COUNTIESPOWER

Distribution Code
Part 5: Technical Interference Requirements

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Distribution Code – Part 5: Technical Interference Requirements

1.0 Introduction

This document provides information relating to the impact of connections to the quality of the supply provided over the Counties Power network. It covers system disturbances and waveform distortion, power factor standards, motor requirements and mains-borne signalling.

The full Distribution code comprises six parts, all of which are available from Counties Power's website www.countiespower.com, each covering a specific set of requirements:-

Part 1: General Requirements

Part 2: Network Connection Standard

Part 3: Metering Requirements for Electrical Installations

Part 4: Distributed Generation Requirements

Part 5: Technical Interference Requirements (this document)

Part 6: Distribution Operation Code

Definitions of terms and abbreviations are found in section 14.1 of Part 1 of this code.

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Contents

2.0 System Disturbances and Waveform Distortion

2.1 General

Distortion of the system voltage waveform caused by certain types of equipment may result in annoyance to users of the distribution system or damage to connected apparatus. In order to limit these effects the following shall apply to users' plant (loads or generation) connected to the distribution system.

2.2 Voltage and Current Waveform Distortion Limits

To limit the potential effects of voltage waveform distortion and other disturbances on the network caused by certain types of User Equipment, a User's load or generation must comply with the following:

(a) voltage and current waveform distortion must comply with the limits set out in all relevant Regulations, Rules, Electrical Codes of Practice and 61000 series joint Australian / New Zealand EMC standards;

(b) the voltage and current waveform distortion by any load or End-Consumer Installation must comply with the current versions of:

i) AS/NZS 61000.3.2 Electromagnetic compatibility (EMC) Part 3.2 Limits – Limits for harmonic current emissions (equipment input current less than or equal to 16 A per phase);

ii) AS/NZS 61000.3.4 Electromagnetic compatibility (EMC) Part 3.4 Limits – Limitation of emission of harmonic currents in low voltage power supply systems for equipment with rated current greater than 16 A; and

iii) AS/NZS 61000.3.6 Electromagnetic compatibility (EMC) Part 3.6 Limits – Assessment of emission limits for distorting loads in MV and HV power systems (IEC 61000-3-6:2014, MOD).

(c) Voltage fluctuations and flicker due to any load or equipment (e.g., motor starting, motor operation, sudden switching of large loads or equipment, operation of electrical arcing equipment such as welding machines or arc furnaces, etc) must comply with:

i) AS/NZS 61000.3.3 Electromagnetic compatibility (EMC) Part 3.3 Limits – Limitation of voltage changes, voltage fluctuations and flicker in public low- voltage supply systems, for equipment

with rated current less than or equal to 16A per phase and not subject to conditional connection.

ii) AS/NZS 61000.3.5 Electromagnetic compatibility (EMC) Part 3.5 Limits – Limitation of voltage fluctuations and flicker in low-voltage supply systems, for equipment with rated current greater than 16 A.

iii) AS/NZS 61000.3.7 Electromagnetic compatibility (EMC) Part 3.7 Limits – Assessment of emission limits for fluctuating loads or generation in MV and HV power systems (IEC 61000-3-7:1996, MOD).

2.3 Corrective Measurers

Counties Power may require a user to implement corrective measures to limit the level of distortion, at its own expense, if the user's equipment does not comply with the requirements above. Under special circumstances Counties Power may consider other limits or levels.

2.4 Fault Conditions

Under fault and circuit switching conditions the rated frequency or voltage may fall or rise transiently. The fall or rise in voltage will be affected by the method of earthing of the neutral point of the Network, and this variation in voltage will be taken into account by users in selecting user Equipment.

3.0 Power Factor Standards

3.1 General

Counties Power reserves the right to require the installation of reactive metering and to charge for VAr's supplied to an installation where the mean power factor of the installation is below 0.95 lagging.

All new and/or additional motors of size 0.75 kW (1 HP) and over shall be installed with power factor correction to ensure that the power factor of the motor is maintained at, or better than, 0.95 lagging.

The presence of harmonics (as introduced by some electronic starters and speed controllers) may have a detrimental effect on power factor correction capacitors.

