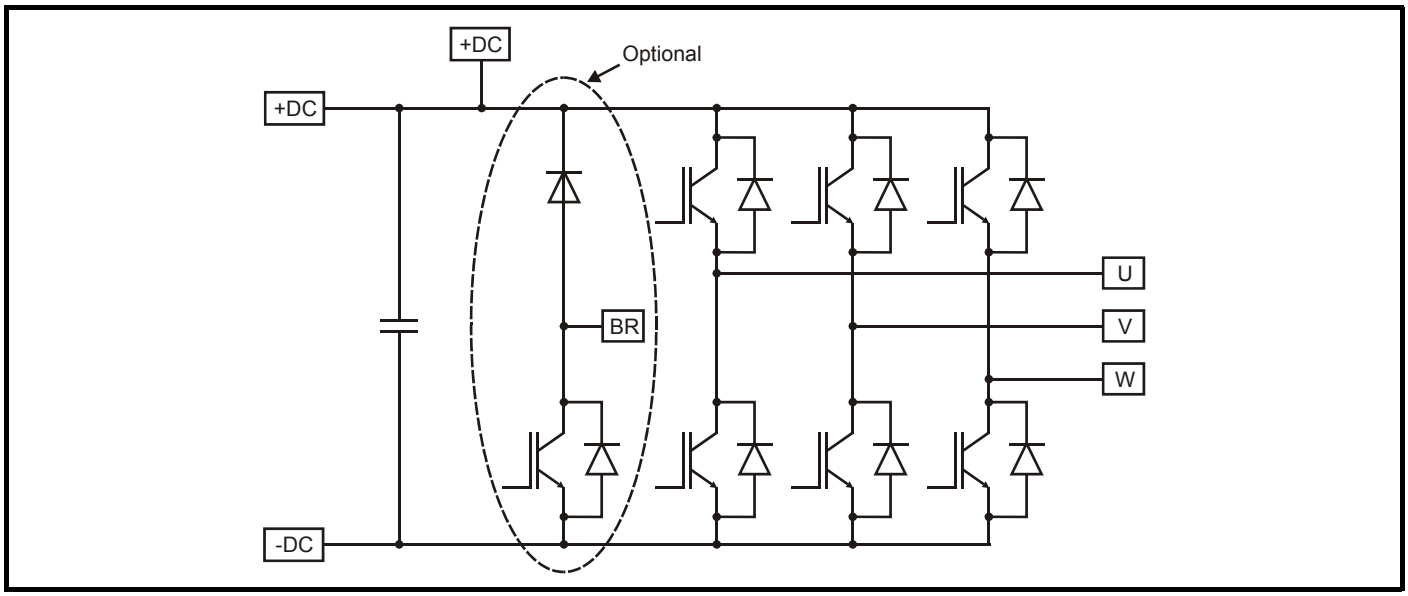
2.4 SPMD inverter

The SPMD is an inverter stage only (DC in to AC out). If a rectifier is required, then an SPMC or SPMU and AC input line reactor must also be installed. It can provide a maximum continuous output current of 350A (400V drive). DC connections can be used for regen and bus-parallel applications. The SPMD is available with or without a braking IGBT installed.

Figure 2-6 SPMD inverter schematic



2.5 Input line reactor

The INL line reactor must be used in conjunction with the Unidrive SPMC/U rectifiers. See section 6.2.2 *Input line reactor specifications* on page 70 for further information.

Figure 2-7 Single input line reactor (INLX0X)/force cooled (INLX0XW)

