



ECFANGRID RETROFIT KIT



ECFANGRID MODULE



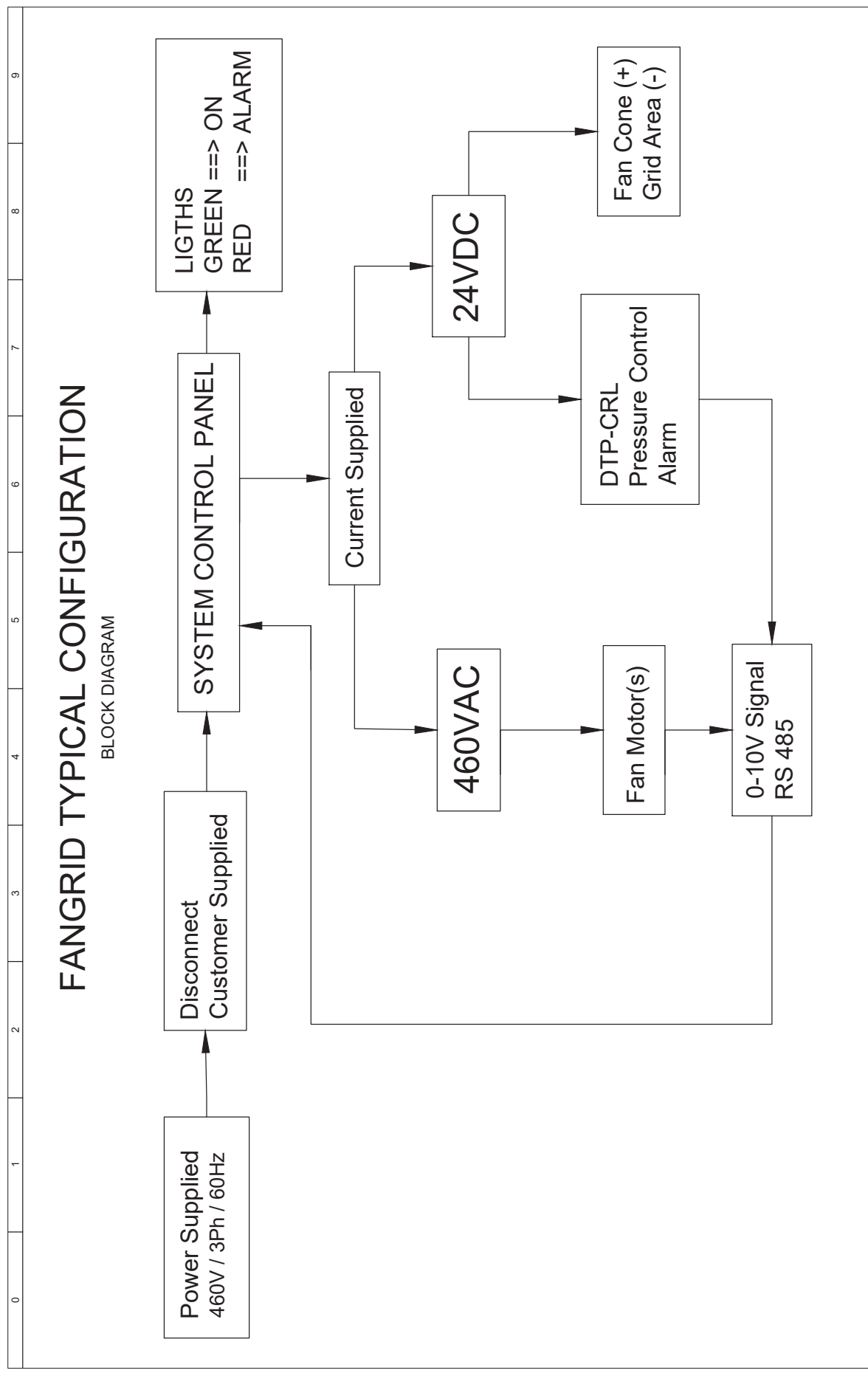
ECFANGRID UNOBOX ARRAY

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Manufacturer reserves the right to discontinue or change specifications or designs without notice or obligation



FANGRID TYPICAL CONFIGURATION

BLOCK DIAGRAM

0 1 2 3 4 5 6 7 8 9

| | | | | | |
|----------|---------------|-----------|------------------|--------------|------------------------------|
| DATE | May 12, 2017 | REFERENCE | FAN GRID | PROJECT | TYPICAL SYSTEM CONFIGURATION |
| DRAWN BY | L.F. ORELLANA | FILE | BLOCK DIAGRAM | # OF DRAWING | 1 / 1 |
| VERSION | 05/12/17 AV | NAME | ROSENBERG CANADA | | |
| DATE | | NORM | | | |



SAFETY CONSIDERATIONS

Hazards may exist within each Fan Module Unit because it contains electrical and powerful moving components. Only qualified service personnel should install or service this equipment. Observe precautions as marked in literature and on labels attached to each unit.



