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APPENDIX S

ROOFBOLTER PUMP MOTOR

Typical nameplate data for the pump motor of a Roofbolter can be seen in Table S-2. The pump motor measured at both sections was a 30 kW induction motor with a full load current rating of 20 A.

Table S-1: Nameplate data of the pump motor on a CM.

Roofbolter Pump Motor				
Power	30	kW	Voltage	1000 V
Duty	S1		Current	20 A
Ins class	F		RPM	1460
			pf	0.94

Table S-2: Production figures for shifts that the conveyor motor was investigated.

Date	Sect 21		Sect 61	
	Morning	Afternoon	Morning	Afternoon
17-May-2005	858	2145	-	-
18-May-2005	1320	2112	-	-
19-May-2005	1716	2013	-	-
23-May-2005	-	-	1740	2030
24-May-2005	-	-	1450	2320
25-May-2005	-	-	2320	1160

S.1 LOAD PROFILE

The next section focuses on the load profiles of the pump motor. Each graph shows the line voltage and the voltage limits, the load current and full load current capacity of the pump motor. The morning shifts and afternoon shifts are separated as well as the measurements made at the different sections.

S.1.1 SECTION 21

S.1.1.1 Morning shifts

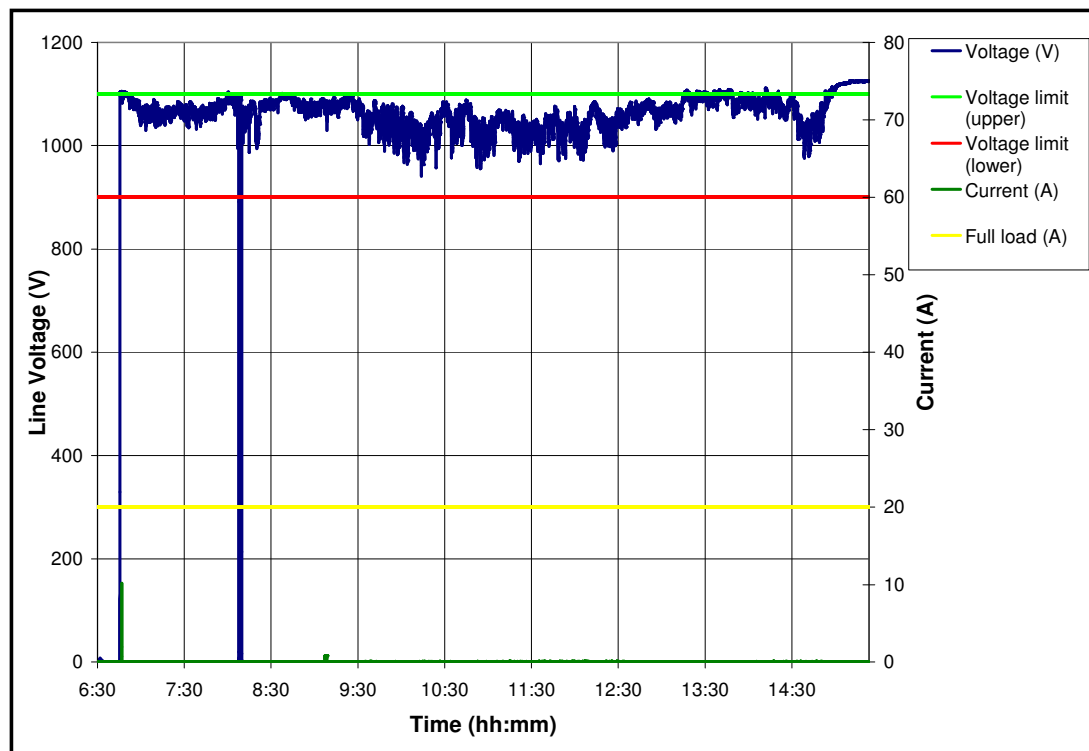


Figure S.1-1: Load current and voltage for a pump motor – 17 May 2005.

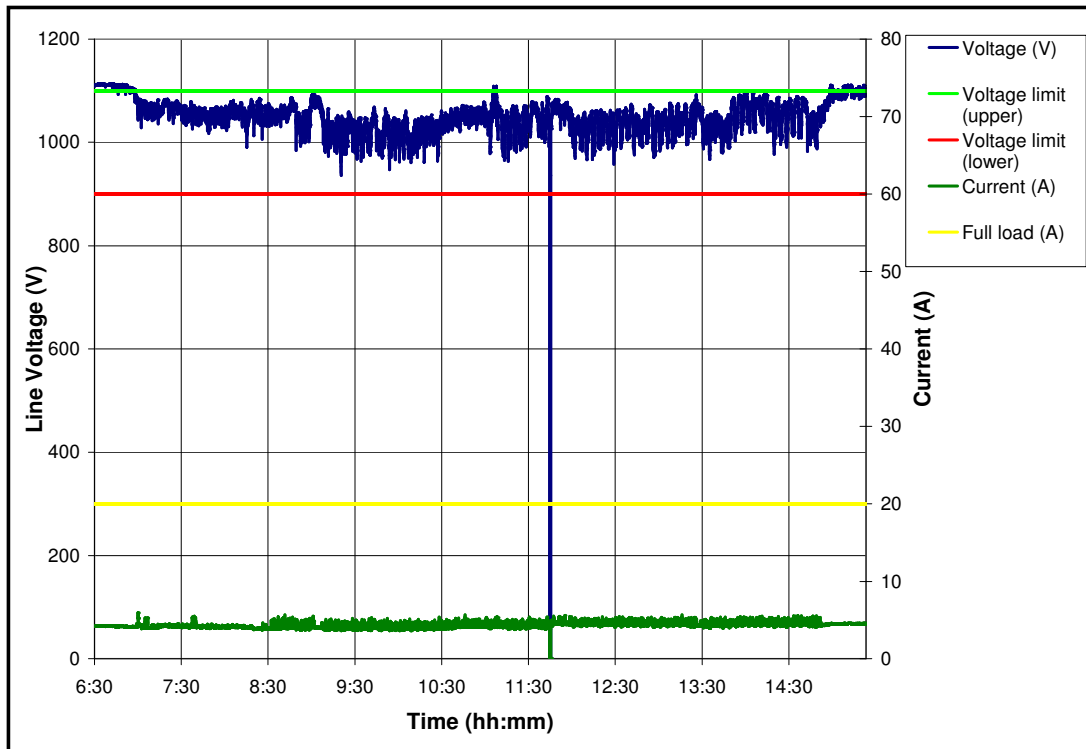


Figure S.1-2: Load current and voltage for a pump motor – 18 May 2005.

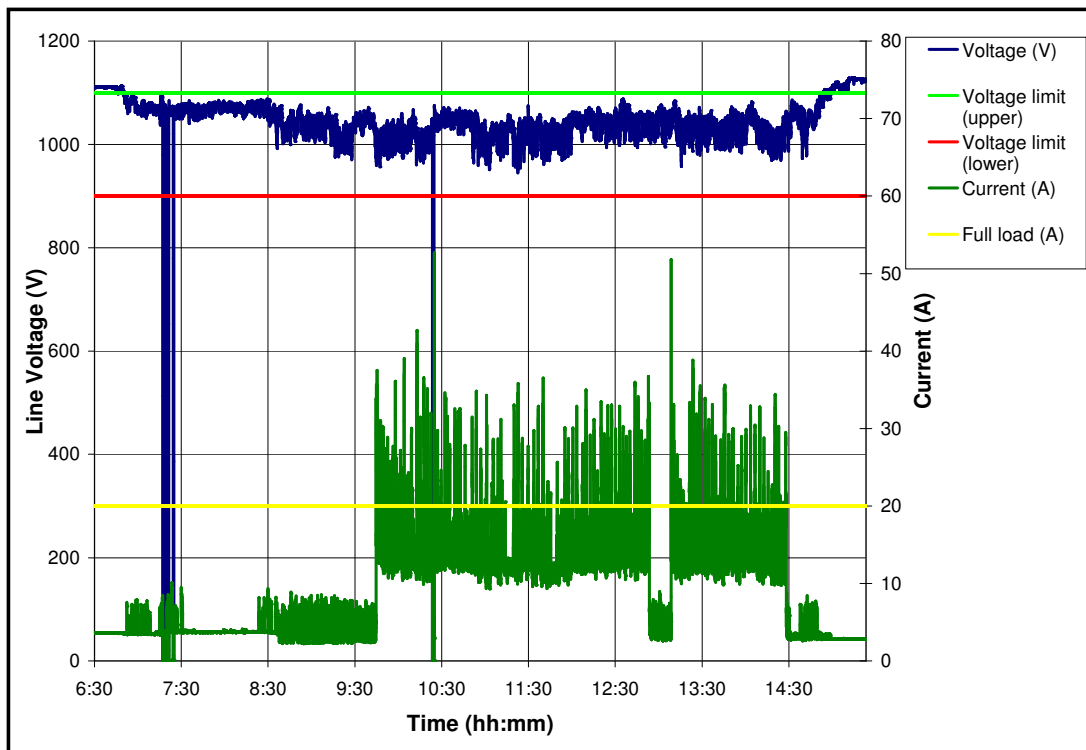
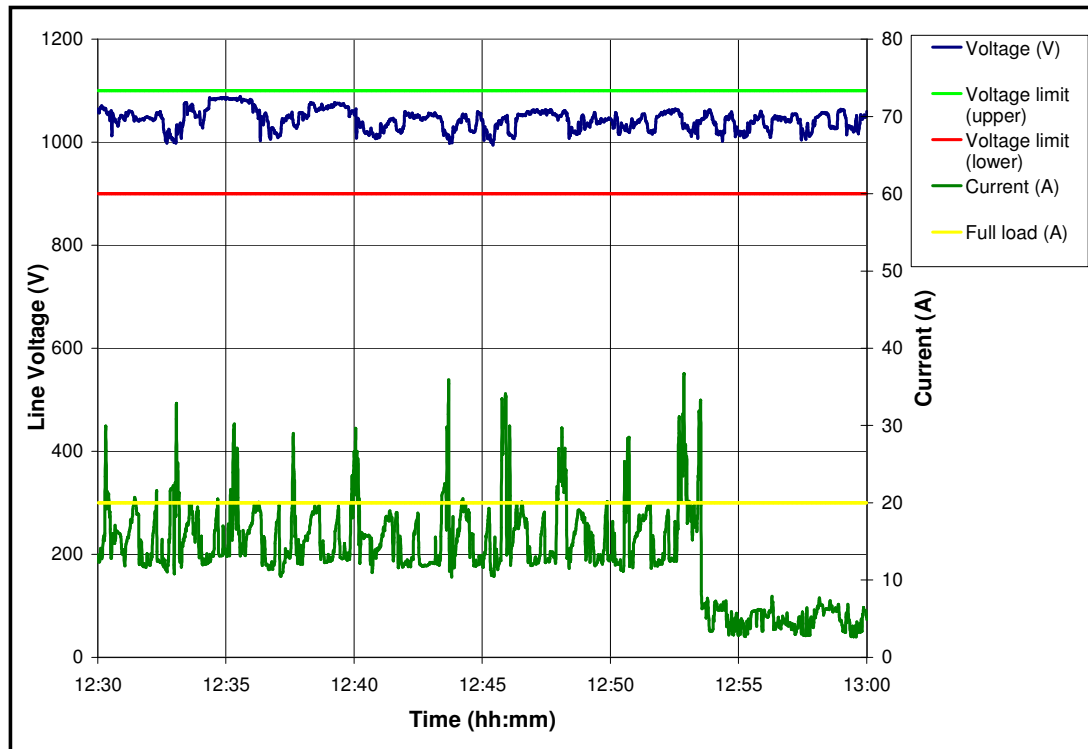


Figure S.1-3: Load current and voltage for a pump motor – 19 May 2005.



