



SPRINT ELECTRIC

**PL / PLX
Digital DC Drive
Additional Manual
for
PL/X 275-800**

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This manual should be read in conjunction with the PL / PLX Digital DC Drive Manual

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2 Introduction

These additional models have all the functionality as described in the **PL / PLX Digital DC Drive Product Manual**. They also have the option of being supplied as HV units that are able to accept AC supply voltages up to 690 Volts for motors with armatures of 750 Volts DC.

All models are available with the high current 3 phase supply terminals in standard top entry, or bottom entry as an option.

3 Rating Table

Nominal maximum continuous shaft ratings

Model	kW at 460V olt	HP at 460V olt	HP at 500V	HP at 750V (690V AC) HV models	100% Armature Current DC Amps	100% Field Amps	Dimensions mm W x H x D
PL 2 quadrant PLX 4 quadrant Suffix HV for 690 VAC Suffix BE for bottom entry 3 phase power							
PL and PLX	275	370	400	600	650	32 or 50	253 x 700 x 350
PL and PLX	315	425	460	690	750	32 or 50	253 x 700 x 350
PL and PLX	360	485	520	780	850	32 or 50	253 x 700 x 350
PL* and PLX	400	540	580	875	950	32 or 50	253 x 700 x 350
PL and PLX**	440	590	640	970	1050	32 or 50	253 x 700 x 350
PL and PLX	520	700	760	1140	1250	64	506 x 700 x 350
PL and PLX	600	810	880	1320	1450	64	506 x 700 x 350
PL* and PLX	700	940	1020	1530	1650	64	506 x 700 x 350
PL and PLX	800	1080	1170	1760	1850	64	506 x 700 x 350

Regenerative stopping with PL models

* Starred models: (*PL) 2 Quadrant models have electronic regenerative stopping.

Standard Models)

Main 3 phase supply 50 - 60hz
Auxiliary 3 phase supply 50 - 60hz
Control 1 phase (50VA) 50 - 60Hz

Any supply from 12 to 480V AC +/- 10%
Any supply from 100 to 480V AC +/- 10%
Any supply from 110 to 240V AC +/- 10%

High Voltage (HV) Models

Main 3 phase supply 50 - 60hz
Auxiliary 3 phase supply 50 - 60hz
Control 1 phase (50VA) 50 - 60Hz

Any supply from 12 to 690V AC +/- 10%
Any supply from 100 to 690V AC +/- 10%
Any supply from 110 to 240V AC +/- 10%

Internal Fan supply

PL/X 275/315/360/400/440 models also need a separate 100VA 240V 50/60Hz ac supply for the fan.
PL/X 520/600/700/800 models also need a separate 200VA 240V 50/60Hz ac supply for the fan.

