AC Power TM for Business-Critical Continuity

Liebert AF2 Monitoring Software

User Manual



Liebert AF2 Monitoring Software

User Manual

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1. Introduction

We thank you for the trust in selecting our Liebert AF2 Monitoring Software.

Liebert AF2 Monitoring Software is for monitoring Liebert AF2 Active Harmonic Filter. User can use this software to monitor the operational status of Liebert AF2 and download the waveform, spectrum and event log data from the equipment through the communication port (RS234/422/485, USB and RJ45) that Liebert AF2 provides.

This software package only has one software CD below. The CD consists of setup program and user manual.



This manual explains how to install and operate Liebert AF2 Monitoring Software.

1-1 System requirements

Basic requirements

- D Pentium- 800M Hz, 256MB, HD500MB
- □ Microsoft Windows 2000
- **D**isplay 1024x768

Recommend requirements

- D Pentium-4 1.8G Hz, 512MB, HD2GB
- Microsoft Windows XP
- Display 1024x768

2. Installing *Liebert AF2* Monitoring Software

The installation steps are as follows,

Step1:

Double click Setup.exe to execute the Setup program; refer to figure 2-1.



Figure 2-1

Step2:

If you agree to this Software License Agreement, please click "ACCEPT" to continue setup program. If you do not, please click "DO NOT ACCEPT" to stop the installation; refer to figure 2-2.



Figure 2-2

Step3:

Click "OK" button to continue setup program; refer to figure 2-3.

🕫 Liebert AF2 Monitoring Software Setup
Welcome to the Labert AP2 Monitoring Software installation program. Setup cannot insig system Ries or update shared Ries if they are in use. Before proceeding, we recommend that you close any applications you may be running.
CK Egit Setup

Figure 2-3

Step4:

Chang the directory to you specified destination directory and then click *button* to install this program; refer to figure 2-4.

đ	
Englished TAP2 Mathins Things Software Setup Englishe includion by cicking the button below. Cick the button to instal Liebert AP2 Marks specified destination directory.	orng Software software to the
Directory: C:\Program Files(Lebert AF2 Monitoring Software)	ghange Directory
Ept Setue	

Figure 2-4

Step5:

Enter the program group name and click "Continue" button to continue install program; refer to figure 2-5.



Figure 2-5

Step6:

Program setup is now completed successfully. Click "OK" button to exit this setup program; refer to figure 2-6.



Figure 2-6

Step7:

Go to Control Panel \rightarrow Select Regional and Language Options to install East Asian language, if required; refer to figure 2-7.



Figure 2-7

Step8:

You can now start *Liebert AF2* Monitoring Software.

3. Function Descriptions

This Section will introduce the operation of each functional windows.

3-1 Getting Started with Liebert AF2 Monitoring Software

Step1:

Start **Liebert AF2 Monitoring Software** by clicking on the "Liebert AF2 Monitoring Software" icon; refer to figure 3-1.



Figure 3-1

Step2:

Please key in Serial number and Password, and then click <u>Register</u> button to register this software; refer to figure 3-2. If the Serial number or Password wasn't correct, **Liebert AF2 Monitoring Software** can't be executed. Please contact Emerson Network Power representative to get a valid Serial Number and Password.

Note : The password and serial number are printed on the sticker the CD cover. The password is the same as Administrator Login password.

Register
Serial number:
Password:
Register Cancel

Figure 3-2

Step3:

Figure 3-3 is setting windows of *Liebert AF2 Monitoring Software*; the functions are described as follows,

- a. Enter system : Enter Liebert AF2 Monitoring Software main window.
- **b.** Function :
 - Add a new AHF : Add a new Liebert **AF2** into this monitoring system. The maximum number of units that can be monitored with this monitoring software is 255.
 - **Delete an existing AHF** : Delete an existing *Liebert AF2* from this monitoring system.

Record interval of parameter : To set the power parameters record interval, start and end record time. The record interval time can be set from 1 to 60 minutes; refer to figure 3-4.

Note: The hard disk space requirement is less than 100MB if you record power parameters of a Liebert AF2 per minute for one year.

- c. About : This function displays the information about *Liebert AF2 Monitoring Software*.
- d. ID : ID is Identification number of a particular *Liebert AF2* unit. Each *Liebert AF2* has an ID number that is stored in the EEPROM of *Liebert AF2* controller. This number has to be the same as the ID number that is stored in the EEPROM of *Liebert AF2* controller. If the numbers are different, computer can't communicate with *Liebert AF2*. If you use RS422 or RS485 communication port, all AHF units ID can't be the same. User can use "*AF Setting Tool*" to read and set the ID number of the AHF unit. For further details, please refer to "*Liebert AF2 User Manual*".
- e. Name : The Identification name of a particular *Liebert AF2* unit that is defined by user.
- **f. Baud Rate :** This set value has to be the same as communication card. User can use "*AF Setting Tool*" to set the baud rate of communication card. For further details, please refer to "*Liebert AF2 User Manual*".
- **g.** Connected type : There are three types communication port can be selected. They are Com port, USB port and TCP/IP port. Please choose the right type of communication port that a *Liebert AF2* is connected with. For further details, please refer to chapter 4 of this manual.
- **h. Record** : When this option is selected, the power parameters record function is enabled. Otherwise this function is disabled.