Main power must be disconnected via the main disconnect and 'locked out' before performing any service to at each unit(s) – failure to do so could result in an electric shock which could cause personal injury or death.



Improper installation, adjustment or alteration to a unit(s) could cause property damage, personal injury or death.

During Construction and/or Installation the following Safety Codes must be observed:

- ☐ Safety Shoes, Safety Glasses, Hard Hats and Work Gloves must be worn.
- ☐ Fire Extinguishers must be on Site for any Cutting, Welding and/or Brazing, as required.

INSPECTION on ARRIVAL

All Rosenberg Fan Products are carefully constructed and inspected prior to shipment to insure the highest level of quality and performance.

A Visual Inspection of Fan Modules and/or UnoBoxes as well as optional components should be carried out for any damage that may have occurred during shipment or material handling. In addition the Packing List should be compared to the quantity of items received.

Should any damage be evident or if there is a discrepancy, with regard to missing items – the Carrier's Bill of Lading should be signed indicating damage and items missing.

INSPECTION prior to INSTALLATION

After all forms of Packaging have been removed from all the Units, a further inspection of the Fan Wheel in all cases is required to ensure freedom of rotation and that there is an equal distance/clearance between the Wheel Cone and the Inlet Cone through 360o.

If there is a discrepancy in freedom of rotation, the Fan in question should not be installed and immediately reported to the Sales Office located in Mississauga, Ontario.

INSTALLATION of MODULES and UNOBOXES

Prior to installing Modules and/or UnoBoxes, the supporting structure must be found to be level horizontally and vertically plum.

Frame Construction with Modules begins with the installation of the Inlet Cone Plate on to an Engineered Structure, capable of carrying both static and dynamic loads, resulting from the operating system. The next step is to connect the Fan Assembly (Motor Cable Connectors pointing to floor) with the (4) Struts to the Inlet Cone Plate. The final assembly of each Module in the FanGrid requires attaching the Inlet Cone to the Cone Plate with the Pitot Tube connection pointing down to the floor.

UnoBox Construction, requires connection angles at each level, to provide stability at both the Inlet and Outlet of each UnoBox.

FanGrid , requires that the Design of the Support Structure, shall be suitable not only for static and dynamic loads but also have a natural frequency separation of at least 20% from the Fan System operating speed/speed ranges.

INSTALLATION of CONSTANT VOLUME CONTROL SYSTEM

A FANGRID System requires the measurement of negative Air Pressure within the Space in front of the Inlet Fans Area. The measurement device consists of ¼” nylon tubing and 1/8” nylon tees forming a circular ‘Loop’ in the interior of the Space. The distance of the circular ‘Loop’ from the Inlet Fan Face Area is calculated by the following

Formula, where (a) and (b) represent the width and height of the space:

INTERFACE of the CONTROL SYSTEM

The Flow Control of the FANGRID is established by the connection of the circular ‘Loop’ and the ‘Pitot Ring’ on each of the Inlet Cones to a DIFFERENTIAL PRESSURE TRANSDUCER, which converts the Differential Pressure with **Calibration Factor (k-factor)** of the Fan System.

ELECTRICAL CONNECTIONS



When installed, the FANGRID and optional Controls shall be wired and electrically grounded in accordance with local codes as well as with the National Fire Protection Association (National Electrical Code), ANSA/NFPA70 and/or the Canadian Electrical Code CSA C22.1. The FANGRID installation must have an uninterrupted, ground to minimize possible personal injury, should any electrical fault occur. Failure to follow this procedure could result in that the Installer being liable for personal injury to others.

Electrical characteristics of each individual Fan in the FANGRID, specifies maximum voltage and amperage requirements, for optimum performance.

Required Line Voltage(s) and/or Control Voltage(s) are detailed and specified in the attached APENDIX A, B, C & D.

