



PRODUCT DATA & OPERATION

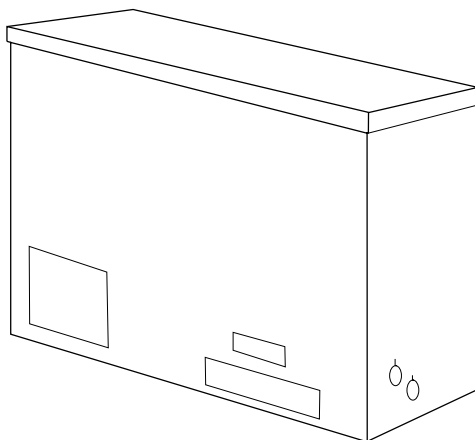
Bulletin T40-TLC-PDI-6
Part # 1068826

	PRODUCT SUPPORT	<i>scan:</i>
	web: www.t-rp.com/tlc	
	email: smcu@t-rp.com	
	call: 1-844-893-3222 x521	

Lead / Lag Control Panel

Model TLC1 / TLC2 / TTLC3

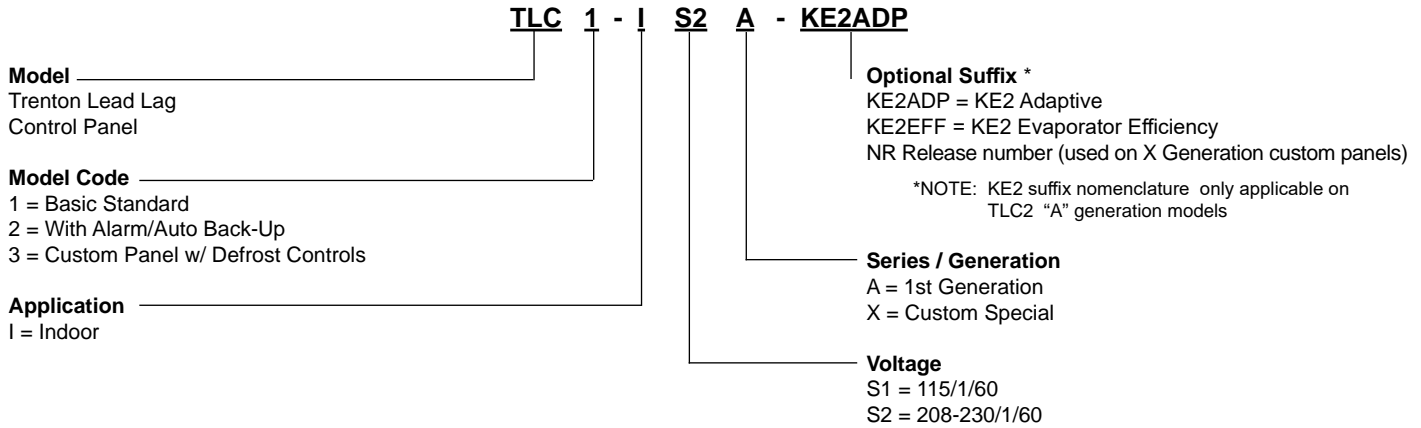
Electrical Power:
115/1/60,
208-230/1/60,
200-220/1/50



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- For use on TWO independent refrigeration systems using pumpdown control mode. (Thermostat wired into liquid line solenoid valve).
 - Panel can be mounted at condensing unit on indoor installations or can be mounted remote inside on a wall when used with outdoor condensing units.
 - Designed to alternate each system automatically at a preset 24 hour time period. (can be readjusted from a 6 to 300 hour time period).
- Three position toggle switch provides:
1. Condensing Unit #1 runs only.
 2. Lead Lag mode. (alternates unit #1 and unit #2 automatically).
 3. Condensing unit #2 runs only.
- TLC1 model offers low cost simple operation by automatically (pre-set time) or manually alternating each unit.
 - TLC2 model offers the same features as TLC1 as well as supplemental refrigeration backup during abnormal load situations or in the event one refrigeration system fails. (Includes alarm dry contacts)
 - Panel is suitable for use with Air, Electric and Hot Gas defrost systems.
 - Custom designed panels (TLC3) available to suit any specific customer requirement (contact factory)