Liebert Enter system	AF2 Monit Function	oring Software About					
₁ Se	tting						
Ind	lex ID	Name	Baud Rate	Connected type	IP Address	Record	
1	1	Filter 00	57600	TCP/IP	192.168.7.36	V	
2	1	Filter 01	57600	USB			
3	1	Filter 02	57600	COM1		V	
4	1	Filter 03	57600	COM2			



Liebert AF2 Monitoring Software	vare	
Enter system Function About Setting Index ID Nar 1 1 Filte 2 1 Filte 3 1 Filte 4 1 Filte	Record interval of parameter Addr ar 00 1 Minute / per record 0K ar 01 1 Minute / per record 0K ar 02 Record 0 1 ar 03 start 2007 / 11 / 22 16 : 28 28	ress Record 8.7.36 IZ IZ IZ IZ IZ



Step4:

When all of the settings are completed, please select "Enter system" to enter **Liebert AF2 Monitoring Software** main window; refer to figure 3-5. The functions of main window are described as follows,

a. Communication Status :

(5) Connected.

Disconnected.

b. Parameter Record Status :

When power parameters record function is enabled \blacksquare icon will be shown. Otherwise \blacksquare icon will be hidden. The icon will be blinking when the parameter data is being recorded.

c. Name :

The identification name of a *Liebert AF2* that is defined by the user. Double click this Name to see more detailed information of *Liebert AF2*.

d. 🔽 Filtering :

This indicator is green when a *Liebert AF2* is turned on. This indicator is white when a *Liebert AF2* is shut down,.

e. **>** Full Correcting :

This indicator is yellow when *Liebert AF2* operates under full load condition. Otherwise this indicator is white

f. Error :

This indicator is red when some possible external or internal abnormal conditions occur and the AHF unit stops working. Otherwise this indicator is white

g. Phase/Wire :

Displays the utility system if it is 3-phase 3 wire (3P3W) or 3-phase 4 wire (3P4W).

h. Frequency. :

Displays the utility frequency as 50Hz or 60Hz.

i. Panel :

Displays the control panel type of your Liebert AF2 as LCD or LED Panel.

j. Event :

Displays the latest event or status of *Liebert AF2* unit.

Liebert	AF2 Mo	nitoring Soft	ware							
Function A	bout									
	Index	Name	N	\geq		Phase/Wire	Frequency	Panel	Event	
🛞 🗐	1	Filter 00				××	xx	xx	xx	
6 🗏	2	Filter 01			•	3P4W	60Hz	LCD	2007/11/20 10:20:58 (Frequency Error No)	
🕓 🗐	3	Filter 02	•			3P4W	60Hz	LCD	2007/11/22 17:22:38 (Filtering Yes)	
6 🗏	4	Filter 03				3P3W	60Hz	LCD	жж	

Figure 3-5

If some of the settings need to be edited, you may select *Function* \rightarrow *Go to Setting Page* to edit/modify them and return back to Setting window.

Table 3-1 shows the function list of *Liebert AF2 Monitoring Software*. When the control panel of *Liebert AF2* is LCD panel, all functions are supported. The LED panel does not support some of the functions.

Panel	LCD Panel	LED Panel
Status	•	•
Identification	•	•
Parameters	•	Х
Waveform	•	Х
Spectrum	•	Х
Event Log	•	•

Table 3-1 Function list of Liebert AF2 Monitoring Software

Compensation Selection	•	•
Dry Contract	•	•
Parameter Record	•	Х

- : Support this function
- X : Without this function

3-2. Status & Information

Statu Filte Full Erro Inter	ring correcting r mal CAN BUS ontroller Ver. ontroller Ver. nel Program V	OFF Reset 1.03 1.04 /er. 2.04	Iden Name ID Model Serial Rated Modul Rated Phase Frequ Numb Paralle	number number Voltage e Current Current Wire ency er of Parallel Number	77 Filte 1 ESI TD 400 35 35 35 35 35 40 - Unit 1 1	er 01 D34CRO35400 780130001 W W Hz
Frequency= 59.9)	L	oad side		Source side	Filter side
		KVA= 18	PF= 0.60	KVA= 12	PF= 0.98	KVA= 12
	THDv= 0.9%	ILa= 28A	THDi= 126.4%	ISa= 15A	THDi= 13%	IFa= 22A
Vab= 385V		II b= 27A	THDi= 132.6%	ISb= 22A	THDi= 12%	IFb= 22A
Vab= 385V Vbc= 385V	THDv= 1.1%	JILD- 27A				
Vab= 385V Vbc= 385V Vca= 384V	THDv= 1.1%	ILC= 28A	THDi= 134.9%	ISc=19A	THDi= 9%	IFc= 22A

Figure 3-6 shows the Status & Information window. All functions are described as follows,

Figure 3-6

a. Function :

User can use this menu to switch function windows as.

- 1) Status & Information Indicates *Liebert AF2* operation status and unit identification.
- 2) Waveform Displays voltage and current waveform.
- 3) Spectrum Displays voltage and current harmonic spectrum.
- 4) Event log Download the event logs from *Liebert AF2*.
- 5) Compensation Selection Shows *Liebert AF2* compensation setting.
- 6) **Parallel Information** Shows sysem level parallel information.
- 7) **Dry Contact Setting** Define the action of each dry contact.

8) Parameter Record

Shows the records of power parameters.

b. Status :

1) Filtering :

This indicator is green when *Liebert AF2* is turned on,.