Pre START-UP Check

A – Lock-Out Main Power disconnect to the FANGRID, prior Module or UnoBox check.

B – On outlet/discharge side check for visible damage resulting from installation.

C – Check backdraft damper(s) for smooth operation, if supplied and move dampers to ensure full range of motion.

D – On inlet side check for damage to inlet cone plate and inlet cone.

E – Rotate the fan wheel(s) by hand and ensure that they are properly aligned with inlet cone.

F – Check VFD sizing and ratings for voltage and horsepower.

G – Check in coming voltage at main disconnect against phase to phase on three phase electrical system. – if is not within 5% of Fan Nameplate Rating or 2% of phase to phase, the condition must be corrected prior to start-up.



ECFanGrid™

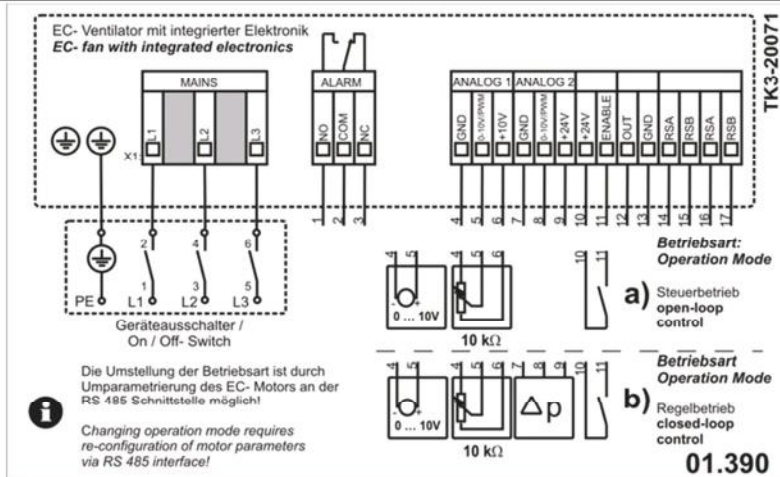
Installation, Operation and Maintenance Instructions

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START-UP PROCEEDURE

To ensure proper operation of the FANGRID as per design, qualified personnel should perform the start-up as outlined below:

