filtex®

Fan Filter Unit (FFU)

for Clean Room System

Technical Submittal

1. Specification & Drawing

Specification

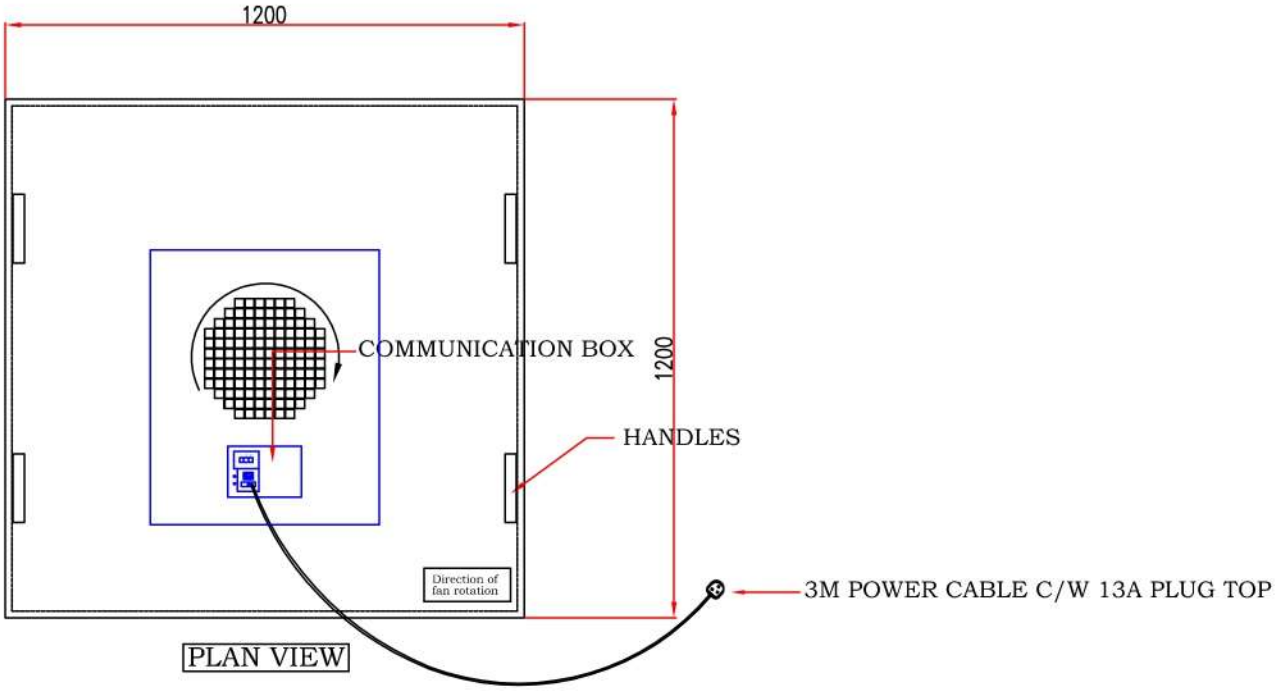
filtex EC FFU (EC Fan + eLisa 7.0 control)

Fan filter Unit

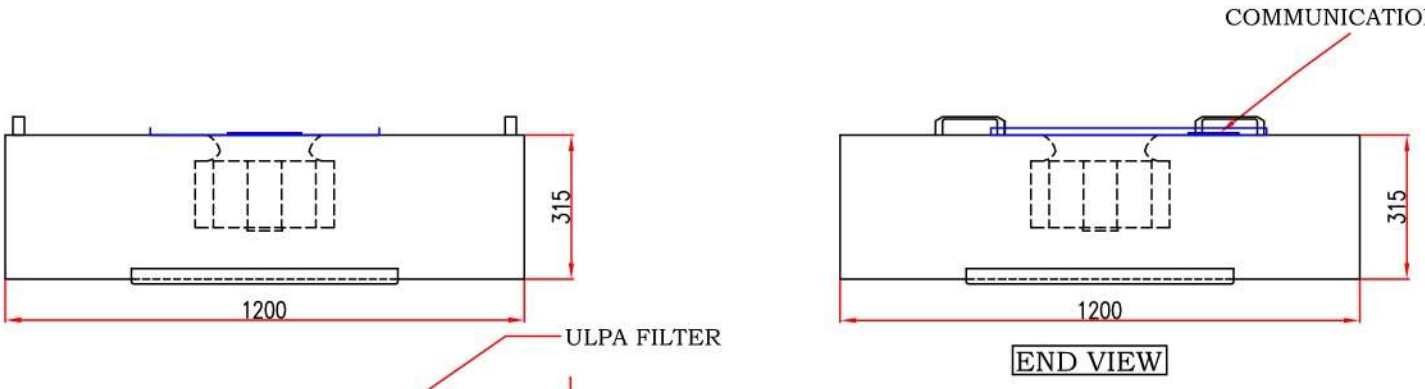
- Dimension: 1200 x 1200 mm (4' x 4')
  600 x 1200 mm (2' x 4')
- Power supply: 1 Phase/230V/50Hz
- Fan: Wide voltage range EC Fan, build- in EC, brushless
- Designed running condition: TSP 210 Pa at 0.45 m/s face velocity
- Fan Model: EBM R3G400 AC30-61
- Fan access type: Top Access
- Housing: Galvalume 0.8 mm thick
- Others: Dual ABS handles, Protection air inlet guard, air guiding plate

e*Lisa 7.0 Network Control System*

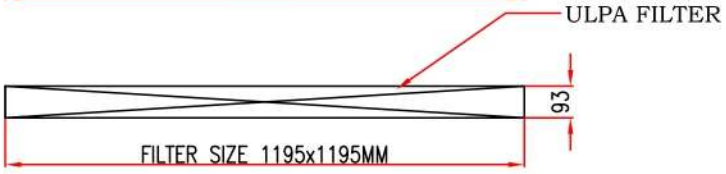
- Master Gateway and Slave gateway
- Software
- Controller on FFU



