to find channel = 1 and loop = 1 from 17 decimal value. Therefor all these variables will get their specific values from the master diffuser unit on channel 1, loop 1

How to setup Bind map values automatically using MLM application

After commissioning all the diffusers on the network, goto File and select "BACnet mapping table update" to send to the MCU BACnet device the first 20 masters and change the Bind map values to the correct decimal values.

9) MLM Controls – Fault diagnostic Procedure

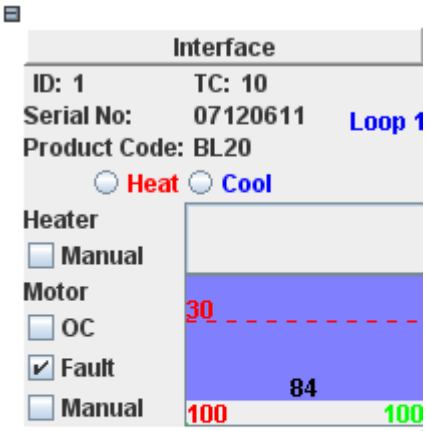
Fault detection point	Fault Symptoms	Possible Cause	Fix
MLM Interface	Red LED constantly on	Interface flash program upload unsuccessful	Retry upload up to 3 times. If not successful replace.
		Processor in undefined state	Power off and on. If not successful replace.
	Red LED off	No power to the Interface unit due to cabling error.	See item 'Cable verification' below.
		No Wall Stat or Analog module installed. These units initiate the data communication.	1) Verify that at least one Wall Stat or one Analog module is installed per Power Supply. 2) Cabling error to Wall Stat unit. See item 'Cable verification' below.
		Faulty Power Supply Unit	See item 'Power Supply'
Power Supply	LED on PSU, visible through side vent, is constantly off.	Short circuit between V+ and GND	1) Verify cabling 2) Unplug MLM interface units until the fault is isolated
		Faulty Power Supply	Replace
	LED on PSU is cycling.	Faulty Power Supply	Replace
		Low input voltage	Check mains feed voltage and connection
Wall Stat	Cycles continuously between Revision and temperature on the LCD	More than 15 MLM Interface nodes installed on the bus	Remove excessive nodes
		Faulty Wall Stat cabling	See item 'Cable verification' below.
		Faulty MLM Interface connected to the Wall Stat	Replace
		Faulty Wall Stat	Replace
	Displays temperature only on the LCD	MLM Interface unit not operational	See MLM Interface diagnostics
		MLM Interface in flash program loader mode	See MLM Interface diagnostics
		Faulty Wall Stat cabling	See item 'Cable verification' below.
	No display on wall Stat LCD	No Power to Wall Stat	See item 'Cable verification' below.
		Wall Stat unit faulty	Replace

MLM Controls – Fault diagnostic Procedure (continued)

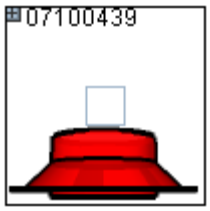
Motor actuator drive	Motor noisily grinding against an end stop, top or bottom.	Premature end stop detection due to more than 8 diffuser nodes connected to a single Power Supply connection point	1) Re-arrange Power Supply placement 2) Upload rev 1.16 or later power management flash program to MLM Interface
		Faulty slave cabling	See item 'Cable verification' below.
	Motor not moving (verify with 'motor manual' command in BACS application)	Motor harness flat cable unplugged on the MLM Interface box	Secure
		Motor harness cable faulty	Replace cable
		Motor faulty	Replace motor
		Low voltage to motor	See item 'Cable verification' below
	Motor slow and jerky movement	Motor harness cable faulty	Replace cable
		Motor faulty	Replace motor
	Motor erratic movement up and down – in tandem with other diffusers	More than one temperature and/or setpoint is selected for one control zone (room area)	Access the control zone with the BACS application and unselect the superfluous setpoint/temperature parameters
		Temperature sensor unplugged or faulty	Secure or replace
Cable verification	Wall Stat (RJ12) cable	Cable not plugged in properly	Secure
		Connector plug connection point damaged due to installation	Test and replace
		Cable damaged due to installation	Test and replace
	Slave cable – 3 core 20AWG to 4-pole Microfit connector	Cable not plugged in properly	Secure
		Connector not inserted correctly	Verify the connector polarity with the latch towards the top
		Cable core pulled back on the pin	Replace