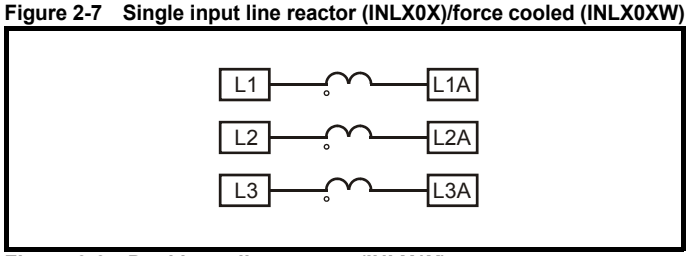
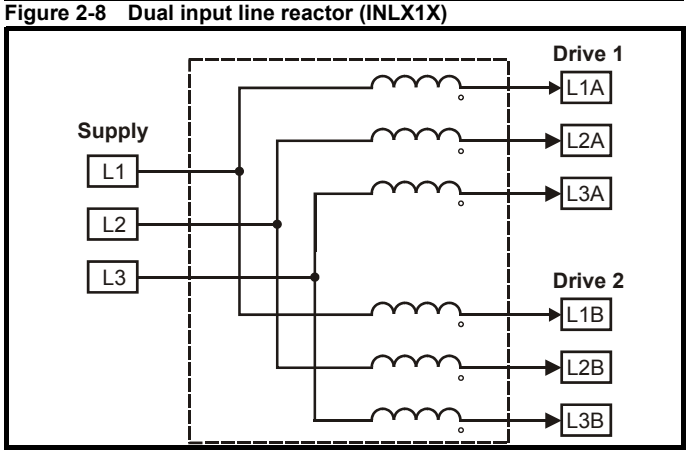


Figure 2-8 Dual input line reactor (INLX1X)



NOTE

This is not an interbridge reactor.

2.6 Output sharing choke

The OTL output sharing choke must be used on the output of Unidrive SPMA/D when more than one module is paralleled together.

Figure 2-9 Single output sharing choke (OTLX0X)

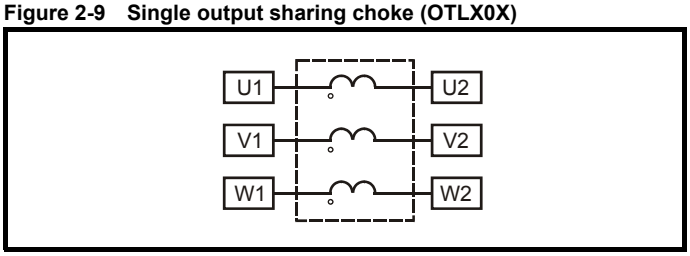
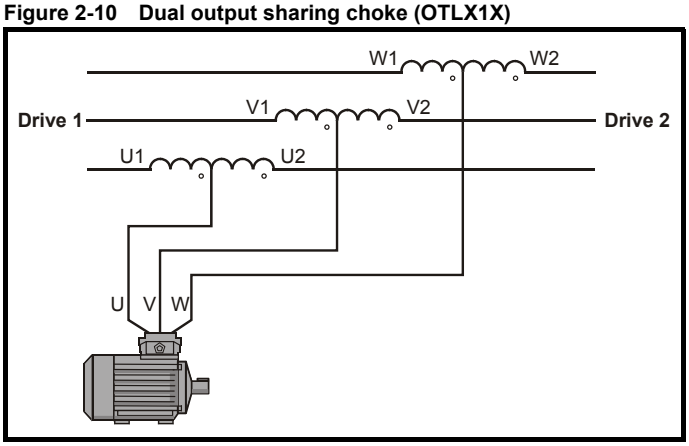


Figure 2-10 Dual output sharing choke (OTLX1X)



For a physical representation of the input line reactors and output sharing chokes, see Figure 3-4 on page 22.

2.7 Model number

The way in which the model numbers for the Unidrive SPM range are formed is illustrated below.

Figure 2-11 Rectifier (SPMC and SPMU)