NOMENCLATURE



TLC1-IS1A, IS2A BASIC - OPERATION GUIDE

- The TLC1 panel design provides low cost, basic alternating operation between two independent refrigeration systems, each consisting of a condensing unit and evaporator(s) and room thermostat controlling the liquid line solenoid valve.
- Mechanical or electronic room thermostat type can be utilized with the TLC1 Lead-Lag panel. Refer to the TLC2 Lead-Lag panel for more advanced features such as automatic back-up and additional alarms.
- The TLC1 panel is designed with a manual 3 way toggle switch (centre position) allowing the user to select a "Lead-Lag" mode providing automatic alternation on each unit over a set time interval (typically 24 hours). The alternating timer is factory set at 24 hours and is user adjustable.
- Refrigeration system 1 (Lead) or system 2 (Lag) can be set for continuous operation by a toggle switch positioned either fully left or right. This overrides any Lead-Lag operation.
- The TLC1 panel can be applied to either air defrost or electric defrost applications. Electric defrost applications require the timer is set to a 24 hour setting to maintain evenly distributed 4 hour or 6 hour defrost intervals. Maximum alternating time duration available is 300 hours. (approximately two weeks).
- The TLC1 Panel includes 2 contactors. The contactors (C1 and C2) function as a "power interruption" for each of the liquid line solenoid valve control circuits. The Lead-Lag panel timer energizes the lead or lag contactor (C1 or C2).
- The TLC1 Lead-Lag Panel does not provide automatic temperature back up, alarm or monitoring features. These features are available in the TLC2 and the TLC3 Lead-Lag panel described in detail in this literature.

TLC2- IS1A, S2A CONVENTIONAL - OPERATION GUIDE

- The TLC2 “A” generation panel incorporates the same operational function as the TLC1 panel, plus an automatic room temperature back up system. Rising room temperatures due to any abnormal load conditions will energize the idle (lagging) C1 or C2 contactor and provide additional capacity as required. Refer to the TLC2 “A” generation panel wiring diagram attached.
- The automatic back up relay is controlled by a separate room thermostat (supplied loose for field installation). This thermostat is used in conjunction with an additional timer (T2) in the panel. Both the thermostat and the T2 timer are adjustable for both temperature cut-in settings and alarm delay time to suit any preferred field condition.
- The TLC2 panel also includes warning and alarm indicator lamps as well as a dry contact alarm relay for use with horns or remote dialers (supplied by others).
- Note: In the event of a TLC2 panel power loss, both C1 and C2 contactors become de-energized. This will de-energize any power to the liquid line solenoid circuits. Each C1 and C2 contactor are provided with an auxiliary N/C (Normally Closed) contact switch available for optional field wiring. Upon a power loss event, these N/C contacts allow the condensing unit control power source to be bypassed, keeping voltage supplied to the liquid line solenoid valve circuit. Additionally, the TLC2 panel alarm relay will activate the horn or remote alarm signal signifying a power loss to the panel. Refer to the TLC2 panel wiring diagram for further system wiring details.
- The C1 and C2 contactors are normally factory installed and wired within each of the condensing unit control panels when the TLC2 panel is specified and ordered with the condensing units. However, for Lead-Lag panels that are ordered separately (without condensing units), the C1/C2 contactors (equipped with auxiliary contacts) are shipped loose and will require field installation.

TLC2- IS1A-KE2ADP, IS2A- KE2ADP KE2 ADAPTIVE - OPERATION GUIDE

- The TLC2 “KE2ADP” suffix panel is similar in size and construction as the conventional TLC2 standard panel.
 - The “KE2ADP” suffix panel is specifically designed to work only with the KE2 Therm Solutions Inc. KE2 Adaptive controller and a single evaporator system. The KE2 therm product literature and operating instructions provide full details of the operation of the KE2 Adaptive controller.
 - The automatic system back up and alarm features are managed within each of the two KE2 Adaptive controls. The C1/C2 contactors and automatic back up thermostat that are used with the Conventional TLC2 model are no longer needed.
 - The lead-lag design principle with the KE2 Adaptive controller differs from the concept of the conventional TLC2 C1/C2 contactor power interruption method. The KE2 method uses a principle of having two temperature thermostat settings. The individual temperature settings are initiated by a digital input signal with installed communication cable between each of the KE2 controllers. Refer to the attached TLC2 “KE2ADP” panel diagram for wiring details.
- The digital signal temperature mode is generated from a closed or opened dry contact relay. The relay is energized by the alternating timers located within the lead-lag panel.
- The thermostat parameter setting (tS) is assigned a higher temperature setting than the second tS2 setting. Refer to QSU KE2 Adaptive operating instructions.