10) Diffuser unit views (See also: How to change between different diffuser views 1.5)

Expanded View



Collapsed View



Master Diffuser

Black Diffuser: initializing

Blue Diffuser: cooling

Red Diffuser: heating

Yellow Diffuser: manual mode

White Diffuser: idle/deadband

11) Visual Elements of Diffuser network

-Diffuser Unit

-interface module

-analogue module

-wallstat module

-port

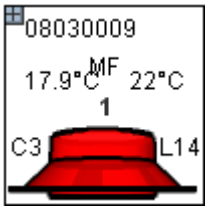
-Grouping

-zone edges

-loop edges

-Errors

-motor fault



-over current

12) Keyboard Shortcuts

-F1, to bring up Help window

-Delete button, deleting selected loop, zone edge or project section

13) Making changes to a diffuser network

-in the networkview frame, select the view (Physical, Logical) where changes need to be made.

-start the edit mode by pressing the  button in the networkview frame toolbar.

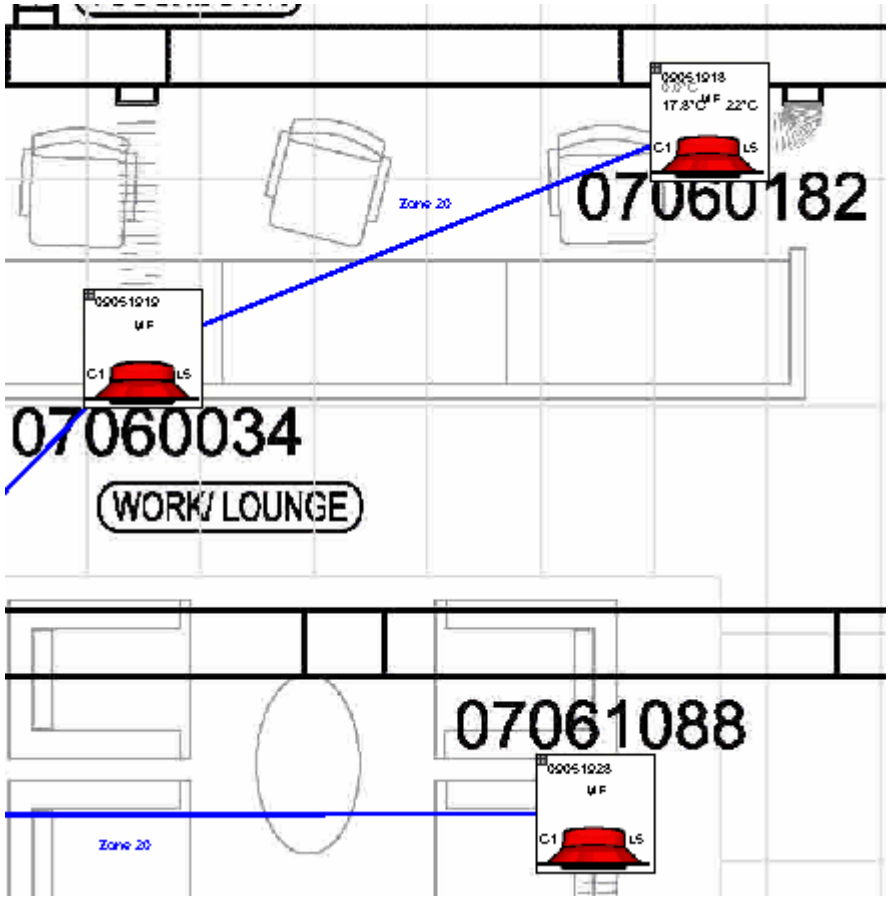
-make changes to diffuser network (See 1.6)

-to save the changes press the  button.

-wait until the  button has grayed out  to show that save process has finished

-Any errors found in verification of diffuser network should pop up. (See 1.5.3)

14) Image file used for background of physical view



In the physical view the selected image for a project section will be loaded as the background. When creating the image jpg, squares of dimensions 100x100 pixels can be drawn as placeholders where collapsed diffuser views can be moved to when viewing an existing diffuser network.

