

ENVIRONMENTAL CONTROL

LinkUp Supervisor Panel USER MANUAL





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1.0 Introduction

LinkUp™ is a supervisory system that manages the networking of Liebert CEMS100 advanced microprocessor control environmental units¹ and optionally provides a MODBUS RTU communication gateway for BMS systems. The architecture of the system is a master-slave, multi-drop EIA-485 local area network (LAN) that utilises a proprietary communication protocol. The system is designed for supervising up to 4 zones, in which up to 10 units can be connected. LinkUp supervises each zone as a group of duty and stand-by units to maintain the zone conditions and to activate stand-by units if required, without human intervention. The main display provides the operator with a single point of access to all unit status and alarm conditions.



The primary functions of the LinkUp Supervisor are: -

- Event sequencing of duty and stand-by units
- Cascade temperature control (cooling only) of stand-by units
- Activating stand-by unit upon duty unit alarm
- Alarm management
- Zone unison control strategy
- Sequential re-starts after the resumption of loss of power
- Emergency shutdown

In addition to these functions, LinkUp provides the following features: -

- 3 levels of auto-dialler output on alarm (assignable)
- Alarm logging with time/date stamping
- 2 levels of user password to prevent unauthorised access
- Fail safe operation
- Zone operating status
- Graphic presentation of data (temperature, humidity, control variables)
- Time & date synchronisation
- Zone control set points and parameters synchronisation
- Zone test mode
- Optional connection for auxiliary temperature/humidity sensor (monitoring only)
- Optional EIA-485 MODBUS RTU communication

Note 1: CEMS100 display software must be 0617231 Ver. S (AA05D021) or later to work with LinkUp Supervisor. CEMS100 display hardware 5 years or older may need to be upgraded. Contact your local Emerson office for more information.



2.0 System Configuration & General Arrangement

The LinkUp LAN system is comprised of a LCD display board and an interface board, powered by a 24Vac supply. These two components are housed in a keylockable cabinet. The interconnection cabling between the LinkUp panel and the CEMS100 air units is achievable by either:

- 6-wire, flat telephone cable, with each end crimped with a 6P/4C RJ-12 modular plug (refer figure 1), or
- 2-wire, twisted pair, shielded cable (refer figure 2)

The base communication port of the CEMS100 unit controller is EIA-232, therefore an EIA-485 output is required for the completion of the LAN connection. A choice of communications adaptor PCB's are available either as factory fitted or field retrofit options. Consult the factory for more information.

Note: A "normal" environment consists of an installation where noise or electrical interference is minimal. This is typical of communication wiring run in properly grounded conduit or in areas where high voltage or radio transmissions are not present. Otherwise, these conditions are designated "noisy".

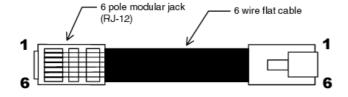
The recommended cable characteristics are:

Normal Environments:

6 wire, 7/0.12mm (0.08mm²), 28AWG, telephone flat cable (non-shielded), or

Noisy Environments:

2 wire, 7/0.20mm (0.22mm²), 24AWG, twisted pair cable (shielded)



Modular Plug LAN cable configuration

Connector type: RJ-12 6P/4C Cable type: 6 wire, flat telephone cable Gauge: 7/0.12mm (0.08mm², 28AWG)

Figure 1. 6 wire, flat telephone LAN cable (non-shielded type)

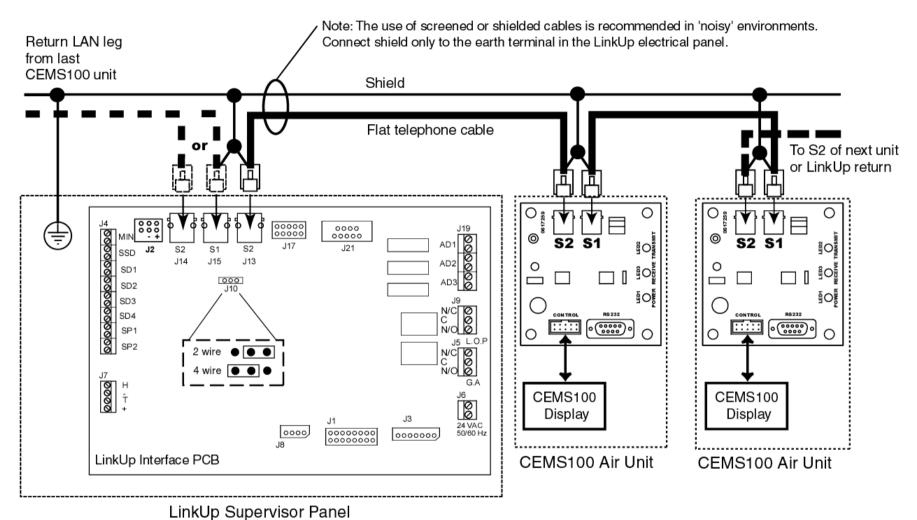


2 Wire LAN cable configuration

Cable type: Belden #8641 Beldfoil or equivalent Gauge: 7/0.20mm (0.23mm², 24AWG)

Figure 2. 2 wire, twisted pair LAN cable (shielded type)





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Figure 3. LinkUp system interconnection diagram – Flat telephone cable and RJ-12 modular plugs