OUTPUT VOLTAGE RANGE

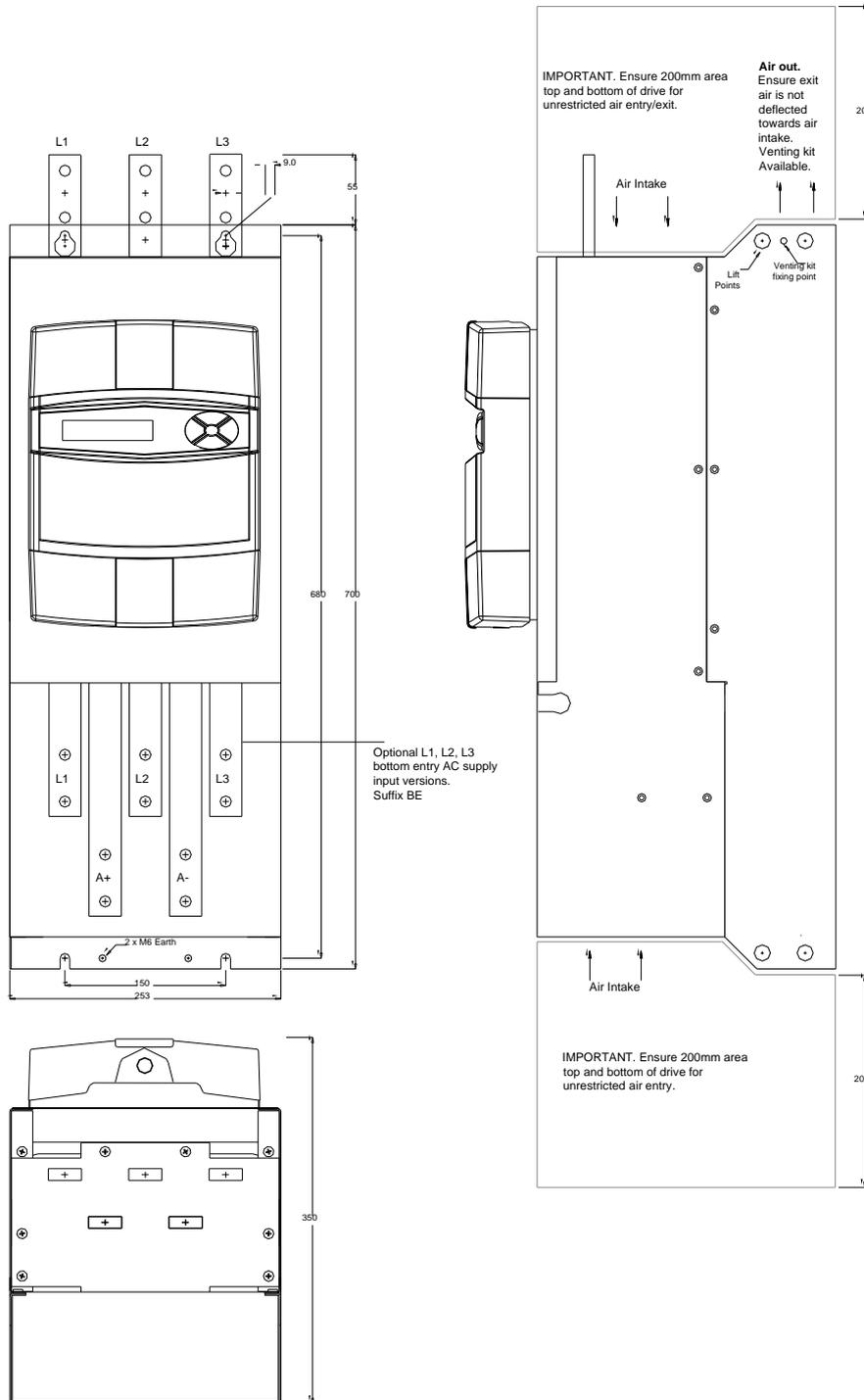
Armature PL 0 to +1.2 times AC supply. PLX 0 to +/- 1.2 times AC supply.
Note. 1.1 times AC supply is recommended if supply variations exceed -6%.
Field 0 to 0.9 times AC supply on auxiliary terminals. (EL1, EL2, EL3)

OUTPUT CURRENT RANGE

Armature 0 to 100% continuous. 150% for 25 seconds +/- for PLX
Field programmable minimum to 100% continuous with fail alarm.