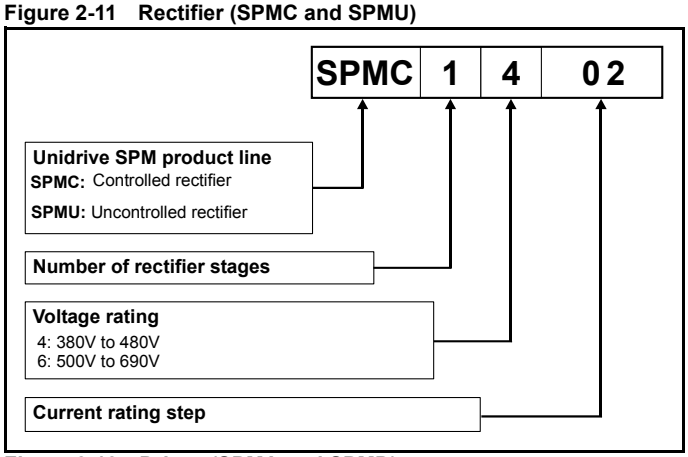
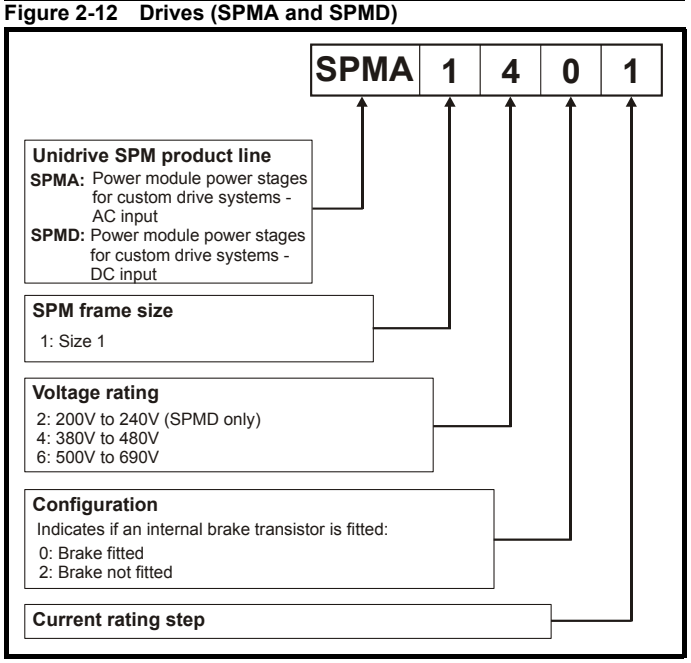


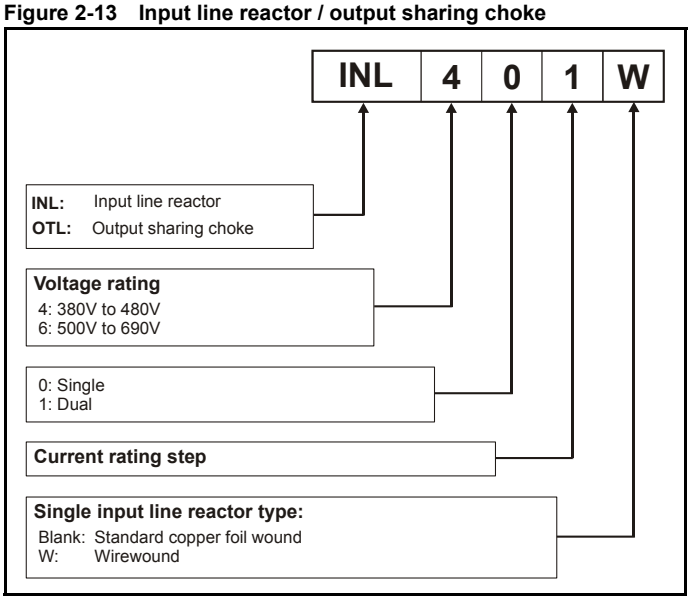
Figure 2-12 Drives (SPMA and SPMD)



NOTE

200V to 240V SPMD modules can only be supplied by an SPMU or separate soft start circuit.

Figure 2-13 Input line reactor / output sharing choke



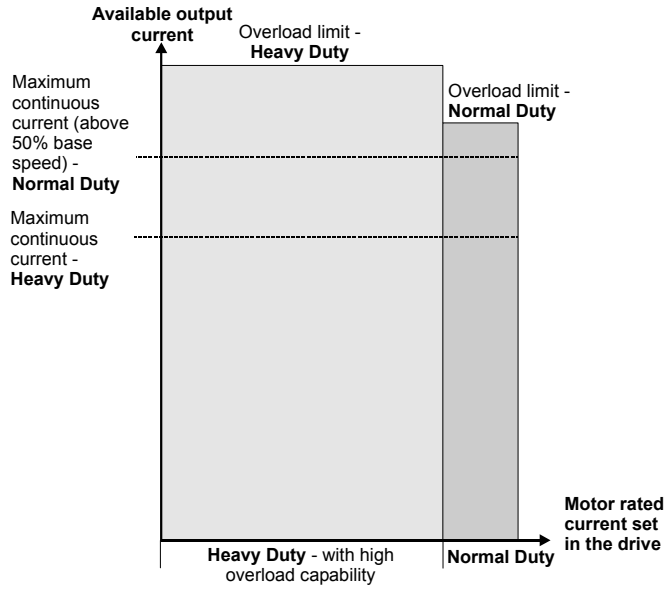
NOTE

The wirewound type of input line reactor is the minimum material version. Minimum airflow and maximum ambient temperature must be maintained. Refer to Table 14-24 on page 271.