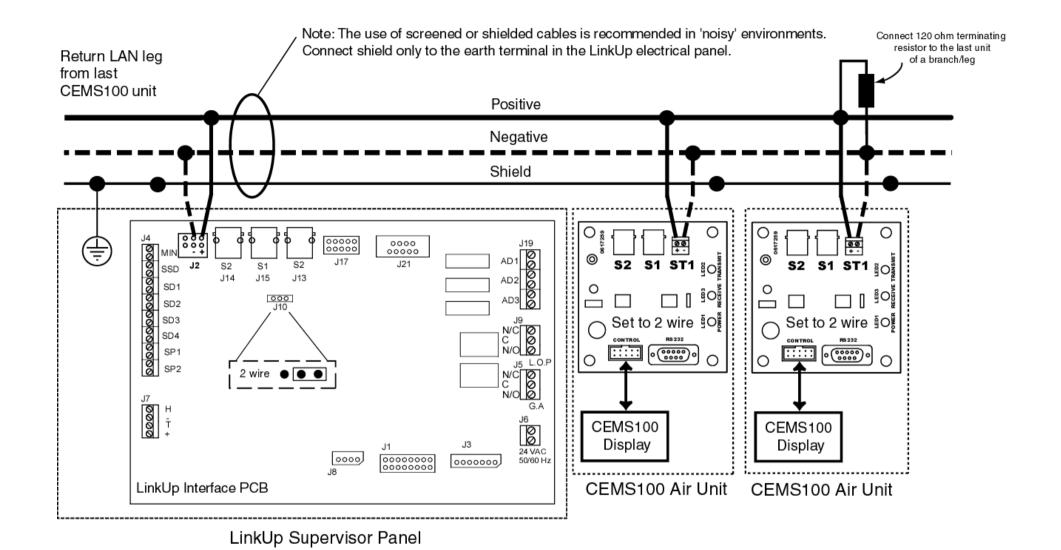


Figure 4. LinkUp system interconnection diagram – Twisted pair screw terminal connection Note: Communication jumpers must be set to '2 wire'

2.1 LinkUp LCD Display

The 240 x 180 LCD display provides the user interface with the LinkUp system. There are five control buttons to navigate, interrogate and configure the LinkUp system. The screen display consists of menus, alarm messages, status screens and graphs. Menus are composed of screens for setting up the system configuration, control parameters and for displaying control variables.

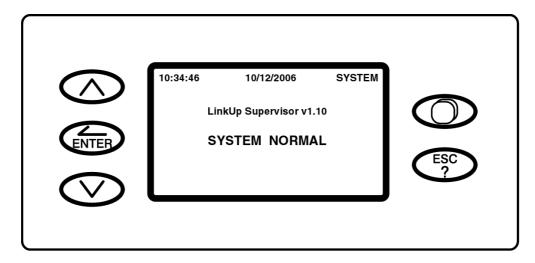


Figure 5. LinkUp LCD display

2.2 LinkUp Interface PCB

The interface PCB, as shown in Figure 6, provides connections for digital inputs and outputs, two analogue signals for temperature and humidity sensors and link connections for LAN communications. There are 8 digital inputs and 5 digital outputs. The 8 digital inputs (voltage free contacts) are as follows: -

- I input for emergency complete system shutdown
- 4 digital inputs each for individual zone emergency shutdown
- I digital input for maintaining minimum units run on emergency power shortage and preventing cascade operation (ie power supply switches to generator)
- 2 digital inputs for spare alarm

The 5 digital outputs are as follows: -

- I digital output as a general alarm for the system (rating 5A 240VAC)
- I digital output as a LinkUp loss of power signal (rating 5A 240VAC)
- 3 digital outputs providing staged levels for auto-dialler output (rating 24VAC 100mA)

Note: The interface board incorporates unique wiring connectors designed to prevent overtightening problems associated with traditional screw clamping terminals. An innovative cage clamp spring ensures sufficient force is applied to the conductors or ferrules. A **small flat-bladed screwdriver** is all that is required to 'push' each handle downwards to insert/release the conductors. Take care not to apply excessive force or use oversized or incorrect tools to operate the handles, which could result in damage to the terminal or PCB.



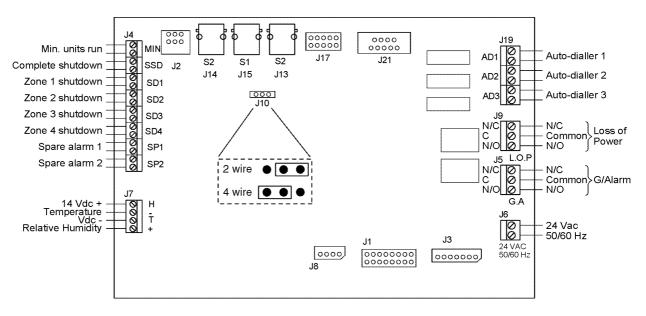


Figure 6. LinkUp Interface PCB

Connection Details: -

JI	LinkUp LCD display PCB CON I
J2	2 wire connection for LAN cabling to CEMS100 units
J3	LinkUp LCD display PCB CON10
J7	Auxiliary sensor (optional)
J8	LinkUp LCD display PCB CON9
J13(S2)	RJ-12 connection to first CEMS100 air-conditioning unit
J15(S1)	RJ-12 loop back link connection socket (if last unit is an odd count number)
J14(S2)	RJ-12 LAN loop back link connection socket (if last unit is an even count number)
JIO	LAN configuration jumper (2 or 4 wire mode selection)

2.3 Auxiliary sensor

Provision for an optional auxiliary sensor is available on the interface PCB (J7) for independent monitoring purposes. The control signal type for the temperature and relative humidity readings are 4-20 mA. The two adjacent terminals are the I4 Vdc outputs to power the sensors.



3.0 Features:-

3.1 Event Sequencing

LinkUp manages the rotation sequence of the units within each zone to promote balanced operation and even wear and tear of components. This can be programmed by the operator to occur at any given time of the day. It also manages the cascading control whereby the operating units at any given time are kept to a minimum (as specified by LinkUp minimum units ON parameter) and the stand-by unit(s) are only activated when required.

3.2 Zone Unison Control

The LinkUp supervisor continuously monitors the operational mode of each unit and inhibits any units that would work in opposite mode to the majority of the units within the same zone. For example, when the majority of the units are on cooling, heating output on any other units will be inhibited. The same applies for humidifying and de-humidifying. This strategy avoids units fighting one another and benefits energy usage.