2) Full Correcting :

This indicator is yellow when the AHF operates under full load condition,

3) Error :

This indicator is red when a AHF unit stops working due to possible external or external abnormal conditions.

4) Internal CAN BUS :

The indicator is green when the communication between *Liebert AF2* control board and LED/LCD panel is normal. If the communication is abnormal, the indicator turns red.

5) CPU1 Controller Ver. :

Displays the CPU1 controller version.

6) CPU2 Controller Ver. :

Displays the CPU2 controller version.

7) LCD Panel Program Ver. :

Displays the LCD Panel controller version.

c. Control Button :

1) **ON/OFF**:

Only Administrator can click this button to control *Liebert AF2* to turn on or turn off.

2) RESET :

Click this button to clear the error status.

d. Identification : Displays the information of *Liebert AF2*.

- 1) Name : The Identification name of *Liebert AF2* unit.
- 2) **ID** : The Identification number of *Liebert AF2* unit.
- 3) Model Number : The model number of *Liebert AF2* unit.
- 4) Serial Number : The equipment serial number of *Liebert AF2* unit
- 5) Rated Voltage : Rated voltage of *Liebert AF2* unit.
- 6) Module Current : Rated current of each Power Module.
- 7) Rated Current : Rated current of *Liebert AF2* system.
- 8) **Phase/Wire :** Displays the utility system as 3P3W (3 phase 3 Wire) or 3P4W

(3 phase 4 wire).

- 9) Frequency : Display the utility frequency ais 50Hz or 60Hz.
- **10)** Number of Parallel Unit : Displays the number of parallel units of Control Module. If 4 Control Modules operate in parallel, 4 will be displayed.
- 11) Parallel Number : Displays the parallel number of Control Module.
- e. Parameters : Display the power parameters information.
 - 1) **Frequency :** Utility frequency.
 - 2) **3 phase voltage :**
 - 2-1) Vab, Vbc, Vca : RMS Voltage.
 - 2-2) THDv : Voltage total harmonic distortion.

3) Load Side :

- 3-1) KVA : Apparent Power of Load side.
- 3-2) PF : Power Factor of Load side.
- 3-3) ILa, ILb, ILc, In : Load side RMS Current.
- 3-4) THDi : Load side current total harmonic distortion.

4) Source Side :

- 4-1) KVA : Apparent Power of Source side.
- 4-2) PF : Power Factor of Source side.
- 4-3) ISa, ISb, ISc, In : Source side RMS Current.
- 4-4) THDi : Source side current total harmonic distortion.

5) Filter Side :

- 5-1) KVA : Apparent Power of Filter side.
- 5-2) IFa, IFb, IFc, In : Filter side RMS Current.
- f. Load Rate : The percentage of Liebert AF2 output current to the rated capacity.
- **g. Export :** Export the parameter data in a CSV file which is Comma Separated Value (CSV) file format.

3-3. Waveform

Figure 3-7 shows the Waveform window, this window can display waveforms of voltage and current on source, load and Filter side. The function describes as follows,

- a. Update : Click Update button to download the waveform from *Liebert AF2*.
- **b.** Export : Click Export button to store the waveform data in a CSV file which is the Comma Separated Value (CSV) file format.
- **c.** Color : Click Color button to change the waveform color.
- **d.** Click the up/down = button to change the current scale.
 - (1) IL/IS : Source side current and Load side current.
 - (2) IF : Filter side current.
- **e.** Waveform menu of window 1. There are 15 waveforms can be selected individually.
 - (1) Vab, Vbc,Vca : 3 phase line-line (L-L) voltage waveform.
 - (2) ILa, ILb, ILc, ILn : 3 phase current waveforms of load side.
 - (3) ISa, ISb, ISc, ISn : 3 phase current waveforms of source side.
 - (4) IFa, IFb, IFc, IFn : 3 phase current waveforms of filter side.
- **f.** Waveform menu of window 2.
- **g.** Waveform display window 1.
- **h.** Waveform display window 2.



Figure 3-7

3-4. Spectrum

Figure 3-8 and figure 3-9 are Spectrum window. Figure 3-8 shows Harmonic Spectrum in graph and figure 3-9 shows Harmonic Spectrum in data table. User can use this function to view the spectrum of voltage and current harmonics. The function is described as follows,

- **a.** Update : Click Update button to download the spectrum data from *Liebert AF2*.
- **b.** Export : Click Export button to store the waveform data in a CSV file which is in the Comma Separated Value (CSV) file format.
- **c.** Color : Click Color button to change the color of spectrum bar.
- **d.** Spectrum : Click Spectrum button to show the spectrum in bar-graph.
- **e.** Table : Click Table button to show the spectrum in data table.
- f. The menu of voltage and current spectrum.
 - **1)** Vab, Vbc,Vca : 3 phase line voltage.
 - **2)** ILa, ILb, ILc : 3 phase current of load side.