PLAN VIEW



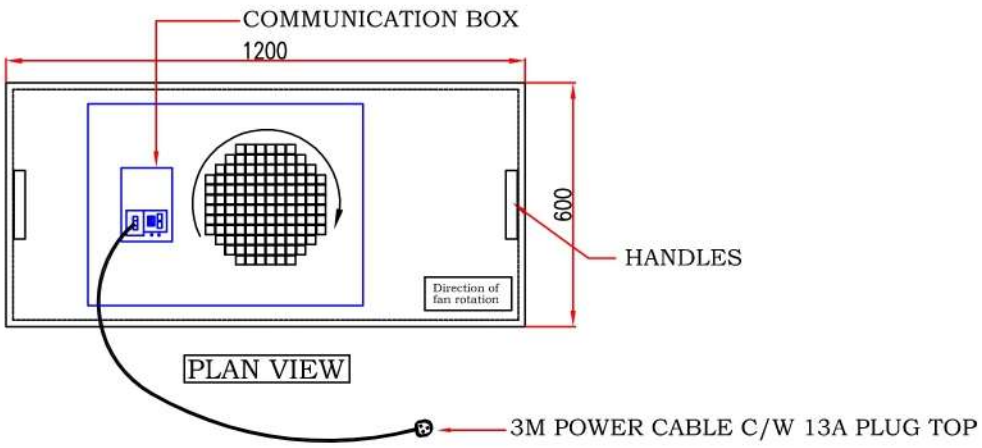
END VIEW

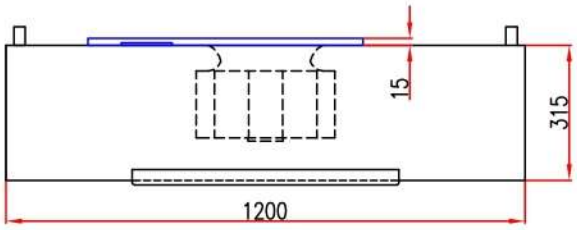


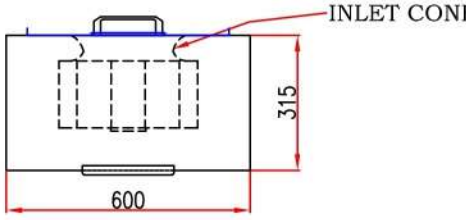
SECTION SIDE VIEW

Title FAN FILTER UNIT	**Job :**

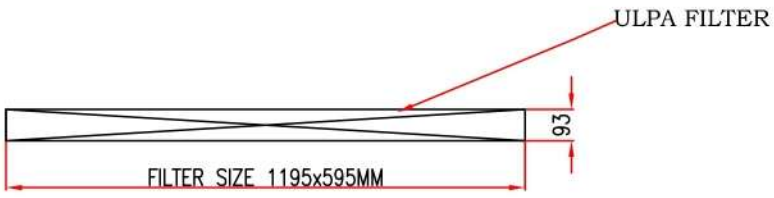
filtex®







END VIEW



SECTION SIDE VIEW

Title	
FAN FILTER UNIT	Job :

filtex®

2. Performance Curve

R3G400-AC30-61(meID:73076)

1200 x 1200x 315 mm

EC centrifugal fan

backward curved, single inlet

epM inlet nozzle

Nominal data

Nominal voltage range	V	1~ 200 .. 277
Frequency	Hz	50/60
Fan speed	min-1	1370
Input power	W	380
Current draw	A	1.7
Mass	kg	5.78
Min. ambient temp.	°C	-25
Max. ambient temp.	°C	30
Protection class		20
Approvals		CSA C22.2 Nr.113; UL 507; CCC
Number of blades		6
Mounting position		Shaft horizontal or rotor on top
		rotor on bottom on request

Air performance measured as per ISO 5801 Installation category A. For detailed information on the measuring set-up, please contact ebm-papst. Suction-side noise levels: L_wA measured as per ISO 13347 / L_pA with 1 m distance to fan axis. The values given are valid under the measuring conditions mentioned above and may vary according to the actual installation situation. With any deviation from the standard set-up, the specific values have to be checked and reviewed with the unit installed.

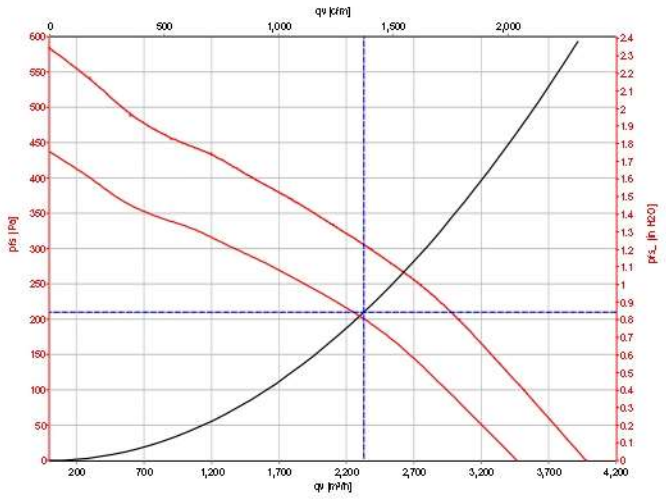
q_V = Airflow
p_{fs} = static pressure
p_f = total pressure (static + dynamic pressure)
n = fan speed))
P_{ed} = Power input)
I = current draw))
$L_WA(A,in)$ = Sound power Inlet)
$L_WA(A,out)$ = Sound power Outlet)
ρ = air density
SFP = specific fan power
η_{ed} = eta(impeller) x eta(motor) = overall efficiency (from total pressure)
η_{es} = overall static efficiency

Data in operating point

q_V	m³/h	2330
p_{fs}	Pa	210
p_f	Pa	222
n	min-1	1198
P_{ed}	W	268.7
SFP	kW/(m³/s)	0.415
η_{ed}	%	53.5
η_{es}	%	50.6
I	A	1.18
$L_WA(A,in)$	dB(A)	-
$L_WA(A,out)$	dB(A)	-
$L_WA(A,in+out)$	dB(A)	-
$U_{control}$	V	8.8

Settings

$\rho_{calculated\ to}$	kg/m³	1.14
$\rho_{measured\ at}$	kg/m³	1.15



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R3G400-AC30-61(meID:73076)

600 x 1200x 315 mm

EC centrifugal fan

backward curved, single inlet

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Number of blades		6
Mounting position		Shaft horizontal or rotor on top
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Air performance measured as per ISO 5801 Installation category A. For detailed information on the measuring set-up, please contact ebm-papst. Suction-side noise levels: L_wA measured as per ISO 13347 / L_pA with 1 m distance to fan axis. The values given are valid under the measuring conditions mentioned above and may vary according to the actual installation situation. With any deviation from the standard set-up, the specific values have to be checked and reviewed with the unit installed.

