CONTROL SYSTEMS, INC.

909 Quinn Street • Jackson, Mississippi 39202
P.O. Box 4852 • Jackson, Mississippi 39296-4852
Phone 601.355.8594 • FAX 601.355.8774

RTU CELLULAR MONITORING/WATCHDOG PANEL(S)

MIZE, MS

2021

CUSTOMER: TOWN OF MIZE

JOB NO.: 56276

DATE: June 15, 2021

TABLE OF CONTENTS

General

CONTROL SYSTEMS, INC.

Make it work. Make it simple. Make it last.

Installation

☐ **CSI is the panel supplier only on this project. We do not include any installation, conduit, wire or terminations in the field.**

☑ **CSI will provide field services on this project as detailed in the Field Services Tab.**

WARRANTY STATEMENT

Warranties to distributors and other commercial customers. Control Systems, Inc. warrants equipment manufactured by it to be free from defects in materials and workmanship for a period of one (1) year from date of acceptance. If within such period any such equipment shall be proved to Control Systems, Inc. satisfaction to be defective, such equipment shall be repaired or replaced at the option of Control Systems, Inc. Repair parts may be new parts, used parts, rebuilt parts, or exchange parts, at the option of Control Systems, Inc. This warranty shall not apply (a) to equipment not manufactured by Control Systems, Inc., (b) to equipment which shall have been repaired or altered by others than Control Systems, Inc. so as, in its judgement, to affect the equipment adversely, or (c) to equipment which shall have been subjected to negligence, accident or damage by circumstances beyond the control of Control Systems, Inc. or to improper operation, maintenance or storage, or to other than normal use or service. With respect to equipment not manufactured by Control Systems, Inc., the warranty obligations of Control Systems, Inc. shall in all respects conform to and be limited to the warranty actually extended to Control Systems, Inc. by its supplier. The foregoing warranties do not cover reimbursement for transportation, removal, installation, or other expenses which may be incurred in connection with repair or replacement.

This warranty is expressly in lieu of any other warranties, expressed or implied, including, but not limited to, any warranty of merchantability or fitness for a particular purpose. Remedies under this or any warranty are expressly limited to repair or replacement as specified above, and such repair or replacement constitutes the sole and exclusive remedy. Under no circumstances shall Control Systems, Inc. be liable for any claims for loss or damage of any kind, for injuries to any person or property caused either directly or indirectly by the equipment. Any and all claims for direct special, indirect or consequential damage for any person or property or for any other economic loss are expressly excluded, whether arising out of failure of the equipment to operate for any period of time or out of any defects of the equipment or for any other reason. Except as may be expressly provided in an authorized writing by Control Systems, Inc., Control Systems, Inc. shall not be subject to any other obligations or liabilities whatsoever with respect to equipment manufactured by Control Systems, Inc. or services rendered by Control Systems, Inc.

CONTROL SYSTEMS, INC.

Make it work. Make it simple. Make it last.

Preliminary Start-Up Check List

Customer: _____

Job Name: _____

Prior to scheduling start-up services, we require you to complete and return this form via FAX or email.

Completion of this form constitutes liability on your part should any items marked "yes" be incomplete and start-up cannot be completed as planned. Additional days and return trips will be billed at $750 per day.

	YES	NO	N/A
Are pumps mounted and ready to run?			
Is the control panel mounted and field terminations completed (including float switches, pump power cord, pump sensor cord, incoming power, and properly grounded)?			
Are conduits from the wetwell to the control panel sealed? Control panel warranty is void without proper seals.			
Is the main power on and ready for operation?			
Is there sewer/water available to test run the pumps?			
Is the force main complete and ready to receive flow?			
If operator training is required, will maintenance personnel be present?			

The items above are completed and ready for Control Systems, Inc. service personnel to perform start-up services.

Customer Signature: _____

Title: _____

Date: _____

PRE START-UP REQUIREMENTS/INSTRUCTIONS

1. GROUNDING REQUIREMENTS

Has CSI equipment been properly grounded per NEC article 250? Resistance to ground measurements of twenty-five (25) ohms or less is acceptable, however five (5) ohms or less is recommended for the ground system to function as intended. CSI's warranty could be voided if ground system is **NOT** installed per current National Electric Code requirements.