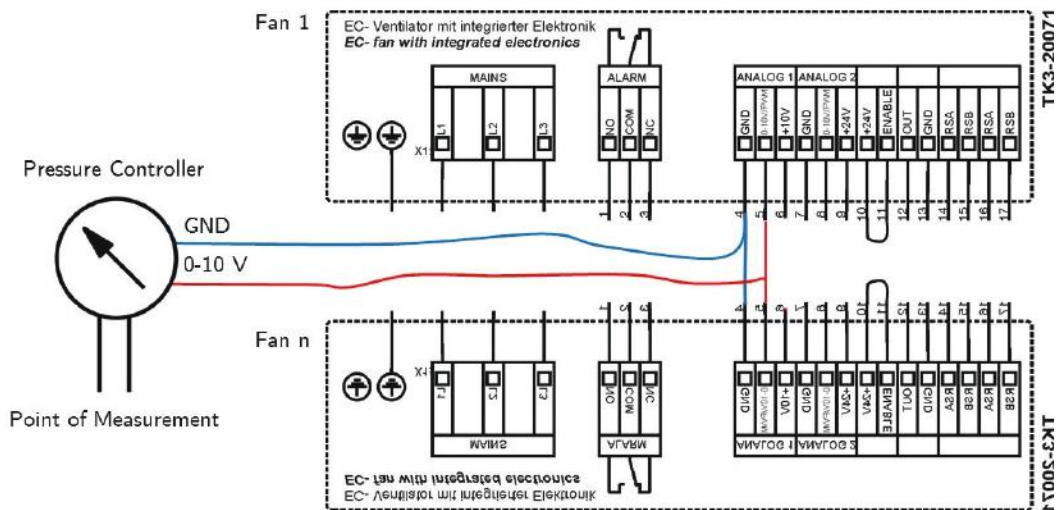
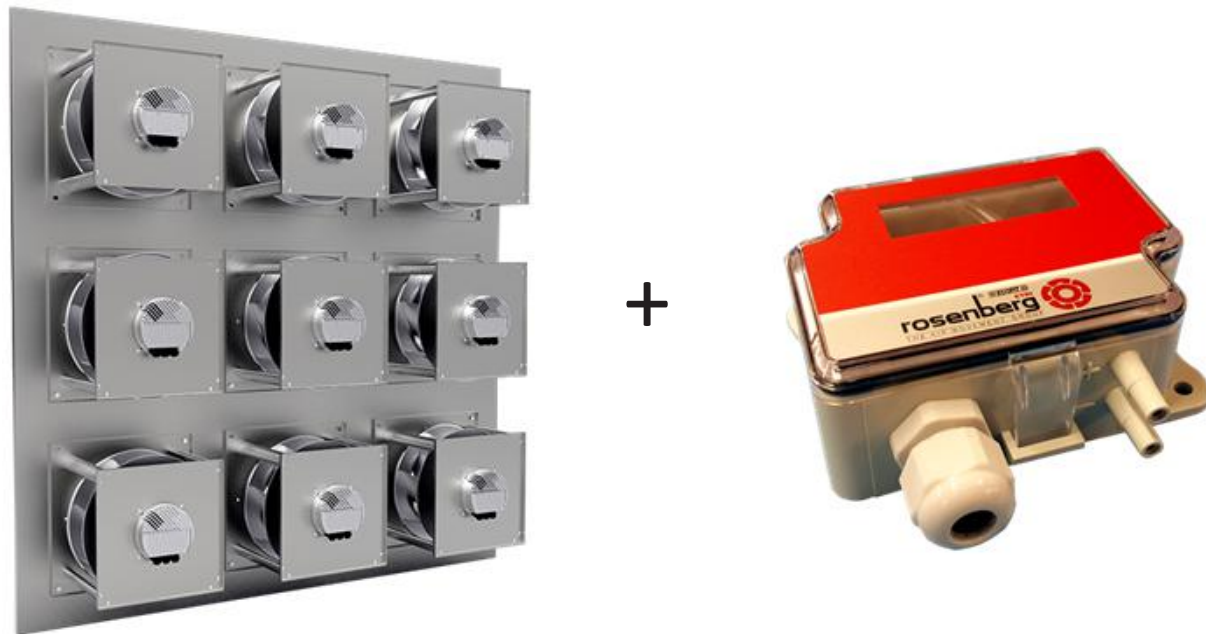
1. Energize incoming main power to the FANGRID.
2. Bump-start the Fan(s) in the FANGRID, to ensure Fan Rotation is correct – if not check motor leads, for correct connection.
3. Perform start-up on AC Motor(s) which are VFD controlled, as specified by the VFD Manufacturer – adjust the Fan Motor(s) for the correct air volume/Hertz
4. Perform start-up on EC Motors(s) which are (0 to 10 vdc) controlled from Fan Motor.
5. Check if the Constant Volume or Constant Static Pressure monitoring system is functioning (if supplied)



| No. | Terminal | | Type | Type |
|-----|-------------|--------------|---|---|
| | PE | Earth Ground | 3 ~ 380 – 480 V -10% /+6% 50 / 60 Hz ± 5% | 3 ~ 200 – 240 V ± 10% 50 / 60 Hz ± 5% |
| | L1 | Mains L1 | 3 x L / PE | 3 x L / PE |
| | L2 | Mains L2 | | |
| | L3 | Mains L3 | | |
| 1 | NO | alarm relay | make ON failure | max. 250VAC/4A or 42VDC/1,5A under ohmic load |
| 2 | COM | | COMMON | |
| 3 | NC | | break ON failure | |
| 4 | GND | GND | $ U_{GND-PE} < 15V$ | |
| 5 | (0-10V/PWM) | rated value | 0-10VDC; Permissible input signal 11V; input resistance 130kΩ PWM-frequency ≥ 500 Hz / PWM-amplitude = 10V | |
| 6 | +10 V * | power supply | ± 5% / max. 6mA / short circuit protection | |
| 7 | GND | GND | $ U_{GND-PE} < 15V$ | |
| 8 | (0-10V/PWM) | actual value | 0-10VDC; Permissible input signal 11V; input resistance 130kΩ PWM-frequency ≥ 500 Hz / PWM-amplitude = 10V | |
| 9 | +24V * | power supply | ± 20% / max. 50mA / short circuit protection for 30s | |
| 10 | +24V * | power supply | | |
| 11 | ENABLE | | ≤1V disabled / ≥ 10V enabled (max. 30V) / input resistance 4,7 kΩ | |
| 12 | A-OUT * | speed out | 0-10V (max. 5mA) | |
| 13 | GND | GND | $ U_{GND-PE} < 15V$ | |
| 14 | RSA | A-RS485 | RS485 Bus IN / OUT (MODBUS RTU) $ U_{RSA-RSB} < 12V; U_{RSA-PE} < 6V; U_{RSB-PE} < 6V$ | |
| 15 | RSB | B-RS485 | | |
| 16 | RSA | A-RS485 | | |
| 17 | RSB | B-RS485 | | |