3.3 Alarm Management.

LinkUp provides a choice of 3 actions to effect duty and stand-by unit operation upon alarm (TRANSFER, ENABLE and DISABLE). This flexibility in alarm management allows users to customise their duty/stand-by strategies depending on fault condition and individual circumstances.

When an alarm has been generated from any unit, the alarm message will be displayed in the LinkUp main screen. As a result, three alarm actions are activated.

- I. audible alarm,
- 2. general alarm output, and
- 3. auto-dialler alarm output

Each alarm can be assigned to one of three auto-dialler outputs. Up to 100 time/date stamped alarm messages, past and present, are held in battery-backed memory. A rolling log means oldest alarms are purged once the limit is reached. The alarm history log provides a useful tool for analysing symptoms of any particular pattern of problem that may develop on site. Records of alarm events will also provide a means for evaluating the performance of the installation.

Refer to the table on the next page for alarm action and default settings for both CEMS100 and LinkUp.



Source: CEMS100 Unit

Alarm Description	Audible	General Alarm	Auto-dialler
			Level
Faulty sensor	Yes	Yes	I
High temp	Yes	Yes	1
Low temp	Yes	Yes	3
High hum	Yes	Yes	2
Low hum	Yes	Yes	3
No air	Yes	Yes	2
HP/LP	Yes	Yes	2
Water under floor	Yes	Yes	1
Hum low water	Yes	Yes	2
Spare I & 2	Yes	Yes	2
Battery low	Yes	Yes	2*
Loss of power	Yes	Yes	3*

^{*} Not configurable

Source: LinkUp System

Alarm Description	Audible	General Alarm	Auto-dialler
			Level
Min units run	No	No	3
System shutdown	No	No	3
Zone Shutdown	No	No	3
Spare alarm	Yes	Yes	2
Parameter corruption	Yes	Yes	N/A
Loss of comms	Yes	Yes	3
Loss of power	Yes	Yes	3
Date/time not set	Yes	Yes	N/A
Insufficient units	Yes	Yes	3
ROM checksum	Yes	Yes	3
Battery low	Yes	Yes	2
Mains frequency loss	Yes	Yes	N/A
Check battery	No	No	N/A

Table I – LinkUp Alarm Reference Table



3.4 Fail Safe

Once LAN communication is established, LinkUp processes its control management algorithm and determines which units should be run as duty and which should be on stand-by (based on system configuration settings). Should the network be disconnected or the LinkUp panel lose mains power, the CEMS100 units maintain their state of operation prior to the loss of communication. The units will continue to remain in that mode until successful LAN transmission is restored.

On resumption of mains power, LinkUp will supervise the re-starting of units sequentially to avoid excessive in-rush current.

Note: This is independent of, and overrides, the CEMS100 unit's own start-up delay timer. It is recommended that each CEMS100 start-up delay timer be configured for staged starts (refer System Menu/System Setup in CEMS100) in the unlikely event that the LinkUp unit fails on power-up.

Note: It is recommended to power the LinkUp from a continuous power source eg. UPS

3.5 Synchronisation

Synchronisation functionality is provided for both zone set-point settings and system time/date to assist commissioning and ensure system continuity.

Note: Time/date synchronisation occurs automatically each midnight

3.6 Permanent Units

To support critical areas within a zone, up to 4 individual units can be configured to always run (Permanent) i.e. they are ignored by the event sequencing algorithm. This strategy can protect against potential hot spots in unevenly loaded rooms or large unit zones during event sequencing (duty/stand-by changeover) and protects space conditions. Careful consideration and proper planning in zone configuration is crucial to the success and performance of the system.



3.7 Operating status

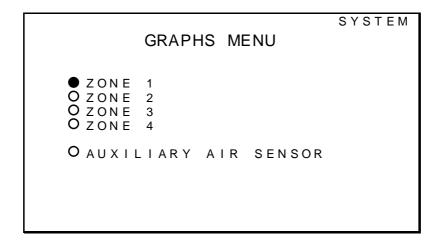
The operating status screen provides a general overview of the operating status of the units that are connected to LinkUp LAN. There is one operating status screen per zone that provides the following information: -

- ❖ Average values of temperature and relative humidity of each zone
- Number of units in operation
- Unit alarm indication
- Unit on service indication ('Spanner' icon)
- Permanent (P), Duty (D) or Stand-by (S) unit status indication
- Number of units in cascade mode
- Zone test mode status

10:35:21	10/12/2006	ZONE1
AVERAGE	24 _{°c} 47 _{"rH}	
CASCADE: 0		
1 D 条	2 S	
1 D &	4 D 🚓	
5	6	
7	8	
9	10	

3.8 Graphic presentation

LinkUp can provide graphical displays of the average control data of each zone for monitoring the operational performance of the zone. Trend data for return air temperature and humidity, supply air temperature, auxiliary temperature and humidity (opt. sensor required) and P-I-D are available.





4.0 LinkUp Navigation

4.1 Control buttons

There are five control buttons on the main LinkUp panel which have the following functions: -



Toggle button.

Pressing this button allows the screen to toggle from the default to Zone I operating status screen or vice versa. Pressing this button while in any other screens returns the operator to the default screen.



Escape button

This button returns the screen to the previous screen. Pressing in any user input field before the ENTER button aborts any data entry.



ENTER button

Use this button to select a menu item and modify an input field.



UP button

Use this button to cycle through menu selections, toggling options and increasing the value of an input field.



DOWN button

Use this button to cycle through menu selections, toggling options and decreasing the value of an input field.