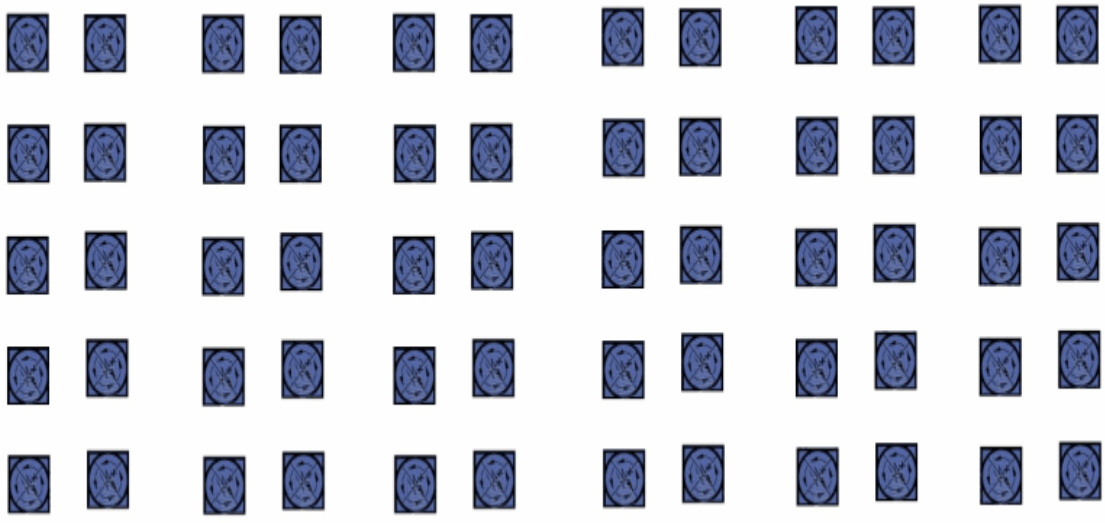
What detail should appear on a background image for each section

-It should be a 2d presentation (viewed from the top) of all the diffuser locations in a section area

-All the diffusers should share the same connection

-up to 15 diffusers for a USB connection

-up to 60 diffusers for a tcpip connection



-also read step 5 below, how to select only relevant parts of a larger jpg image

15) How to create project background images

1. Image format used: jpg

2. Maximum image dimensions: (4000 x 4000) pixels

-Any image used in project view should not have bigger dimensions than 4000x4000 pixels. For example, 3100x4500, 3000x5500 should be fine.

-Very big dimensions like 7000x6000 have memory constraints that will make it unusable.

3. How to check image dimensions

-open windows explorer and select jpg image

-right click and select properties at the bottom

-click on Summary tab at the top and press the Advanced button at the bottom if needed

-take note of the width and height value in pixels

4. How to insert diffuser placeholders with dimensions 100x100 in existing jpg image

-open jpg image with Microsoft Paint program (found under Start, All Programs, Accessories) or any other image editing program.

-start a 2nd Paint program instance and start with a new, blank image

-select Image, Attributes and enter Width: 100, Height 100 using Pixel Units

-Press Ok button

-Now an image rectangle with dimensions 100x100 is created

-Change white background to different colour or any other pixel pattern using drawing tools

-save image to use next time placeholder image needs to be inserted in an existing image

-press Edit, Select All

-press Edit, Copy

-switch back to 1st opened image

-press Edit, Paste

-if Edit, Paste is greyed out, make certain that aboth steps Edit, Select All and Edit, Copy was followed properly.

-in the top left hand corner of the image a 100x100 selection area will be copied

-left click inside created selection area, not releasing button and drag the selection to correct position on image background. If the visible area does not include the proper location, drag selection to the visible area edge, release mouse button, use scroll bars to make invisible parts visible, reselect selection and start drag process again.

-use Edit, Undo to delete last changes

-repeat insert process starting with Edit, Paste

-save the changed image, using a different name if needed

5. How to select parts of a too large jpg image file

-open image in image editing program, for example paint shop pro, coral draw, irfanviewer etc.

-Don't use Microsoft paint program due to limited selection capabilities (no autoscrolling when dragging selection area)

-use selection tool to break down big image into smaller images. Keep in mind that it should fit in an area with dimensions of 4000 x 4000 pixels

6. How to rescale jpg image

-open image with image editing program, for example Microsoft Paint

-press Image, Stretch/Skew

-Enter under Stretch, Horizontal and Vertical percentage value, for example 50%, 110% to rescale whole image

-DON'T rescale an already large image much bigger, your pc will run out of memory and slow down dramatically.

