# 1. Introduction

## *1.1 Background*

The 4K2e provides both an expansion in capability and a hardware update to the MCS-4000 controller. It is backward compatible with existing communications systems, COM-5002 and ADV-6000 (firmware upgrades required) as well as the 4000 series I/O boards. The same user interface, Menus and Screens were retained, thus it requires little or no training to move from the MCS-4000 to the 4K2e. Existing MCS-4000 programs may be converted with Ezset2004 (version xx or later) to run on the 4K2e. This gives the customer the ability to integrate the 4K2e into existing installations. Greatly expanded memory enables us to continue to provide new control algorithms, additional logging and new features as requested by customers or as needed to support new technologies. The following discussion covers the 4K2e in more detail.

Note: To accommodate the larger capacity of the 4K2e with a COM-5002, the available logging memory is reduced from 47 blocks to 29 blocks with 8 or less controllers. Thus, you may need to add the expanded memory board to obtain the desired logging capacity. If more than 8 controllers, you must add the expanded memory board to have logging memory available. Refer to COM-5002 manual for logging information.

## *1.2 Expanded Capabilities*

Inputs and Outputs

The input and output capacities have been increased as follows:
Analog Inputs – from 127 to 248
Relay Outputs – from 63 to 128
Digital Inputs – from 63 to 128
Analog Outputs – from 31 to 64

Tasks

The maximum number of tasks has been increased from 100 to 200.

Alarms

The maximum number of alarms has been increased from 100 to 250.
The alarm history has been increased from 40 events to 80 events.

Schedules

The maximum number of schedules has been increased from 86 to 172.

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Logging
The logging capacity has been increased from 384 samples per I/O point to 3008 samples for each I/O point.

All *task types* are available in a single 4K2e controller. Thus, any 4K2e controller can control Refrigeration, HVAC, Lighting and Miscellaneous.

Memory
The 4K2e utilizes Flash Memory. The amount of memory has been increased by approximately 16 times which provides the additional system capacity, expanded logging, and future updates. Flash memory also provides firmware upgrades via upload rather than chip changes.

In order to handle the expanded I/O capability, the AI-16 and RO-8 boards have been modified to allow addressing of up to 31 boards of each type. A jumper (J1), is provided below the rotary addressing switch that adds sixteen to the rotary switch value when the jumper is placed in the “32” position.

| | Jumper Position | |
|---|---|---|
| | 16 | 32 |
| Rotary Address Sw. Position | Resulting Address | |
| 0 | 1 | 17 |
| 1 | 2 | 18 |
| 2 | 3 | 19 |
| | Etc. | Etc. |
| 9 | 10 | 26 |
| A | 11 | 27 |
| | Etc. | Etc. |
| E | 15 | 31 |
| F | 16 | N/A |

Global Transfer addresses on the 4k2e have been moved to addresses 33 -1 thru 36 – 8. However, on the ADV-6000 and the COM-5002, global addressing is still handled on addresses 17-1 through 20-8. The 4K2e handles the translation, so that it can operate properly/maintain compatibility on the same bus with standard MCS-4000 controllers. Local transfers are located on 37-1 to 40-8.

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## *1.3 Backward Compatibility*

The new 4K2e circuit board will mount on the same door/enclosures that the MCS-4000 uses. It uses the same display and overlay/touch keypad (new logo).

Connections for power, local and global buses, and alarm outputs are in the same location and utilize the same connectors. Refer to MCS-4000 Manual/drawings.

## *1.4 Other Differences & Features*

Two rotary dip switches have been added for addressing up to 32 4K2e controllers on a single global bus network.

The eight position dip switch functions were changed as follows:

| Switch | Function |
|---|---|
| 1 | Local Sonalert mute |
| 2 | not used |
| 3 | not used |
| 4 | not used |
| 5 | not used |
| 6 | not used |
| 7 | Local bus termination resistor |
| 8 | Global bus termination resistor |

Twelve LED's have been added to provide additional diagnostic information as follows:

T0 – remote alarm buzzer status
T1 – remote alarm light status
T2 – remote alarm reset status
T3 – global bus comm. fail
T4 – local bus comm. fail
T5 – programming flash 1
T6 – programming flash 2
T7 - debug cable connected
RST – system reset (normally On)
VDD – 3.3 volt supply
BTF – battery fail
VCC – 5 volt supply

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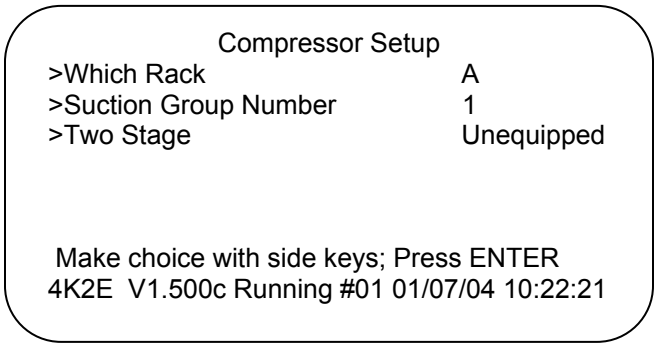
# 2. Set-up/Programming

Set-up/programming is handled in the same way as it is on the MCS-4000. The only difference being the integration of all the task types being available in one controller. This provides the capability of doing Refrigeration and HVAC control in the same unit. This capability, in conjunction with its expanded capacity, enables one 4k2e to handle all the control needs for smaller supermarkets, or reduces the number of controllers required for larger supermarkets/installations. In most cases, two *4k2e*'s will handle a typical supermarket installation.