**Figure S.1-4: Load current and voltage for a pump motor – 19 May 2005
(30 minute period).**

S.1.1.2 Afternoon shifts

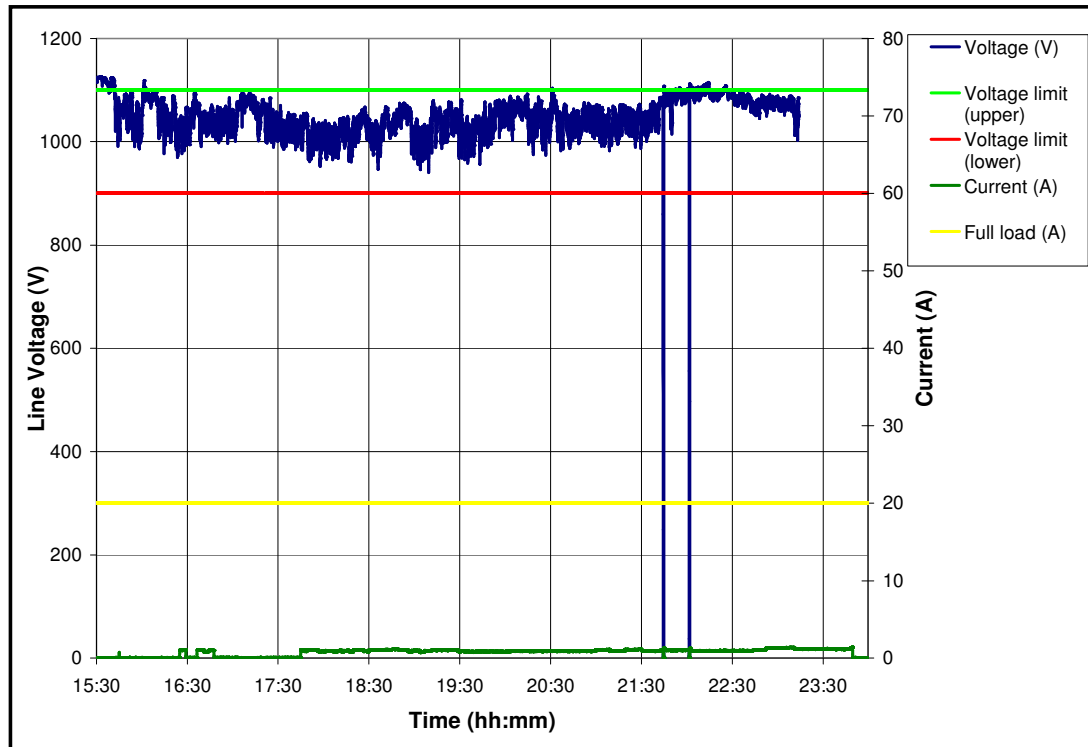


Figure S.1-5: Load current and voltage for a pump motor – 17 May 2005.

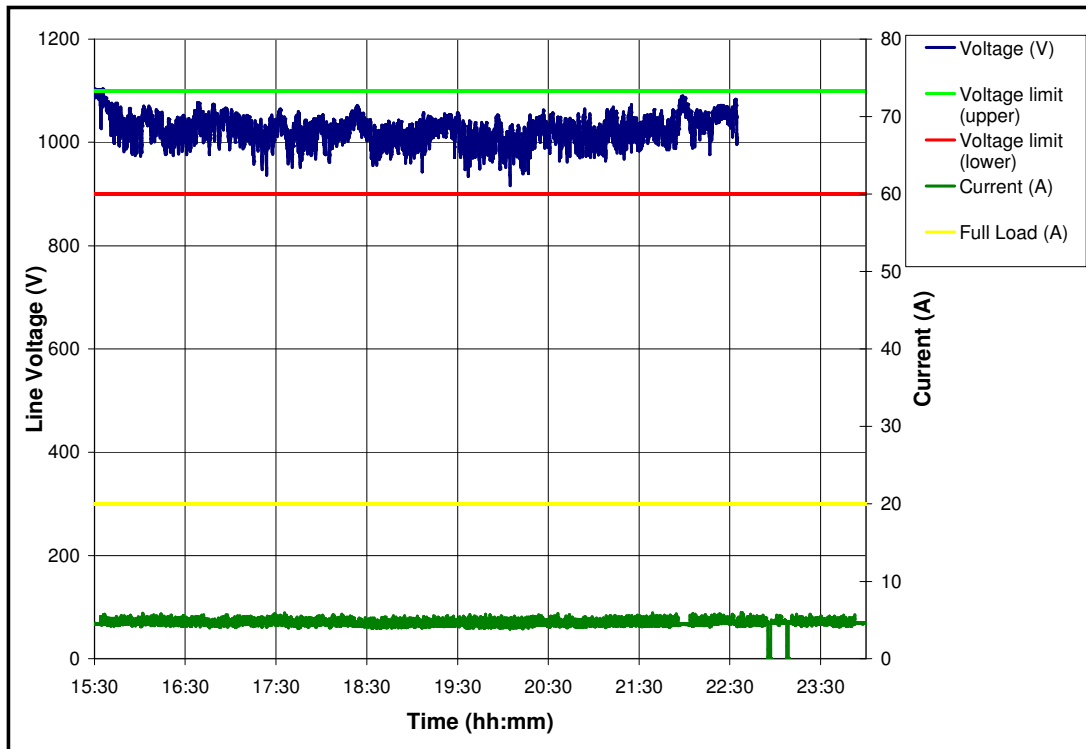


Figure S.1-6: Load current and voltage for a pump motor – 18 May 2005.

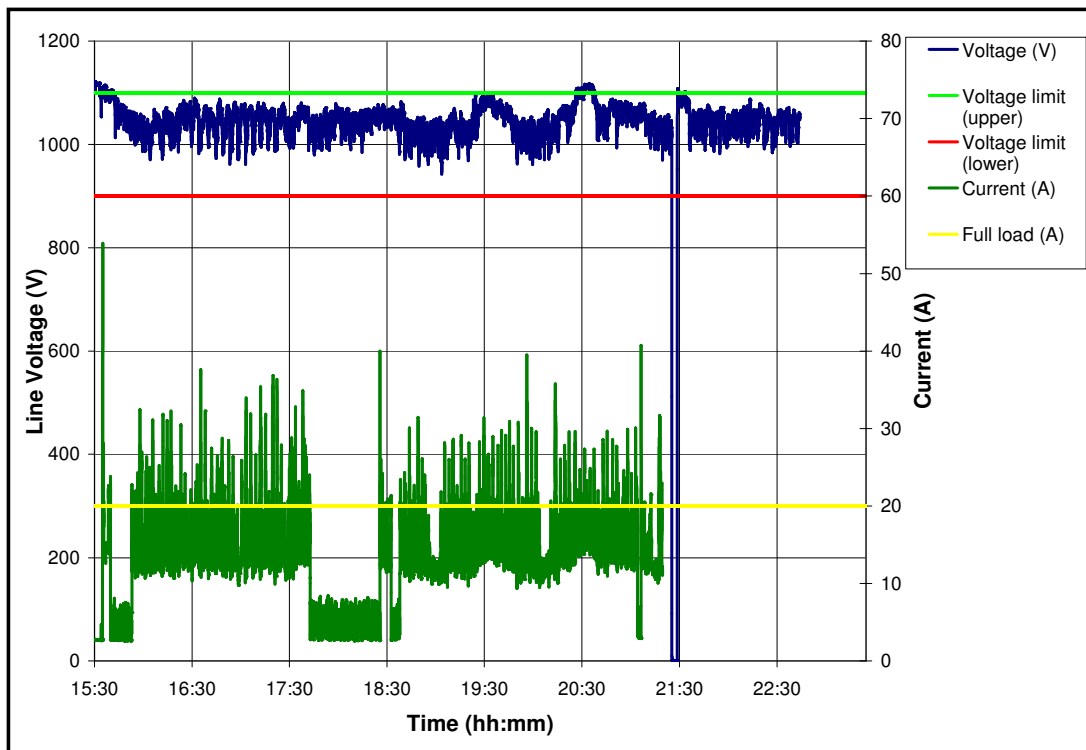
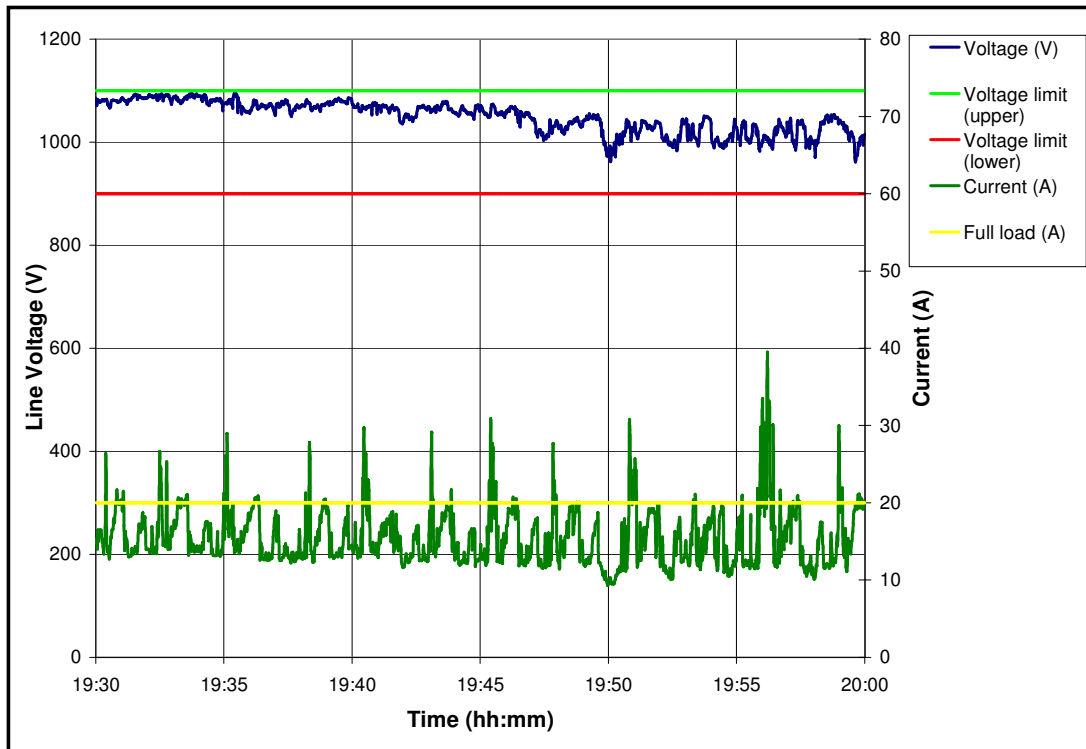


Figure S.1-7: Load current and voltage for a pump motor – 19 May 2005.



