



EMC Compliance folder.

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2 EMC Compliance statement declaration of conformity.



This apparatus complies with the protection requirements of the EMC Directive 89/336/EEC as follows:

2.1 CE Immunity

The unit complies with the following standards:

EN 50082-2-1995 - generic immunity standard - industrial environment

EN 50082-1-1997 - generic immunity standard - residential, commercial and light industry

EN 61800-3:1996 and prA I 1: 1999 - Adjustable speed electrical power drive systems - EMC product standard including specific test methods - first and second environments

Performance criteria:

No change of state or stored data, temporary variation in analogue input or output level < 1%

2.2 CE Emissions

Control supply port and control signal port:

Conducted and radiated emissions comply with the following standards-

EN 50081-2:1993 - generic emissions standard - industrial environment (EN 55011 Class A)

EN 50081-1:1992 - generic emissions standard - industrial environment (EN 55022 Class B)

EN 61800-3:1996 and prA 1 1: 1999 - Adjustable speed electrical power drive systems - EMC product standard including specific test methods - first and second environments, restricted or unrestricted distribution.

Mains harmonics: The control supply port active input power is less than 50W with the class D waveshape and therefore meets EN 61000-3-2:1995 with no limits applied.

motor supply port:

Class B (EN 61800-3 unrestricted distribution, industrial environment) limits. No filter required.

In order to meet Class A (EN 61800-3 restricted distribution, domestic environment) mains conducted emissions limits on this port, a separate filter is required. Please refer to supplier.

3 Applicable products

3.1 1 phase 1Q

1 PHASE 1Q.

340
680
1220

340i
680i
1220i

300
370
400
400i
E400i
800
1200
1600I
3200I/8
3200I/16
3200I/32
3200I/48

3.2 1 phase 4Q

1 PHASE 4Q.

3600XRi/4
3600XRi/8
3600XRi/16 LN
3600XRi/16 LL
3600XRi/32
3600XRi /36

340XRi
680XRi
1220XRi

3.3 Enclosures

ENCLOSURES.

300E
400E
800E
1200E
400ER
800ER
1200ER
SE1600i
SE3200i/8
SE3200i/16
SE3200i/32
SE3200i/48
SE3600XRi/4
SE3600XRi/8
SE3600XRi/16
SE3600XRi/32

SE340
SE680
SE1220

SE340i
SE680i
SE1220i

SE340XRi
SE680XRi
SE1220XRi

3.4 3 phase 2Q

3 PHASE 2Q.

SLE14 34A
SLE24 58A
SLE34 82A
SLE44 106A
SL5 12A
SL10 24A
SL15 36A
SL20 48A
SL30 72A
SL40 96A
SL50 120A
SL65 155A
SL85 205A
SL115 270A
SL145 330A

PL5 12A

PL10 24A
PL15 36A
PL20 51A
PL30 72A
PL40 99A
PL50 123A
PL65 155A
PL85 205A
PL115 270A
PL145 330A
PL185 430A
PL225 530A
PL265 630A

3.5 3 phase 4Q

3 PHASE 4Q.

SLX5 12A
SLX10 24A
SLX15 36A
SLX20 48A
SLX30 72A
SLX40 96A
SLX50 120A
SLX65 155A
SLX85 205A
SLX115 270A
SLX145 330A
PLX5 12A
PLX10 24A
PLX15 36A
PLX20 51A
PLX30 72A
PLX40 99A
PLX50 123A
PLX65 155A
PLX85 205A
PLX115 270A
PLX145 330A
PLX185 430A
PLX225 530A