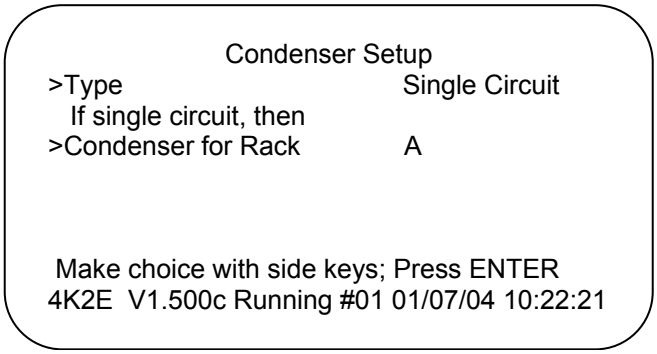
For compressor control, the set-up capability has been expanded to allow the programming of 2 separate Racks with a total combined total of 8 suction groups, or a maximum of 8 suction groups on one Rack, and a separate condenser for each Rack, if required. The rest of the Set-up/Programming remains the same as in the MCS-4000. Refer to the *MCS-4000 Users Manual/MCS 4000* Set-up for further information.

The new *Compressor Grp* Set-up screen is as follows:




Note: If you need more than 6 suction groups, use Ezset2002 for set-up.

The new *Condenser Fans* Set-up screen is as follows:




Note: If Multi-circuit selected, goes to current 1st screen (with single circuit choice removed). If single, A or B selected, skips multi-circuit screen and goes to Fan Stages screen.

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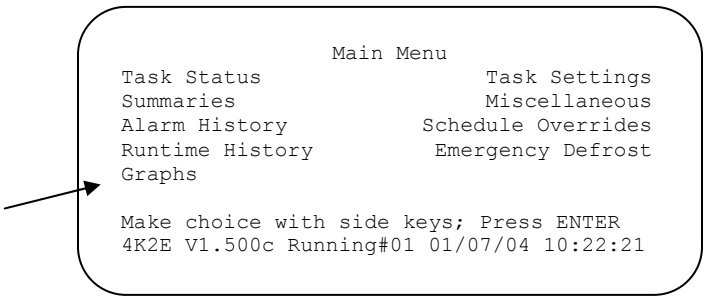
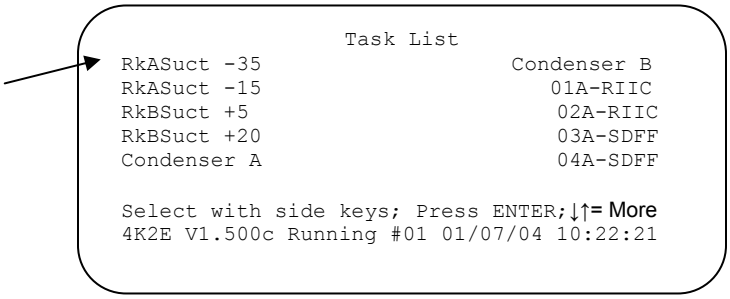
# 3. Using the 4K2e

The user interface and menu system remains the same as the MCS-4000 except for the Graphing/Logging. Please refer to the *MCS-4000 Users Manual* for further information.

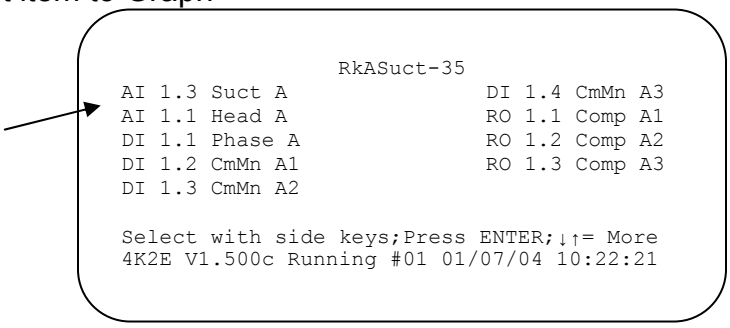
The Graph selection now brings you to the Task List. After selecting the desired Task, a list of the I/O is presented to select the desired item to graph.