3.3 Motor Correction

Recommended capacitor sizes:

Motor Size (HP)	kW	3phase Amps /phase @ .95	Capacitor Size (KVA)
1.0	0.75	1.1	0.5
1.5	1.2	1.8	0.5
2.0	1.5	2.3	0.75
3.0	2.25	3.4	1.0
5.0	3.75	5.7	1.5
7.5	5.6	8.5	2.0
10.0	7.5	11.4	3.0
15.0	11.2	17.1	4.0
20.0	15.0	22.9	5.0
30.0	22.4	34.2	7.0
40.0	29.8	45.5	9.0
50.0	37.3	56.9	12.0

This list applies to 1450 RPM squirrel cage motors only. Larger or special motor installations (e.g. slow speed motors) will require power factor correction designed specifically for the installation.

Power factor correction will normally be wired on the motor side of the protection and control equipment. However, connection to the supply side may, in some instances, be a practical solution. Early discussion with Counties Power Engineering staff is recommended.

3.4 Automatic Control

In larger installations and particularly where there are a number of smaller motors installed, automatic control of a bank of capacitors supplied from the busbars may be a satisfactory alternative to distributed correction.

3.5 Mains Borne Signalling

Refer section 5 regarding the requirement for blocking equipment on power factor correction installations.

4.0 Motors

4.1 Recommended Maximum Size – Single Phase

It is recommended that the maximum size of single phase motors connected is 1.5 kW. Where larger motors are connected, Counties Power accept no responsibility for flicker or other interference caused, to the customer, by motor starting or running conditions. Where flicker or interference is caused to other customers Counties Power may require that the cause of the problem be removed or rectified at the motor owners cost.

4.2 Power Factor Correction

Power factor correction equipment shall be installed so as to maintain a mean power factor of 0.95 lagging – refer section 3

4.3 Motor Starting Requirements - Limiting of Motor Starting Current

No motor shall be connected and started in such a manner that it causes interference or voltage problems. Should it be found to create these problems, or at Counties Power request, the installation or starting system shall be modified at the customer's cost. Discussions with Counties Power Engineering staff, at an early stage in the installation planning, may assist in overcoming these problems. When requested, Counties Power Engineering staff will indicate the maximum starting current available at that point in the system. In urban areas this maximum starting current may be less than the network capability due to the problem of starting flicker interference to residential customers.

Providing the above is satisfied, the following shall apply:

- Direct On Line Starters (DOL) may be used for up to and including 5.0 HP multi cage low starting current motors and others approved by Counties Power Engineering staff.
- A Motor supplied from a transformer servicing that customer only, up to and including 50.0 HP, may be installed without Counties Power engineering consent.
- All motors above 50.0 HP shall only be connected with the consent of Counties Power Engineering staff
- Electronic speed control systems have the potential to introduce harmonics into the power system. Where the controlled load is a significant portion of the total load, the introduced harmonics can exceed the maximum levels recommended by the Electrical Code of Practice –

ECP 36. It is the customer's responsibility to ensure that these levels are not exceeded.

- Where a number of motors are connected to the supply consideration should be given to configuring the overall control system to provide for staggered starting of motors to prevent the starting current capacity of the supply being exceeded and /or excessive voltage drop.

Counties Power engineering staff will use the Electricity Engineers Association 'Motor Starting Current for AC Motors' as a guide when considering motor starters.

5.0 Mains Borne Signalling

Counties Power uses a superimposed 375Hz injection signal "Ripple Signal" for load control signalling purposes across its network. Installations that could significantly absorb this signal (e.g. centralised power factor correction systems) shall incorporate suitable blocking equipment.

Where users install mains-borne signalling equipment for their own internal use, it shall comply with appropriate Industry Standards as amended from time to time.

Where a user proposes to use such equipment to superimpose signals that will or could flow on to the Counties Power distribution system, the prior agreement of Counties Power is required.

Counties Power uses the Decabit standard for its control signal injection channels and has the following channels in service: -

1 – 14	Domestic Water Heating control
21 – 29	Commercial controlled loads
31 – 33	Glasshouse controlled load
40 – 41	Emergency Under-frequency Control
46 – 47	Street Lighting Control
50 – 55	Peak Saver Tariff control
91	Low Rate Tariff control
93	Summer/Winter Tariff control
94	Commercial Night Rate Tariff control

95	Maximum Demand Indicator reset
96	Domestic Night Rate Tariff control
97	Industrial Customer Control
99	Night Rate Control