3 Product Information

3.1 Ratings

The Unidrive SPM is dual rated.
The setting of the motor rated current determines which rating applies - Heavy Duty or Normal Duty.
The two ratings are compatible with motors designed to IEC60034.
The graph aside illustrates the difference between Normal Duty and Heavy Duty with respect to continuous current rating and short term overload limits.



Normal Duty

For applications which use self ventilated (TENV/TEFC) induction motors and require a low overload capability (e.g. fans, pumps).
Self ventilated (TENV/TEFC) induction motors require increased protection against overload due to the reduced cooling effect of the fan at low speed. To provide the correct level of protection the I^2t software operates at a level which is speed dependent. This is illustrated in the graph below.

NOTE

The speed at which the low speed protection takes effect can be changed by the setting of Pr **4.25**. The protection starts when the motor speed is below 15% of base speed when Pr **4.25** = 0 (default) and below 50% when Pr **4.25** = 1.

Heavy Duty (default)

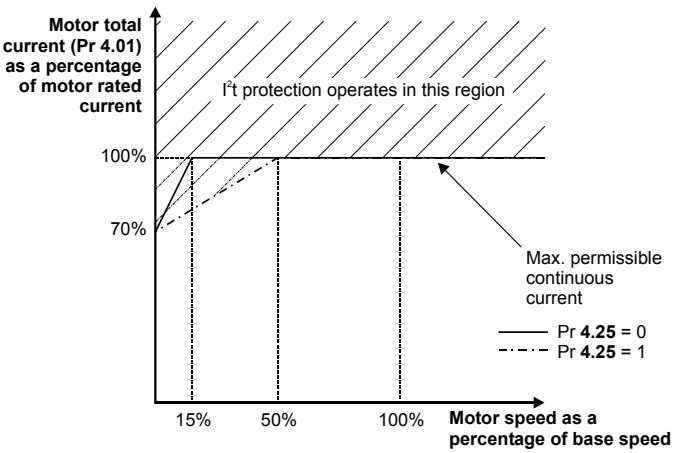
For constant torque applications or applications which require a high overload capability (e.g. winders, hoists).
The thermal protection is set to protect force ventilated induction motors and permanent magnet servo motors by default.

NOTE

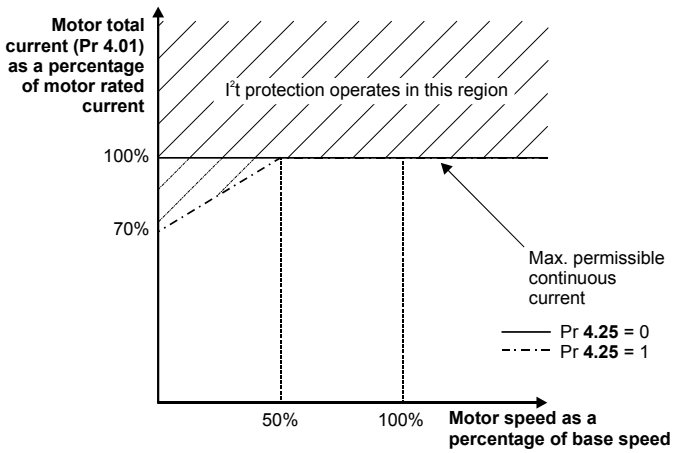
If the application uses a self ventilated (TENV/TEFC) induction motor and increased thermal protection is required for speeds below 50% base speed, then this can be enabled by setting Pr **4.25** = 1.