**Figure S.1-8: Load current and voltage for a pump motor – 19 May 2005
(30 minute period).**

S.1.2 SECTION 61

S.1.2.1 Morning shifts

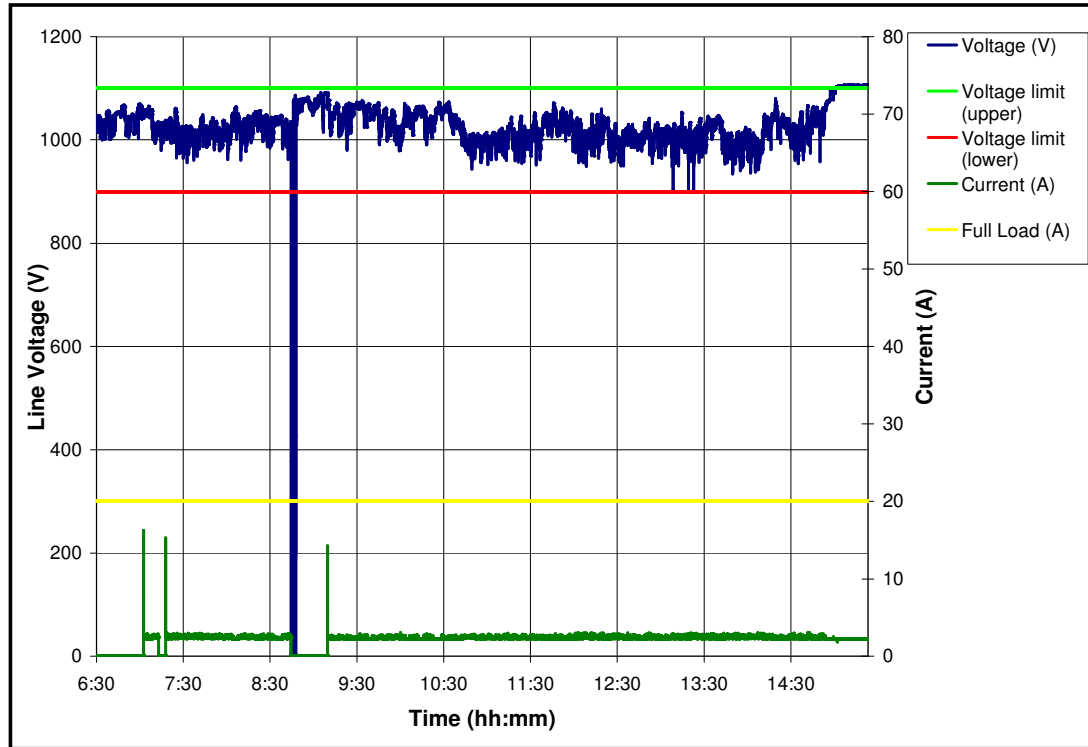


Figure S.1-9: Load current and voltage for a pump motor – 23 May 2005.

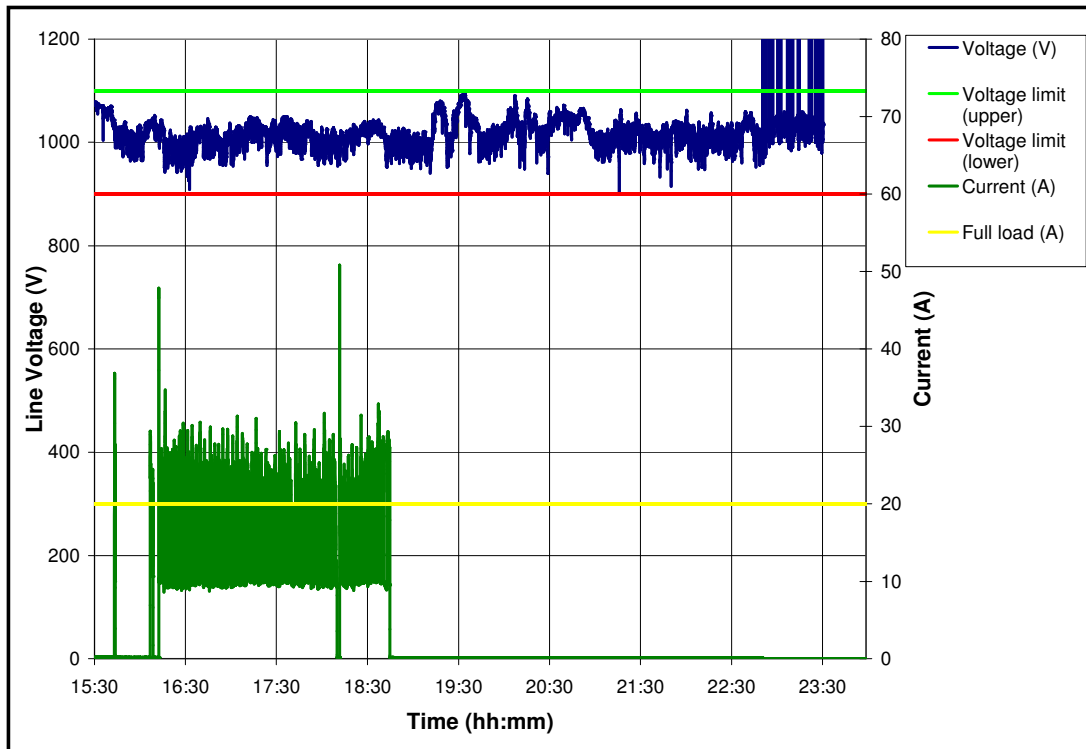


Figure S.1-10: Load current and voltage for a pump motor – 24 May 2005.

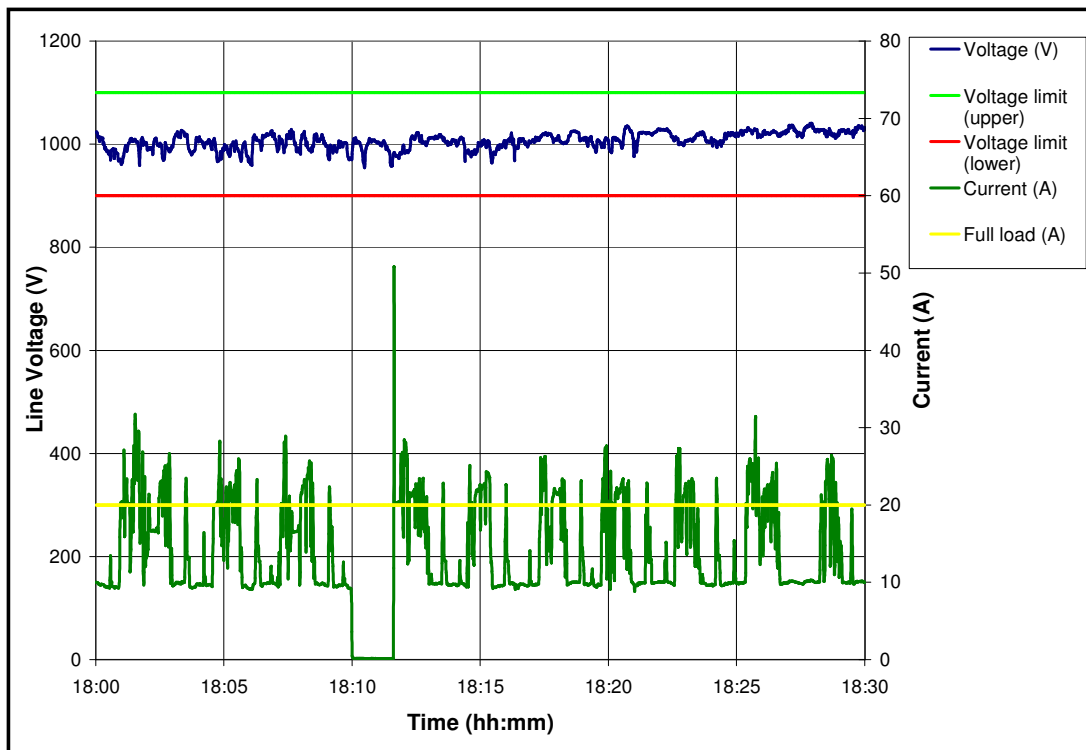


Figure S.1-11: Load current and voltage for a pump motor – 24 May 2005 (30 minute period).

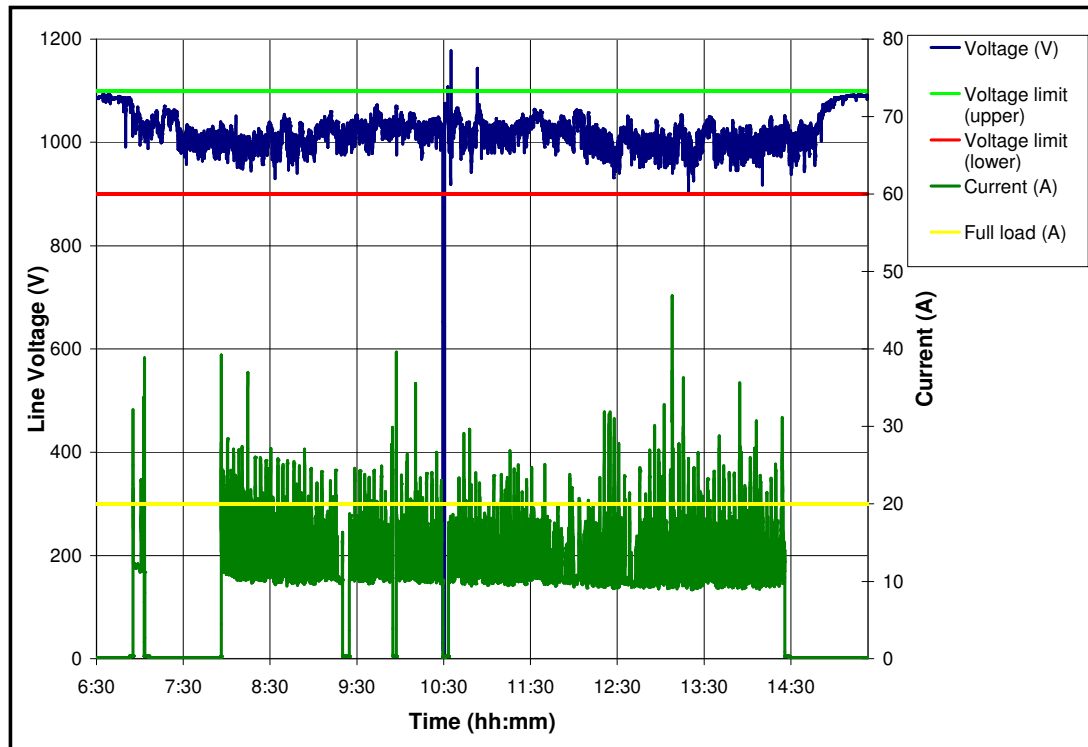
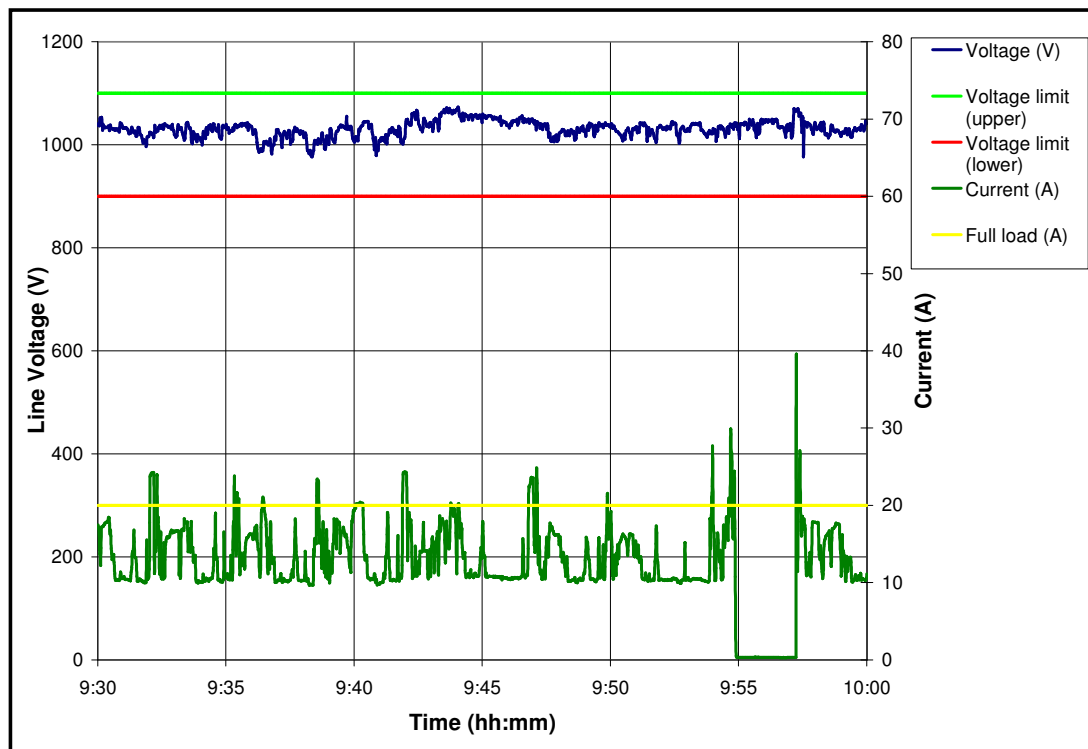


Figure S.1-12: Load current and voltage for a pump motor – 25 May 2005.