**Note. Model PLX440 has no overload capability.

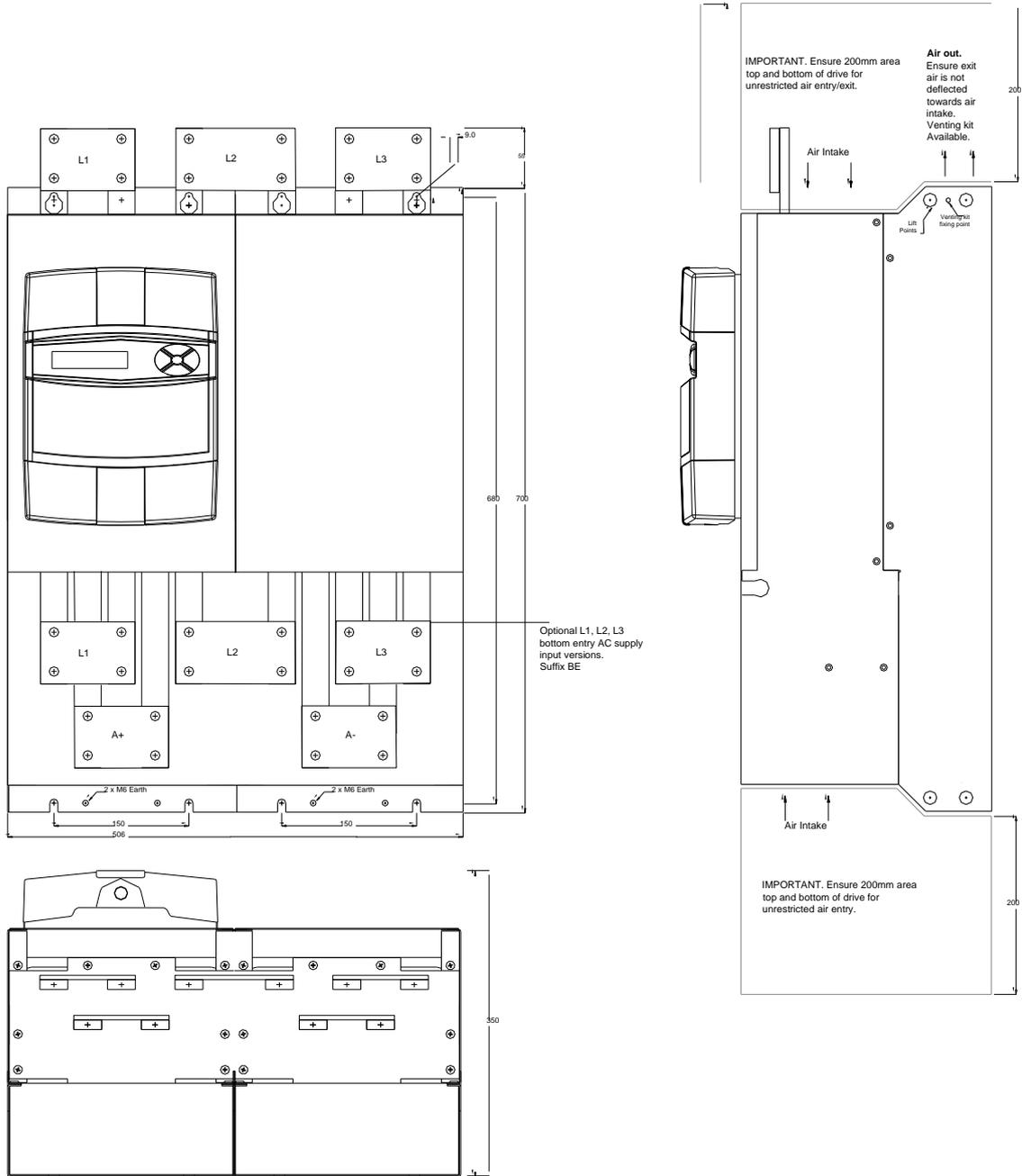
4 Mechanical Dimensions PL/X 275 - 440



Weight 45KG

See 7.5 Lifting

5 Mechanical Dimensions PL/X 520 - 800



Weight 90KG.

See 7.5 Lifting

6 Venting

6.1 General venting information

In order to keep these units within the required operating temperatures under all operating limits they are equipped with a very efficient cooling system. It consists of a powerful centrifugal fan system integral to the unit mounted at the bottom, which blows air over a high dissipation heatsink. Cool air is drawn in both at the top and bottom of the unit and after travelling over the internal heatsink fins, is exhausted at the top of the unit. From here the warm air must be vented from the enclosure used to house the drive.