-save rescaled image

7. also read How to create JPG from DWG drawing

16) How to create JPG image from DWG drawing

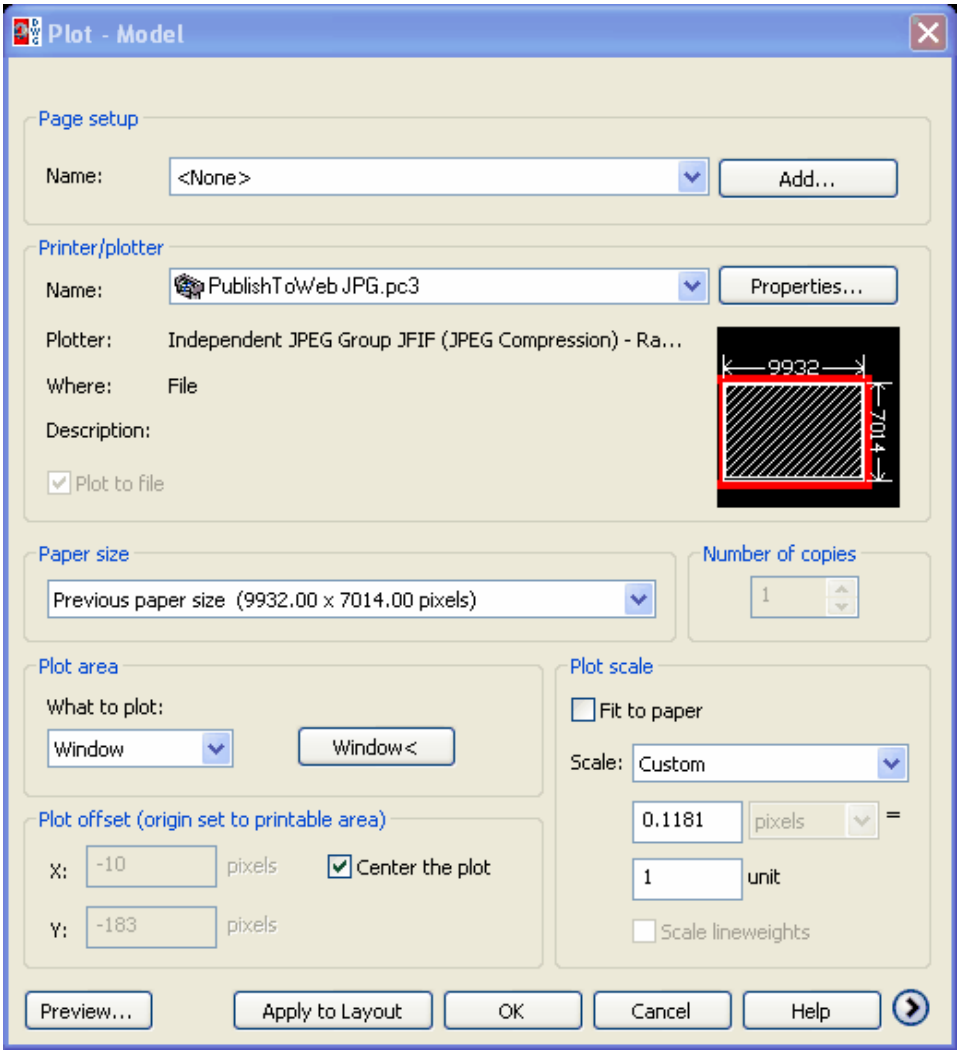
1. Use Autocad or Download free autodesk viewer program DWG TrueView 2008

(http://www.download.com/DWG-TrueView/3000-6677_4-10690117.html)