2. CONDUIT SEALING INSTRUCTIONS

A. The contractor is responsible for all conduit entrances to enclosures to be temporarily sealed during construction, even before contractor pulls cables, to protect enclosure components from corrosive gasses and/or moisture during construction.

B. Once the cables have been pulled through the conduits into the enclosure the conduits must be sealed immediately. CSI recommends using 3M Scotchcast 2112C re-enterable compound for this purpose. This does not replace conduit seal for hazardous/explosion-proof applications. Explosion-proof applications require KWIKO cement or equal.

C. If corrosive gasses have been allowed to enter the enclosure and components have become damaged, consequently CSI will **NOT** provide warranty replacement.

3. EQUIPMENT SETTINGS

A. Have the adjustable circuit breakers been set to CSI drawing value?

B. Have overload relays, variable frequency drives, and solid state starters been set per motor nameplate Full Load Amperes (FLA) data?

C. Have all timer settings been adjusted to CSI drawing values?

D. Motor Monitors MUST BE FIELD SET based on actual motor full load amps. Please refer to catalog cut sheet page C231B for instructions on setting to running amps setpoint and the high amps setpoint. Set the running amps setpoint to 20% below actual full load amps. Set the high amps setpoint to 10% above the actual full load amps. (DO NOT set the motor monitor using the motor nameplate full load amps.) If applicable.

4. VERIFICATION

A. Verify proper torque on all terminals and/or lugs; i.e. main lugs, all circuit breakers, line and load side or starters and overload relays.

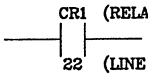
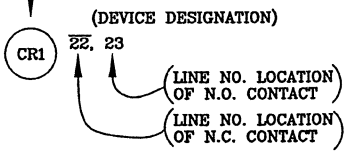
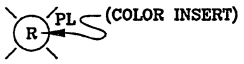
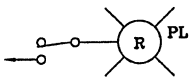
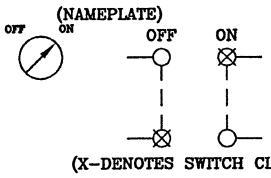
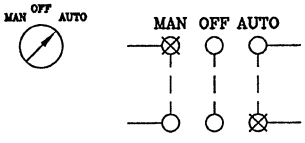
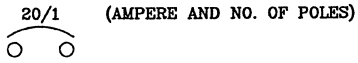
B. Verify proper connection of power and control wiring.

5. WIRING NOTES

A. D Prefix = DC Low Voltage = Blue Wire
1. DC Low Voltage conductors shall be installed in separate conduit from AC conductors per National Electric Code.

B. All other = 120 VAC Minimum

ALL PANELS
ELECTRICAL SYMBOLS

SYMBOL	DESCRIPTION
	— FACTORY WIRING
	— FIELD WIRING
	— TERMINAL
	— NORMALLY OPEN INSTANTANEOUS CONTACT
	— NORMALLY CLOSED INSTANTANEOUS CONTACT
	— NORMALLY OPEN TIMED CLOSED CONTACT
	— NORMALLY CLOSED TIMED OPEN CONTACT
	— NORMALLY OPEN TIMED OPEN CONTACT
	— NORMALLY CLOSED TIMED CLOSED CONTACT
	— DEVICE COIL
	— NORMALLY OPEN FLOAT SWITCH
	— NORMALLY CLOSED FLOAT SWITCH
	— NORMALLY OPEN PRESSURE SWITCH
	— NORMALLY CLOSED PRESSURE SWITCH
	— PILOT LIGHT
	— PUSH-TO-TEST PILOT LIGHT
	— TWO POSITION SELECTOR SWITCH
	— THREE POSITION SELECTOR SWITCH
	— CIRCUIT BREAKER
	— OVERLOAD RELAY

PROOF OF U.L. LABEL AVAILABILITY

NITW January 14, 1983
Industrial Control Panels

CONTROL SYSTEMS INC, JACKSON MS 39216 E84696 (N)
Industrial control panels for general use.