See 4 Mechanical Dimensions PL/X 275 - 440 and 5 Mechanical Dimensions PL/X 520 - 800 for diagram of air exhaust flow.

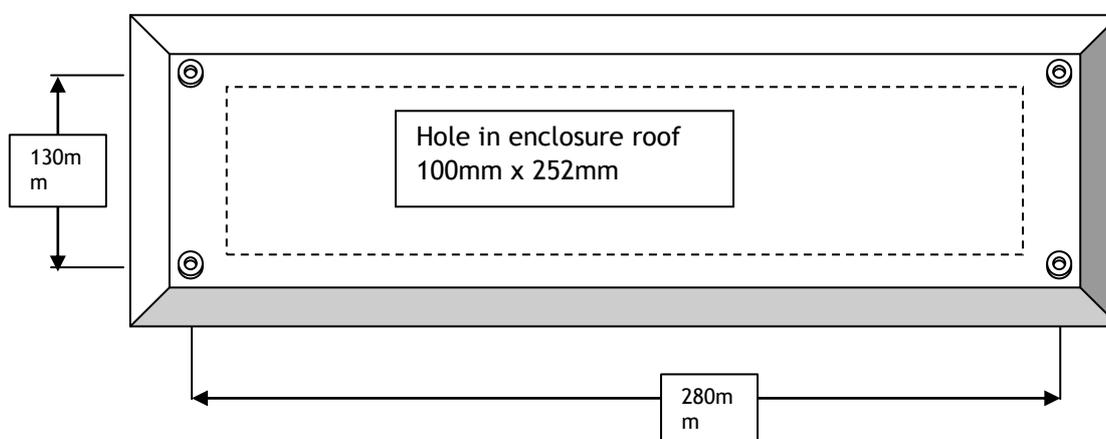
The unit will run cooler and hence be less stressed if the warm exhaust air is prevented from mixing with the intake air. This can be achieved by the use of the optional venting kit.

If it is impractical to use the venting kit then it is usually sufficient to ensure that the enclosure is fitted with exhaust fans that can evacuate air from the enclosure at a rate at least as high as the drive fan, but within the capacity of the enclosure inlet filter. See 3 Rating Table for airflow ratings. When fitting enclosure fans ensure they are placed in the roof of the enclosure directly above the exhaust outlet of the PL/X.