TLC2- IS1A-KE2EFF, IS2A-KE2EFF KE2 EFFICIENCY - OPERATION GUIDE

- The new “KE2EFF” TLC2 panel is similar to the TLC2 “KE2ADP” suffix design. The KE2EFF uses the KE2 Therm Evaporator Efficiency controller.
- The KE2 Evaporator Efficiency controllers offer more user features as well as provides monitoring and alarm notification with network/internet communication and control.
- The TLC2 “KE2EFF” panel size and construction is similar to the TLC2 “KE2ADP”. The TLC2 “KE2EFF” panel features the ability to manage multiple evaporators paired with one condensing unit. Refer to the TLC2 “KE2EFF” panel diagram for wiring details.
- The TLC2 “KE2EFF” requires a KE2 Evaporator Efficiency controller per evaporator. Each controller requires its own digital input (signal cannot be shared). The KLC2 “KE2EFF” Panel Has the capabilities to control multiple evaporators paired to a single condensing unit. Additional equipment required. When using more than two evaporators per condensing unit two additional dry contact relays will need to be utilized in the TLC2 panel. Also, a KE2 Therm network switch will be required.
- KE2 thermostat parameter ROOM TEMP setting must to be re-adjusted to a higher temperature setting than the second assigned 2nd TEMP setting. Refer to KE2 Evaporator Efficiency controller instruction and follow the programming instructions to set up the digital input programming (for terminal D2 inputs). User is to assign the values within the program menu as follows:

- Enter the DIG IN 2 mode (This is usually set at factory default as DISABLED)
- Set up each Control to indicate DIG IN 2 to be set at “2nd (room) TEMP” mode.
- Assign 2nd thermostat setting to be the colder of the two room temp settings (ROOM TEMP and 2nd TEMP).

This setting can be re-adjusted to suit local field requirements. The 5°F difference will allow each redundant unit to start back up in the event the room temperature rises above -5°F. If needed to prevent the second unit from coming on too soon use a higher back up temperature setting (i.e. move 2nd TEMP setting higher to 0°F).

- These settings (2nd TEMP, ROOM TEMP) can always be re-adjusted to suit local field requirements or application. The 5°F differential will allow either redundant unit to start back up in the event the room temperature rises above -5°F. To prevent the back up unit coming on too soon raise the “ROOM TEMP” setpoint to a higher setting (example: move “ROOM TEMP” to 0°F setting). This will now provide a 10°F differential. Contact KE2 Therm customer service for additional technical support.
- Applications with two or more evaporators per condensing unit follow the same program set-up procedure as above and just repeat the wiring for each of the system’s second or third etc evaporator. Note that separate R1/R2 contact wiring are required for each evaporator. Program the same settings on each of the two systems (LEAD and LAG). Ensure that each system KE2 is “bonded” as per KE2 instruction for use with multiple evaporators. Follow KE2 instructions for any other preferred wiring or programming methods. Refer to KE2 instructions and customer support for details on network switch wiring.