PLXD Stack Driver
PLA Applications Module
Pulse Tx Bd LA102800

3.6 Linear

LINEAR

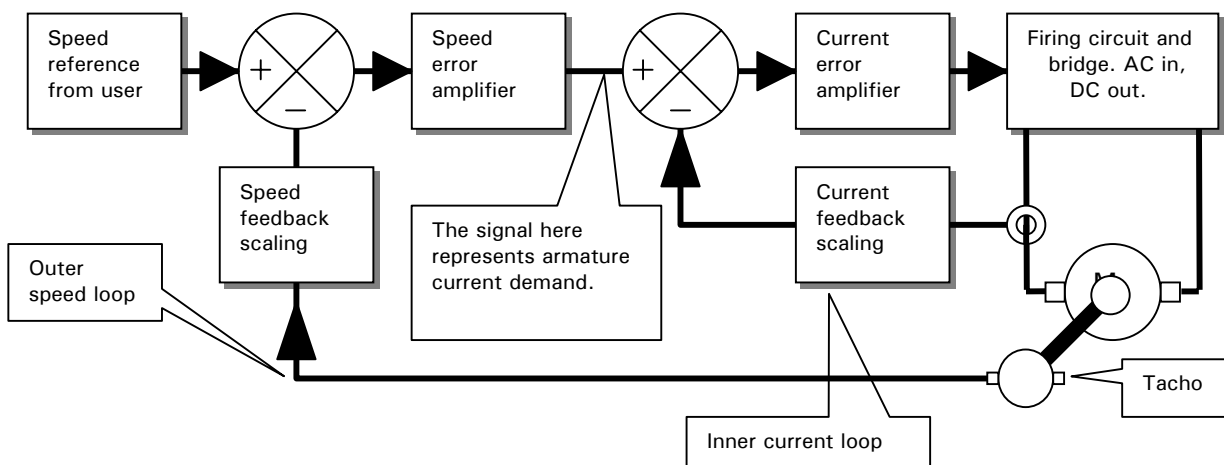
200XLV

4 Product Description for DC motor controllers

The DC motor controller uses closed loop control of armature current and feedback voltage to give precise control of motor torque and speed. The unit also controls the motor excitation field. The closed loop parameters are programmable by the user and extra inputs and outputs are provided to allow typical motion control processes to be achieved. The product range is comprised of single phase and 3 phase models with 1, 2 and 4 quadrant versions.

Built in application software blocks are provided to be connected up as desired. Comprehensive fault monitoring and serial communications allow off site programming and remote diagnostics. All models, plus fuses, filters and line reactors are stock items.

4.1 Block diagram of DC motor controllers



This shows the basic arrangement of the drive control loops. The thyristor bridge is a phase-controlled rectifier, which delivers power to the motor armature. The armature current (and hence the motor torque) is sensed to provide feedback to the inner current loop. After being scaled this is compared to the current demand. The current error amplifier is able to detect any difference, and then act in such a way that the current feedback remains identical to the current demand during normal operation. This inner loop monitors the armature current and delivers more current or less current as required.

The outer speed loop works in the same way as the inner current loop but uses different parameters. In the above example, the demand is provided by the user in the form of a speed reference, and the speed feedback is derived from a shaft-mounted tachometer. Any difference is detected and translated into a new current demand level. This level provides the right amount of current (and hence torque) to reduce the speed error to zero. This new demand level is presented to the inner current loop, which obeys as rapidly as possible.

The whole process is performed on a continuous basis giving speed accuracy and dynamic performance.

Description applies to

- 3.1 1 phase 1Q
- 3.2 1 phase 4Q
- 3.3 Enclosure
- 3.4 3 phase 2Q
- 3.5 3 phase 4Q
- 3.6 Linear

5 Test report

The products all operate in the same way and share very similar if not identical construction techniques. They are differentiated primarily on the power ratings and bridge configuration. (1Q, 2Q, 4Q)

For the purposes of testing, a representative sample from each range was selected by the test facility to represent all models in that range.

6 Independent test houses



Testing was performed by two independent test facilities and also by the manufacturer.

ERA Technology Ltd, Cleeve RD. Leatherhead, Surrey, KT22 7SA, England.

Elmac Services, Gravel Lane, Quarry Lane Ind. Est. Chichester, West Sussex, PO19 2PQ, England

Sprint Electric Ltd. Rudford Ind. Est. Ford, Arundel, West Sussex, BN18 OBD, England

6.1 Era Test Report



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44.MP/EP/16F/L1405
Your Ref:

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19 April 1994

Dear Edwin

Drives Club II EMC Investigations on
Sprint Electric and Harland Simon DC Drives

Introduction

Investigations were performed by ERA's Drives Club II to identify the RF conducted emissions from standard industrial DC drives. Two Sprint Electric drives of 0.55 kW and 7.5 kW were tested and one Harland Simon drive of 7.5 kW. Schaffner UK were invited to filter these drives to meet the generic emission standards BS EN 50081-1/2.