P O BOX 4852

LOOK FOR LISTING MARK ON PRODUCT

Replaces E84696 dated Dec. 2, 1982.

GND

CONTROL SYSTEMS, INC.

Make it work. Make it simple. Make it last.

CSI Equipment Grounding Requirements

The electrical equipment (panel or motor control center) shall be effectively and permanently connected to a ground grid system. The ground grid shall provide a good path to earth ground, and shall consist of a minimum of three 5/8" x 10' copperweld ground rods by exothermic-welded type connection.

Resistance to ground shall be twenty-five Ohms or less as a **minimum** and a resistance of five Ohms or less for maximum protection of equipment. Final tests shall ensure that this requirement is met. If twenty-five Ohms cannot be attained with ten-foot ground rods, use thirty-foot ground rods. If twenty-five Ohms still cannot be attained, then increase the number of thirty-foot ground rods.

Approved testing methods shall be: Four Point – Wenner Method, Three or Four Point – Fall of Potential Method. Hand-held multi-meters and meggers are **NOT** approved testing methods.

All equipment connected to the CSI gear shall also be grounded in the gear, and the gear shall be connected to the ground grid. Separate ground rods with no common connection to the main ground grid will not provide adequate protection.

Please complete the attached project ground grid report and email to leslie@controlsysinc.com or FAX to 601.355.8774 to the attention of Leslie Fitzhugh.

NOTE: A certified ground test report will be required **prior** to CSI attending start-up and to activate equipment warranty period.

CONTROL SYSTEMS, INC.
Make it work. Make it simple. Make it last.

CSI Equipment Grounding Report

CSI Job #	General Contractor:
Job Name:	Ground Grid installed by:
Job Location:	Test Performed by:
	Employer:
	Test Witnessed by:

Ground Grid Information

Main Equipment Ground Grid	List all other ground rods used
# of Rods:	Location: Length: Bonded to Main Grid?
Rod Lengths:	
Formation (i.e. 6' triangle):	

Ground Grid Test Report

Date Test Performed:	List Ohm readings of other ground rods tested
Weather Conditions:	Location: Ohm Reading:
Soil Condition (i.e. dry, damp, wet):	
Main Ground Grid Ohm reading:	

Comments:

Technician:

Date:

S

SCADA Programming/Overview/Notes
(Town of Mize, MS - CSI Job #56276)

1. CSI will install two RTU/monitoring panels and one watchdog panel with this project with necessary wire, conduit and cellular antennas for a complete operational project. The two RTU/monitoring panels will be installed accordingly at: elevated tank and well no.1 site(s). The one watchdog panel will be installed at the lift station no.2 site. CSI will program for alarm texting on the water side for: elevated tank high level, elevated tank low level, well 1 failure, well 2 failure and power failures (tank and well 1 site). CSI will program for alarm texting on the wastewater side for: wetwell high level, pump 1 failure (if available) and pump 2 failure (if available) and power failure. The power failure is generated internally with the watchdog. The two RTU/monitoring panels are eliminating the existing telephone communication between the elevated tank site and well no. 1 site as well. The existing telephone communication between the well no. 1 and well no. 2 site will remain in service. CSI will program the RTU101's as shown on the I/O structure pages 1P1 and 2P1, accordingly.

2. CSI will perform necessary field modifications to accomplish the above on the water side as detailed on the first pages of tab 4P and 5P.

3. CSI will install a relay or a float to acquire the high level signal of the lift station no.2 for the watchdog panel. This high level signal is a requirement by the operator. If the pump failure no.1 and no.2 is available then CSI will wire for them accordingly. If not available, no other action will be accomplished to acquire them.

4. CSI install crew will need to confirm receipt of form on page S2 from customer with sales or receptionist before leaving the office. If not received, have customer complete while at the job site(s). CSI install crew will complete the cell activation date and site cell number boxes at the bottom of page S2.