Figure 3-8

🧳 Lieber	rt AF2 Monito	ring Soft	iware									
Function	Administrator	Logout	About									
- Sr	portru	im -										
J-		///								Spectre	um I	
			1	F .	1				1			
	Update			Export				LOI	or	Table		
	Frequ	Vab	Vbc	Vca	ILa	ILb	ILc	ISa	ISb	ISc		
H01	60.0 Hz	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%		
H02	120.0	00.4%	00.3%	00.2%	01.4%	01.2%	01.7%	01.9%	05.4%	02.4%		
H03	180.0	00.3%	00.2%	00.2%	87.1%	91.5%	92.3%	01.5%	03.7%	03.7%		
H04	240.0	00.1%	00.1%	00.2%	01.5%	01.7%	01.7%	02.0%	01.8%	00.9%		
H05	300.0	00.8%	00.8%	00.7%	69.3%	73.1%	73.1%	02.5%	02.4%	01.0%		
H06	360.0	00.1%	00.1%	00.1%	02.1%	01.4%	01.0%	01.0%	00.5%	01.5%		
H07	420.0	00.2%	00.2%	00.2%	46.3%	50.4%	51.5%	05.6%	03.5%	01.8%		
H08	480.0	00.0%	00.1%	00.1%	01.8%	01.1%	01.7%	00.9%	01.9%	00.9%		
H09	540.0	00.1%	00.1%	00.1%	26.3%	29.5%	29.9%	02.3%	01.6%	02.0%		
H10	600.0	00.0%	00.0%	00.0%	01.3%	00.9%	00.7%	00.8%	00.8%	01.1%		
H11	660.0	00.1%	00.1%	00.1%	12.2%	13.6%	13.6%	02.5%	00.7%	02.8%		
H12	720.0	00.1%	00.0%	00.1%	01.4%	00.5%	00.8%	02.0%	01.1%	01.3%		
H13	780.0	00.1%	00.1%	00.0%	09.3%	08.2%	06.6%	02.2%	01.5%	01.8%		
H14	840.0	00.1%	00.0%	00.1%	01.2%	00.6%	01.1%	01.2%	01.0%	01.3%		
H15	900.0	00.1%	00.0%	00.1%	09.6%	07.1%	06.9%	01.0%	00.8%	00.4%		
H16	960.0	00.0%	00.0%	00.1%	01.2%	00.5%	00.8%	00.8%	00.5%	00.5%		
H17	1020	00.1%	00.0%	00.1%	07.2%	04.6%	05.4%	01.7%	00.7%	01.5%		
H18	1080	00.0%	00.0%	00.1%	00.7%	00.1%	00.8%	00.9%	00.4%	01.1%		
H19	1140	00.1%	00.1%	00.1%	04.6%	01.2%	03.6%	01.1%	01.1%	01.1%		
H20	1200	00.1%	00.0%	00.0%	00.7%	00.3%	00.6%	00.8%	00.8%	00.4%		
H21	1260	00.2%	00.2%	00.1%	02.8%	02.7%	03.2%	02.5%	06.0%	01.8%		
H22	1320	00.1%	00.0%	00.1%	00.8%	00.7%	00.3%	00.9%	00.8%	00.5%		
H23	1380	00.2%	00.1%	00.1%	02.2%	04.5%	03.3%	02.5%	03.2%	01.2%		
H24	1440	00.1%	00.0%	00.1%	00.2%	00.5%	00.5%	00.5%	00.6%	00.5%		
H25	1500	00.0%	00.1%	00.1%	01.7%	03.4%	02.8%	02.7%	00.8%	01.7%		
H26	1560	00.1%	00.0%	00.1%	00.4%	00.5%	00.4%	01.0%	00.6%	00.5%		~
Luca	4000	00.40	00.40	00.40	00.701	00.001	04.001	0.4.000	00.70	00 50		

Figure 3-9

3-5. Event log

Figure 3-10 shows the Event log window, User can download the event logs from *Liebert AF2*. The function is described as follows,

- a. Update : Click Update button to download the event log data from *Liebert AF2*.
- **b.** Export : Click Export button to store the event log data in a CSV file which is the Comma Separated Value (CSV) file format.
- **c.** Count : Choose the number of event logs to be downloaded.

on Admir	uistrator Logout Ab	out			
_	11				
:ven	t IOA —				
					1
U	odate	Export		Count: 50	
Index	Date	Time	Code	Event Log Describe	
061	2007/11/22	17:28:17	S00101	Filtering Yes	
060	2007/11/22	17:28:17	C01700	Filter ON(AP)	
059	2007/11/22	17:26:17	C02000	CALIBRATION UPDATE	
058	2007/11/22	17:22:49	S00100	Filtering No	
057	2007/11/22	17:22:48	C00200	Filter OFF	
056	2007/11/22	17:22:38	S00101	Filtering Yes	
055	2007/11/22	17:22:38	C00100	Filter ON	
054	2007/11/22	17:22:12	S00100	Filtering No	
053	2007/11/22	17:22:11	C00200	Filter OFF	
052	2007/11/22	17:22:09	S00101	Filtering Yes	
051	2007/11/22	17:22:09	C00100	Filter ON	
050	2007/11/22	17:21:38	A03200	Phase Rotation Error No	
049	2007/11/22	17:21:38	C00300	ERROR RESET	
048	2007/11/22	17:21:10	C00400	ALARM SILENCE	
047	2007/11/22	17:20:58	A03100	Frequency Error No	
046	2007/11/22	17:20:57	A03101	Frequency Error Yes	
045	2007/11/22	17:20:57	A03201	Phase Rotation Error Yes	
044	2007/11/22	17:20:57	A03100	Frequency Error No	
043	2007/11/22	17:20:56	A03101	Frequency Error Yes	
042	2007/11/22	17:20:56	A03100	Frequency Error No	
041	2007/11/22	17:20:55	A03101	Frequency Error Yes	
040	2007/11/22	17:20:00	C01100	IDENTIFICATION UPDATE	
039	2007/11/22	14:39:36	A00321	M2> Input Power Abnormal Yes	
038	2007/11/22	14:39:36	A03201	Phase Rotation Error Yes	
007	0007 144 100	44.00.00	100404	··	