Operation of motor I^2t protection (It.AC trip)

Motor I^2t protection is fixed as shown below and is compatible with:
- Self ventilated (TENV/TEFC) induction motors



Motor I^2t protection defaults to be compatible with:
- Forced ventilation induction motors
- Permanent magnet servo motors



NOTE The Unidrive SPMD can be connected to its rectifier module in two ways, directly above the inverter (docked) or independently mounted in different vertical planes (undocked). Changes in the flow of air mean that the ratings are different for the two mounting methods for SPMD14x4. For details on docking, refer to section 5.6 *Docking a Unidrive SPMC/U to an SPMD* on page 42.

Table 3-7 SPMD 400V motor drive ratings (380V to 480V ±10%) based on AC supply voltage

Model	Normal Duty				Heavy Duty					Required rectifier	Required input line reactor	External 24V current consumption
	Maximum continuous output current	Peak current	Nominal motor power at 400V	Nominal motor power at 460V	Maximum continuous output current	Open loop peak current	Closed loop peak current	Nominal motor power at 400V	Nominal motor power at 460V			
	A	A	kW	hp	A	A	A	kW	hp			A
SPMD14X1 *1	205	225	110	150	180	232	270	90	150	1 x SPMC1402	1 x INL401	3.3
SPMD14X2 *1	246	270	132	200	210	271	315	110	150			
SPMD14X3 *1	290	319	160	250	246	310	359	132	200		1 x INL402	4.5
SPMD14X4 *2	335	365	185	300	290	374	435	160	250			
SPMD14X4 *3	350	385	200	300	290	374	435	160	250			

* Derating is applied to these drives at low output frequencies. Please contact the supplier of the drive for more information if the application requires significant torque, at or close to zero speed for extended periods of time or if prolonged periods of overload (>100%) are required.

*1 SPMD12X1 to 12X3 ratings apply with the rectifier docked and undocked.

*2 SPMD12X4 rating with the rectifier docked. The overload rating for the SPMD12X4 is only available if the ambient temperature is 35°C or lower.

*3 SPMD12X4 rating with the rectifier undocked. The maximum continuous output current and overload rating for the SPMD12X4 is only available if the ambient temperature is 35°C or lower.

Table 3-8 Paralleled SPMD 400V motor drive ratings (380V to 480V ±10%) based on AC supply voltage

Paralleled SPMD modules	Normal Duty				Heavy Duty					Required rectifier	Required input line reactor	Required output sharing choke
	Maximum continuous output current	Peak current	Nominal motor power at 400V	Nominal motor power at 460V	Maximum continuous output current	Open loop peak current	Closed loop peak current	Nominal motor power at 400V	Nominal motor power at 460V			
	A	A	kW	hp	A	A	A	kW	hp			
2 x SPMD14X1*	389	428	225	300	342	439	512	185	300	1 x SPMC2402	1 x INL411	1 x OTL411
2 x SPMD14X2*	467	514	280	400	399	513	598	225	300			1 x OTL412
2 x SPMD14X3*	551	606	315	450	467	586	683	280	400		1 x INL412	1 x OTL413
2 x SPMD14X4*	636	700	355	500	551	708	826	315	450			1 x OTL414
3 x SPMD14X2*	701	771	400	600	598	769	897	315	500	1 x SPMC2402 + 1 x SPMC1402	1 x INL411 + 1 x INL401	3 x OTL402
4 x SPMD14X1*	779	856	450	650	684	878	1025	355	600	2 x SPMC2402	2 x INL411	4 x OTL401
3 x SPMD14X3*	826	909	450	700	701	879	1025	400	650	1 x SPMC2402 + 1 x SPMC1402	1 x INL412 + 1 x INL402	3 x OTL403
4 x SPMD14X2*	934	1028	500	800	798	1026	1197	450	700	2 x SPMC2402	2 x INL411	4 x OTL402
3 x SPMD14X4*	954	1050	560	800	826	1062	1239	450	750	1 x SPMC1402 + 1 x SPMC2402	1 x INL412 + 1 x INL402	3 x OTL404
4 x SPMD14X3*	1102	1212	630	900	934	1172	1367	550	800	2 x SPMC2402	2 x INL412	4 x OTL403
4 x SPMD14X4*	1272	1400	710	1000	1102	1416	1652	630	900		2 x INL412	4 x OTL404

NOTE When connecting drives in parallel they must be derated. Table 3-2, Table 3-4, Table 3-6, Table 3-8 and Table 3-10 have already the required de-rating.