5. This project includes the one year of cellular service per site(s).

6. CSI will make sure all is working properly as a necessary startup service before leaving each site.

7. Contact Person: Lester Ivy (Town of Mize) @ 601-466-0678.

8. Cellular Monitoring Sites:
   a. Elevated Tank
   b. Well no.1
   c. Lift Station no.2

RTU/MONITORING PANEL
(ELEVATED TANK)

RTU/MONITORING PANEL
I/O STRUCTURE/CHECKLIST

ANALOG INPUTS	4-20mA
AI1 - ELEVATED TANK LEVEL SIGNAL (IF AVAILABLE)	(0-35')
AI2 - SPARE	

ANALOG OUTPUTS
AO1 - SPARE
AO2 - SPARE

DIGITAL INPUTS
DI1 - POWER FAIL
DI2 - LEAD WELL START
DI3 - LAG WELL START
DI4 - ELEVATED TANK LOW LEVEL
DI5 - ELEVATED TANK HIGH LEVEL
DI6 - SPARE
DI7 - SPARE
DI8 - SPARE

DIGITAL OUTPUTS
DO1 - SPARE
DO2 - SPARE
DO3 - SPARE
DO4 - SPARE

RTU/MONITORING PANEL
STANDARD NAMEPLATE LEGEND DETAIL

NP1. VOLTAGE LABEL –

DANGER HIGH VOLTAGE
120 VOLTS

(RED WITH WHITE LETTERING)

NP2. AUTHORIZED PERSONNEL LABEL –

AUTHORIZED PERSONNEL ONLY

(RED WITH WHITE LETTERING)

NP3. ARC FLASH LABEL –

WARNING
ARC FLASH & SHOCK HAZARD
APPROPRIATE PERSONAL PROTECTION EQUIPMENT REQUIRED
APPROPRIATE PERSONAL PROTECTION AND TOOLS REQUIRED WHEN WORKING ON THIS EQUIPMENT.
EQUIPMENT ID:

NP4. CSI LOGO LABEL –

NP5. SERVICE ENTRANCE LABEL –

(BLACK WITH WHITE LETTERING)

NP6. STATION NAME OR NUMBER LABEL –

ELEVATED TANK RTU

(BLACK WITH WHITE LETTERING)