Figure 3-10

3-6. Compensation Selection

Figure 3-11 and figure 3-12 show Compensation Selection window. This window only provides user to view the compensation setting of *Liebert AF2*. Users cannot change any setting. If user wants to change the setting, please contact Emerson Network Power authorized representative.. The function is described as follow,

3-6-1. Setting Function (Service Option Only)

(1) Compensation Setting

Item	Function Description	Option or Input Range	Default
Harmonic Compensation	To enable or disable Harmonic Compensation functionality	ENABLE DISABLE	ENABLE
Power Factor Correction	To enable or disable displacement Power Factor Correction functionality	ENABLE DISABLE	DISABLE
Compensation Priority	To set the priority of the compensation, either Harmonic Compensation or Power Factor Correction.	Harmonic PFC	Harmonic
Reactive Power	To set the reactive power compensation mode as Target DPF (Displacement Power Factor) or Fixed KVAR basis when Power Factor Correction is enabled.	Dynamic Fixed	Dynamic
Target DPF (Displacement Power Factor)	To set the Target DPF $\cos \phi_1$.	+: leading - : lagging 0.7~1.0	-0.95
Fixed KVAR	To set the Fixed KVAR compensation value.	+: leading - : lagging Please refer to table 3-3 for input range.	0
Balance Utility	When 3 Phase load current load is unbalance and Balance Utility is enabling LIEBERT AF2 will compensate the utility current to balance. This function is only for 3 Phase 4 Wire applications. 480V Model of Liebert AF2 is not equipped with this function.	ENABLE DISABLE	DISABLE
Application Mode	LIEBERT AF2 is inbuilt with several control parameters set that are used for different type loads to obtain the best performance.	$(1\sim7)$ Please refer to table 3-4.	2

Table 3-2. Compensation Setting Description

Liebert AF2 Model		
Voltage	Current	Input Range (KVAR)
Rated	Rated	
	35 A	$-24.2 \sim +24.2$
4001/	60 A	-41.6 ~ +41.6
400 v	90 A	$-62.4 \sim +62.4$
	120 A	-83.1 ~ +83.1
	<u>35 A</u>	-23.0~+23.0
2001/	<u>60 A</u>	-39.5~+39.5
<u>380 v</u>	<u>90 A</u>	-59.2~+59.2
	<u>120 A</u>	-79.0~+79.0
	30 A	0~+24.9
48017	50 A	0~+41.6
400 V	75 A	0~+62.4
	100 A	0~+83.1

Table 3-3. Fixed KVAR Input Range

Table 3-4. Application Mode List

	Application Mode		
1	User Define		
2	6P UPS + Passive Filter		
3	6P UPS		
4	12P UPS + Passive Filter		
5	12P UPS		
6	User Define		
7	6P UPS + Passive Filter		

on Administrator Logout About	
Companyation Salactia	2
Compensation Setting	System Setting
Harmonic Compensation Enable	PHase/Wire 3P4W
Power Factor Correction Enable	Number of External CT 3CTs
Compensation Priority Harmonic	Primary Ampere of CT(100~10000) 2000
Reactive Power Dynamic	Secondary Ampere of CT(1/5)
Target DPF 0.95	CT Position Source
Fixed KVAR 10.4	CT direction detection Enable
Balance Utility Disable	Phase A CT Normal
Application Mode 0	Phase B CT Normal
Oracia contral	Phase C CT Normal
Smert Save Energy Disable	Perellel CT Ratio 500/1
ON Delay Time(Second) 10	
OFF Delay Time(Second) 10	Primary Voltage Level 400
Max. ON Current Level	
Min. OFF Current Level 0.5	
Auto Re-Start Enable	
Delau Time(Second)	-> Harmonic

Figure 3-11

(2) Compensation Logic Control

		1 6 1		
	Item	Function Description	Option or Input Range	Default
	Smart Save Energy	When this function is enabled, the filter can start-up or shutdown automatically, according to the load current level. When the load current less than Min. OFF Current Level for OFF delay time, the filter will shutdown automatically and remain OFF until the load current greater than Max. ON Current Level for ON Delay Time.	ENABLE DISABLE	DISABLE
	ON Delay Time	The delay time for automatic start-up.	0~3600 Sec	10
	OFF Delay Time	The delay time for automatic shutdown.	0~3600 Sec	10
Smart Save Energy	Max. ON Current Level	The current level for automatic start-up. For example, if the Max. ON Current Level is 1.0 for 60A <i>Liebert AF2</i> , it means the load current has to be greater than 60Ax 1.0=60A. This current level has to greater than Min. OFF Current Level。	0.1~10.0	1.0
	Min. OFF Current Level	The current level for automatic shutdown. For example, if the Min. OFF Current Level is 0.5 for 60A <i>Liebert AF2</i> , it mean the load current has to greater than 60Ax 0.5=30A. This current level has to less than Max. ON Current Level _o	0.1~10.0	0.5
Auto Re-Start	Auto Re-Start	When this function is enabled, <i>Liebert AF2</i> is allowed to automatic re-start after some abnormal conditions return to normal. The abnormal conditions include system voltage abnormal, frequency error, etc.	ENABLE DISABLE	ENABLE
	Delay Time	The delay time for automatic re-start.	0~3600 Sec	10

