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Revision history ed.2 to ed.3:
-Additional contact usage for DSL cabinet.
-New dimension lower length
-Increased fan flow cubic
-Increased cooling capacity

Baskı/Ed-Tarih/Date						
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Baskı/Ed-Tarih/Date	2	14.11.2008	3	14.03.2009		
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Common Features

When the external temperature is lower than the internal temperature, and a maintenance free system is required, an air to air heat exchanger is the most convenient choice. Air to air heat exchanger, with the internal heat cooling sealed aluminium core, satisfy completely the market request by small dimensions, very high efficiency and new design. Our system has average 122K/W heat transmission rate. It is always supplied with deflectors for the outlet of ambient and enclosure air in order to optimize the enclosure thermal management.

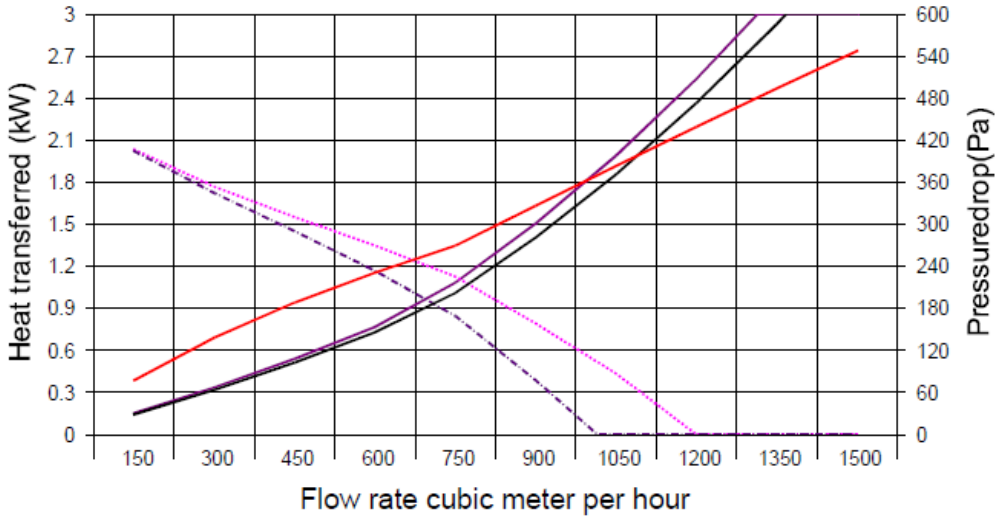
Benefits

-No filter this model has the heat exchanger surfaces specially designed to prevent particles and fibres in the ambient air. They remain very efficient in the worst ambient conditions so filters are eliminated.
-Integral silicon covered silicon assure an IP55.
-There is electronic temperature measurement assures fully electronic heat management.

Technical Specifications of Hex117A

Voltage	**53,5VDC**
Height/Width/Depth	**960mm 411mm 146mm**
Specific Heat Transmission	**128 K/W**
Power absorbed (at full speed)	**250 W**
Power absorbed (at min speed)	**75 W**
Absorbed Current (max)	**4,8 A**
Working limits ambient temp	**-35 /+65 °C**
Side cabinet protection Degree	**IP54**
Noise Level	**60 dB (meets ETSI 300 753)**
Alarm (Heat Exchanger Major)	**Dry Contact**
Over Temperature Alarm	**Dry Contact**
Alarm Led	**Red**
Test port	**Max speed and major/Ov temp led**
Material	**Aluminium**
Temperature Control	**Electronic**
Internal/External Fan	**1300 m3/h**
Position	**Door**

Figure 1. View of Hex117A



Temp: 55/ 45 Qmax: 1.37kW Qred: 1.28kW Qredfan: 1.17kW Tem
Exhaustflowred: 708m3/h(186Pa) Supplyflowred: 693m3/h(

109-128 W/K

Figure 2. Heat core versus fan heat discharging transfer Diagram of Hex117A

HEX 117A TECHNICAL QUALIFICATION

Goal

This document describes the design and the functional requirements of the heat exchanger Hex117A used for Outdoor cabinet. Fresh air-cooling is not allowed in outdoor. The Hex117A helps the airflow inside the cabinet isolated from that outside. The two airflows are separated by heatcore; blowers in each circuit force the air. The rotation of blowers is temperature controlled.

