

190/230 Watt AC-DC Front End with PFC

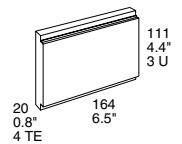
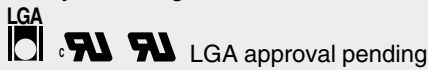
PC Series

Preliminary

Universal AC-input range
Single outputs for 70 and 85 V DC loads
No electrical isolation input to output

- Step-down converter with single stage AC to DC conversion and PFC
- Immunity to IEC/EN 61000-4-2, -3, -4, -5, -6
- Harmonics below IEC/EN 61000-3-2
- No electrical isolation input to output
- Complete solution with input and output filters
- Input over- and undervoltage protection
- Very high efficiency up to 95%
- Output no load, overload and short-circuit proof
- Output overvoltage protection
- Thermal protection with automatic restart
- Ambient operating temperature range -40...71 °C
- Plug-in type for 19" rack systems with H15 connector
- Extremely slim case (4TE wide) fully enclosed
- Very high reliability

Safety according to IEC/EN 60950, UL 1950



Summary

The LPC series is a range of non isolated AC-DC converters for use as power factor corrected front ends capable of delivering up to 230 Watt at nominal output voltages of up to 85V. For higher power requirements, several units may be connected in parallel.

The AC-DC converters are ideally adapted to mains operation due to their universal input voltage range. Key features are: Power factor correction, low input harmonic distortion, no inrush current, low RFI, high immunity to electrical disturbances and high efficiency over the entire input voltage range.

The outputs are no load, overload and short-circuit proof and are protected against overvoltages by means of a built-in suppressor diode.

The converters are especially suited to powering Melcher DC-DC converters of the P and Q series which, depending on the mains input voltage level, provide the necessary electrical isolation for SELV (Safety Extra Low Voltage) outputs.

The OK LED displays the status of the converter and allows visual monitoring of the system at any time.

The AC-DC converters are designed and built according to the international safety standards IEC/EN 60950, UL 1950, CAN/CSA C22.2 No.950-95, LGA, UL and cUL. Approvals are in progress.

The converters are based on a single PCB with high power density. The thermal concept allows operation at full load up to an ambient temperature of 71 °C in free air without forced cooling. If forced air cooling is provided the ambient temperature may exceed 71 °C but the case temperature T_C must remain below 95 °C under all operating conditions. Semiconductors and other heat generating components are mounted in such a way that the generated heat is transferred directly to the rugged metallic case. High efficiency, low heat dissipation and careful consideration of possible thermal stresses ensure no hot spots and high reliability. A built-in temperature sensor generates an inhibit signal which disables the output if the case temperature T_C exceeds 95 °C. The output is automatically re-enabled when the temperature returns below this limit.

A special feature of the LPC front end is the extremely slim case, just 4TE wide.

The modules are plug-in types fitted with an H15 connector for use in 19" rack systems according to DIN 41494.

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Type Survey and Key Data

Table 1: Type survey

Nominal ¹ output voltage $U_{o\ nom}$ [V]	Output current $I_{o\ nom}$ [A]	Output power $P_{o\ nom}$ [W]	Input voltage range 47...63 Hz $U_{i\ min}...U_{i\ max}$ [V AC]	Efficiency η [%] ²	Type designation	Options
72	2.7	190	85...255	94	LPC 1901-7 ³	-9 D
85	2.7	230	95...255	94	LPC 1902-7 ⁴	

¹ No electrical isolation input to output.

² Measured at $U_{i\ nom}$.

³ For use with Melcher P units and Q units based on an AC input voltage of up to 150 V.

⁴ For use with Melcher P units based on an AC input voltage of up to 250 V.

Type Key and Product Marking

Type Key

Input voltage range U_i 85/95...255 V AC, 47...63 Hz L	L PC 1 901 -7 D
Series PC	
Number of outputs 1	
Nominal voltage output 1	
72 V 901	
85 V 902	
Ambient temperature range T_A :	
-25...71 °C -7	
-40...71 °C -9	
Customer specific -0...-6	
Option: Converter OK signal D	

Example: LPC 1901-7: Power factor corrected AC-DC converter, input voltage range 85...255 V AC, non isolated output providing 72 V DC, 2.7 A.