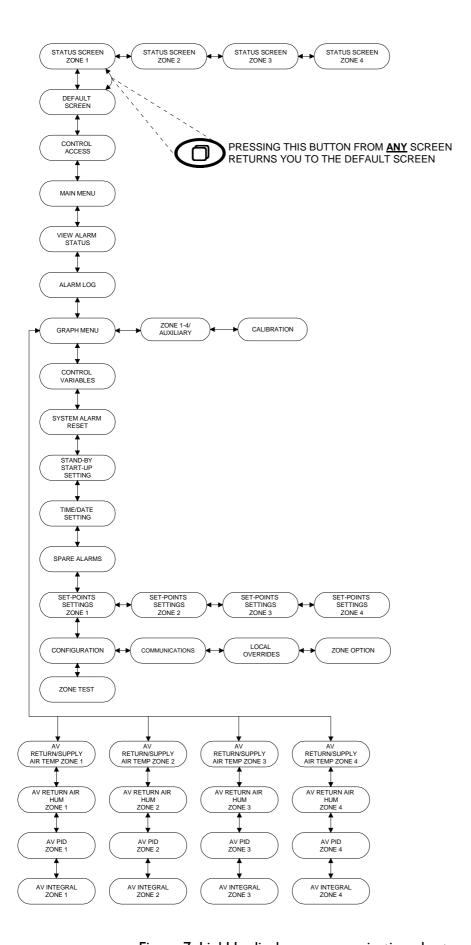


Figure 7. LinkUp display screen navigation chart



5.0 Guidelines for setting up a LinkUp system

5.1 Limitation

The LinkUp LAN system is only limited to the following conditions: -

- Maximum of 10 units per zone
- Maximum of 4 zones per system
- Minimum of I duty unit per configured zone
- Maximum of 4 Permanent assigned units per zone

Note: It should be remembered that LinkUp is designed to provide multi-zone event sequencing and cascade functionality in accordance with a user defined configuration. It cannot compensate for inadequate planning on the part of the installer or system designer.

5.2 Site layout

Unit numbering or addressing is vital to the LAN connectivity and LinkUp operation. The unit address *must* be in consecutive order starting with unit I of each zone (refer table 2). Depending on the number of units that is set up in each zone and the number of duty and stand-by units, LinkUp computes the equal spacing algorithm to place the stand-by units equally spaced among the duty units.

5.3 Zoning Strategy

The concept of zoning is to allow an area to be controlled by a group of units that can work together to maintain the same set of conditions with appropriate levels of stand-by support, whilst avoiding conflicting modes of operation. Where large distances separate units, or where room layout inhibits their ability to work together to maintain a common set of conditions, they should be set to a different zone.

5.4 Setting up system configuration

The following site-specific system configuration settings are required:

Unit Zone Information

- Number of units per zone
- Minimum number of units on
- Permanently-on units

Rotation/Delay Information

- Unit rotation period
- Unit rotation time
- Stand-by start-up delay
- Duty/stand-by delay

Refer Section 9.3 for more information.

Note: Subject to room size, unit numbers and zone configuration, units supporting critical loads can be configured as **P**ermanent in the configuration menu, "Permanently On Units", to avoid potential hotspots from event sequencing.



5.5 Setting up the CEMS100 environmental unit controller

Two areas in the CEMS100 controller will need to be set up for the communication to be established successfully and for the system to work properly. These two areas are the unit address and the communication baud rate.

(I). Unit Addressing

Each CEMS100 environmental unit address must be set according to the following table. Refer CEMS100 SYSTEM SETUP menu. Incorrect set up will lead to operational problems within the LinkUp system.

ı		<u> </u>									
		-			Z	ONE I					
	Unit No.	ı	2	3	4	5	6	7	8	9	10
	Address	П	12	13	14	15	16	17	18	19	20
Ŧ					ZC	ONE 2					
•	Unit No.	I	2	3	4	5	6	7	8	9	10
	Address	21	22	23	24	25	26	27	28	29	30
	ZONE 3										
	Unit No.	I	2	3	4	5	6	7	8	9	10
	Address	31	32	33	34	35	36	37	38	39	40
	ZONE 4										
	Unit No.	I	2	3	4	5	6	7	8	9	10
	Address	41	42	43	44	45	46	47	48	49	50

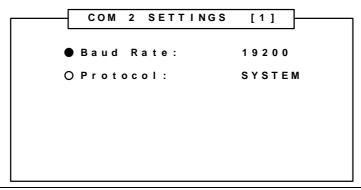
Table 2 Unit addressing format

Note: The unit address in each zone must start with xI, i.e. II for zone I, 2I for zone 2, 3I for zone 3 and 4I for zone 4. The address of the units within a zone must:

- (a) be sequential through the last unit, without spaces between the two addresses, and
- (b) not share the same address number.

(2). Communications screen

The communication transmission of the LinkUp system will not be established without the correct setting in the CEMS100 environmental unit controller COMMUNICATIONS screen. The COMMUNICATIONS screen is under the SYSTEM MENU. The unit must be configured for 19200 baud rate and SYSTEM protocol for successful communication.





5.6 Installing LinkUp

The installation of the LinkUp can be accomplished with minimal interruption to the environmental control units that are already up and running. In the majority of cases, units will be fully installed and set up to run. For new installations, LAN cables should be laid during the installation of the units and the LinkUp panel installed in an appropriate location at the same time. The setup of the LinkUp system can be performed after the completion of the installation of all the environmental units and the positioning of connection cables. In general, the procedures for installing the LinkUp will be as follows: -

- i. Mount the LinkUp Supervisor wall box and provide 230VAC 50Hz single-phase power to the input circuit breaker/terminals.
- ii. Locate either the RJ-12 modular plug or 2 wire screwed terminal EIA-485 connection point within each CEMS100 environmental unit that suits the LAN wiring selected for the installation.
- iii. Connect the LAN cables, except for the last loop back cable (if fitted), between the LinkUp interface PCB and the CEMS100 environmental unit communication adaptor cards (refer figure 3 & 4).
- iv. Configure the unit address and communication baud rate in each CEM\$100 controlled environmental unit as per 5.5.
- v. Power up the LinkUp panel and set up the configuration screen according to site requirements (NB: requires Level 2 password).
- vi. Check the operating screen for each zone to verify unit communication.
- vii. For Full Loop LAN installations: Upon successful communication, connect the last link to the LinkUp interface PCB (J14/S2 or J15/S1) and then disconnect the first link (J13/S2) to confirm communication transmission (refer figure 3). For 2 wire LAN cabling, connect/disconnect the wiring at J2.
- viii. Re-connect the wiring to complete the full loop (if applicable).
- ix. Carry out synchronisation of time/date and set point control parameters as necessary.
- x. Set up the stand-by start-up settings as necessary.
- xi. Perform a Zone Test as necessary.
- xii. Record all settings in the LinkUp Supervisor commissioning form.