**Figure S.1-13: Load current and voltage for a pump motor – 25 May 2005
(30 minute period).**

S.1.2.2 Afternoon shifts

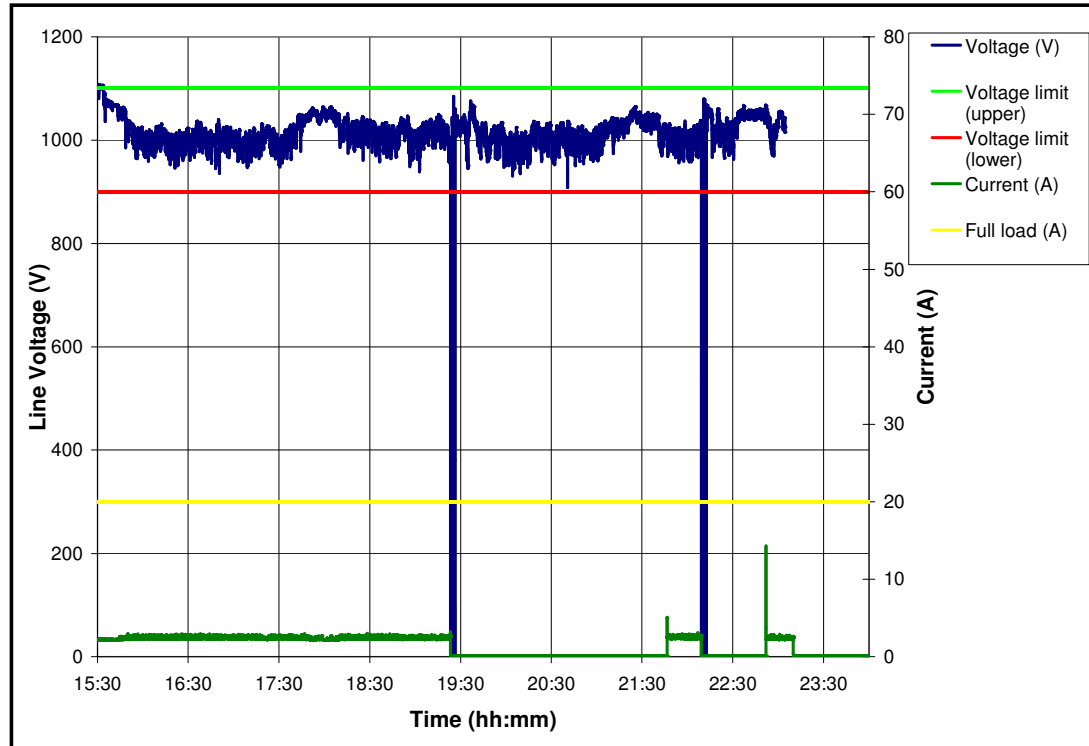


Figure S.1-14: Load current and voltage for a pump motor – 23 May 2005.

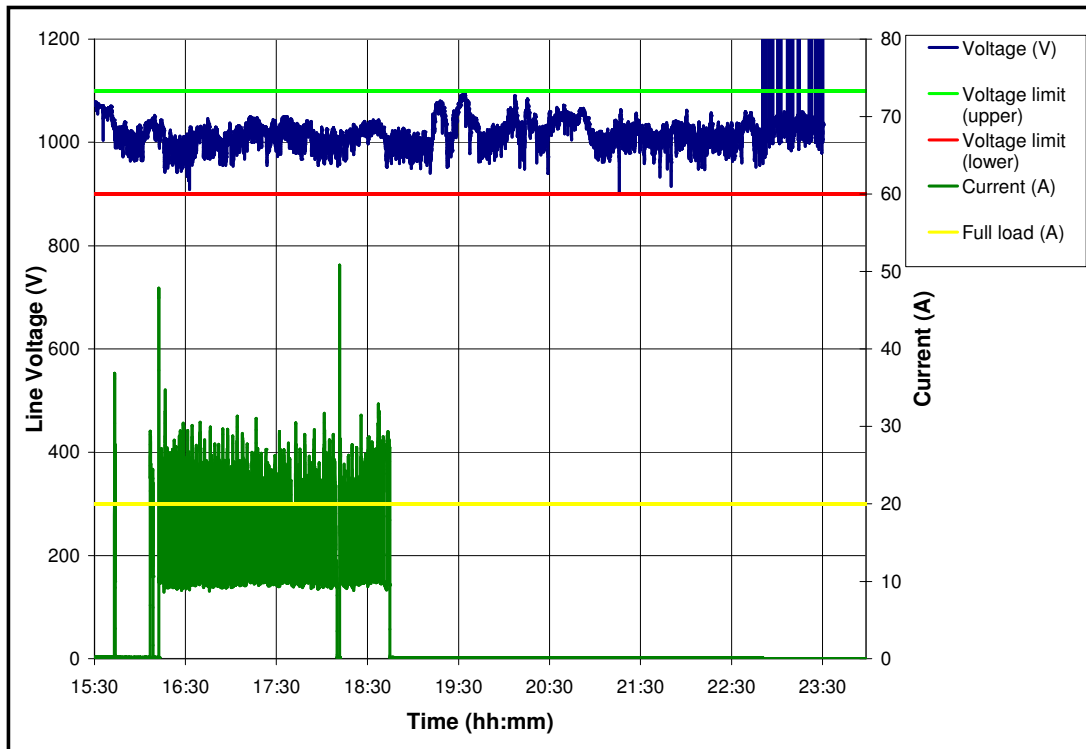


Figure S.1-15: Load current and voltage for a pump motor – 24 May 2005.

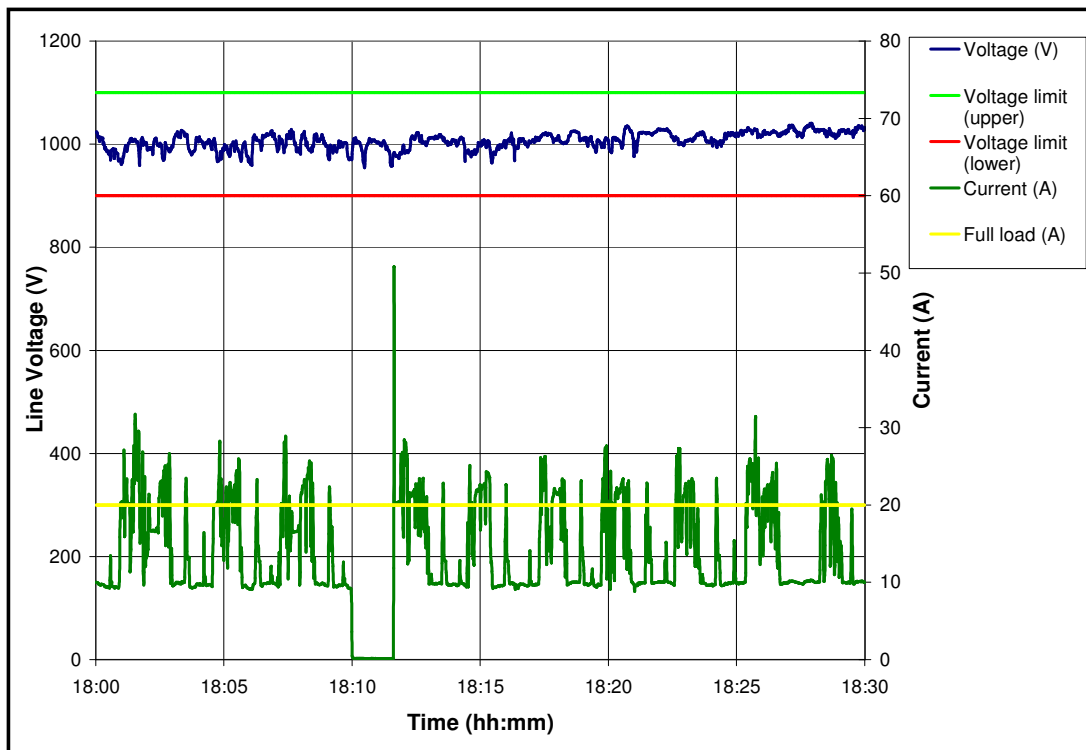


Figure S.1-16: Load current and voltage for a pump motor – 24 May 2005 (30 minute period).

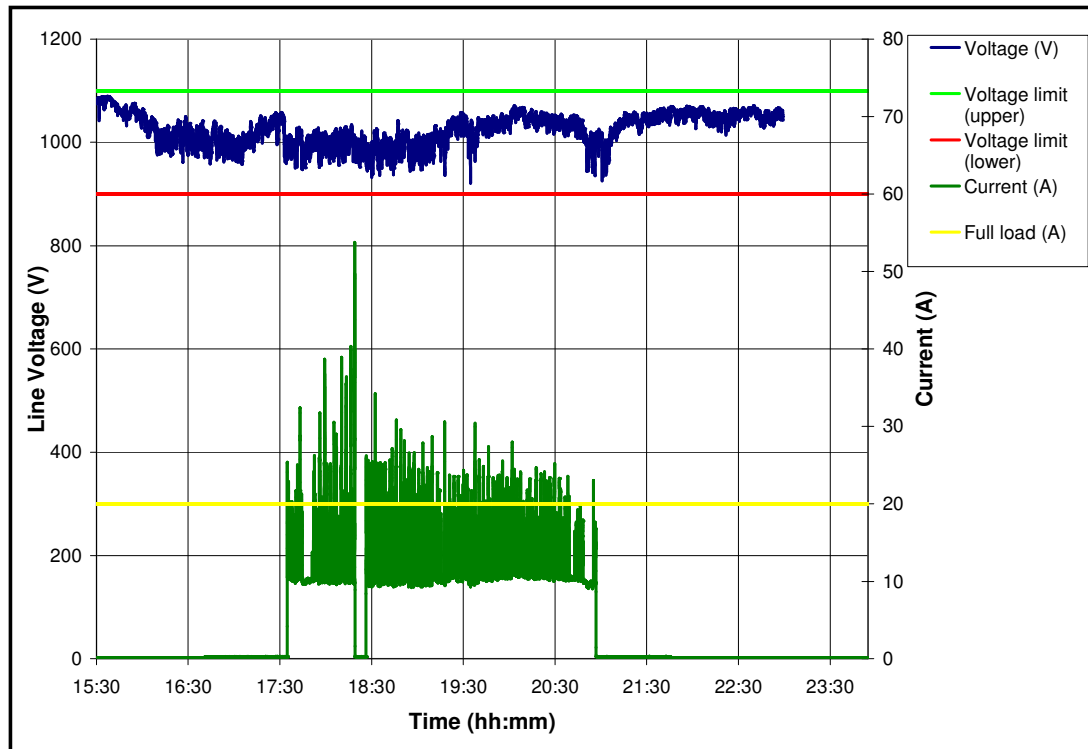
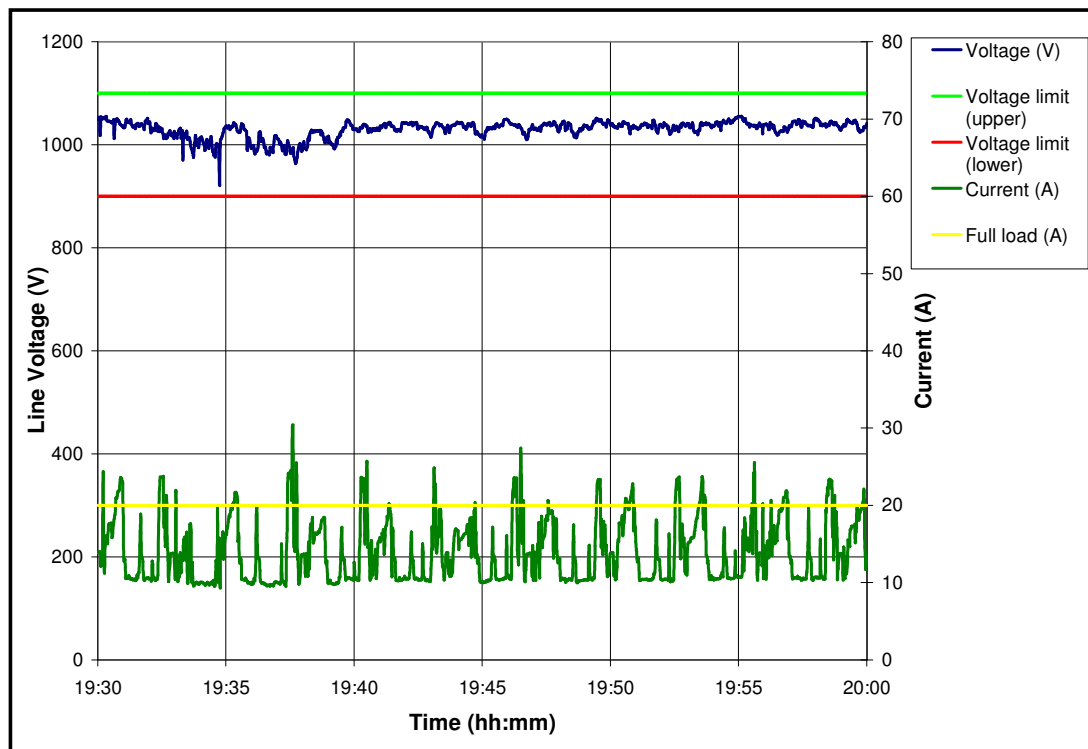