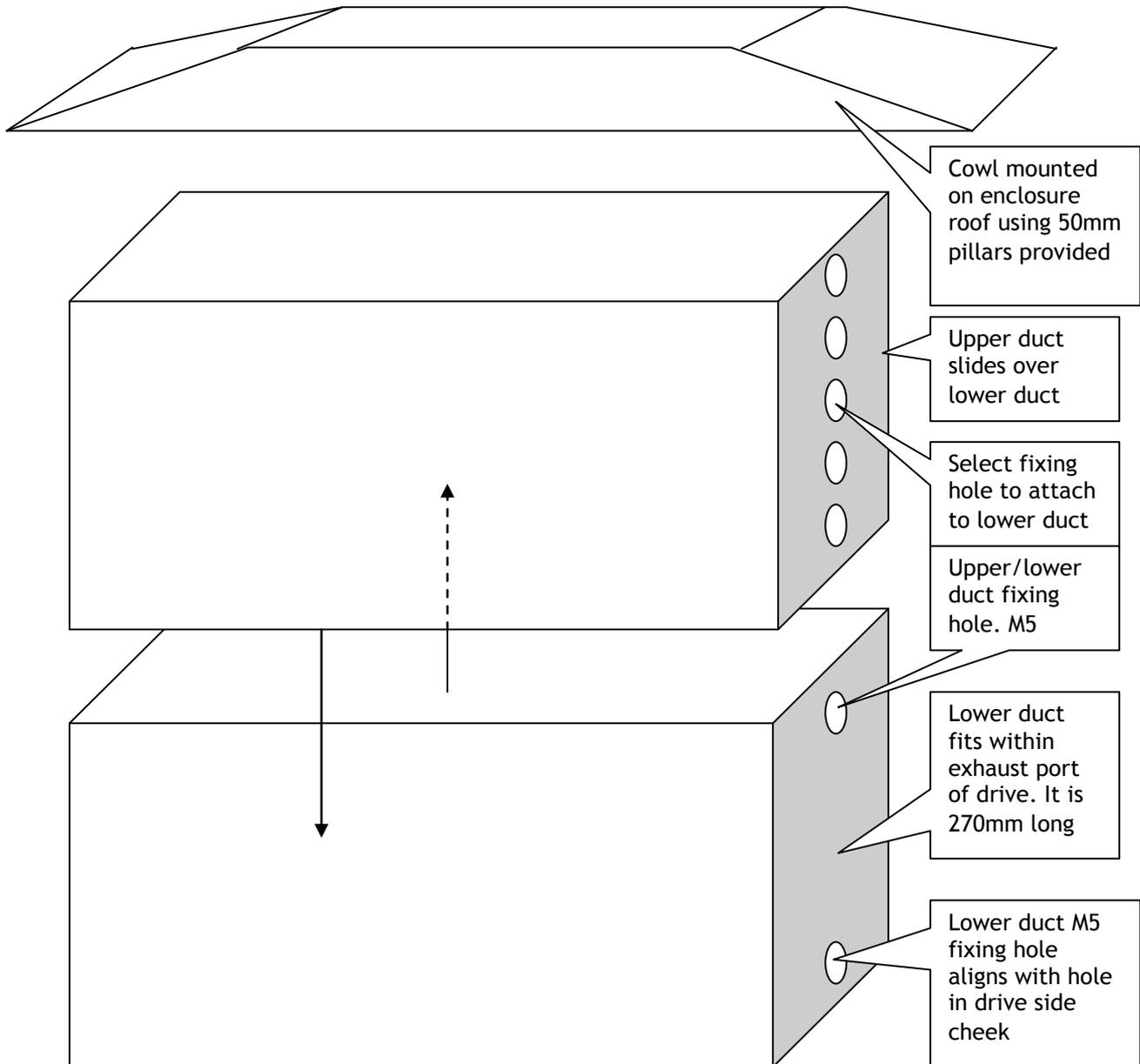
6.2 Venting kit for PL/X 275 - 440

The venting kit comprises two steel ducts which are designed to telescope together. Hence the duct length from the top of the drive is adjustable between 270mm to 538mm. It consists of three main components

- 1) A lower duct which fits within the side cheeks directly above the heatsink exhaust area.
This is secured with 2 M5 screws. See 4 Mechanical Dimensions PL/X 275 - 440 for fixing point drawing. The lower duct is 270mm long from the top edge of the PL/X.
- 2) The upper duct, which fits over the lower duct section, to extend the total length of the venting assembly.
It has a series of M5 side holes to allow adjustment. Once the desired height is established the upper duct can be screwed to the lower duct through the selected hole, one screw per side. The useful length of the extended duct may be adjusted in steps of approx. 20mm from 270mm to 535mm. The duct must be inserted through a tight fitting rectangular hole in the roof of the enclosure (hole size 100mm x 252mm) and protrude above it by 10-20mm. Then the gap between the duct and the roof must be sealed (e.g. using tape or flexible filler) to ensure that the exhaust air and pollutants cannot enter into the enclosure.
- 3) A cowl which is fixed on top of the enclosure to prevent pollutants from dropping into the exhaust outlet.
The cowl is supplied with 4 off 50mm mounting pillars, and 4 M6 holes must be drilled in the roof of the enclosure, to allow the mounting pillars to be fixed such that the cowl is positioned centrally over the duct. The cowl will overhang the duct by 70mm all the way round. If there is a danger of birds or vermin entering the exhaust port then it is recommend that a suitable grille is added round the edge of the cowl.