ECFanGrid–Constant Volume or Constant Pressure Schematic

EC FANGRID can be setup as a Constant Pressure or Constant Volume System with the combination of a Differential Pressure Sensor and a Rosenberg Inlet Cone, supplied with multiple pressure taps.



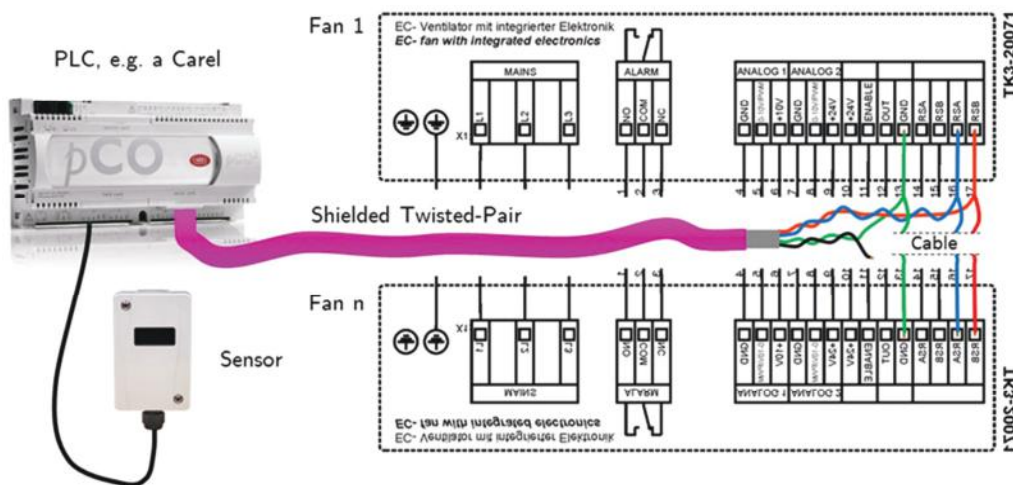
ECFanGrid - BMS Control with ModBus RTU

To control a Rosenberg EC FANGRID with ModBus RTU - three main registers require access:

1. Enable the Fan, Register 0029_{hex}
2. Write the Set Point, Register 002B_{hex}
3. Read the Alarm Status, Register 0055_{hex}

These three registers manage three main tasks, such as **Start/Stop** the EC FanGrid, Change the **Set Point** and detect and/or react to any **Fan Failures**.

To interface a ModBus RTU Control System with an EC FANGRID, a Pressure Sensor (**PREMASGARD 1140**) in conjunction with a PLC, is required.



| Fault | Possible Cause | Action |
|---|---|--|
| FAN WILL NOT START OR RUN | NO Main Power or Incorrect Voltage Phase-to-Phase | CHECK supply mains DIRECTLY at FAN TERMINALS If Voltage is not within 6% of rated or 2% of phase-to-phase, have the condition corrected. |
| | Missing vdc SET POINT from Analog 1 | CHECK for 10vdc availability Between 10V and GND Terminals at Analog 1 |
| | Missing ENABLE Signal | CHECK the 24VDC availability Between 'ENABLE' and GND Terminals |
| | INTERNAL PROTECTIVE FEATURE HAS TRIPPED | <p>"Under voltage" – Incoming Voltage is below the tolerance limit of the specified line voltage.</p> <p>Check main supply and fusing</p> <ul style="list-style-type: none"> ➤ Failure is automatically reset after the voltage rises above the minimum limit |
| | | <p>"Over voltage" – Incoming Voltage is above the tolerance level of the specified line voltage.</p> <p>Check main supply and fusing</p> <ul style="list-style-type: none"> ➤ Failure is automatically reset after the voltage falls under the maximum limit |
| <p>"Locked Rotor"</p> <p>Check Fan Impeller for overload caused by dirt or foreign matter and freedom of rotation. Also check motor Inlet Cone mounting hardware.</p> <ul style="list-style-type: none"> ➤ Manual Reset required | | |
| <p>"Over temperature – electronics"</p> <p>Air Flow and Ambient temperature too high</p> <ul style="list-style-type: none"> ➤ Failure is automatically reset after temperature returns to a normal level | | |