Compatibility

In the Outdoor cabinet heat exchangers from different manufacturers can be used. The different heat exchangers must be compatible in respect to bellow considerations such as;

- Overall dimensions
- Mechanical interface (fixing points to cabinet)
- Electrical interface (input voltage, connectors etc.)

General design rules are given in this specification to be adaptable any outdoor cabinet. Blower redundancy is not requested.

Design

The Hex117A consists of a box divided in inner and outer circuit. The air circulating in one circuit is separated from the air in the other circuit by the features of heatcore mechanical structure.
The core consists of thermally conductive material allowing heat exchange between the both circuits. One blower in each circuit circulates the air.

Dimensions

Overall dimensions are chosen to allow mounting of heat exchanger into specified cabinet. See drawing in fig:

	Height (mm)	Width (mm)	Depth (mm)
Hex117A:	966	411	146

Weight

Maximum 10 kg

Materials and surface finish

Overall housings: Aluminum
Core: Thermo conductive material
Plastics: Halogen free UL94-V2 or better
PCB: UL94-V1

Surface finish:
- EMC relevant surfaces is for conductive treated
- Sharp edges is avoided to prevent injury

Mounting

4 screws according to drawings in fig1, Screw type: Allen 6, M8x170. Appropriate tubes are mounted across Hex117A case to guide the screws. The lid of Hex117A has not these screws.

Fixation lid to case

Quick locks and/or minimum screws (Allen size min. 3 mm) are used to fix heat exchanger lid.

Protection class

IP 55 (between inner and outer circuit, being integrated into cabinet)

Functional Specification

Power input

Nominal input voltage:	53,5V
Input voltage range:	42 to 60V
Protections:	Fuse in 48Vlead, T6.3A, high breaking capacity
Inverse voltage protect.:	Yes
Blower blocking:	Yes

Input power at average working <150 W
DC inrush current at nominal input voltage: 6 A (soft start at switch on)

Cooling efficiency

Cooling efficiency at Un: >120 K/W

Acoustic noise

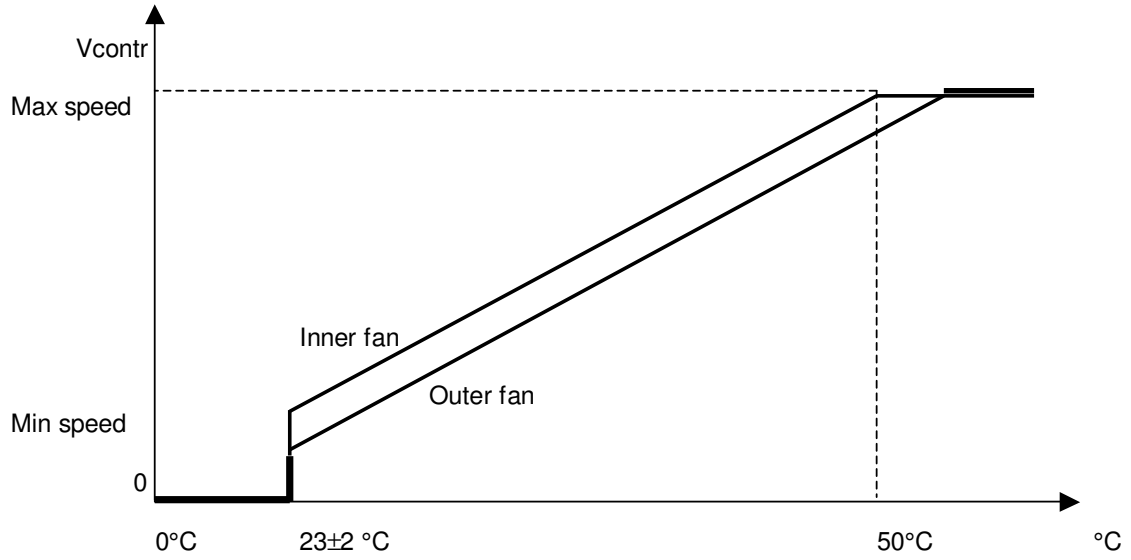
Stand alone conditions, free blowing, inner and outer circuit at max specified speed: < 60 dB (A) (sound pressure measured in 1m distance in front of fan side)

Applicable standard on cabinet level: ETS 300 753, non-weather protected location, protected area class. Stated limits apply to noise generated by equipment during continuous operation. Short period violation occurring at switch-on of blowers is allowed.