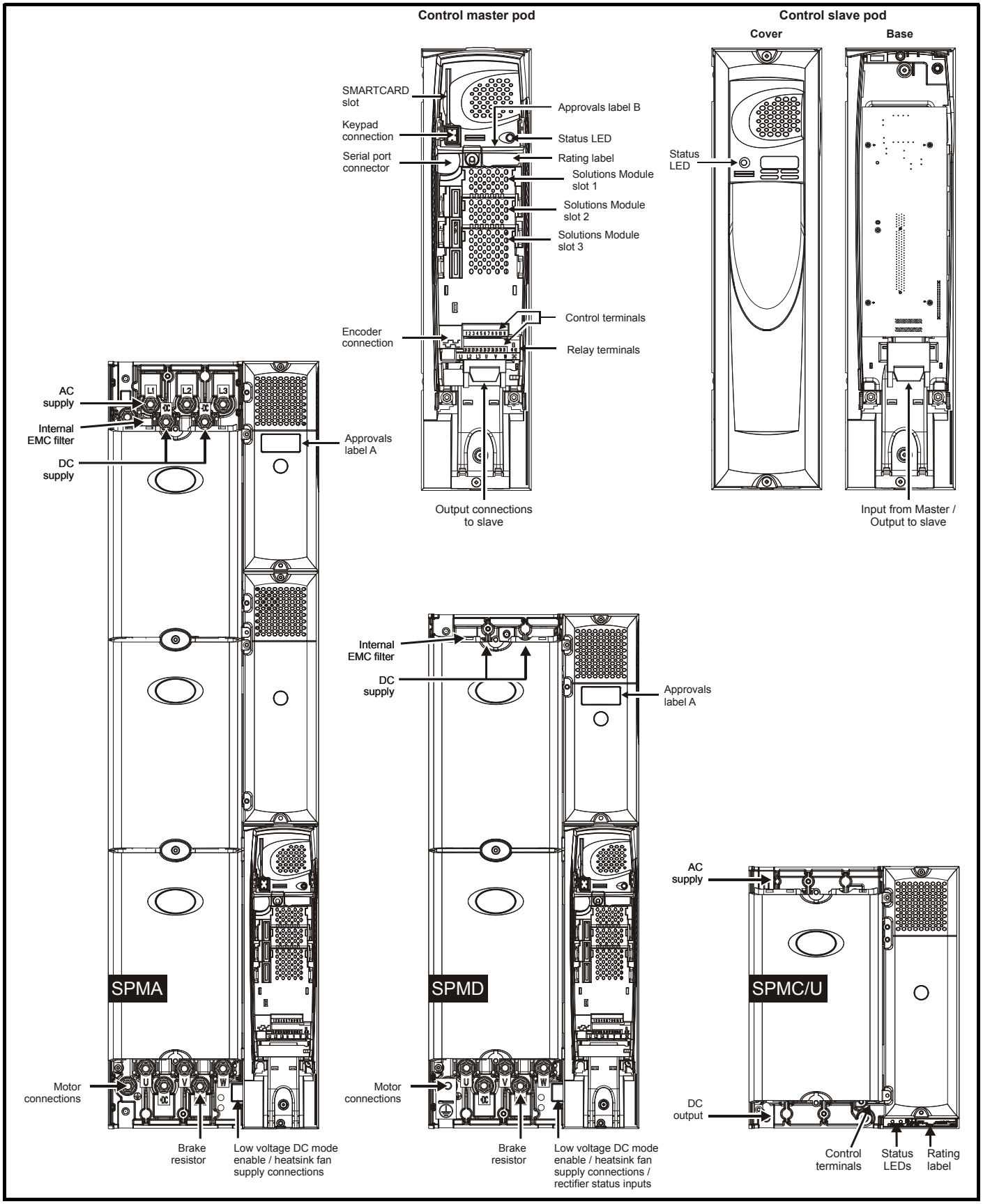
Table 3-9 SPMD 690V motor drive ratings (500V to 690V ±10%)