Table 3-5. Compensation Logic Control Description

T

(3) System Setting

Table 3-6. System Setting Description	1
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		Option or	
Item	Function Description	Input	Default
	-	Range	
Phase/Wire	Select 3P3W (3 phase 3 wire) or 3P4W (3 phase 4 wire) power system that <i>Liebert AF2</i> is connected to. If the system is 3P3W, neutral line doesn't need to be connected/compensated.	3P3W 3P4W	3P3W
Number of External CT	Select 2 or 3 external CTs that will install at Source/Load side. If the system is 3P4W, 3 CTs are needed.	2 CTs 3 CTs	3 CTs
Primary Ampere of CT	Set the primary current rating of External CT.	100~10000	1000
Secondary Ampere of CT	Set the secondary current rating of External CT. The Control Module can accept 1A or 5A rating. 1A is standard. If 5A CT will be used, an optional auxiliary CT card is needed.	1 A 5 A	Auto Detection
CT Position	Select location where External CT is installed.	Load Source	Source
CT Direction Detection	When this function is enabled, <i>Liebert AF2</i> will diagnose the polarity of External CT. When the polarity is incorrect, <i>Liebert AF2</i> will provide alarm and can not start-up.	ENABLE DISABLE	ENABLE
Phase A CT	When the polarity of Phase A External CT is incorrect, set CT reversed can change CT polarity and users don't need to reconnect the CT wires.	Normal Reverse	Normal
Phase B CT	When the polarity of Phase B External CT is incorrect, set CT reversed can change CT polarity and users don't need to reconnect the CT wires.	Normal Reverse	Normal
Phase C CT	When the polarity of Phase C External CT is incorrect, set CT reversed can change CT polarity and users don't need to reconnect the CT wires.	Normal Reverse	Normal
Parallel CT Ratio	When Control Modules operate in parallel, Parallel CTs have to be installed at the total output of <i>Liebert AF2</i> . Each phase has to install 1 CT.	500/1 1000/1 1500/1 2000/1	500/1
Primary Voltage Level	Liebert AF2 is allowed to be applied in different voltage levels with an external transformer that can be installed at the input side of the filter. When the external transformer is used, the voltage level should be set to primary voltage of the transformer.	190~6600V	400

l

3-6-2. Harmonic Function

a. Order :

This shows the harmonic order that users want to compensate. The maximum number of selected harmonic order is 12.

b. Active :

The function shows the harmonic orders which are compensated by *Liebert AF2*. If the resonance occurs between *Liebert AF2* and load, the filter will disable the respective harmonic order creating resonance.

c. Reduction(%) :

The function is to set harmonic reduction ratio. For example, when the load 5^{th} harmonic current is 10A and the reduction is set 80%, *Liebert AF2* only compensate 10A x 80%=8A 5^{th} harmonic current.

d. High Order Compensation :

Global compensate from 32nd to 51st harmonic orders.

ebert AF2 Mo	onitoring Softw strator Logant	/are			
Comp	nensat	tion Selection			
armonic Order	Active	Reduction(%)	Order	Active	Reduction(%)
□ 2		100	₩ 3	v	100
□ 4		100	Z 5	V	100
□ 6		100	图 7	V	100
		100	9	V	100
□ 10		100	M 11	V	100
□ 12		100	₩ 13	V	100
□ 14		100	M 15	V	100
□ 16		100	区 17	V	100
□ 18		100	M 19	V	100
□ 20		100	<u>₹</u> 21	V	100
□ 22		100	M 23	٧	100
□ 24		100	M 25	V	100
□ 26		100	□ 27		100
□ 28		100	2 9		100
□ 30		100	□ 31		100
High Oro	der Compe	nsation: Disable			-> Setting

Figure 3-12

3-7. Parallel Information

Figure 3-13 shows system level Parallel Information window. It can show the status of Control Modules and the rated current of the total Power Modules which is connected to a Control Module. As a reference, one Control Module can be connected with total 4 numbers Power Module totaling maximum rating as 120A. 8 such units can be paralleled to offer maximum rating of AHF to 960A.

State: BUN	State: BUN	State: STOP	State: BUN
Power Module: 60	Power Module: 90	Power Module: 90	Power Module: 120
lumber 5	Number 6	Number 7	Number 8
State: RUN	State: STOP	State: RUN	State: RUN
Power Module: 35	Power Module: 60	Power Module: 90	Power Module: 120

Figure 3-13

3-8. Dry Contact Setting

Figure 3-14 shows Dry Contact Setting window. User can define the action of each dry contact by this window. Click Edit button to enter modify window (figure 3-15) and then set each dry contact setting. There are 38 action events can be set (refer to table 3-7) and the action mode can be set either NO (Normal Open) or NC (Normal Close). After finish the setting, click Update button to store the new setting.

The default definitions of the output dry contacts are as per Table 3-8.

The Remote Control is set the function of input dry contact. The detail description refers to Section 2-1-2(D) of "*Liebert AF2 User Manual*".