Figure S.1-17: Load current and voltage for a pump motor – 25 May 2005.



**Figure S.1-18: Load current and voltage for a pump motor – 25 May 2005
(30 minute period).**

S.2 HISTOGRAM

The next section focuses on the frequency with which a Roofbolters pump motor consumed a certain load current. The graphs show the number of times a certain current has been consumed. The tables give data about the tonnes produced during the shift and the percentage time of the shift that the motors were producing. The time that the motors have been over loaded or loaded within the full load rating of the motor is given as a percentage of the actual producing time. The morning shifts and afternoon shifts are separated as well as the measurements made at the different sections.

S.2.1 SECTION 21

S.2.1.1 Morning shifts

Table S-3: D Data for the total consumption of a pump motor in section 21.

	17-May-05	18-May-05	19-May-05
Tonnes/CM/Shift	858	1320	1716
% Time of shift producing	-	-	53.73%
% of Production time unloaded	-	-	89.80%
% of Production time overloaded	-	-	10.20%

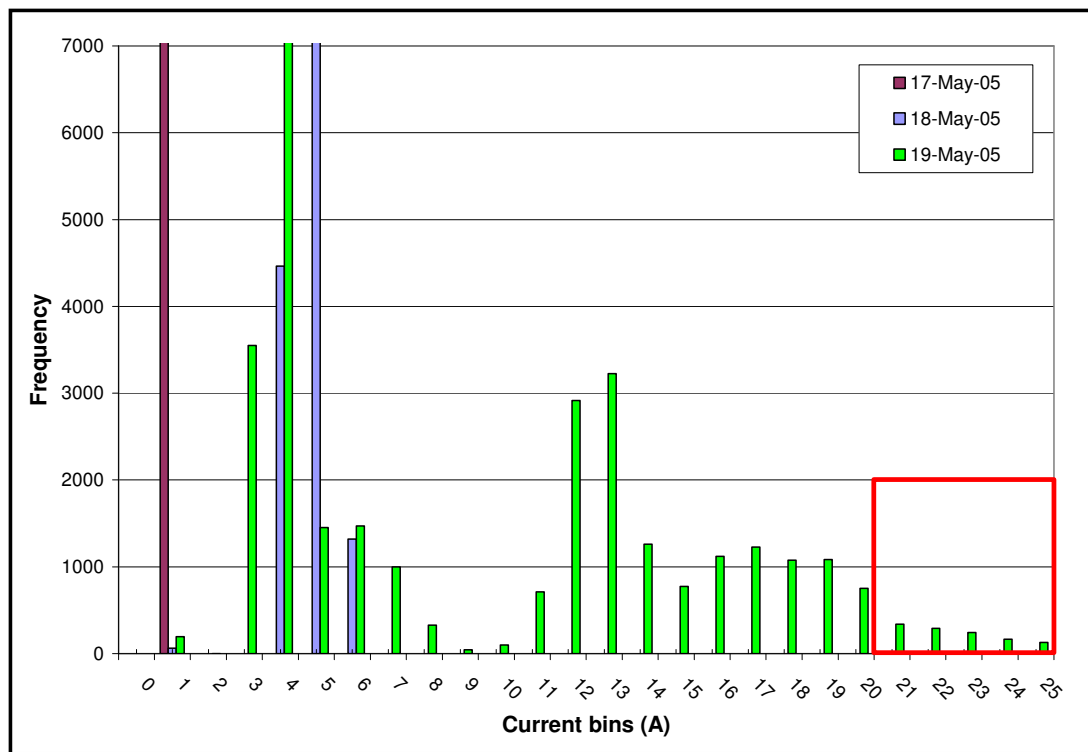


Figure S.2-1: Histogram for current consumed by a pump motor.

S.2.1.2 Afternoon shifts

Table S-4: Data for the total consumption of a pump motor in section 21.

	17-May-05	18-May-05	19-May-05
Tonnes/CM/Shift	2145	2112	2013
% Time of shift producing	-	-	80.38%
% of Production time underloaded	-	-	91.81%
% of Production time overloaded	-	-	8.19%

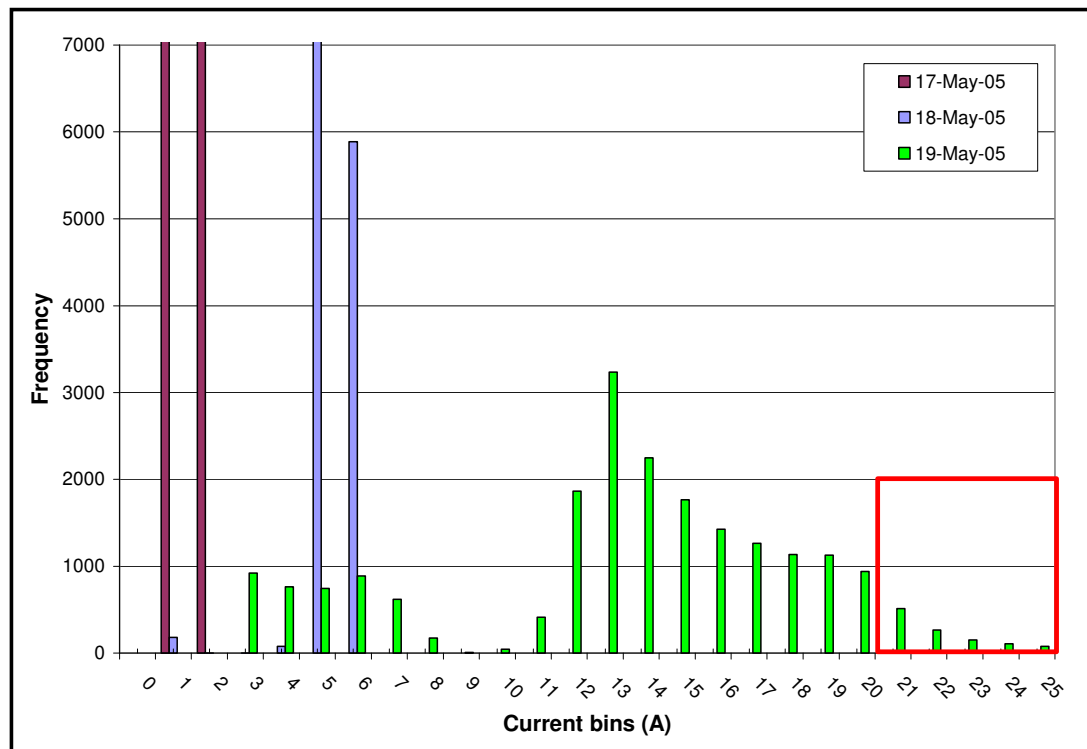


Figure S.2-2: Histogram for current consumed by a pump motor.

S.2.2 SECTION 61

S.2.2.1 Morning shifts

Table S-5: Data for the total consumption of a pump motor in section 61.

	23-May-05	24-May-05	25-May-05
Tonnes/CM/Shift	1740	1450	2320
% Time of shift producing	-	36.51%	71.58%
% of Production time underloaded	-	69.35%	95.05%
% of Production time overloaded	-	30.65%	4.95%

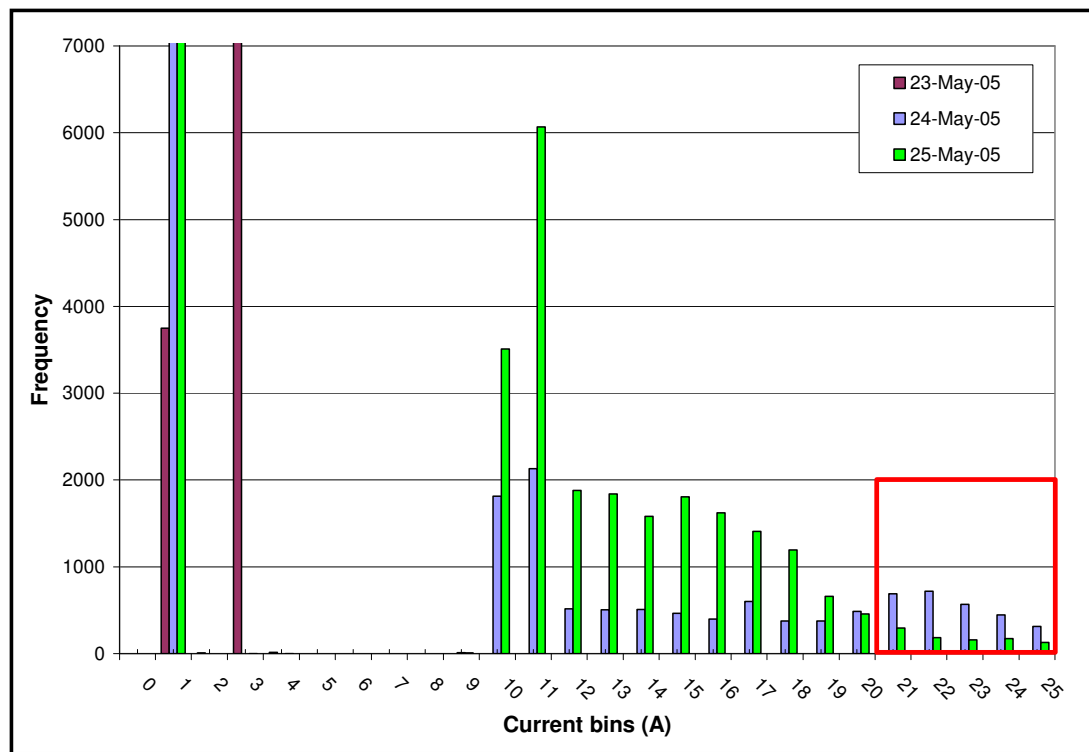


Figure S.2-3: Histogram for current consumed by a pump motor.

S.2.2.2 Afternoon shifts

Table S-6: Data for the total consumption of a pump motor in section 61.