The LinkUp starts polling immediately once the configuration is set. It takes several seconds to completely scan 40 units. Faster transmission occurs with less units. If a unit loses its communication, it will take slightly longer to complete a scan, as it will wait a bit longer for the recipient to have a chance to respond.



5.7 Servicing the CEMS100 unit

Once the LAN communication has been established, the on/off button of the CEMS100 unit controller will not respond to user input. Should a unit need to be shutdown temporarily for servicing, the 'Local Override' feature under the COMMUNICATIONS menu will remove the unit from the 'network'. This allows a technician to carry out safe service work and take full control of the unit. In this mode, LinkUp will consider the unit unavailable. A dynamic spanner symbol is displayed on both the CEMS100 and the LinkUp zone display screens. No alarm will be triggered by the LinkUp.

Note: If the power has to be isolated, LinkUp will generate a 'loss of communication' alarm for that unit. Do not remove the LAN communication link unless it is really necessary and ensure that the loop back link is in place before you do so.

5.8 Successful LinkUp / CEMS100 unit communication

When the LAN communication is established, the CEMS100 controller screen appears slightly differently to stand alone units. At the top right-hand corner of the screen, the UNIT # will change to ZONE address number. For example, UNIT #11 will change to ZONE #1 UNIT #1, UNIT #23 will change to ZONE #2 UNIT #3, etc.

5.9 Operating Units

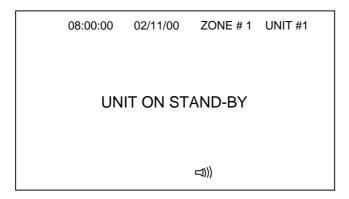
When a CEMS100 unit is under LinkUp control, an additional icon will appear at the bottom of the screen next to the AOM switch icon to indicate the status of the unit. The icons are **D** for a duty unit, **P** for permanently on unit and **S** for stand-by unit. The LinkUp controller determines a duty unit from the equal spacing algorithm.

Note: When the operating mode of a unit is inhibited due to the Zone Unison Control strategy (or majority rule), the mode icon no longer animates. Refer Section 3.2.



5.10 Stand-by units

The default screen of a CEMS100 stand-by unit will show UNIT ON STAND-BY instead of UNIT OFF when LAN communication is established. Similar to operating duty units, an icon will appear at the bottom of the screen indicating either duty unit (D) or stand-by unit (S). Should a duty unit be switched on to stand-by due to a fault, the bottom of the screen will display an alarm icon as shown.



5.11 LAN inter-connection (RJ-12 Modular Plugs)

The link of the LAN connection starts from J13, labelled as S2, to S2 of the adaptor card of first processing unit. The connection of the subsequent units must be S1 to S1, and S2 to S2, until the last unit. All the connections are in series. The last available connector of the unit can either be S1 or S2. When connecting the loop back link, the S1 or S2 of the last CEMS100 unit connection must match the socket as marked in the LinkUp interface PCB. Refer figure 3.

5.12 LAN inter-connection (2 wire, UTP/STP)

The 2 wire UTP/STP LAN connection starts at J2 on the LinkUp interface PCB, and multi-drops to the screw terminal connectors at each CEMS100 unit, returning to J2 (if applicable). Ensure the communications jumpers are set to 2 wire at both the LinkUp interface PCB and CEMS100 units. For single branch wiring install a 120-ohm terminating resistor at the farthest CEMS100 unit. For STP wiring connect the screen/shield at the LinkUp main earth. Do NOT connect to J2. Refer figure 4.

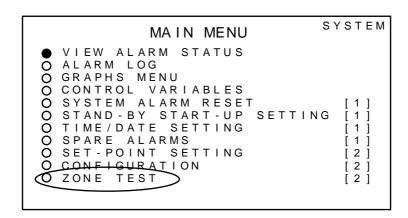
5.13 Steps & Quick Check

- ✓ The LAN cables have been connected as per figures 3 and 4.
- ✓ Units have been set with correct addresses
- ✓ Communications configuration for each CEMS100 unit has been set to 19200 baud & SYSTEM
- ✓ The LinkUp zone configuration parameters have been set correctly.
- ✓ Review the LinkUp status screen for unit LAN confirmation



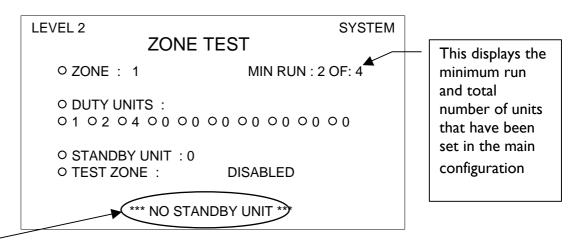
5.14 Zone Test Feature

The zone test mode feature facilitates customer acceptance testing and demonstrates the capability of the LinkUp system to start-up a nominated stand-by unit in response to a duty unit in fault. The units to run can be nominated, provided the total number operating is not below the minimum units set for the zone. Any one of the remaining units can be assigned as the standby. During the test operation all time delays are reduced to a minimum (refer section 6 – Time Delays). The zone status screen and the system screen both indicate when a zone is in test mode.