NP7. CSI JOB NUMBER LABEL –

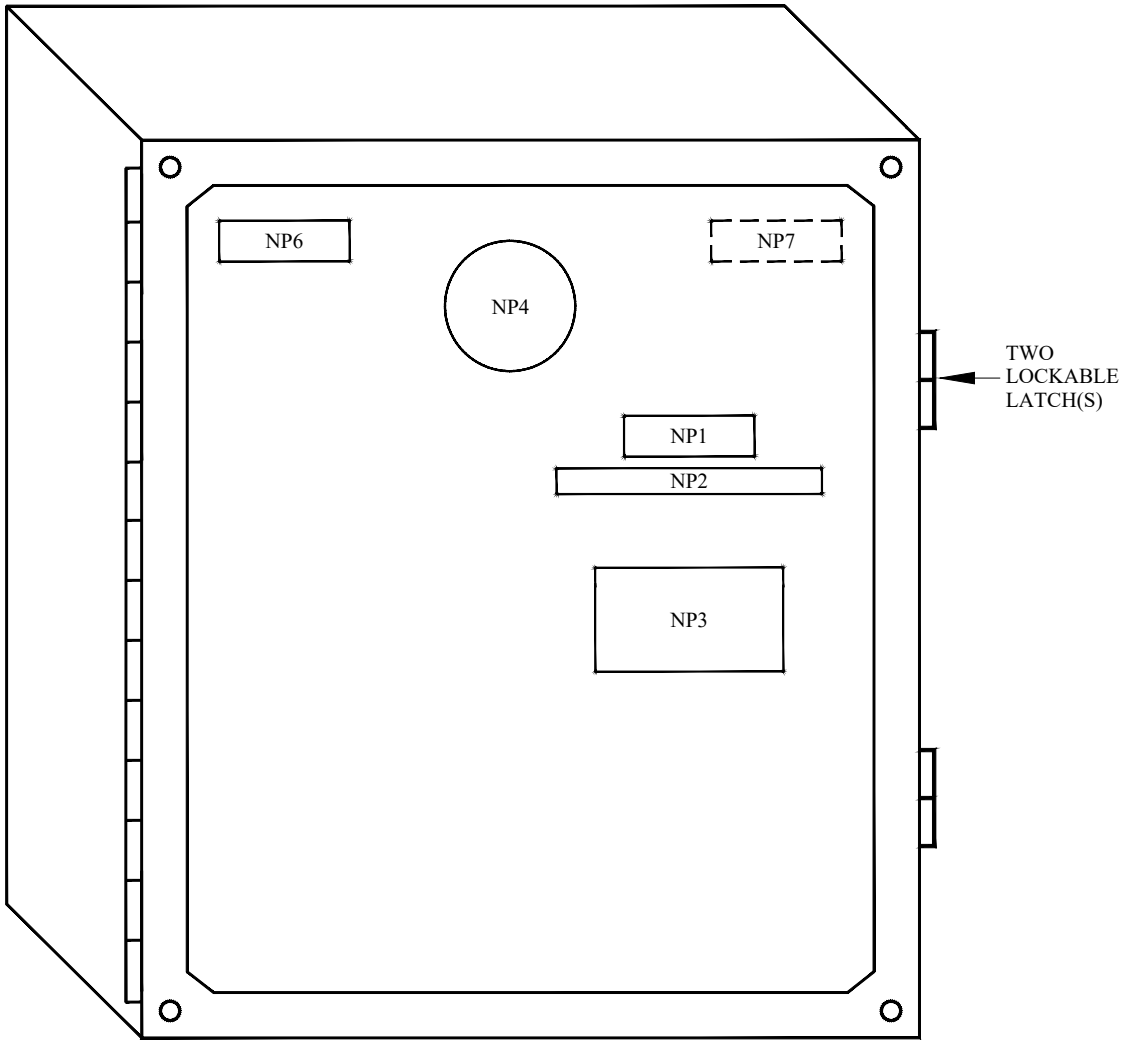
CONTROL SYSTEMS, INC.
JACKSON, MS
JOB NUMBER: 56276 – TAB 1P
DATE OF MFR: ?
120 VOLTS, 1 PHASE, 2 WIRE, 60 Hz
LARGEST MOTOR HP RATING: N/A
NORMAL POWER MAX CURRENT RATING: 10
EMERG. POWER MAX CURRENT RATING: N/A
SHORT CIRCUIT CURRENT RATING: 5,000 TYPE 1
THIS CONTROL PANEL HAS BEEN SUPPLIED WITH AN ELECTRICAL WIRING DIAGRAM. IF THE DIAGRAM DOES NOT EXIST, CALL (601) 355-8594 FOR A REPLACEMENT.