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p_f = total pressure (static + dynamic pressure)
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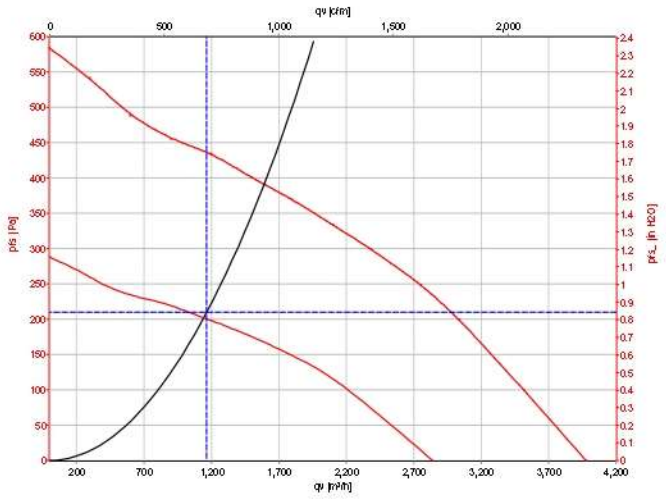
P_{ed} = Power input)
I = current draw))
$L_WA(A,in)$ = Sound power Inlet)
$L_WA(A,out)$ = Sound power Outlet)
ρ = air density
SFP = specific fan power
η_{ed} = eta(impeller) x eta(motor) = overall efficiency (from total pressure)
η_{es} = overall static efficiency

Data in operating point

q_V	m³/h	1165
p_{fs}	Pa	210
p_f	Pa	213
n	min-1	1000
P_{ed}	W	145.1
SFP	kW/(m³/s)	0.448
η_{ed}	%	47.5
η_{es}	%	46.8
I	A	0.64
$L_WA(A,in)$	dB(A)	-
$L_WA(A,out)$	dB(A)	-
$L_WA(A,in+out)$	dB(A)	-
$U_{control}$	V	7.2

Settings

$\rho_{calculated\ to}$	kg/m³	1.14
$\rho_{measured\ at}$	kg/m³	1.15



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3. Performance summary of technical data

Brand name	**filtex**								
Model name	ffus FFU-TZ….								
Product type	EC Motor FFU								
Static Pressure	210 Pa								
Power supply	Single phase, 230V, 50Hz								
Nominal size (ft x ft)	**Actual Size (mm)**	**Air Volume (CMH)**	**Air Velocity (m/s)**	**Fan Speed (RPM)**	**Motor Rating (KW)**	**Max. Current (A)**	**Power Consump. (KW)**	**Running Current (A)**	**Noise Level (dBA)**
4' x 4'	1200+1200	2330	0.45	1198	0.38	1.7	0.268	1.18	54
2' x 4'	600+1200	1165	0.45	1000	0.38	1.7	0.145	0.64	52

The noise level is A-weighted, measured 1.5m below the filter downstream.

4. FFU control system-eLisa 7.0

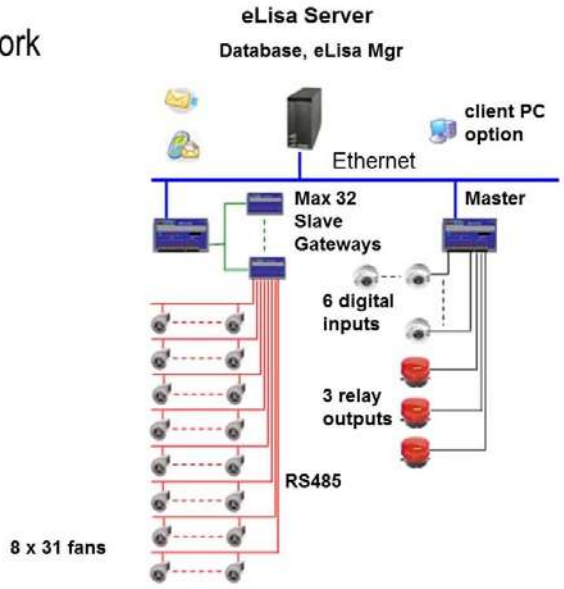
- Control system overview
- Hardware: Master & Slave Gateway
- Software and feature