	23-May-05	24-May-05	25-May-05
Tonnes/CM/Shift	2030	2320	1160
% Time of shift producing	-	30.11%	38.59%
% of Production time underloaded	-	72.38%	90.31%
% of Production time overloaded	-	27.62%	9.69%

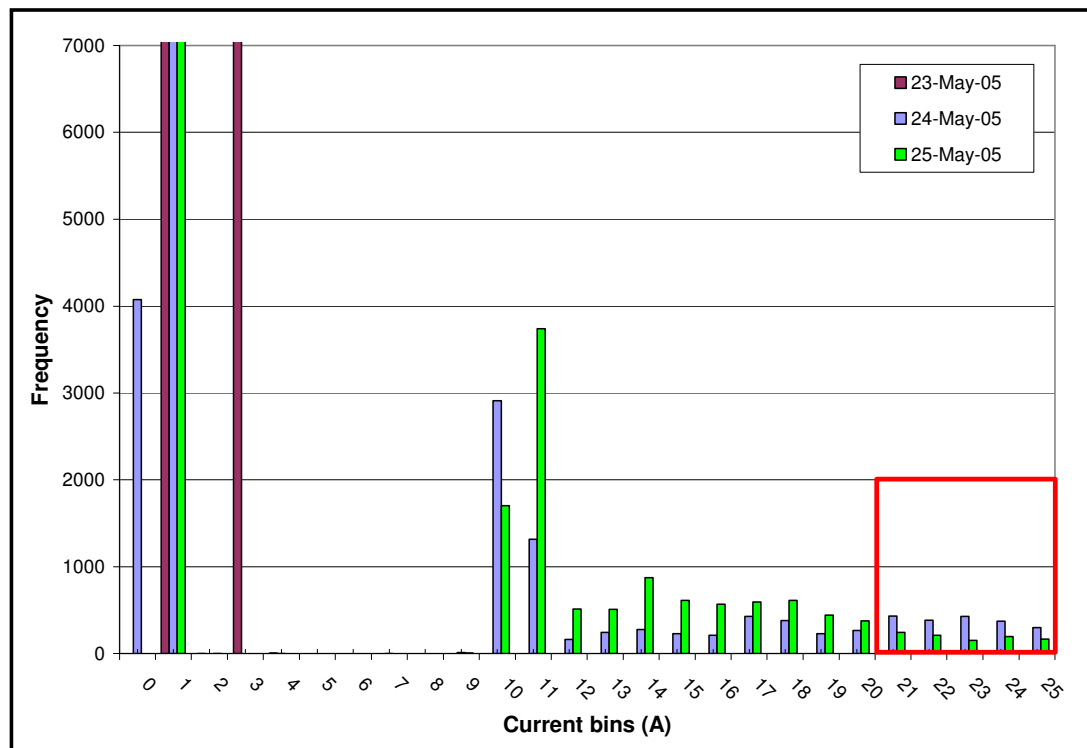


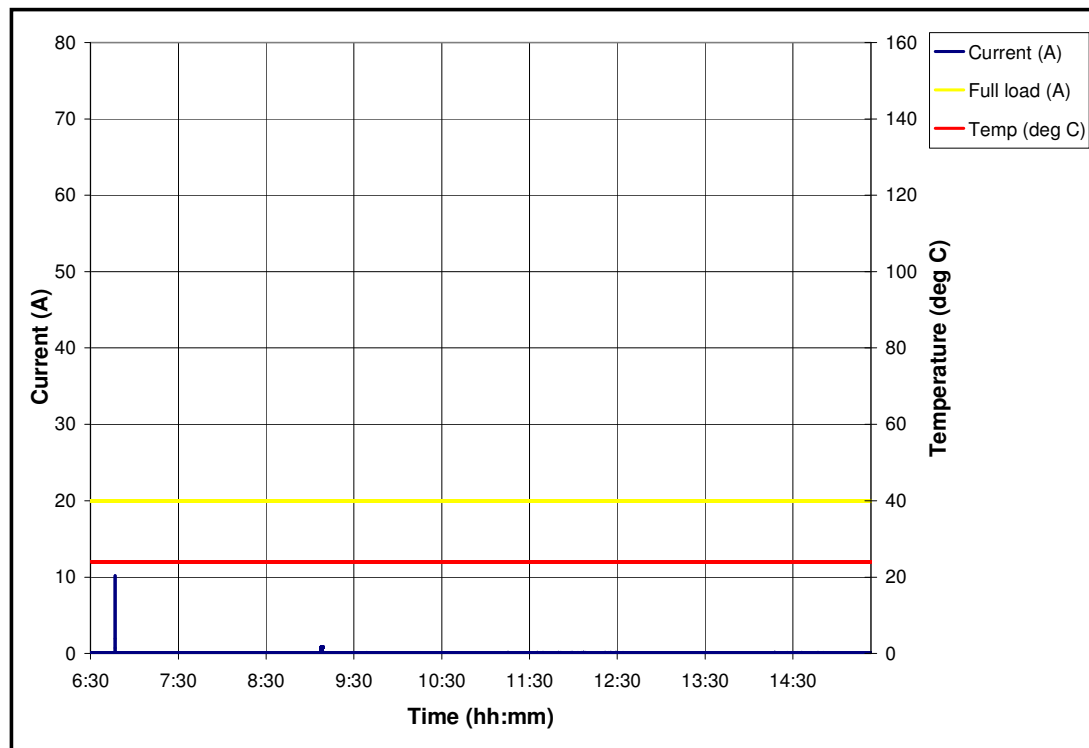
Figure S.2-4: Histogram for current consumed by a pump motor.

S.3 THERMAL CAPACITY

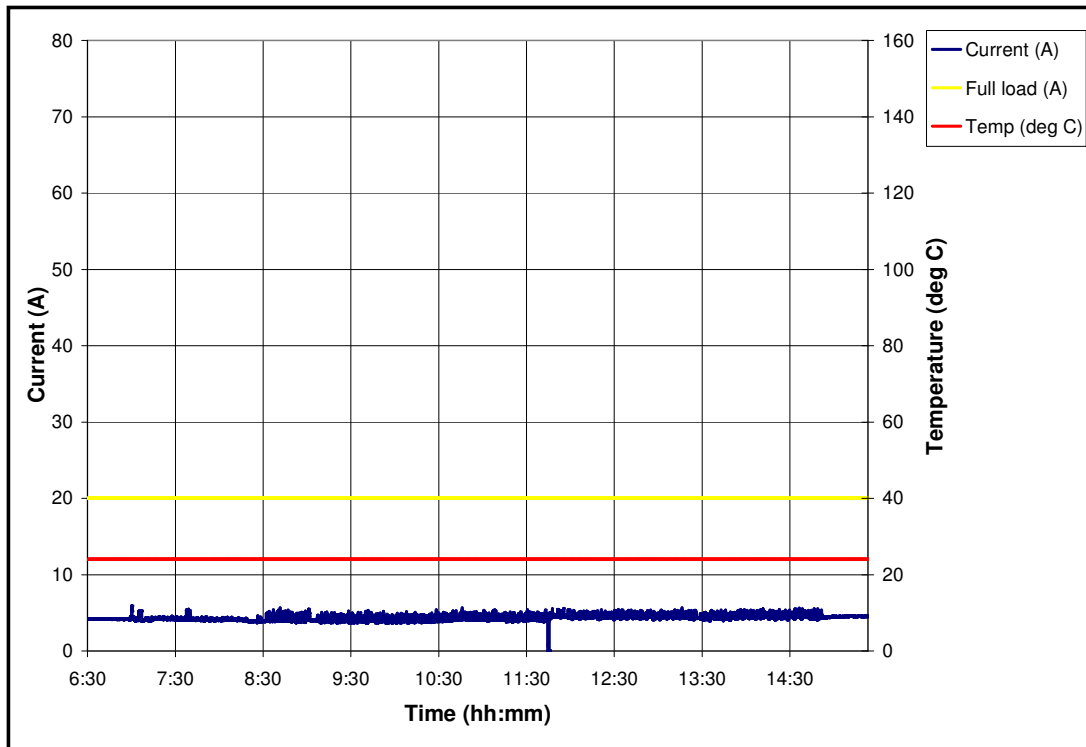
The next section focuses on the temperature of the windings of the pump motor. Each graph shows the temperature of the motor, the load current and rated full load current of the motor. The morning shifts and afternoon shifts are separated as well as the measurements made at the different sections. The thermal time constant is 40 minutes.