Test Set Up

Tests were performed in accordance with BS EN 50081-1/2 to measure the AC supply RF conducted emissions of the DC drives. Five metres of screened cable were used between the drive and the motor armature and field connections. The screen was connected at one end to the motor frame and at the other to the drive earth. The DC motor was loaded with an AC induction machine fed from an inverter. When used to brake the DC machine, the energy was dissipated in brake resistors switched across the inverter DC link. The AC supply to the inverter was RF Filtered as was the inverter output to the induction motor. For the 0.55 kW unit the DC motor was loaded with an eddy current brake instead. Both tests rigs were insulated from the test ground plane/LISN earth, the only earth connection being by the screened motor-drive connections.

cont'd/....

RESEARCH, DEVELOPMENT AND TESTING FOR INDUSTRY - WORLDWIDE

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Approved to British Standard BS 5750 Part 1 (ISO 9001, EN 29001) Reg No FM 1303. Company Registered in England No 170454. Registered Office as above

2

Results

The following tables summarise the results:

Please note that the RF Filtered AC inverter introduced RF conducted noise onto the DC drive supply as shown in Figure 1.1. Note this is for the AC drive running at no load, full speed. This noise will be superimposed on all the conducted emission results with the inverter on.

Table 2
Sprint Electric 0.55 kW 3600 XRI

No load	Full load	Line Reactor	R F Filter	Saturable Reactors	Compliance	Figure No
Yes	-----	No	None	No	No	2.1
----	Yes	No	FN 357	No	EN 50081-1	2.2

Table 3
Spring Electric 7.2 kW SLX

No load	Full load	Line Reactor	R F Filter	Saturable Reactors	Compliance	Figure No
Yes	-----	No	No	No	No	3.1
----	Yes	No	No	No	No	3.2
Yes	Yes	No	FN351	RD200	EN50081-1/2	3.3
Yes	Yes	Yes/No	FN351	No	EN50081-2	3.4

Table 4
Harland Simon Micropower 7.5 kW Drive

No load	Full load	Line Reactor	R F Filter	Saturable Reactors	Compliance	Figure No
Yes	-----	Yes	No	No	No	4.1
----	Yes	Yes	No	No	No	4.2
Yes	-----	Yes	FN351	R200	EN50081-1	4.3
----	Yes	Yes	FN351	R200	EN50081-1	4.4

Conclusions

Without EMC filtering, DC drives (with line reactors) produce large amounts of RF noise which exceed the generic EMC emission specification (BS EN 50081) for the AC supply conducted noise, especially between 150 kHz and 2 MHz. The noise increases as the loading increases. By adding the Schaffner FN351 filter the noise is greatly reduced to levels which approximately meet the 'industrial' generic emission standard BS EN 50081-2. By additionally adding Schaffner RD200 saturable reactors to each phase between the filter and drive, the levels fall to meet the tighter 'light industrial, residential, commercial' generic emission standard BS EN50081-1.

To meet these specifications requires that the cable between the drive and motor is armoured/screened, and the earths are made at each end. This will also help to meet the radiated noise specification, although no tests were performed to measure this.

Please note even with RF filtering DC drives will still produce large harmonic currents of the mains frequency. Limits on the 0-2 kHz harmonic currents are under consideration for future inclusion in the emission standards BS EN 50081-1/2.

Yours sincerely,



M Payn (Dr)
Senior Engineer
Drives Group
Electrical Applications Department
Design Division