Product Marking

Basic type designation, applicable safety approval and recognition marks, CE mark, warnings, pin allocations of inputs and outputs, Melcher patents and company logo.

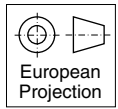
Identification of LED

Specific type designation, operating input voltage range, maximum input current, nominal output voltage and output current, degree of protection and pin allocations of auxiliary functions.

Batch no., serial no. and data code including production site, modification status and date of production.

Mechanical Data

Dimensions in mm. Tolerances ± 0.3 mm unless otherwise indicated.



Preliminary

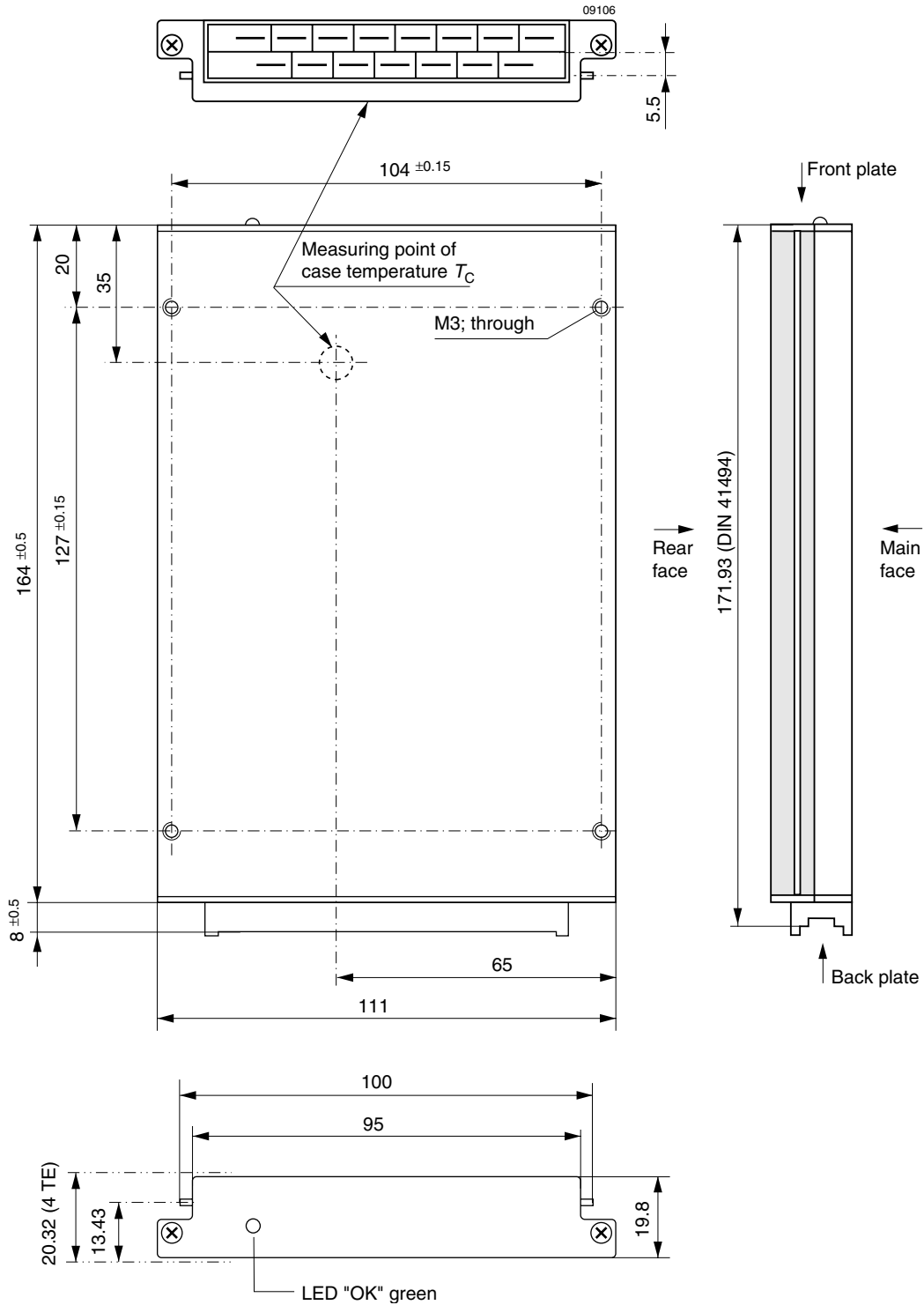


Fig. 1
Case Q03, weight 480 g
Aluminium, fully enclosed,
black finish and self cooling

Note: Long case, elongated by 60 mm for 220 mm rack depth, available on request.