S.3.1 SECTION 21

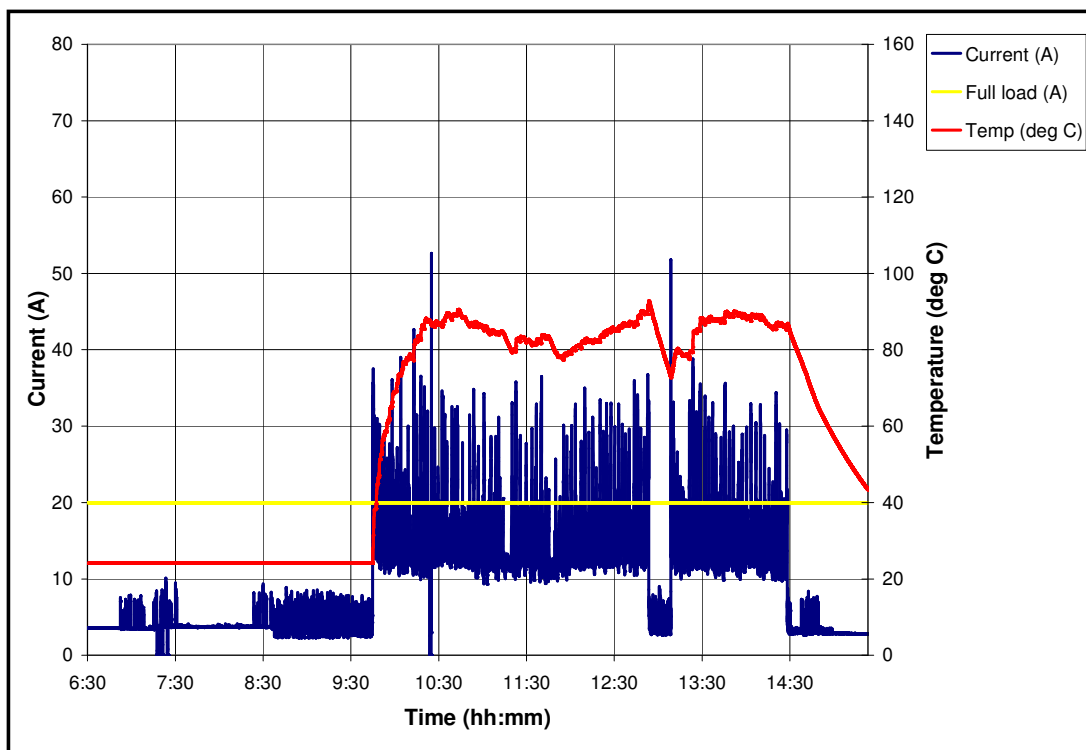
S.3.1.1 Morning shifts



**Figure S.3-1: Load current and motor temperature for a pump motor
– 17 May 2005.**

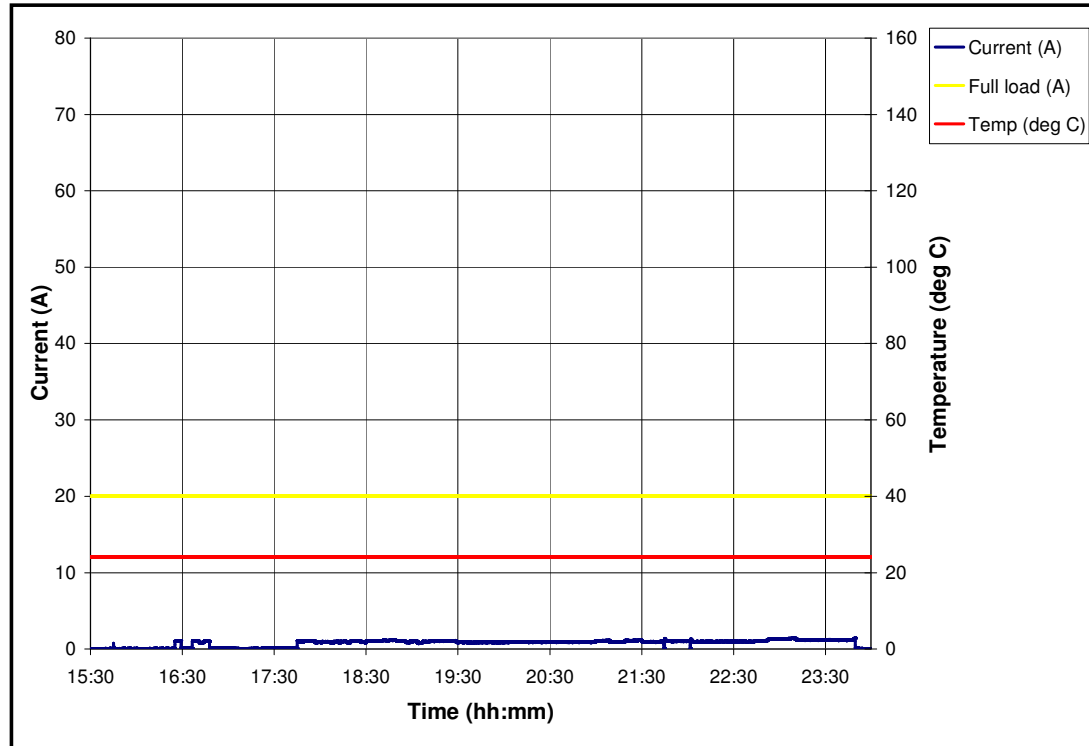


**Figure S.3-2: Load current and motor temperature for a pump motor
– 18 May 2005.**

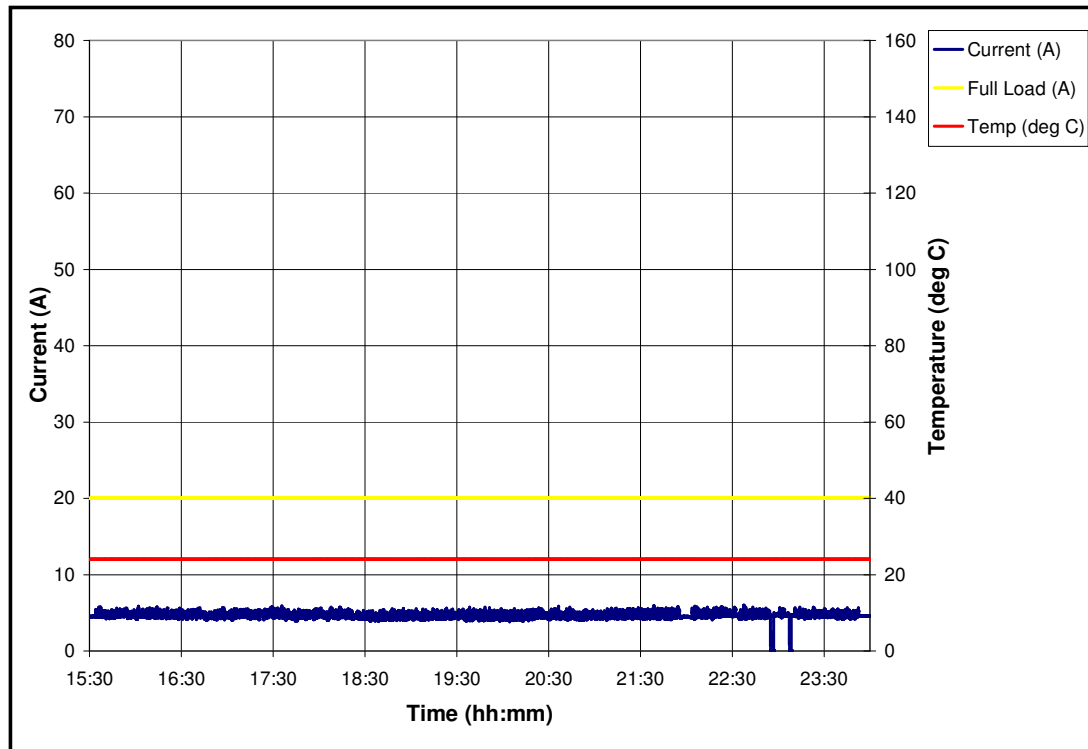


**Figure S.3-3: Load current and motor temperature for a pump motor
– 19 May 2005.**

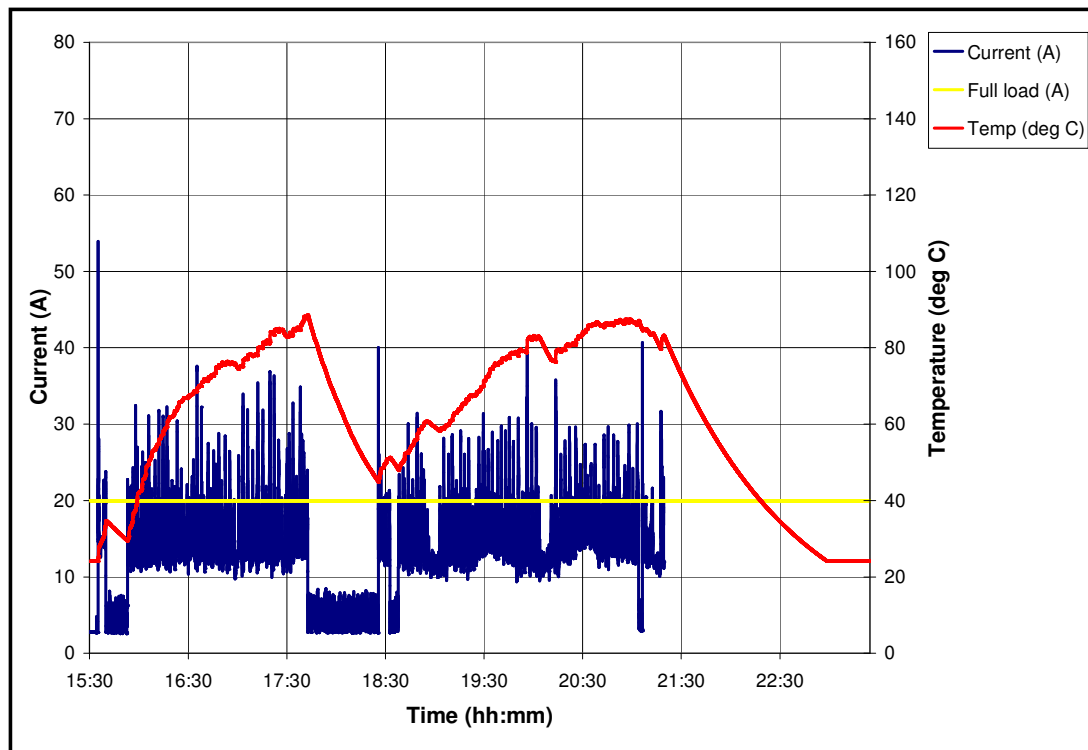
S.3.1.2 Afternoon shifts



**Figure S.3-4: Load current and motor temperature for a pump motor
– 17 May 2005.**



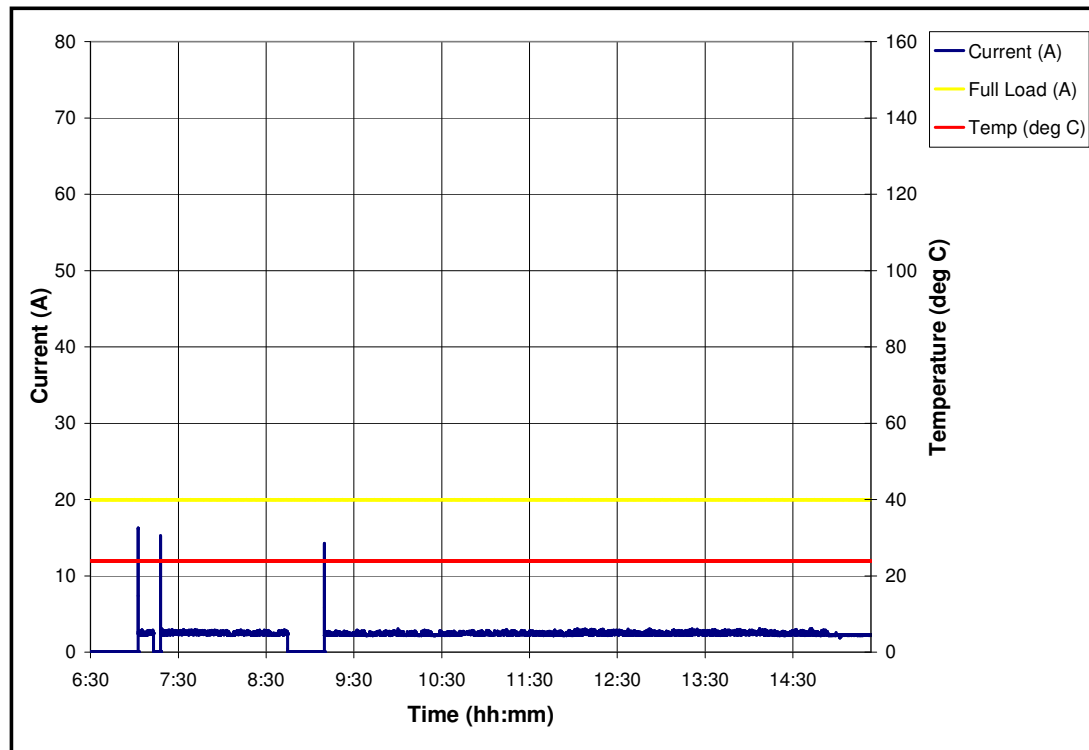
**Figure S.3-5: Load current and motor temperature for a pump motor
– 18 May 2005.**



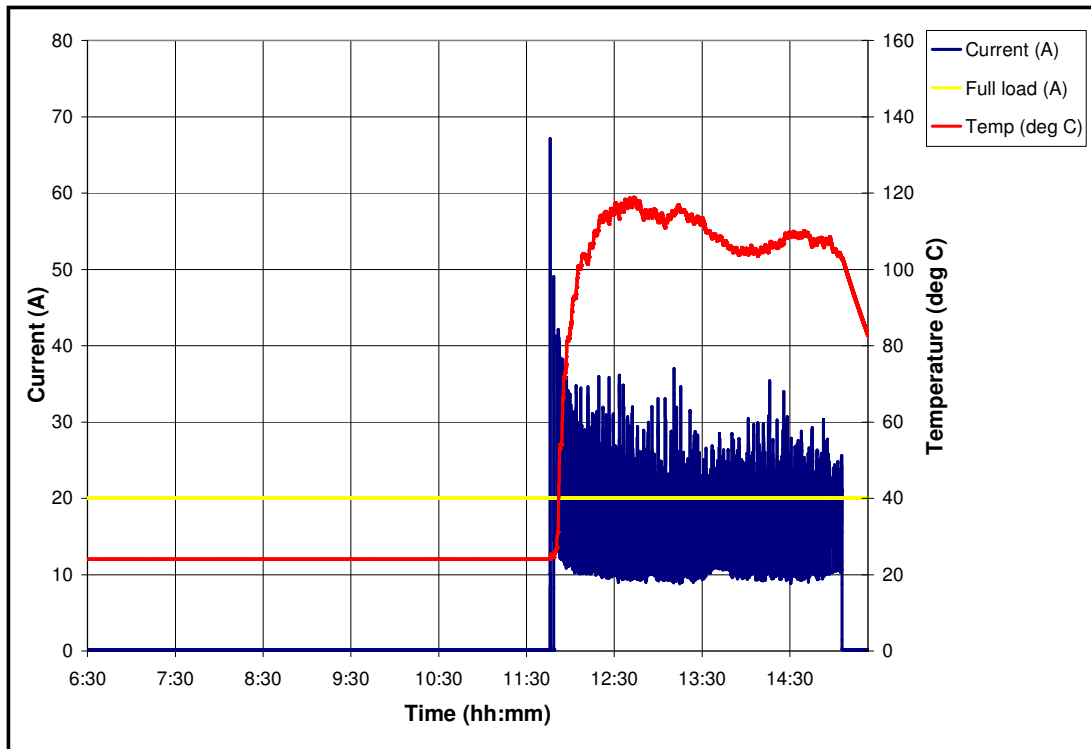
**Figure S.3-6: Load current and motor temperature for a pump motor
– 19 May 2005.**