Model	Normal Duty				Heavy Duty					Required rectifier	Required input line reactor	External 24V current consumption
	Maximum continuous output current	Peak current	Nominal motor power at 690V	Nominal motor power at 575V	Maximum continuous output current	Open loop peak current	Closed loop peak current	Nominal motor power at 690V	Nominal motor power at 575V			
	A	A	kW	hp	A	A	A	kW	hp			A
SPMD16X1*	125	137	110	125	100	129	150	90	100	1 x SPMC/U1601	1 x INL601	3.3
SPMD16X2*	144	158	132	150	125	161	188	110	125			
SPMD16X3*	168	184	160	150	144	185	216	132	150		1 x INL602	4.5
SPMD16X4*	192	211	160	200	168	216	252	150	150			

* Derating is applied to these drives at low output frequencies. Please contact the supplier of the drive for more information if the application requires significant torque, at or close to zero speed for extended periods of time or if prolonged periods of overload (>100%) are required.

3.4 Features

Figure 3-1 Features of the Unidrive SPM Modules



NOTE

24V supply is required for fans on all modules.

14 Technical Data

14.1 Drive

14.1.1 Power and current ratings (Derating for switching frequency and temperature)

For a full explanation of 'Normal Duty' and 'Heavy Duty' refer to section 3.1 *Ratings* on page 14.

Table 14-1 Maximum permissible continuous output current @ 40°C (104°F) ambient (SPMD drives in docked condition)

Model	Normal Duty					Heavy Duty				
	Nominal rating		Maximum permissible continuous output current (A) for the following switching frequencies			Nominal rating		Maximum permissible continuous output current (A) for the following switching frequencies		
	kW	hp	3kHz	4kHz	6kHz	kW	hp	3kHz	4kHz	6kHz
SPMA14X1	110	150	205		164	90	150	180	174	135
SPMA14X2	132	200	236	210	158	110	150	210	175	130
SPMA16X1	110	125	125	100	74	90	100	100	100	74
SPMA16X2	132	150	144	100	74	110	125	125	100	74
SPMD12X1	55	75	192	187	143	45	60	156	150	110
SPMD12X2	75	100	248	225	172	55	75	192	175	128
SPMD12X3	90	125	312	264	202	75	100	250	206	151
SPMD12X4	90	125	335	305	233	90	125	290	241	177
SPMD14X1	110	150	205	187	143	90	150	180	150	110
SPMD14X2	132	175	248	225	172	110	150	210	175	128
SPMD14X3	160	200	290	264	202	132	175	248	206	151
SPMD14X4	185	300	335	305	233	160	200	290	241	177
SPMD16X1	110	125	125	103	74	90	100	100	90	65
SPMD16X2	132	150	140	118	89	110	125	125	112	84
SPMD16X3	160	150	158	133	100	132	150	142	119	89
SPMD16X4	160	200	165	140	106	150	150	160	135	102

Table 14-2 Maximum permissible continuous output current @ 40°C (104°F) ambient (SPMD drives in undocked condition)

Model	Normal Duty					Heavy Duty				
	Nominal rating		Maximum permissible continuous output current (A) for the following switching frequencies			Nominal rating		Maximum permissible continuous output current (A) for the following switching frequencies		
	kW	hp	3kHz	4kHz	6kHz	kW	hp	3kHz	4kHz	6kHz
SPMD12X1	55	75	192	187	143	45	60	156	150	110
SPMD12X2	75	100	248	225	172	55	75	192	175	128
SPMD12X3	90	125	312	264	202	75	100	250	206	151
SPMD12X4	110	150	350*	312	240	90	125	290	255	190
SPMD14X1	110	150	205	187	143	90	150	180	150	110
SPMD14X2	132	175	248	225	172	110	150	210	175	128
SPMD14X3	160	200	290	264	202	132	175	248	206	151
SPMD14X4	200	300	350*	312	240	160	200	290	255	190
SPMD16X1	110	125	125	109	79	90	100	100	95	68
SPMD16X2	132	150	144	128	96	110	125	125	119	89
SPMD16X3	160	150	168	1142	107	132	150	144	126	99
SPMD16X4	160	200	192	158	119	150	150	168	144	102

* Rating at 35°C.

NOTE

For the definition of ambient temperature, see section 5.8.2 *Enclosure ambient temperature* on page 54.

NOTE

An additional derating of 5% is required for parallel applications.