NP8. UL LABEL –

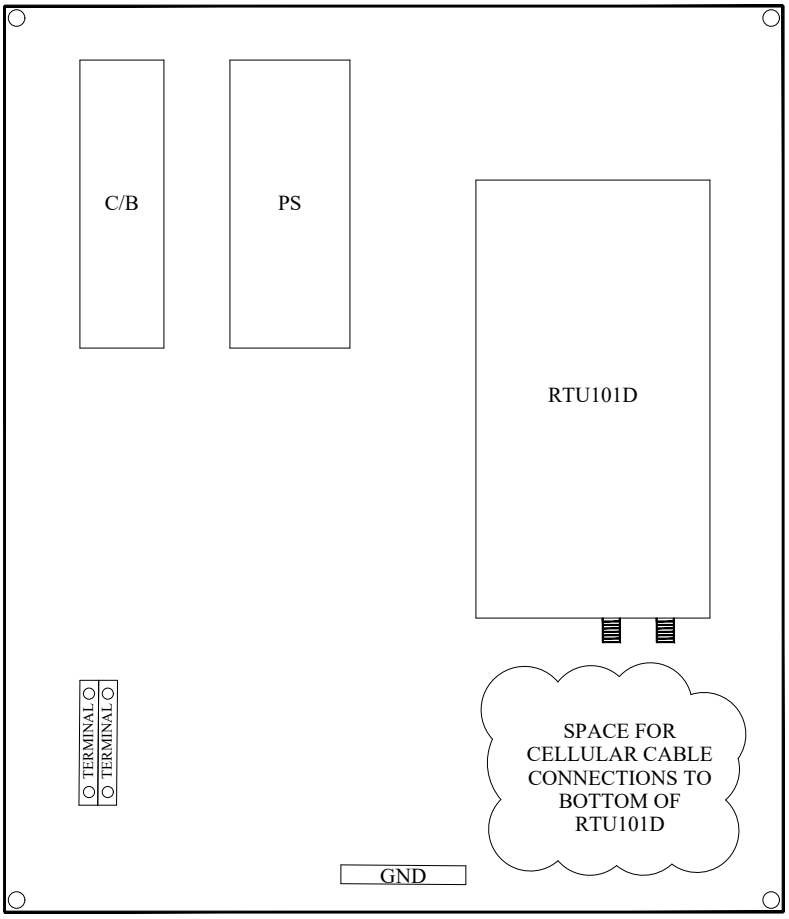
ENCLOSED INDUSTRIAL
LISTED
NO. BT–

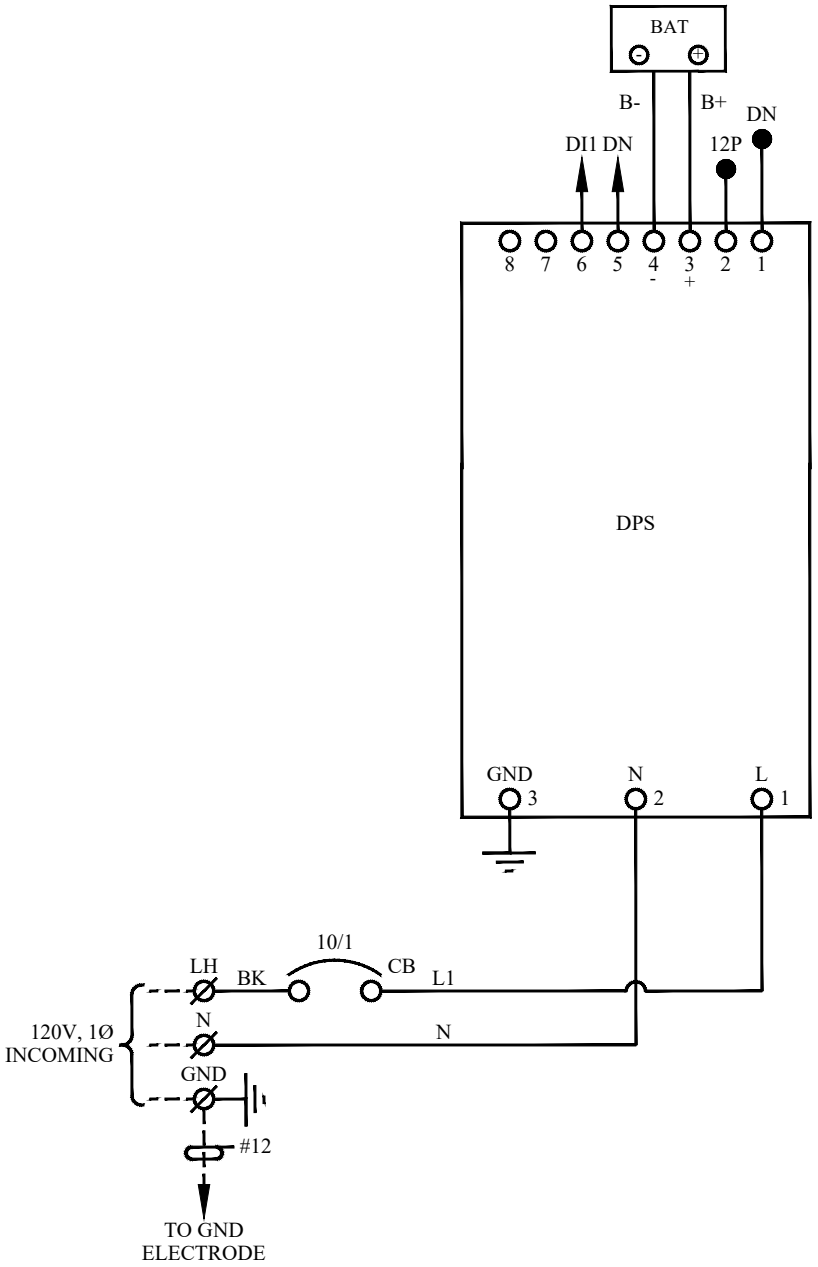
NP9. DE–ENERGIZATION LABEL –

(RED WITH WHITE LETTERING)