2. Open drawing

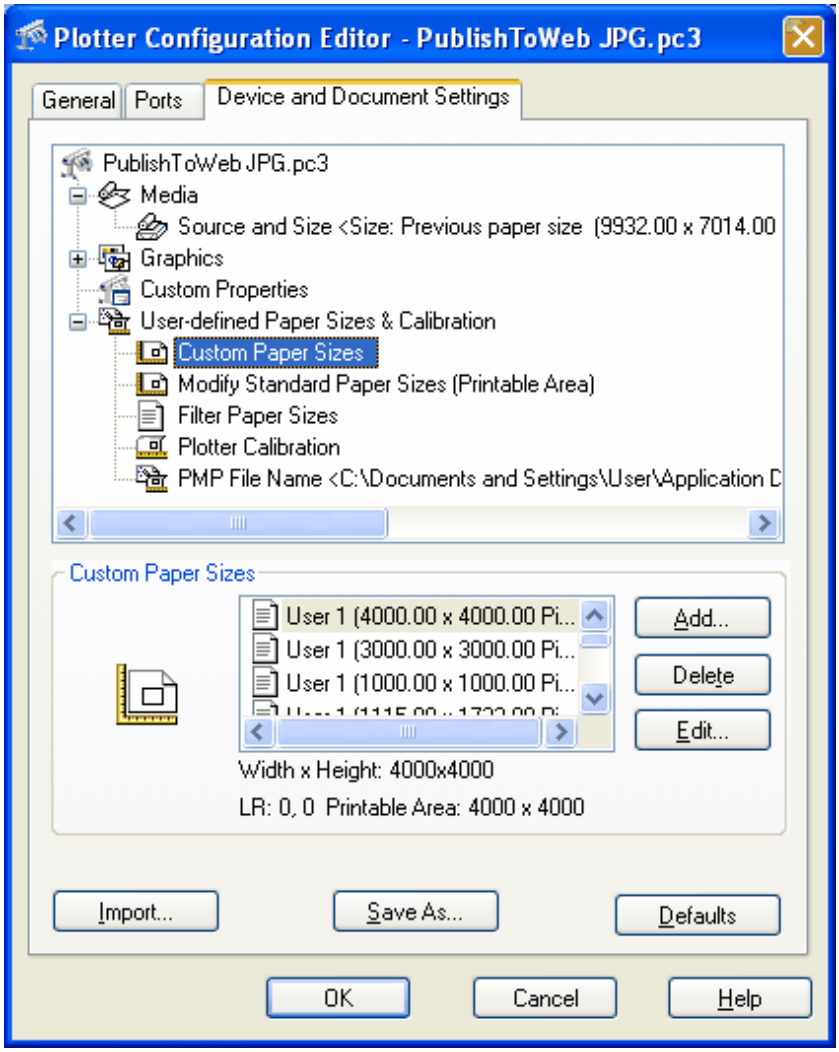
3. Go to File, Plot...

4. Select under Printer/Plotter Name: dropdown "**PublishToWebJPG.pc3"**



5. click Properties button next to PublishToWebJPG.pc3

6. Under User-defined Paper sizes & Calibration, select Custom Paper Sizes
7. press Add... button
8. select Start from scratch, click next
9. enter in Width and Height field 4000 and keep unit on pixels
10. click next, and next, finish
11. click on Ok button to close Plotter Configuration Editor dialogue
12. in the Plot -Model dialogue, select in Paper size dropdown the newly created paper size 4000.00 x 4000.00 pixels



-other paper sizes could also be entered, for example 3000.00 x 5000.00, 2000.00 x 6000.00 etc
13. under Plot area heading select under What to plot: Window
14. Tick **center the plot** and **fit to paper** settings
15. Click on Window< button
16. the screen will flip to model view
17. zoom in with mouse wheel, hold mouse wheel pressed to pan around in drawing area
18. click left mouse button at correct snap point (for example top left corner of floor outside wall) to select top left corner of print area

19. zoom/pan to and click left mouse button again to select bottom right corner of print area (for example bottom right corner of floor outside wall)
20. the screen will flip back to Plot - model dialogue, press ok button (or Preview... button first to see the result)
21. browse to save directory, enter file name to save too and click on save button
22. Test if created JPG is useful

-**<u>each diffuser placeholder on dwg drawing should relate to +- 100x100 pixels on captured jpg</u>**

-if too big, use paper sizes other than 4000x4000 to better fit your floorplan area

-if too small, make certain that only relevant detail relating to diffuser positions are displayed on jpg image. Therefor don't capture irrelevant data like the drawing infomation details normally to the right of the drawing area

-also make changes to original dwg, for example make serial number text font bigger, lines thicker, change colours, etc.