S.3.2 SECTION 61

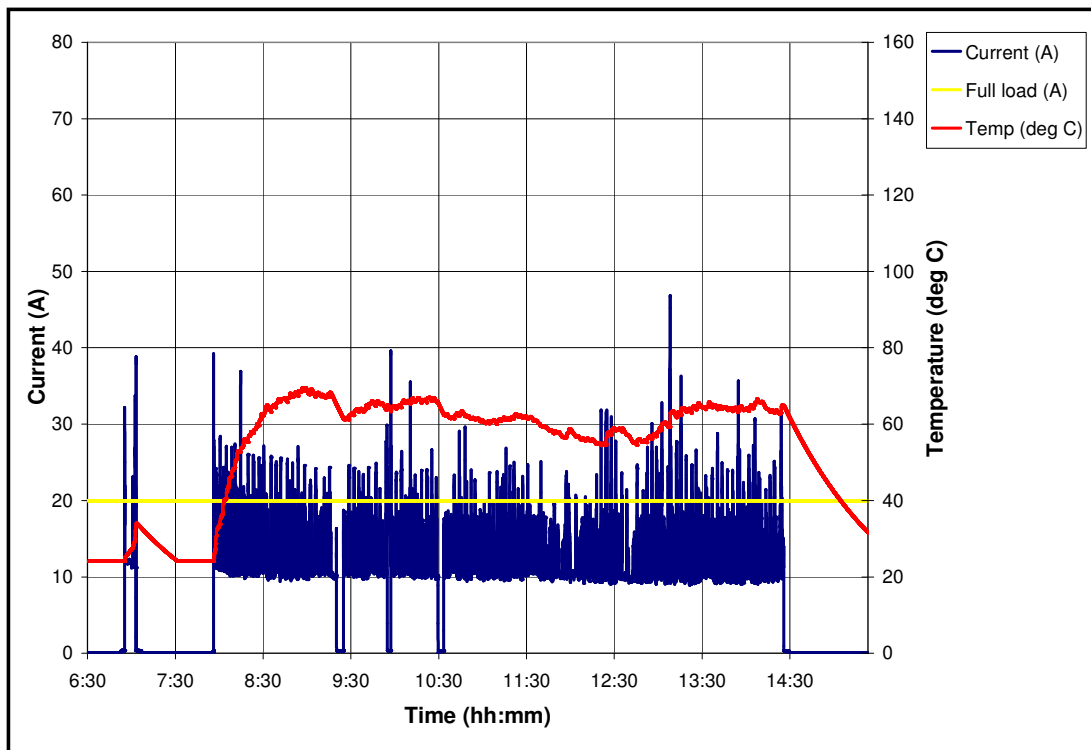
S.3.2.1 Morning shifts



**Figure S.3-7: Load current and motor temperature for a pump motor
– 23 May 2005.**

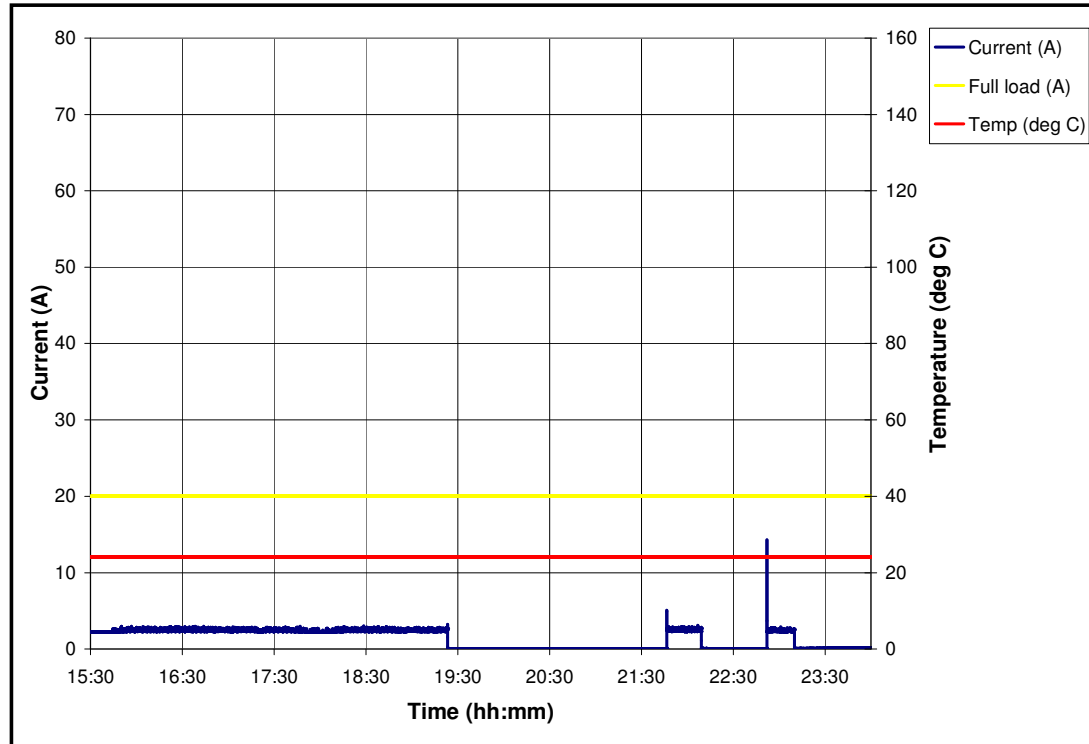


**Figure S.3-8: Load current and motor temperature for a pump motor
– 24 May 2005.**

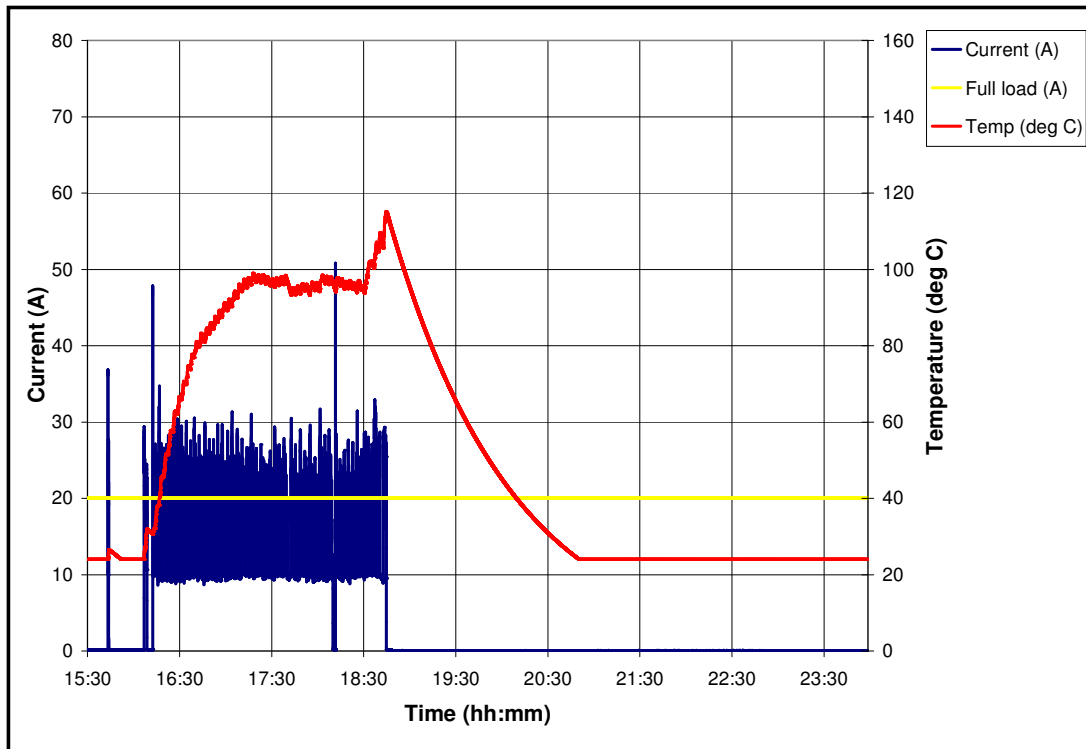


**Figure S.3-9: Load current and motor temperature for a pump motor
– 25 May 2005.**

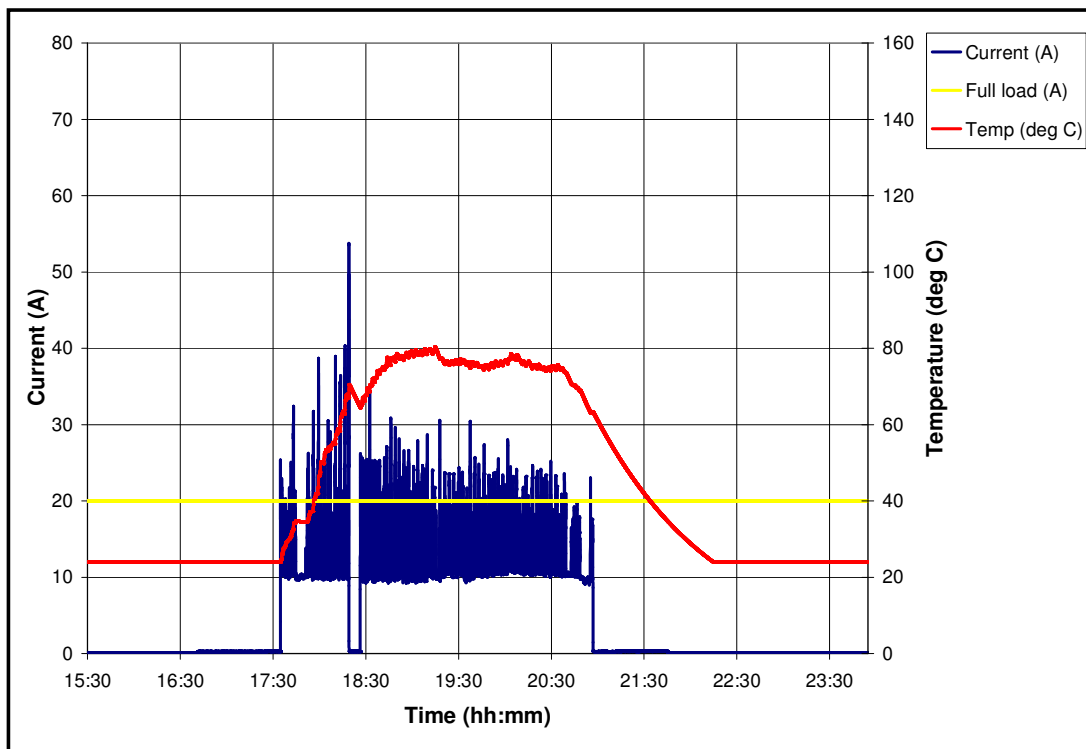
S.3.2.2 Afternoon shifts



**Figure S.3-10: Load current and motor temperature for a pump motor
– 23 May 2005.**



**Figure S.3-11: Load current and motor temperature for a pump motor
– 24 May 2005.**



**Figure S.3-12: Load current and motor temperature for a pump motor
– 25 May 2005.**