Control System overview

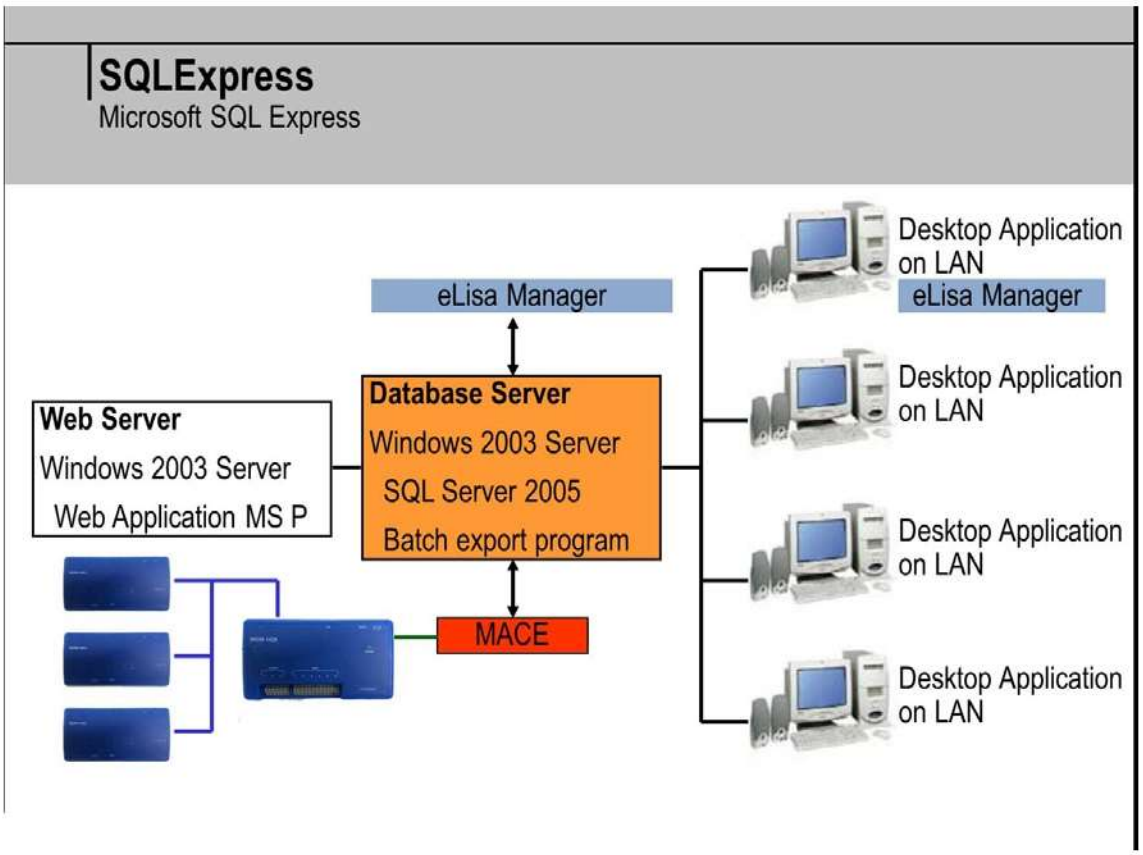
eLisa 7.0

Architecture

- Developed using **.Net** framework
- Design based on n-tier client/server model
- SQLExpress Database
- Scalability
- Interoperability (support OPC server)

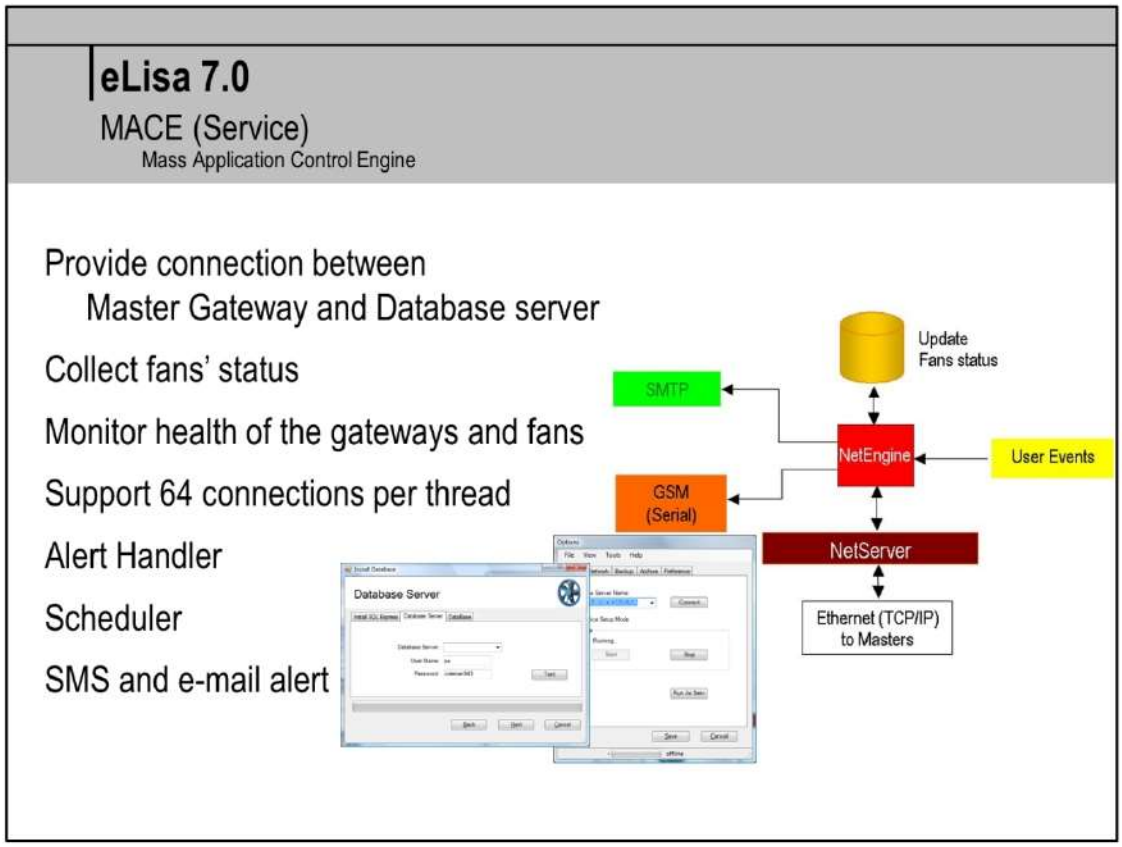


Database serve



Mass Application Control Engine(MACE)

- Provide connection between Master Gateway and Database server



Hardware: Master Gateway and Slave Gateway

Master Controller with IP Enabled(MGW-1420)

The Intelligent Master Controller with IP Enabled Module provides interface up to 3 Master RS 485 interface and a 10 Base-T port.

The IP Enabled Controller provides an ease of use for system integrator.

User can plug the Controller to any LAN points connected to a Network follow by a simple software configuration and it is ready for operations.

The Master Controller is software configurable to one of the following configuration:

- One set of 255 RS-485 Repeaters (7905 Fan Controllers) for direct replacement for upgrading current design
- Master / Slave. In this mode Master can connect up to 255 Slave with the enhanced Fan BUS protocol or the Maximum Number of Fans (7905) with unique Fan Address and Group.

  To improve the performance and efficiency of the System, more Master Gateway should be installed.