Note: Before enabling the zone test mode, ensure the alarm management settings in the 'Stand-by Start-up' screens are set to either TRANSFER or ENABLE for the respective 'fault' test condition. The system will automatically default out of test mode <u>I hour</u> after the last button press, if the test is not terminated manually. Requires Level 2 password access.





A warning message is displayed whenever a selection is invalid. The following warning messages could be prompted depending on the type of invalid data being entered.

```
*** NO STANDBY UNIT ***

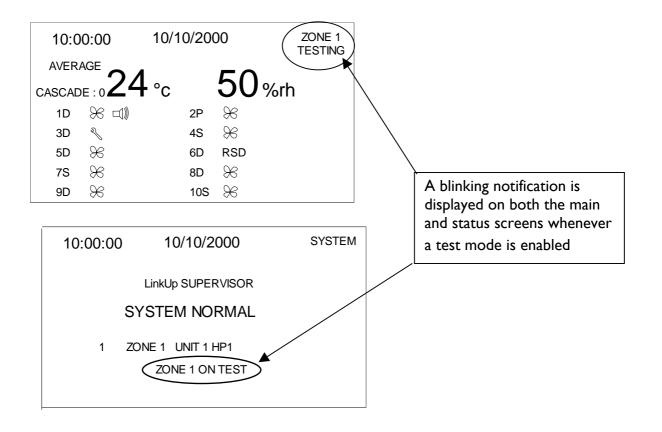
*** STANDBY SAME AS DUTY UNIT ***

*** INVALID STANDBY UNIT ***

*** INVALID DUTY UNIT ***

*** MINIMUM UNITS NOT SET ***
```

Note: The test can only be conducted on one zone at any given time. If the zone number is changed, the zone that has been set on test will immediately be dropped out of the test mode.



6.0 Time Delays

A number of time delays are built into the LinkUp control. Whether it is an alarm changeover mode of operation or on rotation, these time delays help to prevent generating disturbances to the system. Service personnel need to understand these time delays when evaluating system operation. The time delays are:

Description	Delay t	imes
	NORMAL	TEST
Minimum cascade activation delay from last unit	I5min	l min
activation or deactivation		
Minimum cascade deactivation delay from last	I0min	l min
unit activation or deactivation.		
Minimum run time before majority rule is	I 0min	l min
applied to an individual after its activation		
Minimum time for staged activation of mode	10min 10sec	l min
under majority rule		
Minimum time for staged deactivation of mode	I0min	50sec
under majority rule.		
Minimum delay before deactivating a unit from	I0min	30sec
the last unit activation or deactivation		
Minimum delay before including a recently	5min	l min
activated unit into the system averages and		
majority rule calculation.		
Minimum off time of faulted units before it is	30min	3min
allowed to be re-activated if previously		
deactivated.	_	
Minimum run time of any units	I5min	l min



7.0 Passwords

LinkUp provides two passwords for gaining access to setup configuration and control parameters. :

Level	User	Password	Write Access
I	Customer/end user	7361	[1] areas only
2	Service personnel	Contact factory	All

Note: View only access to any screen is available to anyone. Only authorised and trained service personnel should access Level 2 areas.

8.0 Alarm messages & trouble shooting

This section covers only the LinkUp LAN alarms. Refer to the environmental unit installation, operation & maintenance manual for CEMS100 controller details.

Loss of Communications

Check the LAN cable

Check if the communication card is functional (power/transmit/receive LED's)

Check unit address

Check the system configuration

Check power is available at CEMS100 environmental unit

Insufficient Units Zone #x

Check that the faults on all units have been corrected and re-set Re-assess the load and cooling requirements

Parameter Corruption, Battery Low

Check that the battery jumper JP2 on the rear of the LinkUp display has not been removed or is in the incorrect position

Note: When LinkUp initially starts up, a 'Parameter Corruption — System Alarm' may generate. This message appears when the battery has discharged to a low level whilst power is off. This can occur with new units where the battery has not had sufficient operating time to fully charge. Should this message appear following power restoration to the LinkUp, the operator should review the system configuration/setup parameters. To clear this alarm, access a settable field, eg. Set point, and re-confirm the value.

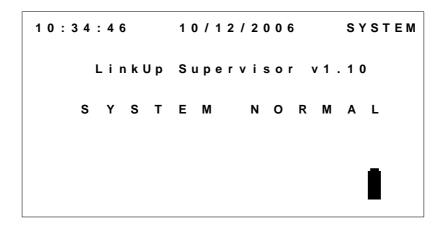


9.0 Menus and Screens

9.1 Main Screen

When the system first starts up, the main screen displays system status, time & date. To access the menu structure, press the enter button which prompts the user for a password. Whilst all screens can be viewed, the correct password must be entered to modify field data. If no user activity occurs for 2 minutes while in a screen , the user will be returned to the main screen. Pressing the toggle button cycles the screen between the Zone I status screen and this screen. To view other zones, press the up or down arrow buttons when zone I is displayed.

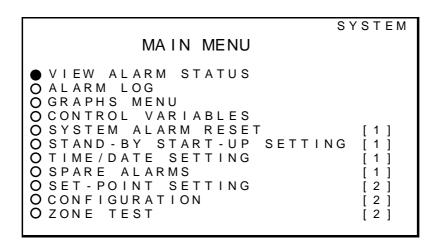
SYSTEM NORMAL will change to SYSTEM ALARM together with the activation of the alarm icon and alarm message when an alarm has been detected.



9.2 Main Menu

The main menu allows the user to navigate through to various functions of the system. The number in the [] indicates the level of password that is required for modifying the data. Level I password is a low level access intended for general operator use. The Level 2 password is intended for service personnel and system configurators responsible for LinkUp operation. Only qualified and trained personnel should access these screens.