6.2 Elmac Services Test Report

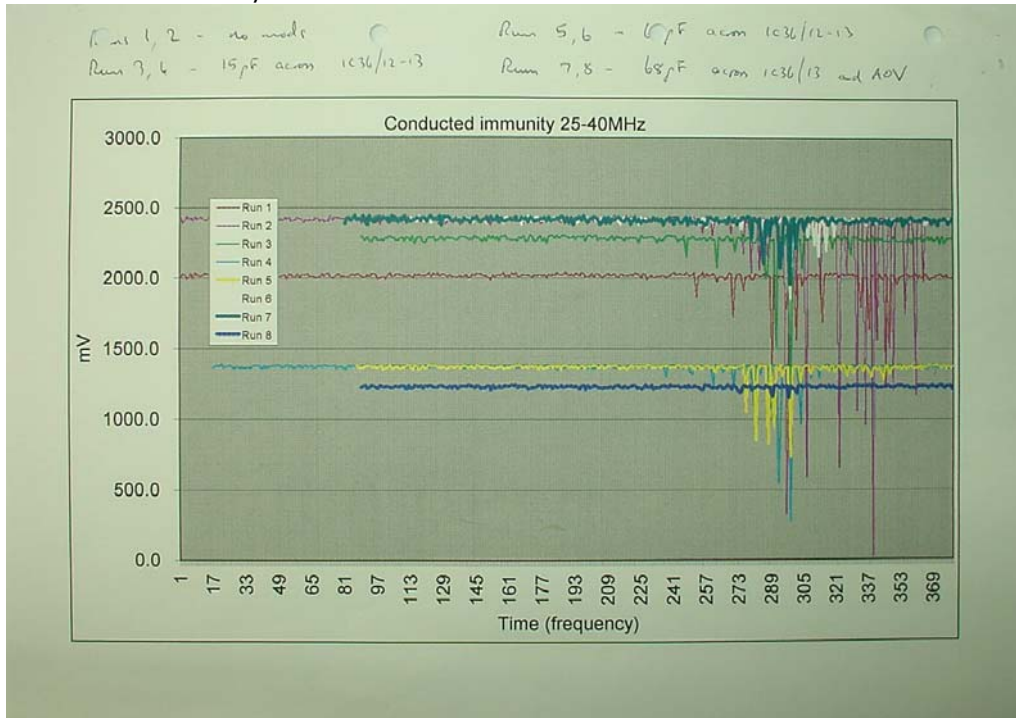
Model under test PL/X50

6.3 Tests performed.

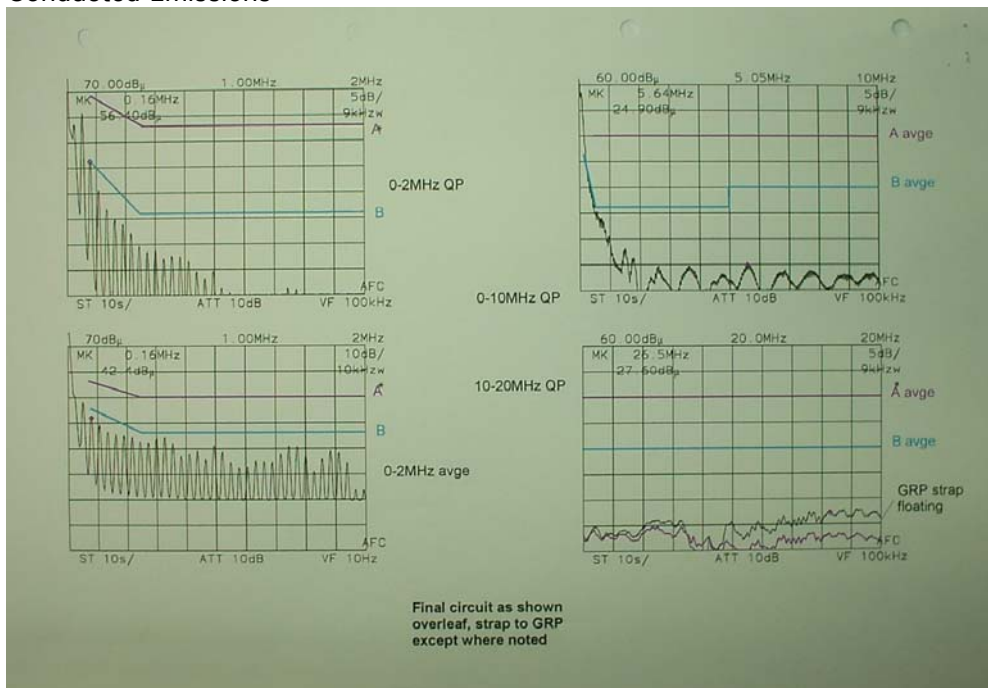
Conducted fast transients

Results. The EUT is compliant to +/- 2KV. No effects beyond +/-1mV displayed jitter were observed when the burst were introduced via the capacitive clamp onto the and motor three-phase connections.