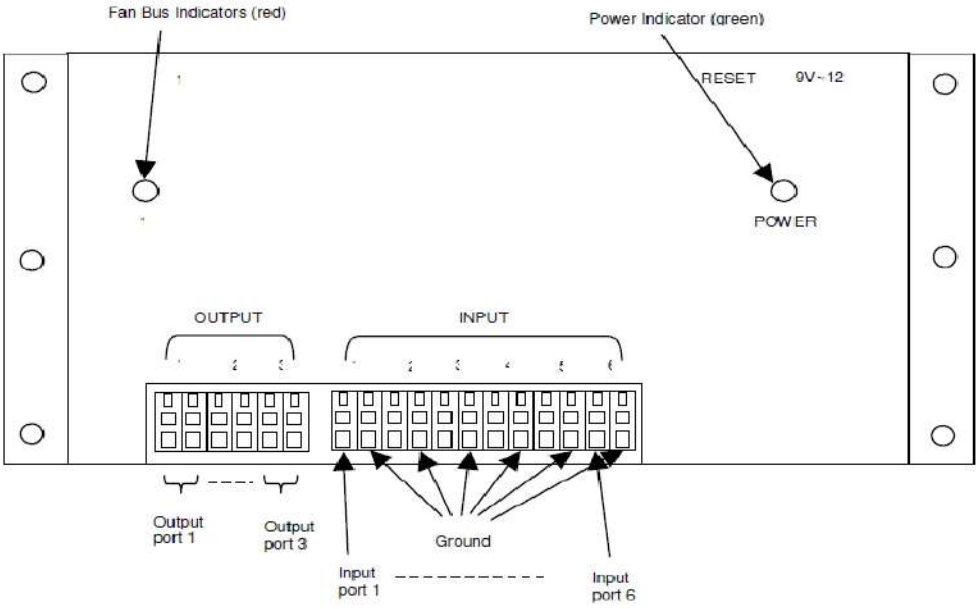


Figure 1: Master Gateway Top View

1. Power Indicator - Green
2. Fan Bus indicator – Red, turn on when there is communication between Slave Gateway and fan
3. Output port 1~3 – dry contact output port.
4. Input port 1~6 - Digital (TTL) input port with alternate ground connector

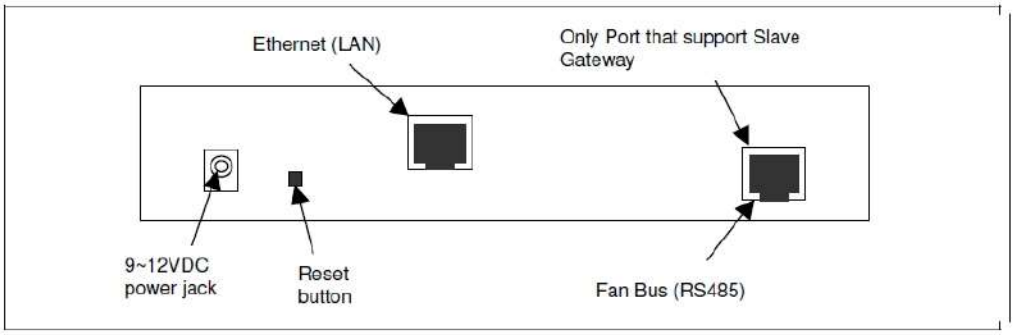


Figure 2: Master Gateway Side View

1. Power – 9 to 12 VDC, 1A.
2. Reset Button – Reinitialise Slave Gateway.
3. Ethernet (LAN) – Connect to the Local Area Network

Product Specification

Model:	MGW 1420
Size	222 x 102 x 35 mm
Interfaces (RJ45)	• Single • Up to 255 slave with enhanced Fan BUS protocol
Isolation (opto)	2.5KVrms
Host Interface	Ethernet (10 Base-T)
Host Protocol	TCP / IP and UDP
Power Supply	9 ~ 12VDC, 1A
LED Signal	1 Red, 1 Green LEDs
Operating Temperature	0℃ to +70℃
Memory	1 Mega Byte Non-volatile Memory
Digital I/O	6 Digital Input and 3 output
Weight	250g (±25g) may vary with configurations
Casing	IP20

Slave Gateway with 8 ports(SGW-1421)

The Slave Gateway provides interface up to 8 RS 485 interface (RJ45) and a RS485 to Maser Gateway interface. And provide auto-polling to reduce work load on the Master Gateway and improve performance for the report rate from approximately 2 min to 25 seconds.

The Slave Gateway is customized with Enhanced Fan BUS protocol to upload all fan controllers status and extended. The Slave Controllers are design with built in 512K flash memory and processor to provide storage of fan Controller tables and polling of the Fan Controller status.