🇳 Lieber	t AF2 Monitoring Sof	ftware	
Function	Administrator Logout	About	
r Dr	v Contac	ct Settina	
Dŋ	y Contact 1	(NO) - POWER ON	
Dŋ	y Contact 2	(NO) - Filtering	
Dŋ	y Contact 3	(NO) - Full correcting	
Dŋ	y Contact 4	(NO) - ERROR	
Dŋ	y Contact 5	(NO) - DC Bus Error	
Re	emote Control	(0)	
	Edit		
<u></u>			

Figure 3-14

🇳 Liebert AF2 Monitoring S	oftware	
Function Administrator Logou	ut About	
- Dry Conta	act Satting	
Dry Conta	ici dening	
Dry Contact 1	ND VOWER ON	
Dry Contact 2	NO Filtering	
Dry Contact 3	ND Full correcting	
Dry Contact 4		
Dry Contact 5	ND DC Bus Error	
Remote Control	0 •	
Ur	pdate Cancel	

Figure 3-15

Item	Event	Item	Event
1	POWER ON	2	Filtering
3	Full correcting	4	ERROR
5	MCCB Tripped	6	Fuse Blown
7	Input Power Abnormal	8	IGBT Fault
9	High Frequency Resonance	10	Over Peak Current
11	Over Current	12	Over Temperature(Power)
13	Fan Fault	14	Temp. Sensor Disconnected
15	DC Bus Error	16	DC Bus Under Voltage
17	DC Bus Over Voltage	18	External CTA Reversed
19	External CTB Reversed	20	External CTC Reversed
21	Parallel CTA Reversed	22	Parallel CTB Reversed
23	Parallel CTC Reversed	24	System Voltage Abnormal
25	System Under Voltage	26	System Over Voltage
27	Frequency Error	28	Phase Rotation Error
29	Control Board Error	30	Control Board EEPROM Error
31	Control Panel EEPROM Error	32	Power Supply Error
33	Current Cable Disconnected	34	CAN Bus Disconnected
35	Parallel Disconnected	36	Parallel ID Duplicated
37	Parallel Setting Error	38	Over Temperature(Control)

Table 3-8 The Default Definition of the Output Dry Contacts

Dry Contact	Event	Active
Dry Contact 1	POWER ON	NO (Normal Open)
Dry Contact 2	Filtering	NO (Normal Open)
Dry Contact 3	Full correcting	NO (Normal Open)
Dry Contact 4	ERROR	NO (Normal Open)
Dry Contact 5	DC Bus Error	NO (Normal Open)

3-9. Parameter Record

Figure 3-16 shows the Parameter Record window. This window provides the view of records of power parameters. The function is described as follows,

- **a.** Viewing Period : Set the start and end viewing time.
- **b. Option :** Choose the power parameters that users want to view.
- **c.** View : Click View button and then loading the power parameters data according to the setting of Viewing Period and Option.
- **d.** Export : Click Export button to store the power parameters data in a CSV file which is the Comma Separated Value (CSV) file format.
- e. Delete Records : Click Delete Records button and then set the start and end time on figure 3-17. Now, click Delete button to delete the power parameters data from database of computer.

Pa	AF2 Monitoring Sof	Reco	rd								
VIEWI	ng Felioa			puon				Vie	w	Expor	t
	start 2007 / 11 /	22 13 3	6	Voltage	🔽 Se	ource Side				· · · · ·	
	end 2007 / 11 /	22 17 : 31	6	☑ Load Side	🔽 Fil	ter Side				Delete Rec	cords
In	Time	Frequenc	Vab (V)	THDv (%)	Vbc (V)	THDv (%)	Vca (V)	THDv (%)	Load Rat	Load Side KVA	~
001	2007/11/22 17:00	60.0	386	0.7	386	1.0	385	0.8	0	5	
002	2007/11/22 17:01	60.0	388	0.9	388	1.1	387	1.0	0	5	
003	2007/11/22 17:02	59.9	387	1.0	386	1.1	385	1.0	0	5	
004	2007/11/22 17:03	60.0	387	0.9	386	1.0	385	0.8	0	5	
005	2007/11/22 17:04	59.9	386	0.9	386	1.1	385	0.9	0	5	
006	2007/11/22 17:05	59.9	386	0.9	386	1.1	385	1.0	0	5	1
007	2007/11/22 17:06	59.9	386	0.9	386	1.1	385	0.8	0	5	
008	2007/11/22 17:07	60.0	387	0.9	387	1.1	386	0.8	0	5	
009	2007/11/22 17:08	60.0	386	1.0	387	1.3	385	1.2	0	5	
010	2007/11/22 17:09	59.9	387	0.8	387	1.1	386	0.9	U	5	
011	2007/11/22 17:10	59.9	387	0.9	386	1.0	385	0.7	U	5	
012	2007/11/22 17:22	59.9	387	0.8	387	1.0	386	0.8	U	5	
013	2007/11/2217:23	59.9	385	1.0	386	1.1	385	0.9	U	5	
015	2007/11/22 17:24	50.0 E0.0	380 200	0.9	380 205	1.0	384	0.8	0	5	
010	2007/11/22 17:25	53.3	386 205	0.8	380 205	0.9	384 205	0.8	0	5	
015	2007/11/22 17:26	50.0 Eq.q	300 305	0.0	202	1.0	200	0.5	0	5	
017	2007/11/22 17:27	33.3	202	0.0	300	1.0	304 305	1.0	0	5	
010	2007/11/22 17:20	Frequenc Vab (V) THDv (2) Vbc (V) THDv (2) Vcage View Exp 217.00 600 386 0.7 386 1.0 385 0.8 0 5 217.01 60.0 386 0.7 386 1.1 387 1.0 0 5 217.02 59.9 387 1.0 386 1.1 387 1.0 0 5 217.02 59.9 387 1.0 386 1.0 385 0.8 0 5 217.02 59.9 386 0.9 386 1.1 387 1.0 0 5 217.02 59.9 386 0.9 386 1.1 385 0.8 0 5 217.04 59.9 386 0.9 386 1.1 385 0.8 0 5 217.05 59.9 386 0.9 386 1.1 385 0.8 0 5 <td>5</td> <td>~</td>		5	~						
< 000										······	>