Conducted immunity



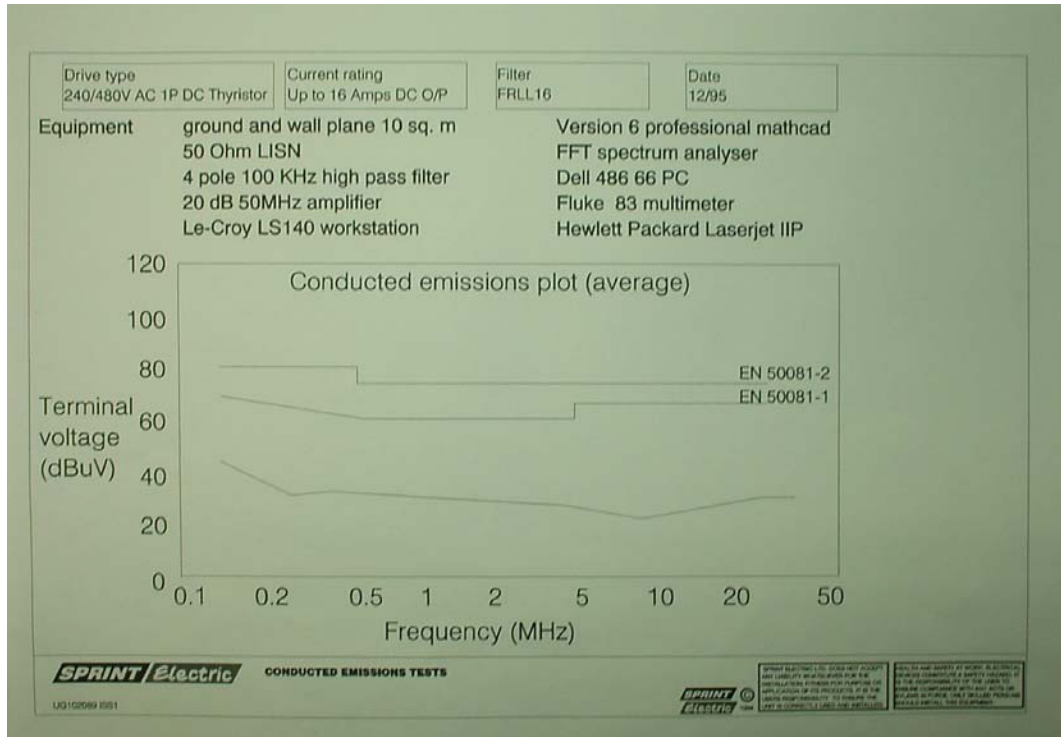
Conducted Emissions



6.4 Sprint Electric Test Report

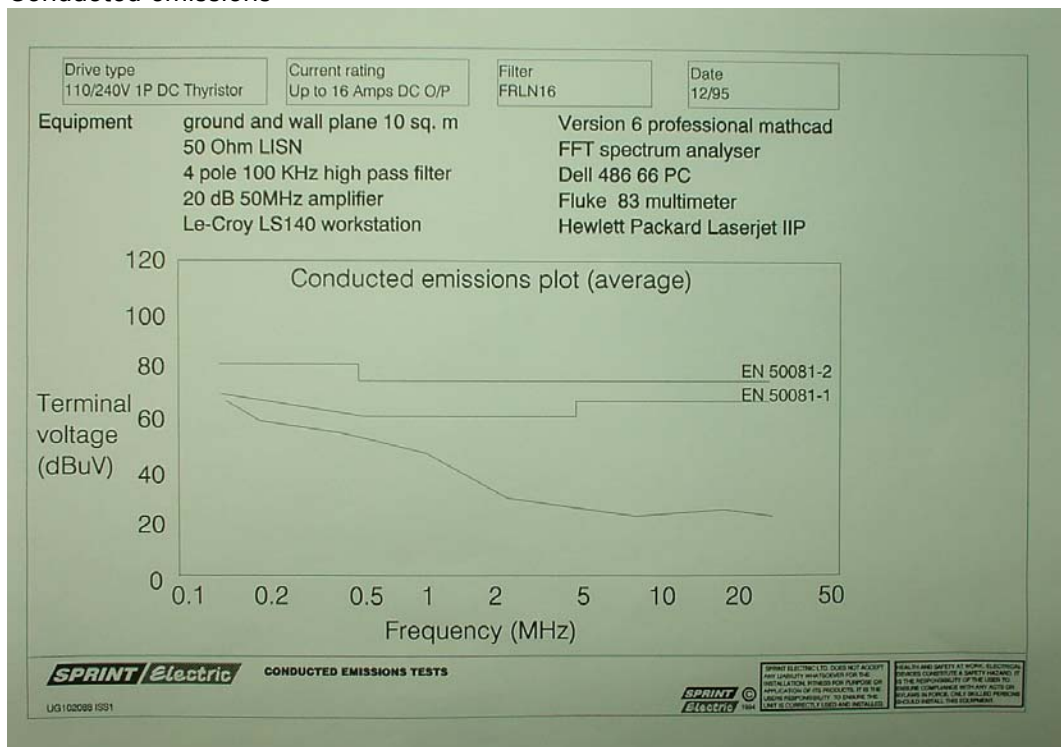
Model under test 3200i

Conducted emissions