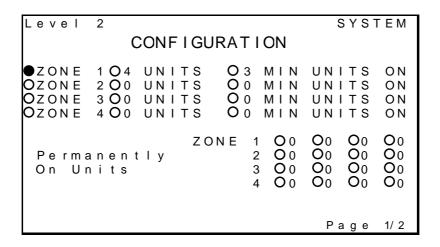
Note: any screen can be accessed in read-only mode.





9.3 Configuration

There are two screens for LinkUp system configuration. Use the up/down arrow buttons to navigate between fields/screens.



Number of units per zone

This number enables the system to scan for the units that are installed on each zone. Entering a larger than connected number of units will slow down the communication transmission and result in a loss of communication alarm. A lower number will result in units not being recognised by LinkUp. The system will start scanning a zone once a unit quantity is entered.

Minimum number of units on

Depends on the size of the air-conditioned space and load, as well as supporting required air changes. This defines the number of duty units (D) in the zone.

Permanently on units

Permanently on units are set to handle critical loads that are adjacent to them. This unit will continue to run and will not be switched to stand-by regardless of a fault. Permanent units are ignored by the event sequencing routine.



Level 2	SYSTEM
CONFIGURATION	
<pre>OUNIT ROTATION OUNIT ROTATION HOUR OUNIT ROTATION MINUTE OSTANDBY STARTUP DELAY ODUTY/STANDBY DELAY</pre>	00 7 D A Y S (7) 10
OCOMMUNICATIONS OLOCAL OVERRIDE OZONE OPTION	[1] [1] [1]
	Page 2/2

Unit rotation

The unit rotation period allows units to rotate between the role of duty and stand-by among the units that are installed in a zone. The choice of selection is from 0 to 99 days (default = 7 days). Note: A value of 0 will result in no rotation taking place.

Unit rotation hour/minute

A specific time of day can be selected for sequence changeover (unit rotation). The setting is in 24 hour time format.

Stand-by start-up delay

This is a delay time for a stand-by unit to start up due to either cascade control or alarm fault. The available choice of selection is 20s, I min and 5min (default = I min).

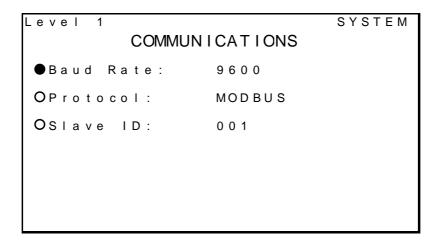
Duty/stand-by delay

This delay time manages the transfer time between duty and stand-by units. The range of selection is from 0 to 99s (default = 30s). This value will result in the start up of the stand-by unit <u>prior</u> to the shut down of the duty unit (sometimes referred to as 'overlap').



9.3.1 MODBUS Communications

LinkUp has the facility to communicate with external building management systems via MODBUS RTU (remote terminal unit) transmission mode. LinkUp operates as a slave device on the BMS network, providing a gateway to access status and alarm points from CEMS100 environmental control units operating on the LinkUp LAN.



On LinkUp-M models, a communications adaptor card is mounted on the rear of the LinkUp front door. A 2 wire screw terminal connector provides EIA-485 MODBUS RTU communications for an external BMS as shown below. Refer Modbus Reference Document – LinkUp/CEMS100 (051526) for point availability and setup information.

Connects to CON2 on CEMS100 display

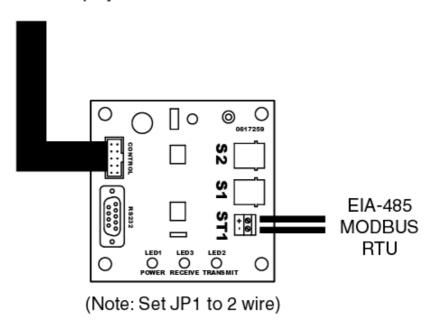
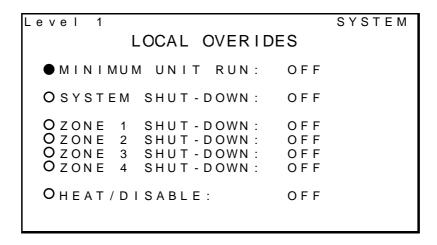


Figure 8 – Optional EIA-485 MODBUS RTU card located on rear of LinkUp door

9.3.2 Local Overrides

In applications where a building management system (BMS) may control LinkUp operation via a high level interface, this screen provides a local override facility in the event that the BMS system fails or is unable to send a reset command to LinkUp.



9.3.3 Zone Control

By default the majority rule algorithm is turned on for all zones. In applications where the LinkUp panel is used as a MODBUS gateway for multiple units that do not share the same physical space and therefore not function as a true zone, the majority rule can be turned off.

```
ZONE OPTION

ZONE 1 MAJORITY RULE: ON
OZONE 2 MAJORITY RULE: ON
OZONE 3 MAJORITY RULE: ON
OZONE 4 MAJORITY RULE: ON
```

9.4 Set Point Setting

The function of this screen enables all the units in the same zone to have the same set-points. The changes take effect by selecting YES to the synchronise parameter.

```
SET POINT SETTING

Return Air Temperature: 23.0 C
OReturn Air Humidity: 50.0 %rH

OHigh Temperature Alarm: 28.0 C
OLow Temperature Alarm: 16.0 C
OHigh Humidity Alarm: 65.0 %rH
OLow Humidity Alarm: 35.0 %rH

OSynchronize Zone 1: NO
```

9.5 Control Variables

The control variables screen displays the average values for return air temperature, humidity and control action terms (P-I-D) per zone. This screen is normally used for assessing the set-up and performance of the system. Trend plots of each variable can be viewed by navigating through the Graphs menu.