Figure 3-16



Figure 3-17

3-10. Disconnected

When some external abnormalities causes the communication disconnected, the *Liebert* **AF2** *Monitoring Software* main window will show the disconnected sign \bigotimes and other function windows will show de-link message. Please refer to figure 3-18 and figure 3-19.

When the communication is disconnected, please check the communication cable between the computer and *Liebert AF2* is connected properly and the communication card operates properly. If the problem persists, please contact with local Emerson Network Power representative.

🗳 Liebert AF2 Mo	onitoring Softwa	пе							
Function About									
Index	Name	N	\geq		Phase/Wire	Frequency	Panel	Event	
🛞 🗐 1	Filter 00				ж	жж	**	xx	
<u>(</u>) 🗐 2	Filter 01			•	3P4W	60Hz	LCD	2007/11/20 10:20:58 (Frequency Error No)	
🚯 🗐 З	Filter 02	•			3P4W	60Hz	LCD	2007/11/22 17:22:38 (Filtering Yes)	
3 🗐 4	Filter 03				3P3W	60Hz	LCD	xx	
			5555555555						

Figure 3-18



Figure 3-19

4. Communication Port Setting

4-1. TCP/IP Setting

When the connected type is TCP/IP, user has to set ID, Baud Rate and IP Address. The ID number has to be the same as *Liebert AF2* and baud rate and IP Address setting has to the same as the communication card of *Liebert AF2*.

🗞 Liebert AF2 Monitoring Software	
Entersystem Function About	
Setting	
Index ID Name Baud Rate Connected type IP Address Record	
1 1 Filter TCP/IP 57600 ▼ TCP/IP ▼ 192.168.7.36 ▼ OK Canc	el

Figure 4-1

4-2. USB Setting

When the connected type is USB, user has to set ID and Baud Rate. The ID number has to be the same as *Liebert AF2* and baud rate setting has to be the same as the communication card of *Liebert AF2*.

🗞 Liebert AF2 Monitoring Software	
Enter system Function About	
Setting	
Index ID Name Baud Rate Connected type IP Address	Record
1 Filter USB _ USB -	CK Cancel

Figure 4-2

4-3. COM(RS-232) Setting

When the connected type is COM port, user has to set ID and Baud Rate. The ID number has to the same as *Liebert AF2* and baud rate setting has to be the same as the communication card of *Liebert AF2*. If using USB to RS232 converter is used, please ensure that the COM port setting is correct.

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Figure 4-3

4-4. RS-485/422 Setting

For connection though RS-485/422 COM port, user has to set ID and Baud Rate. The ID number has to be the same as *Liebert AF2* and baud rate setting has to be the same as the communication card of *Liebert AF2*. All *Liebert AF2* IDs can't be the same.

Children AF2 Monitoring Software		
Setting		
Index ID Name	Baud Rate Connected type IP Addres	ss Record

Figure 4-4

 	-	 -	 	_		 	 -					_		-	
		100						Emoreon	Notwor	k Dowor	Acia D	acific			
								(Headqu	arters)	K FUWEI	Asia F	actric			
								T: 852-25	5722201			F: 852-2	802925	50	
								A 6							
								Australia T: 1800-0	ı)65345			F: 61-2-9	974387	37	
								China	060100	0.0		E. 06 7E	E 9601	0000	
								Hong Ko	ng	08		F. 80-73	J-8001	0909	
								T: 852-25 India	5722201			F: 852-2	83101	14	
								T: 91-22-	2580700	0/2388		F: 91-22	-25828	358	
								Indonesi T: 62-21-	a 2513003			F: 62-21	25106	22	
								Japan	4029504			F. 01 7 I	40220	24	
								Korea	4038594			F: 81-3-3	940329	24	
								T: 82-2-3 Mələvcia	4831502			F: 82-2-5	592788	3	
								T: 603-78	84 5000			F: 603-7	884 51	88	
								New Zea T: 64-3-3	land 430235			F: 64-3-7	343025	0	
								Philippin	es						
								T: 63-2-8 Singapol	934177 re	178		F: 63-2-8	311202	7	
								T: 65-646	572211			F: 65-64	670130)	
								T: 886-2-	2528 353	5		F: 886-2	-25283	3100	
								Thailand	170200				17027	7 1 2 7 0	
								Vietnam	178260			F: 66-2-t	51/82/	/ 2/8	
								T: 84-4-7	62 8908			F: 84-4-7	762 890)9	

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 Precision Cooling
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DC Power Systems Outside Plant Site Monitoring Services



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