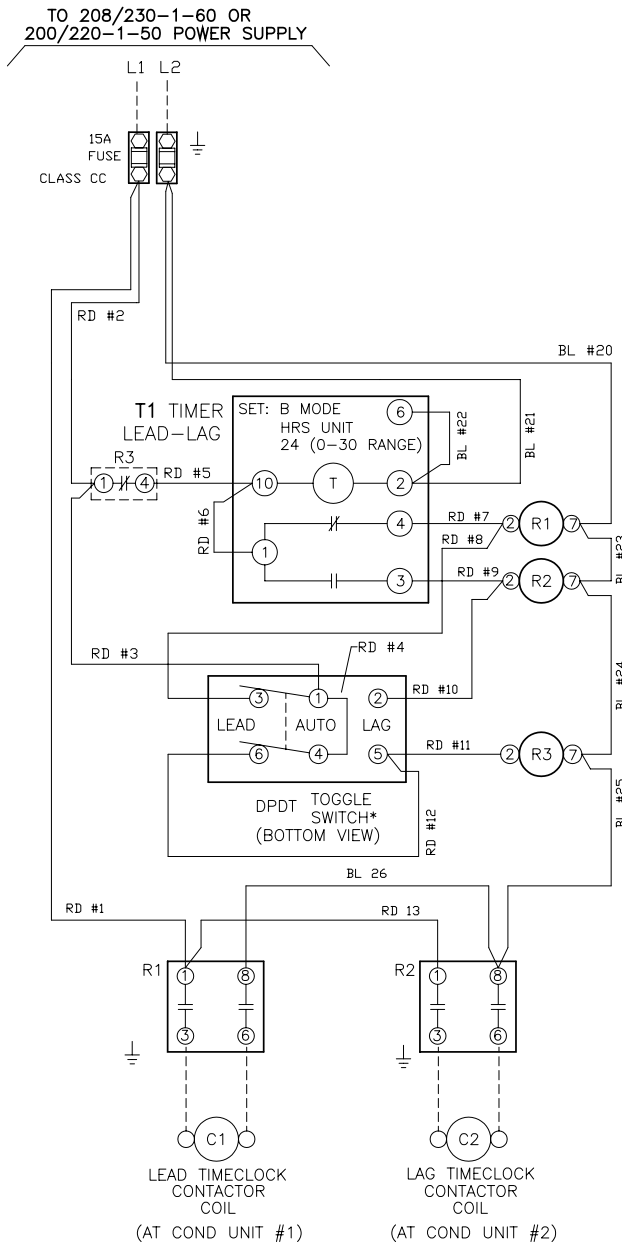
TLC3 “X” GENERATION CUSTOM PANEL (FULL VOLTAGE/ PHASE DEFROST AVAILABILITY) - OPERATION GUIDE

- This is a custom designed lead-lag and defrost panel that can provide similar functions and features as the standard TLC2 Conventional model, “KE2ADP suffix” and “KE2EFF suffix” panels. The notable difference is the incorporation of all the necessary evaporator defrost controls.
- The TLC3 panel now eliminates the use of the C1/C2 contactors and auxiliary contacts (located at the condensing units) and eliminates associated field wiring.
- The automatic back-up thermostat (shipped loose) is still required to be remote mounted and wired on the conventional style panels. However, on the Lead_Lag panels that incorporate the KE2 Adaptive and KE2 Evaporator Efficiency systems a back-up thermostat is not required and is included in the programming of these controllers. This panel is much larger since it is customized to include all the specific evaporator’s defrost components for both systems.
- The TLC3 panel may require a higher electrical service ampacity requirement (MCA) compared to the TLC2 panel due to the additional loads of the evaporator fan motors and defrost heaters.
- The TLC3 incorporates a defrost heater Interlock feature between both systems. The interlock is provided to keep the panel ampacity (MCA) to a minimum. Refer to the attached TLC3 “X” generation panel typical wiring diagram indicating the evaporator defrost control components (fan/heater contactors etc.).

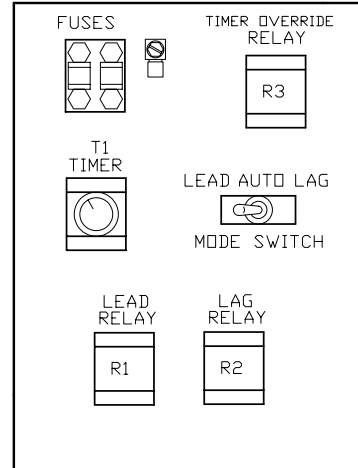
PANEL AND SYSTEM WIRING DIAGRAM - TLC1 - STANDARD

CONTROL PANEL WIRING DIAGRAM: 230-1-60 Hz
TLC1-IS2A CP1215A-IS2B-0008

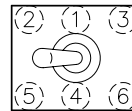
LEAD-LAG CONTROL PANEL- STANDARD BASIC PANEL
230V CONTROL CIRCUIT



CONTROL PANEL COMPONENT LAYOUT



* LEAD AUTO LAG
MODE SWITCH
(TOP VIEW)