	CONTROL VA	RIABI	_ES	5	SYST	ГЕМ
			1	2	3	4
A v A v	Return Air Return Air		24.5 47.5	0.00	0.00	0.00
	Integral Te PID Output	rm	-042 -073	+000 +000	+000 +000	+000 +000

9.6 Alarm Log

All alarms, either from the LinkUp system or from the units, are logged in the Alarm Log screen. Each logged alarm has its associated start and end time and date. If alarms are from the CEMS100 environmental air units, zone and unit numbers are also shown.



9.7 Time/Date Setting

In addition to setting the correct time/date for the system, this screen enables system synchronisation to take effect at the instant when YES is entered. This is recommended for new installations.

```
      Level 1
      SYSTEM

      TIME/DATE SETTING

      ●Hour (0-23): 10

      OMinutes (0-59): 48

      OSeconds (0-59): 23

      ODate: 10

      OMonth: 12

      OYear: 2006

      OSynchronize Time: NO
```

Note: The time/date of the LinkUp system are synchronised to all units automatically each midnight.

9.8 System Alarm Reset

This screen allows the user to re-set the LinkUp latched general alarm and auto dialler outputs after the fault has been corrected. The alarm history and graphs can also be reset via this screen.

```
SYSTEM
Level
     SYSTEM ALARM RESET
■ Reset Gen Alarm/Dialers
                          NO OFF
OReset Dialer 1 Output:
                          NO OFF
OReset Dialer 2 Output:
                          NO OFF
                          NO OFF
       Dialer
               3 Output:
OReset
       Alarm History:
                          ΝO
OReset Graph Logs:
                          ΝO
```

9.9 Stand-by Start-up Setting

There are three choices of duty/stand-by action for each system alarm:

Transfer permits the activation of a stand-by unit and shutdown of the alarmed duty unit when the relevant alarm is generated

Enable operates a stand-by while keeping the duty unit running continuously **Disable** means the duty unit will continue to run without calling for a stand-by unit

```
Level
                                SYSTEM
        STAND-BY START-UP
● Faulty Sensor Alarm TRANSFER O1
O High Temp Alarm ENABLED
                                     Ο1
                          ENABLED
 Low Temp Alarm
High Hum Alarm
                                     О3
                          ENABLED
                                     Ο2
                                     О3
  Low Hum Alarm
                           ENABLED
ONO Air Alarm (A)
ONO Air Alarm (B)
                          TRANSFER O2
                          TRANSFER O2
                                     O_2
      1 (1A)
  ΗР
                           ENABLED
Онр
                                     O_2
      2 (1B)
                           ENABLED
                                     O_2
Онр
                           ENABLED
      3 (2 A)
Онр
      4 (2B)
                           ENABLED
                                     O_2
                               Page
```

```
Level
                              SYSTEM
        STAND-BY START-UP
 ●LP
                         TRANSFER 02
     1 (1A)
 OLP
                         TRANSFER O 2
     2 (1B)
 OLP
     3 (2 A)
                         TRANSFER 02
 OLP
                         TRANSFER 02
     4 (2B)
OWUF Alarm
                         TRANSFER 02
 OHum Water Low
                         TRANSFER 02
 OSpare 1 Alarm
                         TRANSFER 02
 OSpare 2 Alarm
                        TRANSFER 02
                                   Ο2
 OBattery
           Low
                                   О3
OLoss of
           Power
                             Page
                                  2/2
```



9.10 Spare Alarms

Spare alarm I and 2 text can be customised to match the external input devices at the LinkUp. Up to 26 character length is available from the following selection:

ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~space!" #\$%&'()*+,-./0123456789:;<=>?@

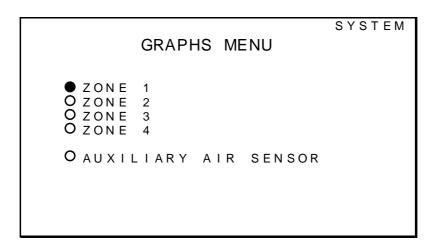
```
SPARE ALARMS

Spare 1 alarm customised text:
Spare 1 alarm

OSpare 2 alarm customised text:
Spare 2 alarm
```

9.11 Graphs Menu

There are five items in the GRAPHS menu. Each zone has trend plots of average control (return or supply) air temperature, return air relative humidity, PID, and integral terms. The supply air plot is only applicable where the optional environmental unit sensor is fitted and the CEMS100 units are configured for supply air control. A zone must be either return or supply air controlled. The auxiliary air sensor graph provides temperature and relative humidity plots.



10.0 Specifications

Electrical	
Supply power*	230 VAC 50/60 Hz +/-10%
Max. current	IA
LAN Communication	
Protocol	EIA-485
Baud	19200 baud
Cable type	
Normal environment	6 wire, 7/0.12mm (0.08mm²), 28AWG,
	telephone flat cable (non-shielded)
Noisy environment	2 wire, 7/0.20mm (0.23mm ²), 24AWG, twisted
	pair cable (shielded)
Connector type	RJ12 modular plug or screwed wire terminal
Cable impedance	100 – 130 ohms
Termination resistance	120 ohms \pm 5%
Maximum total distance	1,200 metres
Mechanical	
Box dimensions (H x W x D)	415 x 360 x 115 mm
Control box degree of protection	IP40
Colour	APO grey
Weight	7 kg
Auxiliary sensor	
Power supply	10/24Vdc ± 10%
Temperature	4-20 mA (4mA = 0°C, 20 mA = 50 °C)
Relative humidity	4-20 mA (4mA = 0 %RH, 20 mA = 100 %RH)

^{*} UPS power recommended

II.0 Spare Parts

Part Number	Description
0617331	LinkUp Display board
0617291	LinkUp Interface board
0617259	EIA-232 to 485 converter
063620	Transformer 230-24VAC 50VA
061289	MCB I0A I pole





ENVIRONMENTAL CONTROL

LinkUp Supervisor Panel

USER MANUAL

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