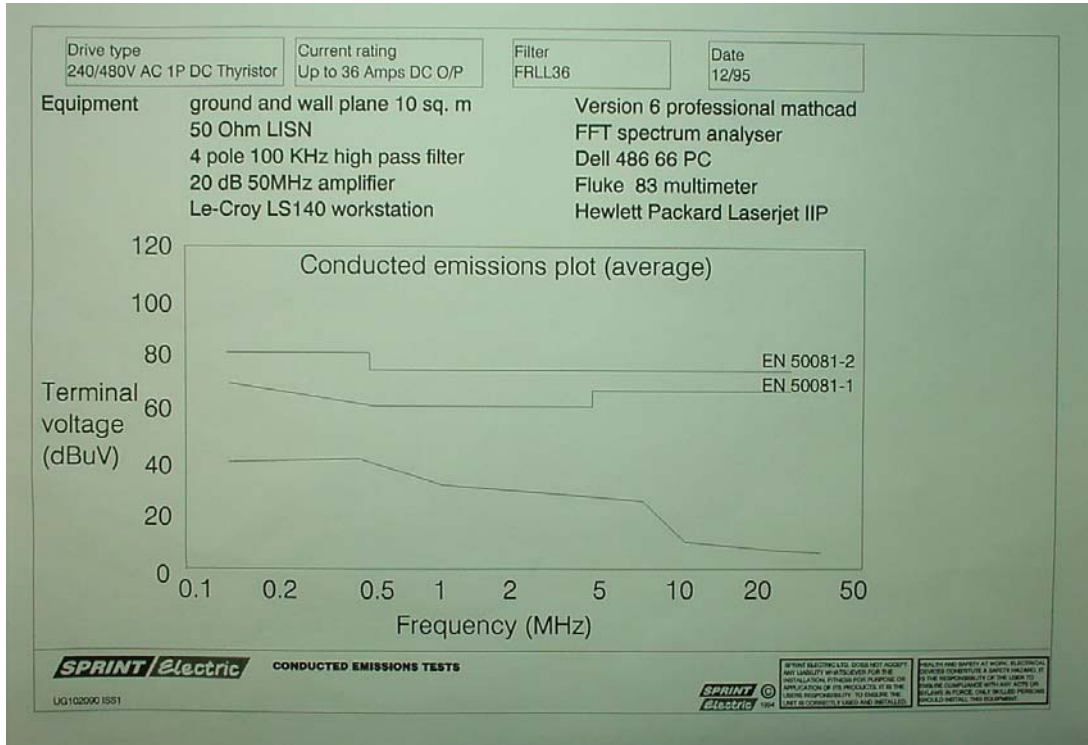
Model under test 1600i

Conducted emissions



Model under test 3600XRi

Conducted emissions



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