NOTES

1. USE COPPER CONDUCTORS ONLY
2. USE 90°C WIRE (OR HIGHER)
3. OPTIONAL COMPONENT MAY BE FACTORY INSTALLED OR SUPPLIED BY OTHERS
4. HEATER LOADS ARE NOT CONCURRENT WITH REFRIGERATION LOADS.
5. OVERCURRENT PROTECTION FOR EACH EVAPORATOR MUST NOT EXCEED MAXIMUM VALUE SHOWN ON EVAPORATOR NAMEPLATES.
6. MAY BE FACTORY INSTALLED-MOUNTED AND WIRED ON EVAPORATOR (PRE-ASSEMBLED MODELS). ON MULTIPLE PRE-ASSEMBLED EVAPORATORS WIRE SECOND EVAPORATOR SOLENOID IN PARALLEL WITH FIRST.
7. ALL FUSES TO BE CLASS CC OR J AND VOLTAGE RATED EQUAL (OR HIGHER) THAN OPERATING VOLTAGE.

CONDUCTORS/WIRING

- FACTORY WIRING
- - - - - WIRING BY OTHERS
- OPTIONAL COMPONENT WIRING
(SOME OPTIONAL COMPONENTS MAY BE FACTORY WIRED.)

G=GREEN RD=RED BL=BLUE ALL OTHER BLACK

ALL FIELD WIRING MUST BE DONE IN COMPLIANCE WITH ALL APPLICABLE LOCAL AND NATIONAL CODES.

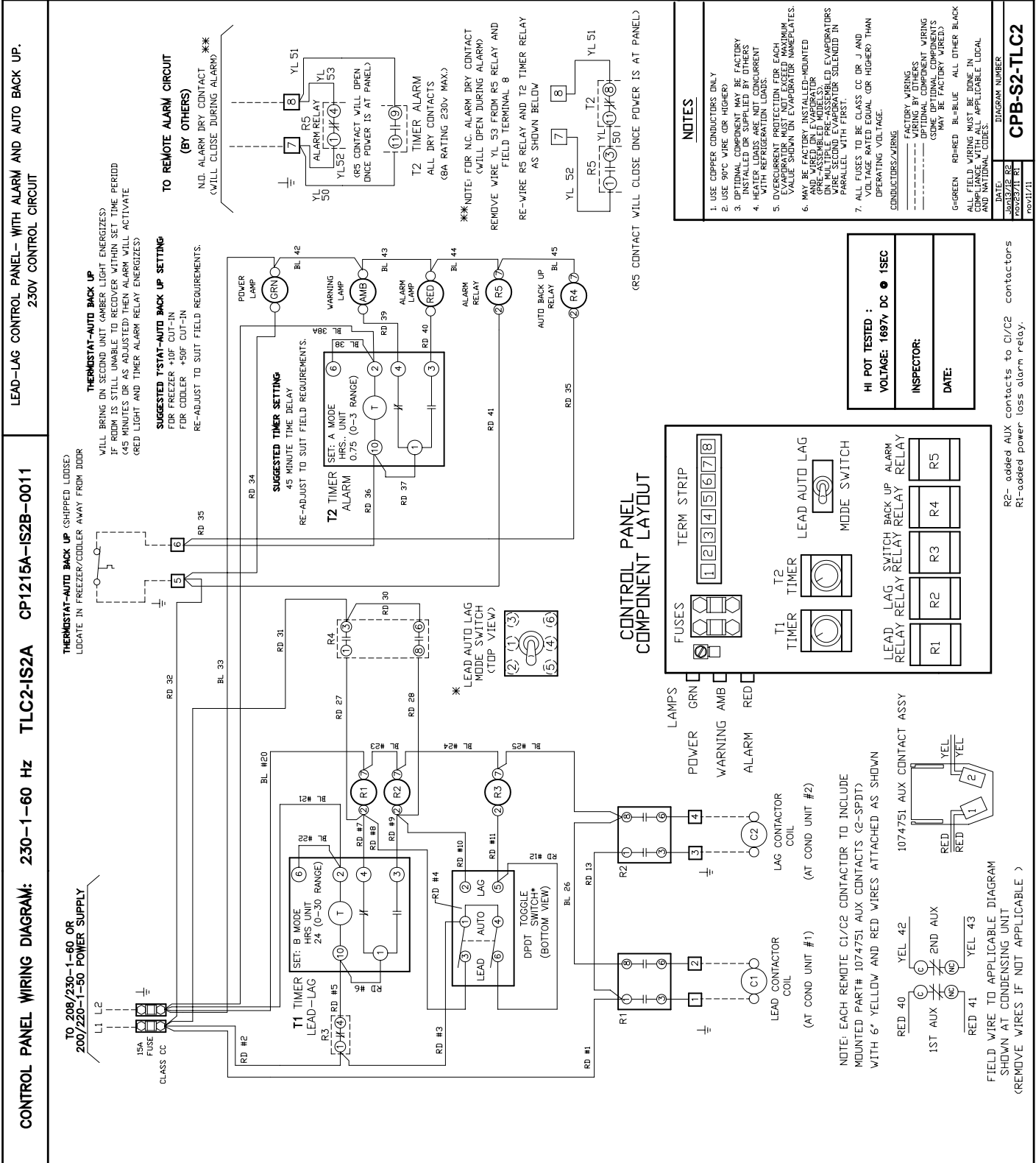
DATE:	DIAGRAM NUMBER
R1 JAN25/12 Feb7/07	CPB-S2-TLC1