6.2.1 Diagram of PL/X 275 - 440 venting kit



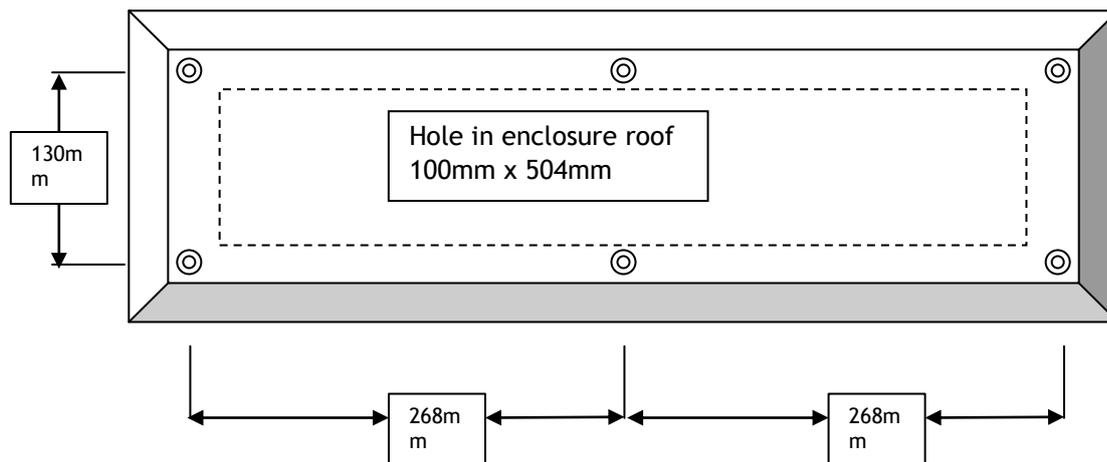
6.3 Venting kit for PL/X 520 - 800

The venting kit comprises a cowl and 2 pairs of steel ducts, each pair being designed to telescope together. Hence the duct length from the top of the drive is adjustable between 270mm to 535mm. There is also an enclosure roof cowl. Each pair is the same unit as described in 6.2 Venting kit for PL/X 275 - 440. There are 2 exhaust ports at the top of the PL/X and each pair of ducts is used with one of the ports. Please read section 5.2 for details about each pair.

The ducts must be inserted through a tight fitting rectangular hole in the roof of the enclosure (hole size 100mm x 504mm) and protrude above it by 10-20mm. Then the gap between the duct and the roof must be sealed (e.g. using tape or flexible filler) to ensure that the exhaust air and pollutants cannot enter into the enclosure. Also the interface between each pair of ducts must be sealed at the top where it protrudes from the roof.

The cowl is fixed on top of the enclosure to prevent pollutants from dropping into the exhaust outlet of the drive. The cowl is supplied with 6 off 50mm mounting pillars, and 6 M6 holes must be drilled in the roof of the enclosure, to allow the mounting pillars to be fixed such that the cowl is positioned centrally over the duct. The

cowl will overhang the duct by 70mm all the way round. If there is a danger of birds or vermin entering the exhaust port then it is recommend that a suitable grille is added round the edge of the cowl



6.4 Air supply to enclosure

It is essential that the enclosure which houses the PL/X is supplied with sufficient cool clean air to satisfy the throughput requirements of the PL/X and any other devices within the enclosure. Do not forget that the current carrying components associated with the drive will be dissipating a considerable amount of heat especially when the system is running at full capacity.

The enclosure must be fitted with one or more air filters suitable for the airborne pollutants encountered within its environment. Together they must have a rated throughput of sufficient capacity for all of the exhaust fans used in the enclosure. If the PL/X is fitted with a venting kit and there is another exhaust fan also operating for cooling other components it is essential that the auxiliary fan does not starve the PL/X of its air supply. This should be avoided provided the input filter has sufficient capacity. Alternatively if there is any doubt, then PL/X must be provided with its own filter, and an enclosure partition used to isolate it from the influence of the rest of the enclosure cooling arrangements.