| | | |
|--|--|---|
| | | <p>“Over temperature – motor”</p> <p>Air Flow and Ambient temperature too high</p> <ul style="list-style-type: none"> ➤ Failure is automatically reset after temperature returns to a normal level <hr/> <p>“Failure in power section”</p> <p>Current or Voltage has risen to a critical level</p> <ul style="list-style-type: none"> ➤ Manual Reset required |
|--|--|---|

| Fault | Possible Cause | Action |
|---|--|--|
| Fan rotates at max speed – independent of Set Point | Fan is in Closed Loop Mode | Contact Rosenberg Support to change parameter with “EC-Param” Soft-Ware |
| Fan does not run at max speed | Max Set Point is not present on Analog 1. | Check Set Point according to pin connection and increase. |
| | Set Point on Analog 1 is too high. | Limit Set Point according to pin connection. |
| | Temperature dependant power derating is activated. | Bring Air Flow and Ambient temperature to within Nameplate limits. |
| Fan rotates with is NO or NOT ENOUGH Air Flow | RPM of Fan too low. | Refer to “Fan does not run at max speed” above |
| | Air Flow restricted | Check System duct elements (filtration, dampers, duct fittings and size) |
| | Actual System pressure is higher than Calculated | Check Fan selection |
| | Installation not favorable to good design practice | Review resistance within the installation design |
| Vibration / Fan | Impeller rubbing | Inspect Impeller for clearance between Inlet cone and Wheel cone. |
| | Poor mounting arrangement - resonance | Modify mounting support – add additional hardware |
| | Impeller build-up | Remove build-up and/or re-balance Impeller |



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Installation, Operation and Maintenance Instructions

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| | | |
|-----------------------------|---|--|
| Noise | Defective bearings | Isolate Fan immediately. Contact Rosenberg Support |
| | Fan operating in stall or forbidden flow region | Move Operating Point by reducing pressure losses |
| | | |
| RCD-Switch or Fuse tripping | Ground Fault or Short Circuit | Check for Cable damage or the presence of moisture |
| | Defective Motor and/or Electronic Head | Contact Rosenberg Support |

ECFanGrid™.

POWER & CONTROL WIRING ARCHITECTURE

MAIN POWER
460V / 3φ / 60Hz



460VAC

DISCONNECT
WITH FUSES



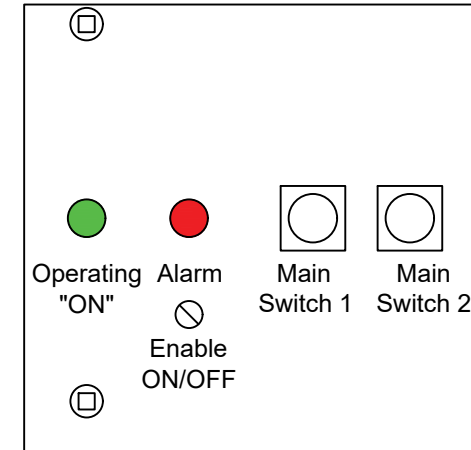
460VAC

SYSTEM CONTROL PANEL

Interior View



Front View



Cable Entry from bottom of Cabinet

24VDC

0-10VDC

System ON



24VDC

Alarm ON



24VDC

PNEUMATIC SIGNAL P(-)

HK DIFFERENTIAL
PRESSURE CONTROLLER



CONSTANT FLOW /
PRESSURE SETTING

PNEUMATIC SIGNAL P(+)

460VAC

FAN MOTOR N+1



460VAC

P(-)

FAN MOTOR N



P(+)



| | | | | | | | | |
|---------|----------|------------|-------------|------------------|-----------|-------------------------------------|--------------|-----------|
| | | | DATE | May 12, 2017 | REFERENCE | ECFanGrid | PROJECT | ECFanGrid |
| | | | DRAWN BY | L.F. ORELLANA | FILE | POWER & CONTROL WIRING ARCHITECTURE | # OF DRAWING | 1 / 1 |
| 1.0 | 05/24/17 | A. VAZQUEZ | VERIFIED BY | ROSENBERG CANADA | | | | |
| VERSION | DATE | NAME | NORM | | | | | |