HI POT TESTED :
VOLTAGE: 1697v DC@ 1SEC

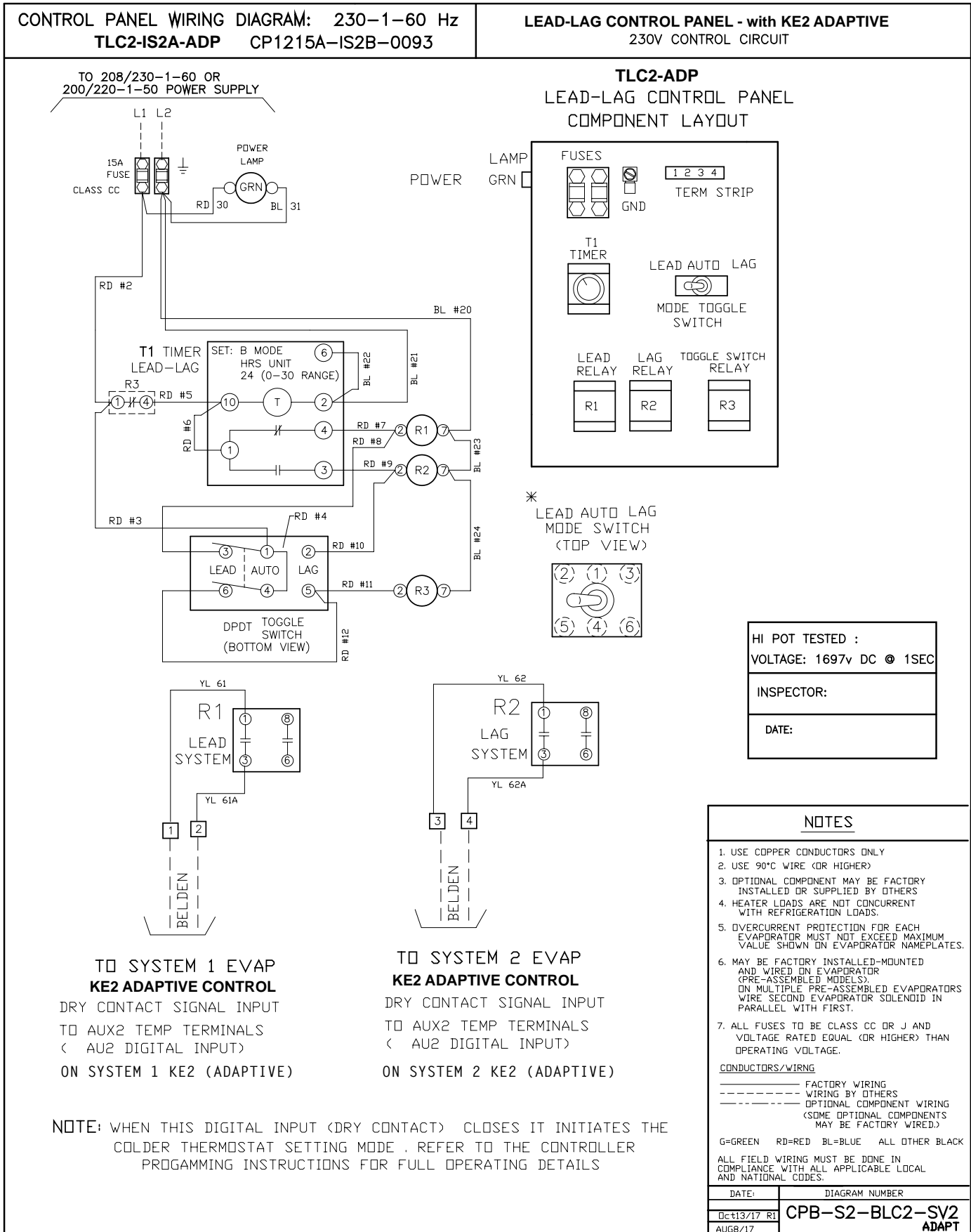
INSPECTOR:

DATE:

PANEL AND SYSTEM WIRING DIAGRAM - TLC2 - STANDARD



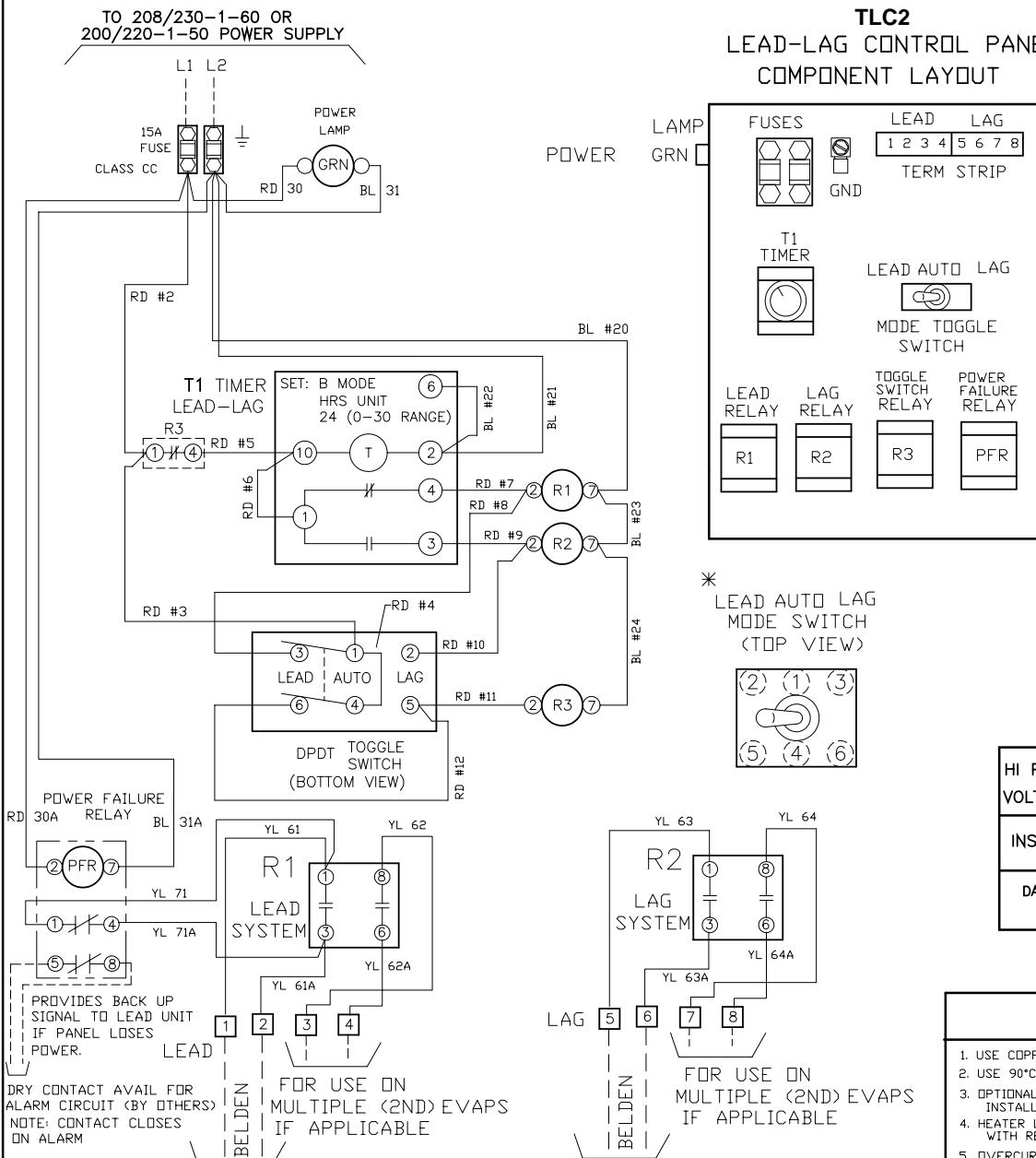
PANEL AND SYSTEM WIRING DIAGRAM - TLC2 - KE2ADP