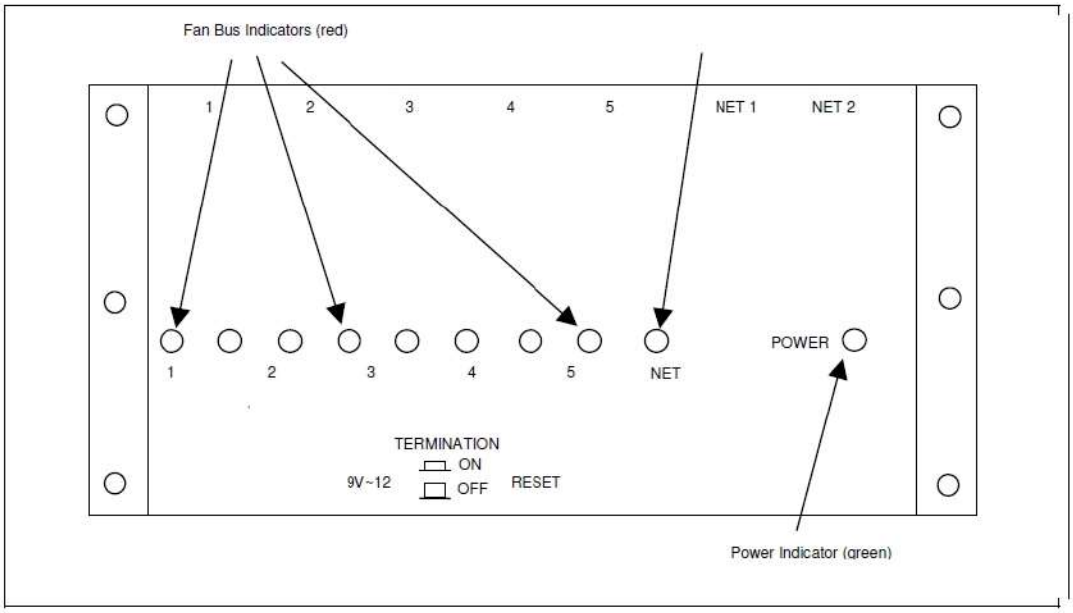


Figure 1: Slave Gateway Top View

1. Power Indicator - Green

2. NET indicator – Red, blink when there is communication between Master and Slave.

3. Fan Bus indicator – Red, turn on when there is communication between Slave gateway and fan.

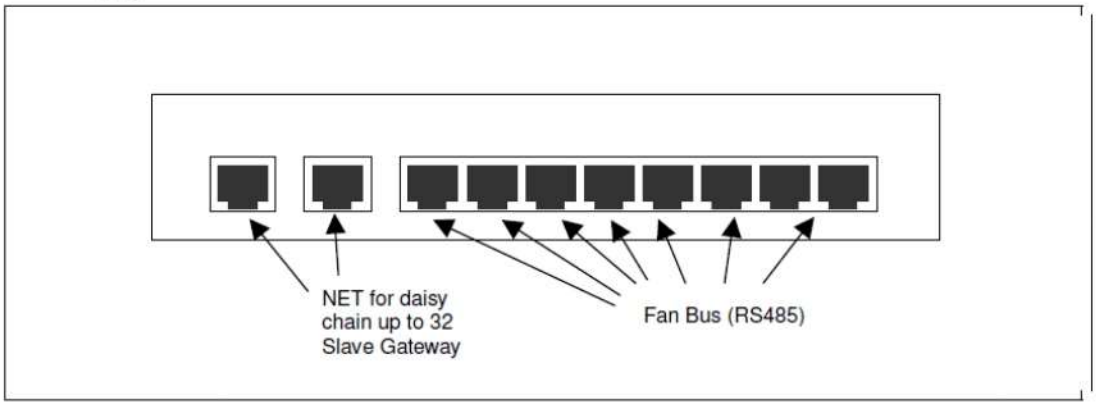


Figure 2: Master Gateway Side View

1. NET 1, 2 – for daisy chain Master and up to 32 Slave Gateway.

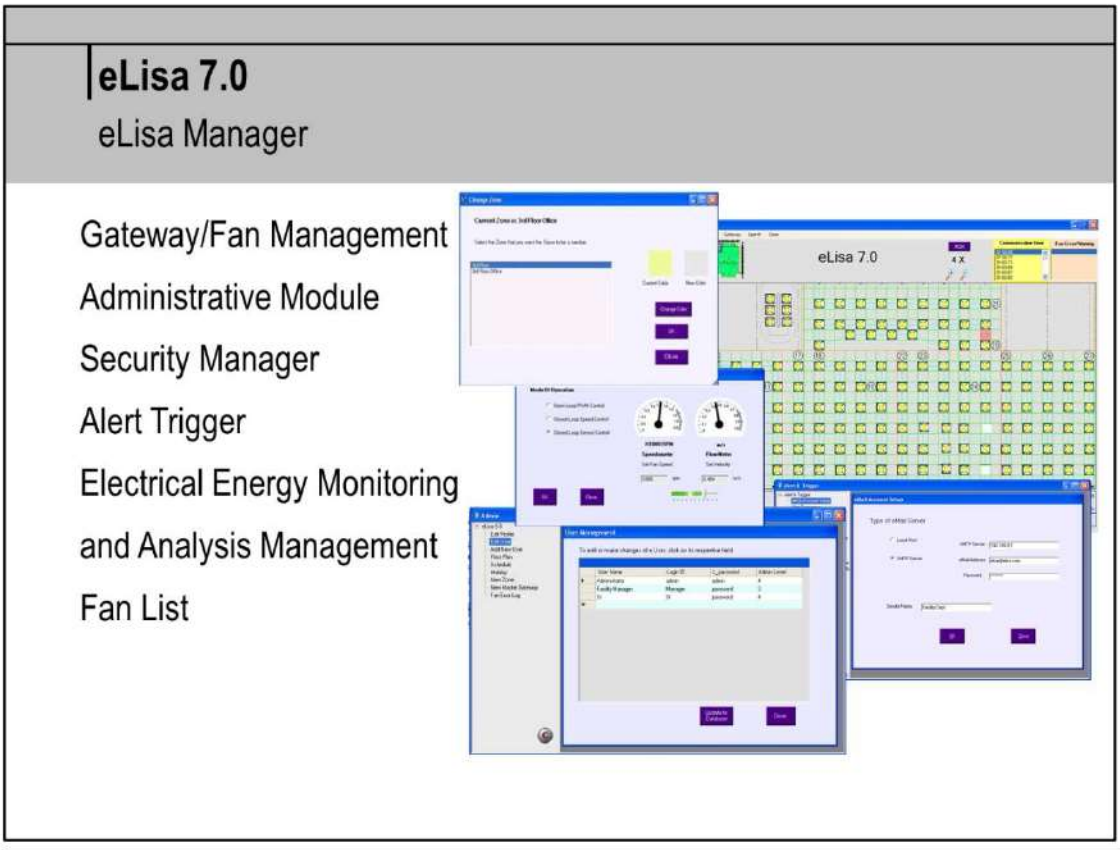
2. Port 1 to 8 - for daisy chain up to max 31 fans.