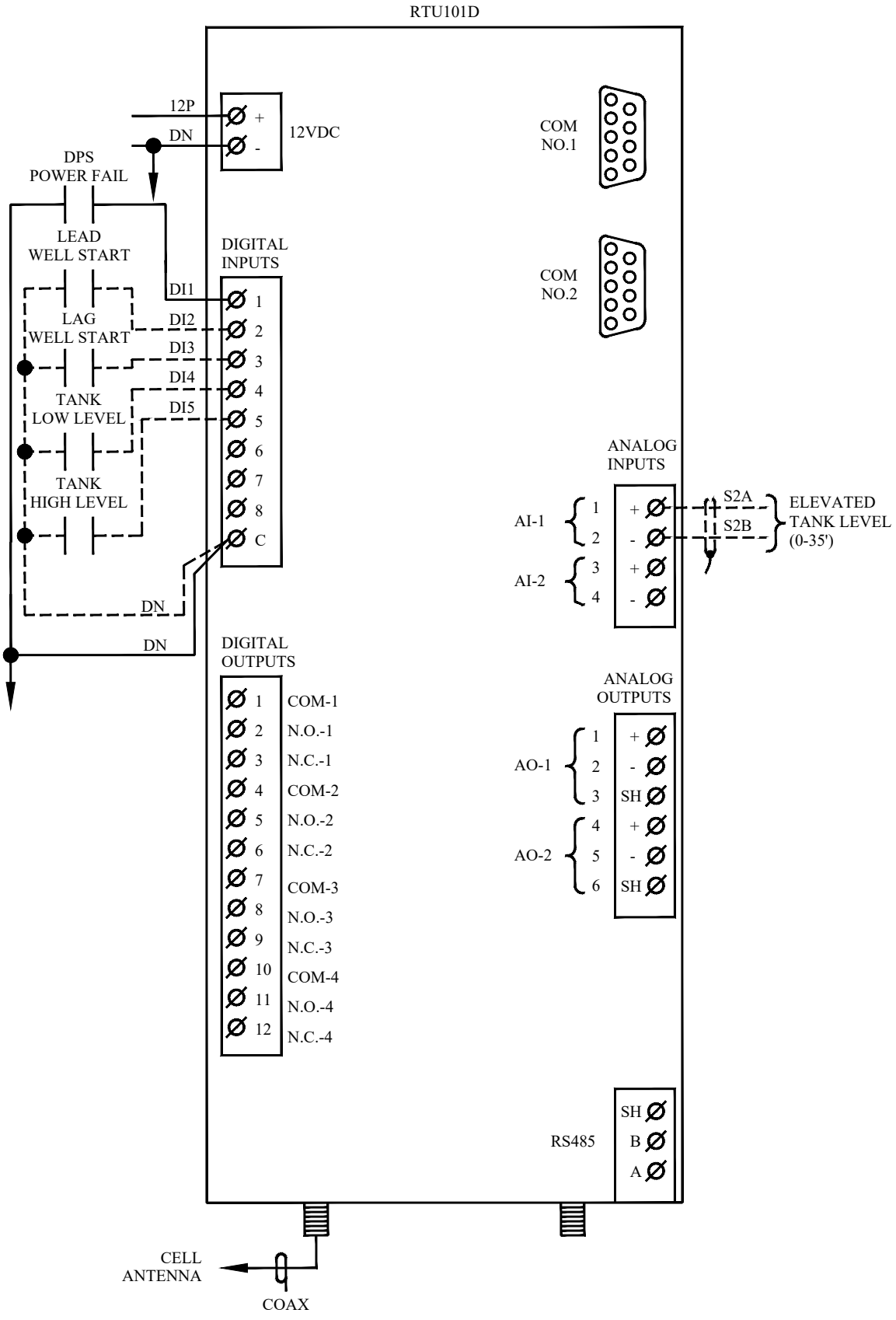


NEMA 6P ENCLOSURE (POLYCARBONATE)
(12"H X 10"W X 6"D)


C/B
PS
RTU101D
TERMINAL
TERMINAL
SPACE FOR CELLULAR CABLE CONNECTIONS TO BOTTOM OF RTU101D
GND



MEANWELL
POWER SUPPLY
DRC-40A



* NOTE: ONE ANTENNA, ANTENNA TO BE MOUNTED OUTSIDE A BUILDING/MOUNTED TO CLEAR OUTSIDE OBSTRUCTIONS.

QTY	SYM	MFR	CAT #	DESC	PAGE #
1		Buss	NFT2-WH	Terminal, 2Pole space saver	C166
1	RTU	CSI	RTU101D w/Cell Modem & Relay Output Board	Remote Telemetry Unit w/2 cell ant. conn. ports	C249-C249A
1		Fibox	AR12106CHSSL	NEMA 6P Enclosure	C432
1		Fibox	ABP1210	Backplate	C432A
1	B	Interstate	SLA-1055	12V, 5ah Battery	C567
1	DPS	Mean Well	DRC-40A	Power Supply	C594-C594D
1		Panorama	LPB-7-27-5SP "CSI Install"	Cell Antenna	C660-C660B
1	CB	Siemens	BQ1B010QLD	Circuit Breaker 10 Amp, 1 Pole, 120V	C732
1	CB	Siemens	SMB6R	Mounting Bracket	C730
1	GND	Square D	PK4GTA	Equipment Ground Bar	C823

RTU/MONITORING PANEL
(WELL NO.1)

RTU/MONITORING PANEL
I/O STRUCTURE/CHECKLIST