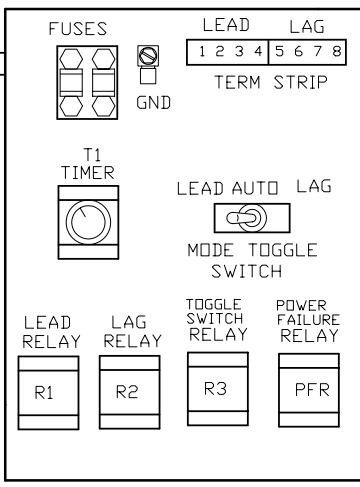
PANEL AND SYSTEM WIRING DIAGRAM - TLC2 - KE2EFF

CONTROL PANEL WIRING DIAGRAM: 230-1-60 Hz
TLC2-IS2A-KE2EFF CP1215A-IS2B-0101

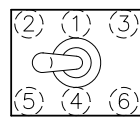
LEAD-LAG CONTROL PANEL - with KE2 ADAPTIVE
230V CONTROL CIRCUIT



TLC2
LEAD-LAG CONTROL PANEL
COMPONENT LAYOUT



* LEAD AUTO LAG
MODE SWITCH
(TOP VIEW)



HI POT TESTED : VOLTAGE: 1697v DC @ 1SEC
INSPECTOR:
DATE:

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- FACTORY WIRING
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DIGITAL INPUT(S)
TO SYSTEM 1 (LEAD) EVAP
KE2 EFFICIENCY CONTROL(S)
DRY CONTACT SIGNAL INPUT
TO D2 INPUT TERMINALS
ON SYSTEM#1 LEAD KE2 EFFICIENCY(S)

DIGITAL INPUT(S)
TO SYSTEM 2 (LAG) EVAP
KE2 EFFICIENCY CONTROL(S)
DRY CONTACT SIGNAL INPUT
TO D2 INPUT TERMINALS
ON SYSTEM#2 LAG KE2 EFFICIENCY(S)

NOTE: WHEN THIS DIGITAL INPUT (DRY CONTACT) CLOSES IT INITIATES THE COLDER THERMOSTAT SETTING MODE. REFER TO THE KE2 CONTROLLER PROGRAMMING INSTRUCTIONS FOR FULL OPERATING DETAILS.
ENSURE MAIN THERMOSTAT (FIRST) SETTING IS AT THE HIGHER SET-POINT AND THE SECOND THERMOSTAT (2ND TEMP) SET-POINT IS AT THE COLDER SETTING WHICH BECOMES THE MAIN ROOM TEMP SETTING.

DATE:	DIAGRAM NUMBER
Oct16/17	CPB-S2-TLC1-KE2EFF

NOTES

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PRODUCT SUPPORT RESOURCES

 PRODUCT SUPPORT	<p><i>web: www.t-rp.com/tlc</i> <i>email: smcu@t-rp.com</i> <i>call: 1-844-893-3222 x521</i></p>
 TROUBLESHOOTING	<p><i>email: troubleshooting@t-rp.com</i> <i>call: 1-844-893-3222 x529</i></p>
 SERVICE PARTS	<p><i>web: www.t-rp.com/parts</i> <i>email: parts@t-rp.com</i> <i>call: 1-844-893-3222 x501</i></p>
 WARRANTY	<p><i>web: www.t-rp.com/warranty</i> <i>email: warranty@t-rp.com</i> <i>call: 1-844-893-3222 x507</i></p>
 ORDERS	<p><i>email: orders@t-rp.com</i> <i>call: 1-844-893-3222 x501</i></p>
 SHIPPING	<p><i>email: shipping@t-rp.com</i> <i>call: 1-844-893-3222 x503</i></p>



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