Blower rotation control

Temperature controlled regulation is used for blower rotation, inner and outer blowers are independent from each other. The control of blowers is internal function of heat exchanger. Control unit is assembled inside of inner circuit.

Regulation diagram:



Maximum rotation is adjusted to fulfill both cooling and acoustic noise requirements. The regulation range is manufacturer specific, defined after tests in cabinet and agreed with respective manufacturer. After switch-on the blowers' speed is accelerated continuously up to maximum specified rotation. Then the speed is regulated down to specified ramp by the controller. Duration of start-up loop is 10 - 15 second.

Temperature sensor

Temperature sensor is mounted in heat exchanger at the air inlet of inner circuit.
In case of failure of temperature Sensor (e.g. sensor disconnected or short circuited) causes following response such as;
- All blowers are rotating with full-specified speed.
- Alarm occurs, red LED is lit, and over temperature red LED is lit.
- The response may be delayed up to about 5 second after the failure occurred.

Test port

SubD female connector located close to power-in/alarm connector. The test port allows connecting external temperature simulator setting respective temperature value to check blower operation depending upon temperature. An external short circuit plug can be used at the connector. In case of response on removed short circuit plug causes following responses such as,
- All blowers are rotating with full speed.
- Alarm occurs, red LED is lit.
- The response may be delayed up to about 5 second after the failure occurred.

Alarm

One alarm output per heat exchanger. Alarm is being raised in case of

- At least one blower fails
- Temperature sensor/plug disconnected
- Temperature exceeds 60°C

- Temperature drops below 0°C

Note:
-Periodical trigger usually starts the blowers. At least 2nd trigger must be awaited before raising alarm (delay alarm about 6 sec.)
-Automatic alarm reset: If failure absent, alarm is disappeared.
-At intentional standstill (temperature lower than blower switch-on threshold) no given alarm indicating.
-Alarm loop must be “not-conductive (alarm ON)” when primary DC is switched off.

The alarm output is isolated by relay like bellow:

Operation Status	Loop Status	Voltage	Current
Normal	Normally Closed	0 V	1A
Alarm	Make open	Open	0A

Or opposite usage of contact:

Normal	Normally open	Open	0A
Alarm	Make closed	0V	1A

LED alarm indication

Hex117A major alarm is realized by means of a red LED.
The red LED is off in case of relevant alarm removed.

Connectors

Power/Alarm:
DSub 9 pin male (pin contacts) Description
Pin assignment:
1 * Nc
2 * 48V
3 * 48V
4 * Nc
5 * Nc contact (Major)
6 * 0V
7 * 0V
8 * Nc
9 * Dry contact (Major)

The DC IN voltage, both + and -, is split to two pins for higher current capability.
In the controller the pins are for dc power input 2-3 and 6-7, respectively.

Test port (temp. sensor port):

D sub 9pin female (socket contacts)
Pin assignment:

1*Nc
2*Nc
3*Nc
4*Nc
5*Nc
6*Nc
7*Nc
8* Connection to 9*
9 *Connection to 8*

Reliability

Controller MTBF is minimum 20 years. Calculation has made at ambient temperature 50℃.
Blowers are maintenance free type, which sealed ball bearing.

Burn-in

When manufacturing process is running, every produced Hex117A is done test under the conditions (only functional test) 24 hours, 60℃, full load.

Safety

The Hex117A meets the requirements of EN 60950 for SELV circuits and danger of energy.
Blowers, Heatcore, control board meet UL and CE certification.
Fire protection class of plastic parts acc. UL94-V2
Fire protection class of printed boards acc. UL94-V1

Grounding:

Hex117A case conductive is connected to DSL outdoor cabinet by means of fixing screws.

Environmental conditions

- Ambient temperature range at any level for blowers, heatcore and control board: -20℃ to +70℃
- Humidity range: 95%

Storage conditions

-45℃ to +70℃

Electromagnetic compatibility

Conducted emission on DC lines according to: EN 55022 class B
Radiated emission: EN 55022 class B (mounted in cabinet, sealing between inner and outer circuit)