Safety and Installation Instructions

Connector Pin Allocation

The connector pin allocation table defines the electrical potentials and the physical pin positions on the H15 connector. The protective earth pins (pins 12 and 14) present on all PC series converters are leading pins, ensuring that they make contact with the female connector first.

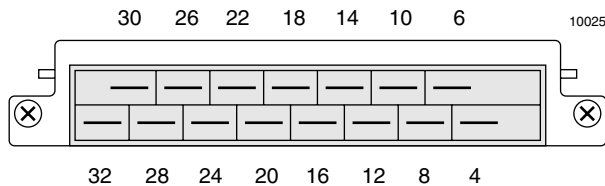


Fig. 2
View of male H15 connector

Table 2: Pin allocation of the H15 connector

Pin no.	Electrical determination	Pin designation
4	Output voltage negative	Vo-
6	Output voltage positive	Vo+
8	Phase	P \sim
10	Neutral	N \sim
12	Protective earth ¹	
14	Protective earth ¹	
16	-	Pin not connected
18	-	Pin not connected
20	OK positive	OK+ ²
22	OK negative	OK- ²
24	-	Pin not connected
26	Output voltage positive	Vo+
28	Output voltage negative	Vo-
30	Output voltage positive	Vo+
32	Output voltage negative	Vo-

¹ Leading pin (pre-connecting). ² Optional

Installation Instructions

The PC series AC-DC converters are components, intended exclusively for inclusion within other equipment by an industrial assembly operation or by professional installers. Installation must strictly follow the national safety regulations in compliance with the enclosure, mounting, creepage, clearance, casualty, markings and segregation requirements of the end-use application.

Important: Since the PC series AC-DC converters do not provide electrical input to output isolation, their output circuit is a Hazardous Voltage Primary Circuit which must not be user accessible.

DC-DC converters with accessible output circuits, powered by a PC series AC-DC converter must provide double or reinforced insulation, based on the mains input voltage of the PC series AC-DC converter. Refer to: *Safety of operator accessible output circuit* of the H, K, M, P, Q and S series data to determine safe installation if such DC-DC converters are powered by a PC series unit.

Connection to the system shall be made via the female connector H15 (see: *Accessories*). Other installation methods may not meet the safety requirements.

The AC-DC converters are provided with pins 12 and 14 (⊗), which are reliably connected to the case. For safety reasons it is essential to connect at least one of these pins to the protective earth of the supply system.

The P \sim and N \sim inputs (pins 8 and 10) are both internally fused. These fuses are designed to protect the unit in case of overcurrent and may not be able to satisfy all customer requirements. External fuses in the wiring to one or both input pins may therefore be necessary to ensure compliance with local requirements.

Ensure that a unit failure (e.g. by an internal short-circuit) does not result in a hazardous condition.

Important: Do not open the modules, or guarantee will be invalidated.

Make sure that there is sufficient air flow available for convection cooling. This should be verified by measuring the case temperature when the unit is installed and operated in the user's application. The maximum specified case temperature T_C max shall not be exceeded. See also: *Thermal Considerations*.

Caution: Check for hazardous voltages before and after altering any connections. Hazardous voltages may be present at the output terminals for 1 minute even after the mains input voltage has been disconnected from the unit.

Cleaning Agents

In order to avoid possible damage, any penetration of cleaning fluids is to be prevented, since the power supplies are not hermetically sealed.

Standards and approvals

All PC series AC-DC converters correspond to class I equipment.

They are UL recognized according to UL 1950, UL recognized for Canada to CAN/CSA C22.2 No. 950-95. LGA approval to IEC/EN 60950 standards pending. The units for:

- Building in
- Basic insulation between input and case based on their maximum rated input voltage
- Operational insulation between input and output (Operational insulation according to the standards includes the case where only rectification and voltage/current regulation by diodes and transistors is provided, as is the case for PC series AC-DC converters. If the input circuit is a primary circuit, the output is a primary circuit, too.)
- Use in a pollution degree 2 environment.