The filter should be fitted in the enclosure below the level of the bottom of the PL/X, and in line with it to ensure that the air drawn in is quickly available for the PL/X.

6.5 Exhaust air

The heated exhaust air will need to be prevented from warming up the room housing the enclosure, by using sufficient ventilation, alternatively the supply of air may be obtained from outside and ducted to the enclosure.

6.6 Summary

Ensure a clean un-interruptable supply of cool air is available for the PL/X and that the exhaust air is adequately disposed of. The PL/X will survive running at high ambient temperatures but possibly at the expense of its potential lifespan. Observe good engineering practice and keep all the components within the enclosure as cool as possible consistent with avoiding condensation.

7 Product rating table

Model PL 2Q PLX 4Q	Output power			Max continuous Current (AMPS)		Max field DC output Amps		Line reactor type	Cooling air flow and dissipation		
	At OP = 460V 380 -415AC Kw HP	At 500V 480AC HP	At 750V 690AC HP	AC IP	DC OP	std	option		cfm	watts	
PL/X275	275	370	400	600	530	650	32	50	LR650	400	1700
PL/X315	315	425	460	690	615	750	32	50	LR750	400	2000
PL/X360	360	485	520	780	700	850	32	50	LR850	400	2300
PL/X400	400	540	580	875	780	950	32	50	LR950	400	2500
PL/X440	440	590	640	970	860	1050	32	50	LR1050	400	2800
PL/X520	520	700	760	1140	1025	1250	64		LR1250	800	3200
PL/X600	600	810	880	1320	1190	1450	64		LR1450	800	3700
PL/X700	700	940	1020	1530	1350	1650	64		LR1650	800	4200
PL/X800	800	1080	1170	1760	1520	1850	64		LR1850	800	4700

Notes

- 1) Only use UL fuses for installations complying with UL codes.
- 2) 2Q models PL400 and PL700 have a regenerative stopping capability.
- 3) The EL1/2/3 connections require 3 auxiliary fuses, (max ratings 80A, I²t 5000).
Sprint part no. Fuse CH00880A. Fuseholder CP102071
When selecting alternative types the fuse current rating must be at least 1.25 X the field current rating of the motor. Max ratings 80A, I²t 5000.
- 4) Please consider the total component dissipation within the enclosure when calculating the required air throughput. This includes the fuses, line reactors and other sources of dissipation.
- 5) 400 Cubic feet per minute is approximately equivalent to 12 cubic metres per minute.
800 Cubic feet per minute is approximately equivalent to 24 cubic metres per minute.
- 6) The output power rating shown is at the 100% rating of the drive and is the power available at the shaft for a typical motor. The actual power available will depend on the efficiency of the motor.
- 7) The high power field output option is an extra cost option and needs to be specified at the time of order.
- 8) The 690V AC supply is an extra cost option and needs to be specified at the time of order. Suffix HV
- 9) The bottom entry AC supply option needs to be specified at the time of order. Suffix BE

7.1 Product rating labels

The product rating labels are located on the unit under the upper end cap. The product serial number is unique and can be used by the manufacturer to identify all ratings of the unit. The power ratings and model type are also found here, along with any product standard labels applicable to the unit.

14.2 Semiconductor fuses

WARNING. All units must be protected by correctly rated semi-conductor fuses. Failure to do so will invalidate warranty. For semi-conductor fuses please refer to supplier.