Product Specifications:

Model:	SGW 1421
Size	220 x 102 x 37 mm
Interfaces	8 independent RS485 ports
Master Interface	1 RS 485 interface
Isolation	2.5kVrms
Host Protocol	Enhanced Fan BUS protocol for performance
Casing	IP20
Power input	12VDC, 1A
LED Signal	2 LEDs (Red, Green) Customization is permissible
Operating Temperature	0°C to +70°C
Memory	512K Byte Flash Memory
Weight	200g (±25g) may vary with configurations

eLisa 7.0(eLisa manager)

- Gateway/Fan management
- Admin. Module
- Security manager
- Alert Trigger
- Electrical Energy Monitoring and Analysis management
- Fan list



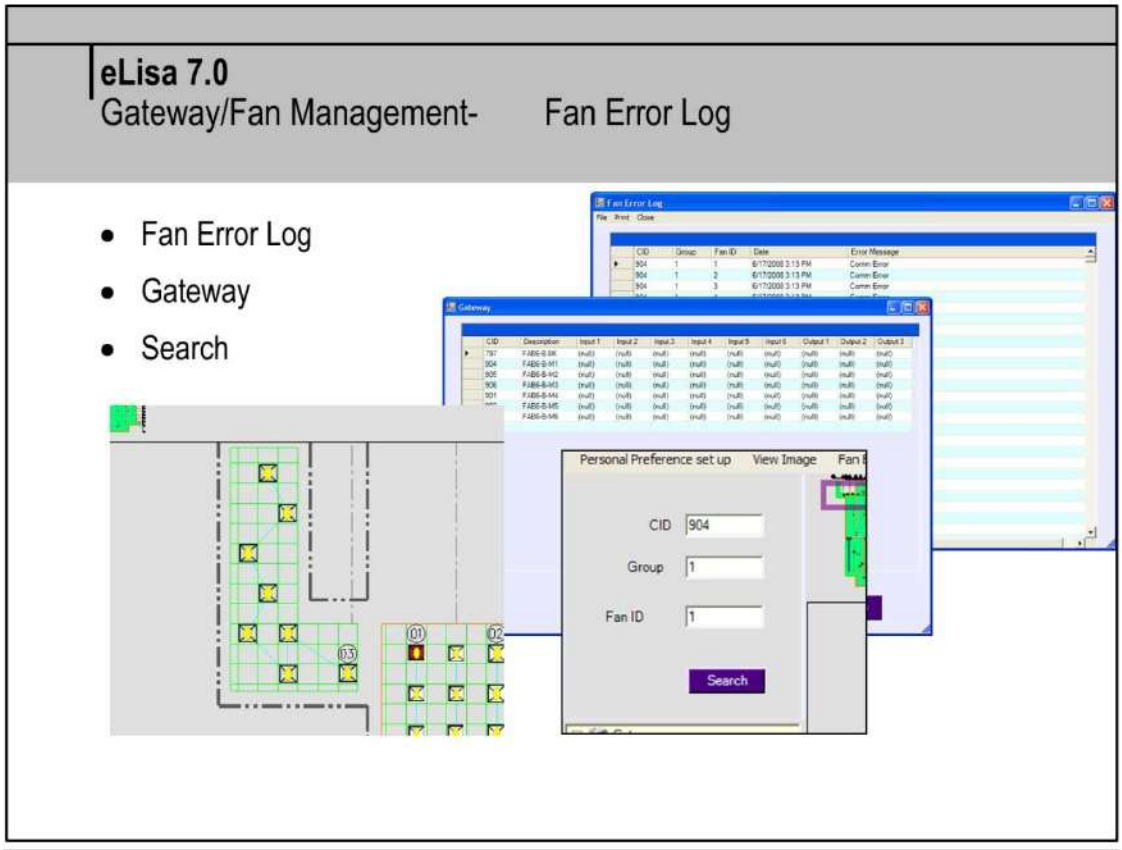
Gateway/Fan Management

- View Image

eLisa 7.0
Gateway/Fan Management- View Image

1. Fan Control panel
2. Project Explorer
3. Navigator
4. Floor plan
5. Comm. Error
6. Fan Error
7. Zone Trigger
8. Info Panel

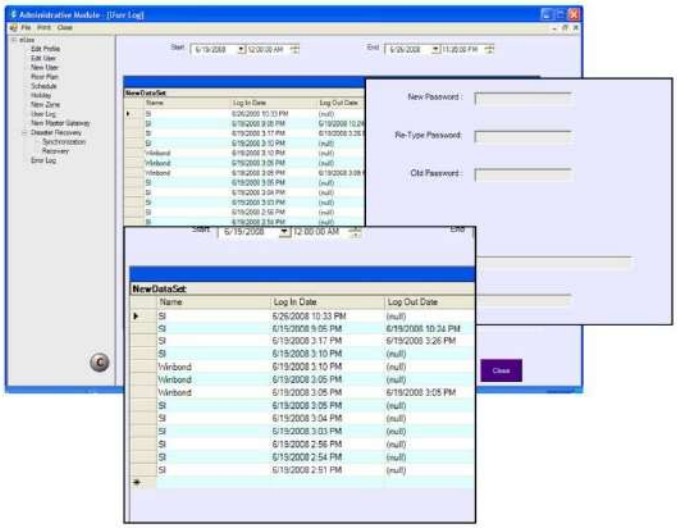
- Fan Error Log



Administrative Module

eLisa 7.0
Administrative Module

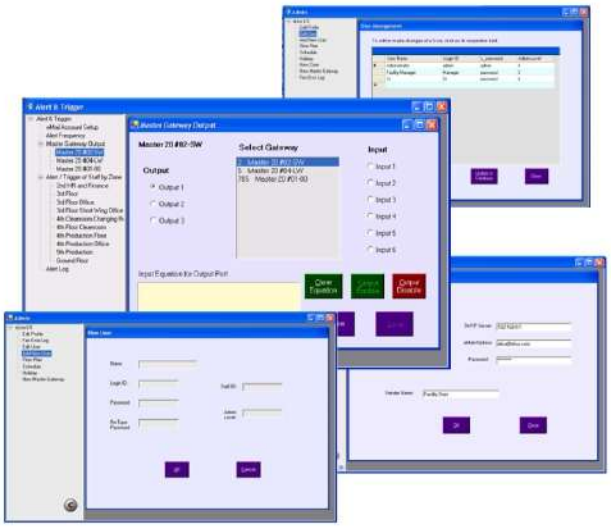
- Manage Users
- Manage Floor plan
- Scheduler
- Zone
- View User Log
- Disaster Recovery
- Error log



Alert Trigger

eLisa 7.0
Alert Trigger

- Verified user's access right
- SMS (using GSM modem)
- e-mailing
- Triggering Mechanism by setting equations
- Set fan speed upon trigger
- Trigger by fan error