The AC-DC converters are subject to manufacturing surveillance in accordance with the above mentioned UL, CSA, EN and with ISO 9001 standards.

Protection Degree

Condition: Female connector fitted to the unit.

IP 40: All units.

Table 3: Temperature specifications, valid for air pressure of 800...1200 hPa (800...1200 mbar)

Temperature			Standard -7		Option -9		Unit
Characteristics		Conditions	min	max	min	max	
T_A	Ambient temperature	Operational	-25	71	-40	71	°C
T_C	Case temperature		-25	95	-40	95	
T_S	Storage temperature	Not operational	-40	100	-55	100	

Isolation

The electric strength test is performed as a factory test in accordance with IEC/EN 60950 and UL 1950 and should not be repeated in the field. Melcher will not honour any guarantee claims resulting from electric strength field tests.

Table 4: Isolation

Characteristic		Input to case	Unit
Electric strength test voltage	Required according to	1.0	kV _{rms}
	IEC/EN 60950	1.4	kV DC
	Actual factory test 1 s	2.1	
	AC test voltage equivalent to actual factory test	1.5	kV _{rms}
Insulation resistance at 500 V DC		>300	MΩ

For creepage distances and clearances refer to: *Technical Information: Safety*.

Safety of operator accessible output circuit

If the output circuit of a power supply system is operator accessible, it shall be an SELV circuit according to the IEC/EN 60950 related safety standards.

Since the output circuit of a PC series AC-DC converter is a primary circuit, it must be non user accessible. In order to generate an accessible SELV output circuit, a DC-DC converter, with double or reinforced insulation between input and output must be connected to the output of a PC series AC-DC converter. See: *Schematic safety concept*.

Leakage Currents

Leakage currents flow due to internal leakage capacitance and RFI suppression Y-capacitors. The current values are proportional to the mains voltage and nearly proportional to the mains frequency. They are specified at maximum operating input voltage where phase, neutral and protective earth are correctly connected as required for class I equipment.

Table 5: Leakage currents

Characteristic			Unit
Earth leakage current	Permissible according to IEC/EN 60950	3.5	mA
	Specified value at 255 V, 50 Hz	1.1 ¹	

¹ Leakage current of one LPC unit operating alone. This value will increase when powering DC-DC converters of the P or Q series or any other load with an internal capacitance between its inputs and earth. When LPC units are operated in parallel, the leakage current of the system will increase linearly with the number of paralleled units.

Refer to the: *Safety concept leading to an SELV output circuit* tables of the H, K, M, P, Q and S series DC-DC converter data in order to ensure that the output of the DC-DC converter, which is supplied by the PC series AC-DC converter, is an SELV circuit according to IEC/EN 60950.

It is the sole responsibility of the installer to ensure the compliance with the relevant and applicable safety regulations. More information is given in: *Technical Information: Safety*.

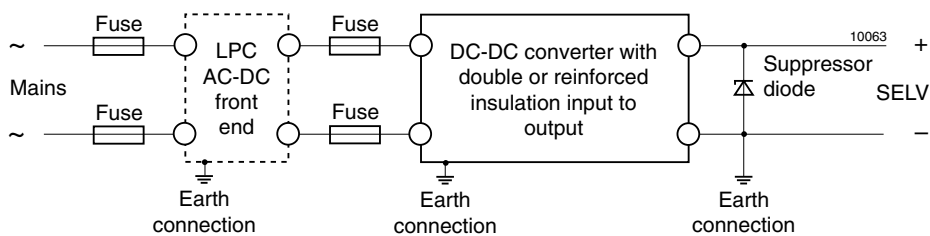


Fig. 3
Schematic safety concept

Use input fuses and earthing of the AC-DC converter as per: *Installation Instructions* of this data sheet.
Use input fuses, earth connection of the DC-DC converter and suppressor diode as per: *Installation Instructions* and per table: *Safety concept leading to an SELV output circuit* of the data sheet of the corresponding DC-DC converter.

Description of Options

**Option D
Converter OK Signal**

Option D indicates the status of the converter. When the input voltage is within the upper and lower limit and the output is above the lower limit the converter delivers an electrically isolated logic Low. Available hold-up time minimum 4 ms.