Model PL 2Q PLX 4Q	Main fuses Max I ² t			
	480V AC 50Hz AC	480V AC 60Hz AC	690V AC 50Hz AC	690V AC 60Hz AC
	Standard	Standard	High Voltage	High Voltage
PL/X275	1,170,000	1,170,000	810,000	770,000
PL/X315	1,170,000	1,170,000	810,000	770,000
PL/X360	1,170,000	1,170,000	810,000	770,000
PL/X400	1,304,000	1,290,000	1,260,000	1,200,000
PL/X440	1,304,000	1,290,000	1,260,000	1,200,000
PL/X520	3,240,000	3,240,000	2,243,000	2,132,000
PL/X600	3,240,000	3,240,000	2,243,000	2,132,000
PL/X700	4,792,000	4,570,000	3,490,000	3,324,000
PL/X800	4,792,000	4,570,000	3,490,000	3,324,000

7.3 Terminal tightening torques

Terminals	Model	Tightening torque
Terminals 1 to 100	PL/X 275-800	4 lb-in or 0.5 N-m
EL1 EL2 EL3 F+ F-	PL/X 275-800	35 lb-in or 3.9 N-m
L1 L2 L3 A+ A-	PL/X 65-265	242 lb-in or 27 N-m
Fan supply terminals	PL/X 275-800	9 lb-in or 1.0 N-m

7.3.1 Forces applied to the power terminals

Avoid applying mechanical stress to the heavy current terminals L1/2/3 A+ A-. Please ensure that any cables or busbars that are bolted to these terminals are supported within the enclosure. Do not rely on the drive terminals to support the weight of the external connections.

Do not use the connecting bolt to hold the terminal and the connecting cable or busbar in alignment, otherwise, if they have been levered into alignment prior to inserting the bolt, there will be a permanent stress on the terminal. Always support the connection to the terminal such that the only purpose of the terminal bolt is to tighten them together and not to maintain their relative position to each other. The respective holes in the terminal and the connecting busbar should remain in alignment without the aid of the terminal bolt. Then you can be sure that there is minimum stress on the drive terminal busbar.

When tightening the connecting bolts of the terminals L1/2/3 A+ A- please ensure that the busbar is not subjected to a turning moment as the nut is torqued down. To do this always use two spanners, one on the bolt head to provide a counter torque and one on the nut to provide tightening torque.

7.3.2 Avoid dropping objects in fan grille

If the unit is in the horizontal plane then there is a danger that objects may be accidentally dropped inside it. The most obvious danger is dropping washers into the air intake grille when connecting the busbars to the terminals. As a precaution it is advised that a temporary cover be placed over the air intake grille, e.g. a piece of cardboard. Do not forget to remove the temporary cover prior to starting the unit.

14.6 Line reactors

Only use CSA/UL certified line reactors for installations complying with CSA/UL codes. These line reactors are not certified. Refer to supplier for certified alternatives.

Model PL 2Q PLX 4Q	Max continuous Current (AMPS)		Line reactor Type 480V AC Supply	Line reactor Type 690V AC Supply
	Input AC	Output DC		
PL/X275	530	650	LR650	LR650HV
PL/X315	615	750	LR750	LR750HV
PL/X360	700	850	LR850	LR850HV
PL/X400	780	950	LR950	LR950HV
PL/X440	860	1050	LR1050	LR1050HV
PL/X520	1025	1250	LR1250	LR1250HV
PL/X600	1190	1450	LR1450	LR1450HV
PL/X700	1350	1650	LR1650	LR1650HV
PL/X800	1520	1850	LR1850	LR1850HV

To obtain line reactor dimensions please refer to supplier

7.5 Lifting the unit

Use the lifting points provided. There are lifting holes at each end of the unit. Attach a loop of suitable rope (approx. 1.2m for PL/X275-440 and 1.5m for PL/X520-800) between the lifting holes at each side at the top end, and a similar loop at the bottom end, to assist in lifting the unit out of its container. When lifting the unit keep it in either the horizontal or vertical plane to avoid deforming the side cheeks at the lifting points. Use the top end lifting loop to assist in presenting the unit onto the back panel. The fixing holes at the top of the unit are designed with a keyhole shape to allow the unit to be initially hung on the securing bolts. These should be fixed on the back panel prior to presenting the unit into the enclosure.

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