

<b>Title:</b>	<b>Unidrive SPMD Paralleling connection details and external Components</b>		
<b>Product:</b>	Unidrive SPM	<b>Issue Date:</b>	10-June-2005
<b>Variant:</b>	N/A	<b>Date Codes:</b>	
<b>Category:</b>	Cubicle design, Wiring etc.	<b>Manuals affected:</b>	No
<b>Issued By:</b>	Steve Roberts	<b>Priority:</b>	Normal

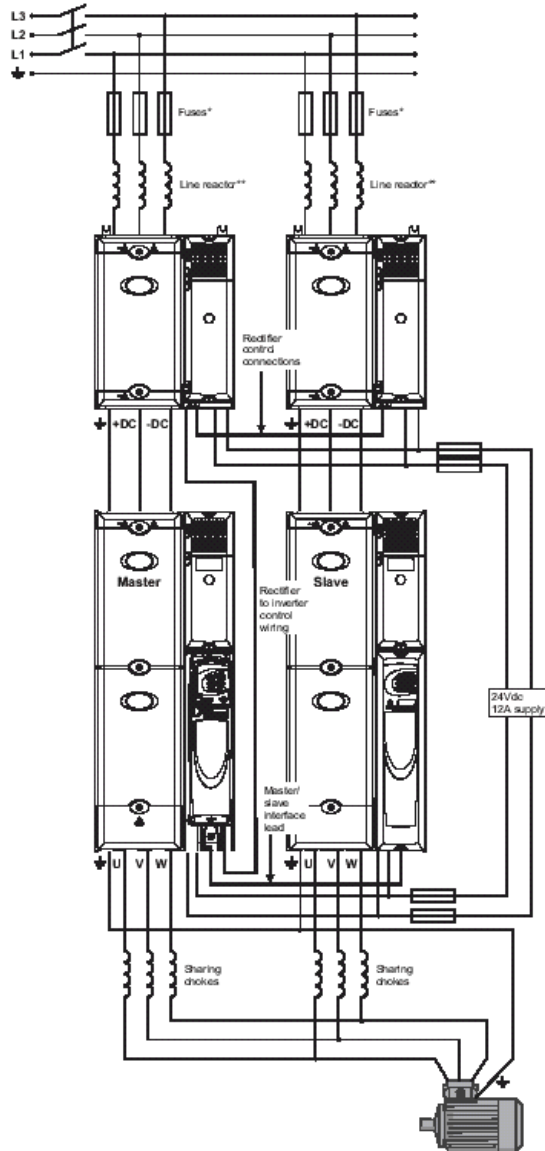
## SUMMARY

This document provides some interim information until the release of the Unidrive SPM User guide. It details information for the paralleling of SPMD modules. Included is the power connections, Input and output inductor specification and details of the braking resistor connection.

## CONNECTION DETAILS

The below diagram details the connections and external components that are required to when paralleling SPMD modules.

NOTE: For paralleling application an 8% de-rating is required.



*Layout for two or more paralleled SPMD modules operating from a 3-phase supply*

## Fuse Ratings

The AC supply to the drive must be fitted with suitable protection against overload and short circuits. The fuse rating tables below show the recommended fuse ratings. Failure to observe this requirement will cause risk of fire.

**NOTE:** It should be noted that fuse option 2 is the only available option for the SPMD1404, SPMC and SPMU units. This arrangement requires a gG type fuse and an aR type fuse to be fitted in series.

### Unidrive SPMD DC Fuse Ratings

Model	Typical DC input current (A)	Max. DC input voltage for cable rating (V)	DC fuse. IEC class aR (A)	DC Input		AC Output	
				mm <sup>2</sup>	AWG	mm <sup>2</sup>	AWG
SPMD1401	219	800	400	2 x 70	2 x 2/0	2 x 70	2 x 2/0
SPMD1402	256	800	560	2 x 95	2 x 4/0	2 x 120	2 x 4/0
SPMD1403	314	800	560	2 x 120	2 x 4/0	2 x 120	2 x 4/0
SPMD1404	379	800	560	2 x 120	2 x 4/0	2 x 120	2 x 4/0