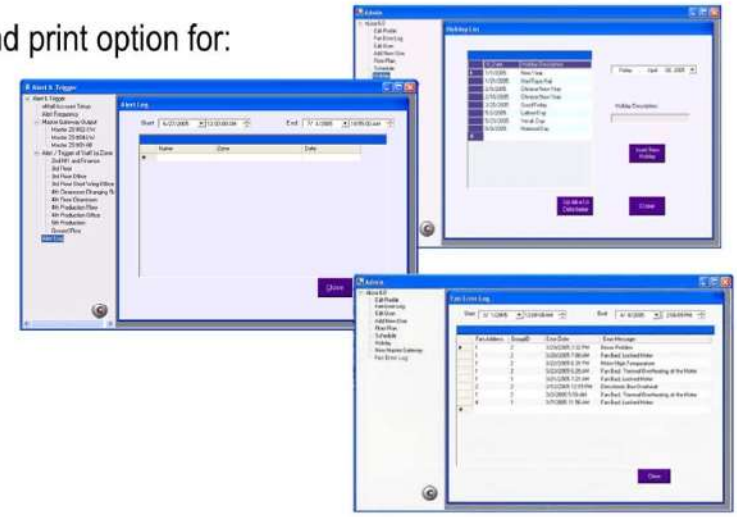


eLisa 7.0 Manager

Log and Lists

Provide view and print option for:

- Fan List
- Error List
- User Log



New features of Gateway/Fan Management

- Search Fan
- Fan name
- Configurable view by personal preference
- Configure display of error
- Navigate through Navigator window
- Rotating fan orientation

eLisa 7.0
Gateway/Fan Management

Here are some new features:

- Search fan
- Fan Name
- Configurable View by personal preference
- Configure display of error
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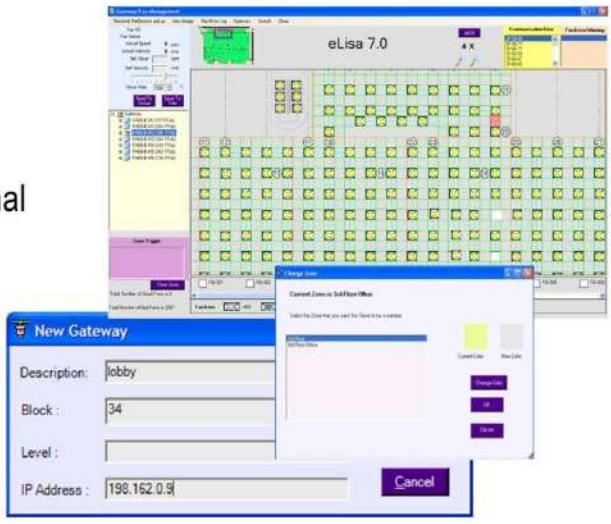
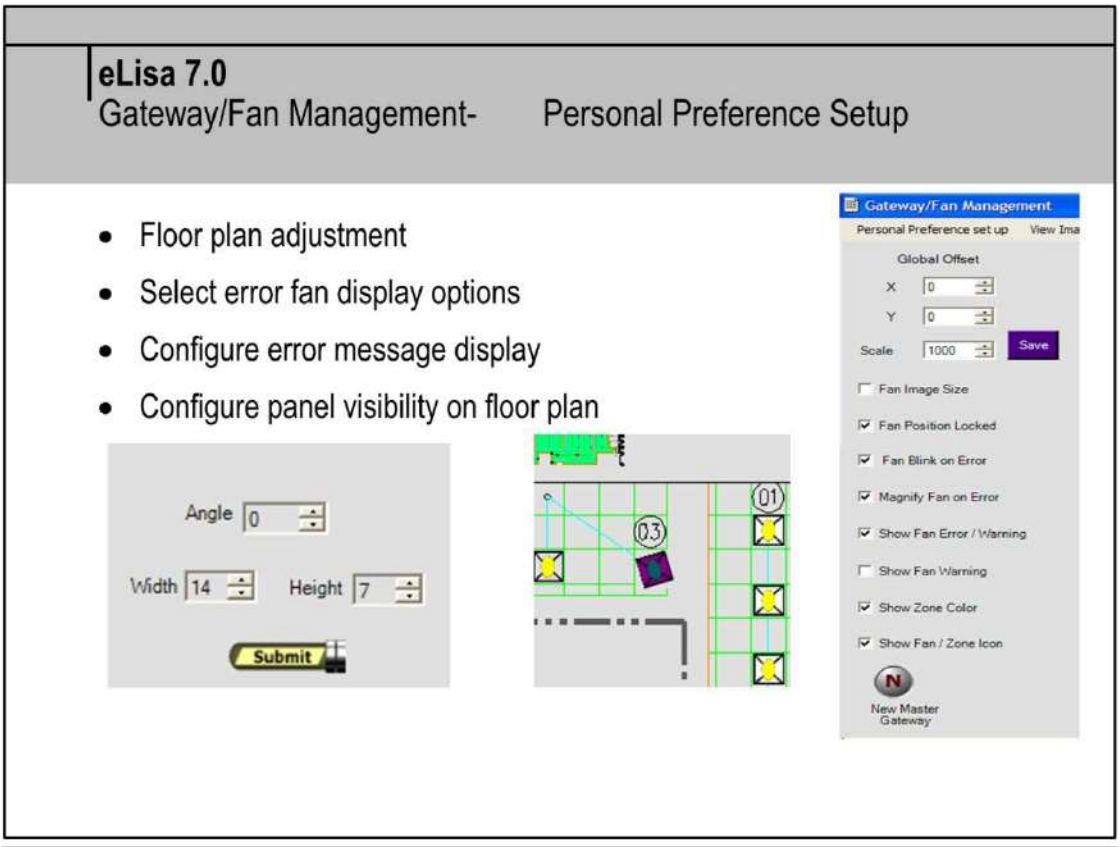
- Rotating fan orientation



New features of Gateway/Fan Management

- Floor plan adjustment
- Select error fan display options
- Configure error message display
- Configure panel visibility on floor plan



New features of energy monitoring and analysis

- Electrical energy analysis
- Zone Power monitoring
- Energy cost analysis

eLisa 7.0
Electrical Energy Monitoring and Analysis Management

- Electrical energy Analysis
- Zone Power monitoring
- Energy Cost Analysis