Select Task




Select item to Graph

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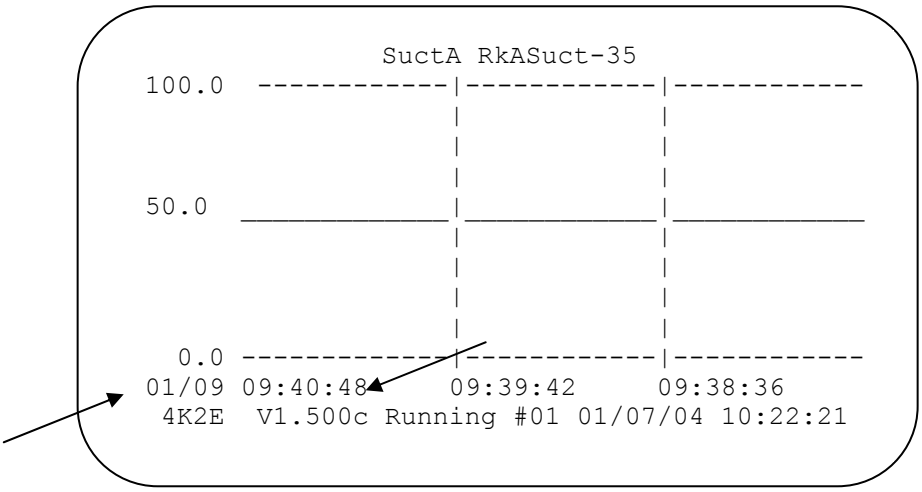
*Setup Graph* is no longer required and that selection has been removed from the Miscellaneous screen. The data displayed for the item selected is auto scaled to fit the display. The display of the graph remains the same. You can advance through the 3008 samples stored more rapidly than the 12 samples at a time with the arrow keys by holding down the "." key, then pressing the arrow key to move a page at a time (36 samples). The date of the most recent sample is shown at the lower left. The seconds are displayed if the logging interval is less than 1 minute.




The up/down arrows will move to next/previous I/O point in task – I/O list.

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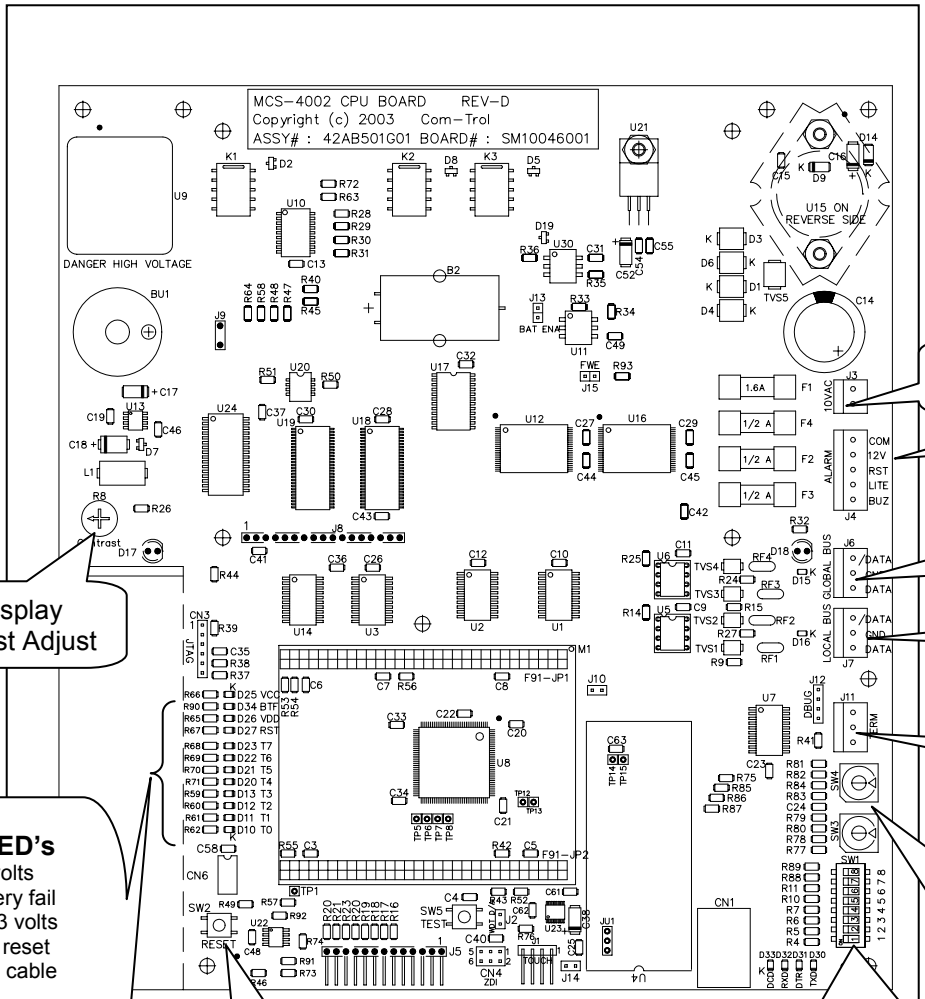
# 4. Appendix

### 4K2e CPU Board




Note: A Com-5002 can support 16 4k/4k2e's, and a ADV-6000 can support 32.

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