### Unidrive SPMD AC Fuse Ratings when used in Regen Model

Model	Typical input current (A)	Max. input current (A)	Fuse Option 1		Fuse Option 2 Semiconductor fuse in series with HRC fuse or breaker.		AC Input		AC Output	
			IEC class gR (A)	North America: Ferraz HSJ (A)	HRC IEC class gG or UL class J (A)	Semiconductor IEC class aR (A)	mm <sup>2</sup>	AWG	mm <sup>2</sup>	AWG
SPMD1401	204	212	315	300	300	315	2 x 70	2 x 2/0	2 x 70	2 x 2/0
SPMD1402	233	246	315	300	315	350	2 x 120	2 x 4/0	2 x 120	2 x 4/0
SPMD1403	287	303	315	350	350	400	2x120	2x4/0	2 x 120	2 x 4/0
SPMD1404	339	354	N/A	N/A	450	400	2x120	2x4/0	2 x 120	2 x 4/0

### Unidrive SPMC and SPMU AC Fuse Ratings

Model	Typical input current (A)	Max. input current (A)	Fuse Option 2 Semiconductor fuse in series with HRC fuse or breaker.		AC Input		DC Output	
			HRC IEC class gG or UL class J (A)	Semiconductor IEC class aR (A)	mm <sup>2</sup>	AWG	mm <sup>2</sup>	AWG
SPMC1401	204	212	300	315	2 x 70	2 x 2/0	2 x 70	2 x 2/0
SPMC1402	339	354	450	400	2x120	2x4/0	2 x 120	2 x 4/0

#### Notes:

Do not use Unidrive SP or SPM in the USA on a supply voltage of greater than 600V  
Cable sizes are from IEC60364-5-52:2001 table A.52-C with correction factor for 40C ambient of 0.87 (from table A52.14) for cable installation method B2 (multicore cable in conduit).  
Cable size may be reduced if a different installation method is used or if the ambient temperature is lower.

Owing to the high level of current on the input of SPMD1404 and the output of SPMC1402 and SPMU1402, the cable installation method must be B1 or C rather than B2 if the ambient is 40C.

Installation method B1 is separate cables in conduit and installation method C is multicore cable in free air.

## Line Reactor Specification

A separate input line reactor of at least the value shown in Table 1 must be used with the rectifiers. Failure to provide sufficient reactance could damage or reduce the service life of the rectifier or inverter.

Model	Current A	Inductance $\mu$ H	Length mm	Depth mm	Height mm	Weight kg	Quantity required	Part No.
INL401	233	63	230	160	230	32	1	4404-0181-00
INL402	339	44	260	170	230	36	1	4401-0182-00

*Table 1 – 400V line reactor ratings*

## Output Inductor Specification

When paralleling two or more drives together a sharing choke has to be fitted to the output of each drive. The specifications for these chokes are detailed below.

### SPMD1401, SPMD1402 and the SPMD1403 Output Choke Specification

NOTE: This choke is as per the Unidrive Classic Size 5 sharing choke.

Min Inductance:	40uH
Frequency range:	0Hz to maximum motor frequency
Current rating:	300A
Overload:	120% rated current for 1 minute in a 10-minute period
Harmonic current:	10% at 3kHz
Saturation level:	200% rated current
Ambient temperature;	55 degrees C max
Temp rise:	100 degrees C max
Cooling:	convection
Insulation class:	H (180 degrees C) or better
High-potential test - winding to core:	2.5kV at 50/60 Hz
High-potential test - winding to windings:	2.5kV at 50/60 Hz

### SPMD1404 Output Choke Specification

Min Inductance:	35uH
Frequency range:	0Hz to maximum motor frequency
Current rating:	350A
Overload:	120% rated current for 1 minute in a 10-minute period
Harmonic current:	10% at 3kHz
Saturation level:	200% rated current
Ambient temperature;	55 degrees C max
Temp rise:	100 degrees C max
Cooling:	convection
Insulation class:	H (180 degrees C) or better
High-potential test - winding to core:	2.5kV at 50/60 Hz
High-potential test - winding to windings:	2.5kV at 50/60 Hz

## **Braking Resistor Connections**

This section details the rules that govern the connection of braking resistors to a parallel application. The braking resistor should be connected across the brake and +DC terminals.

1. The brake terminals must not be connected together. Each module must have its own resistor if required.
2. The resistor connect to each module must not have a value less than the recommended minimum value for that module size.
3. The total power rating must be less than the maximum expected regenerative power.
4. If the DC Links are separate and the modules are all the same rating, the brake resistors must match to better than 5% at all power flows. (If the temperature coefficient and/or temperature rise of the resistor is significant then the cooling must also match to ensure the resistors are at similar temperatures and hence similar resistance values.)
5. If the DC links are common the brake resistors do not need to match. However to use the drive's brake resistor protection algorithm it must be set up to protect the most vulnerable resistor.

## **MANUAL UPDATE**

This information will be included into the Unidrive SPM User guide next issue.