ANALOG INPUTS 4-20mA

AI1 - SPARE

AI2 - SPARE

ANALOG OUTPUTS

AO1 - SPARE

AO2 - SPARE

DIGITAL INPUTS

DI1 - POWER FAIL

DI2 - WELL NO.1 FAILURE

DI3 - WELL NO.2 FAILURE

DI4 - SPARE

DI5 - SPARE

DI6 - SPARE

DI7 - SPARE

DI8 - SPARE

DIGITAL OUTPUTS

DO1 - LEAD WELL START

DO2 - LAG WELL START

DO3 - ELEVATED TANK LOW LEVEL

DO4 - ELEVATED TANK HIGH LEVEL

RTU/MONITORING PANEL
STANDARD NAMEPLATE LEGEND DETAIL

NP1. VOLTAGE LABEL –

DANGER HIGH VOLTAGE
120 VOLTS

(RED WITH WHITE LETTERING)

NP2. AUTHORIZED PERSONNEL LABEL –

AUTHORIZED PERSONNEL ONLY

(RED WITH WHITE LETTERING)

NP3. ARC FLASH LABEL –

WARNING
ARC FLASH & SHOCK HAZARD
APPROPRIATE PERSONAL PROTECTION EQUIPMENT REQUIRED
APPROPRIATE PERSONAL PROTECTION AND TOOLS REQUIRED WHEN WORKING ON THIS EQUIPMENT.
EQUIPMENT ID:

NP4. CSI LOGO LABEL –

NP5. SERVICE ENTRANCE LABEL –

(BLACK WITH WHITE LETTERING)

NP6. STATION NAME OR NUMBER LABEL –

WELL NO.1 RTU

(BLACK WITH WHITE LETTERING)

NP7. CSI JOB NUMBER LABEL –

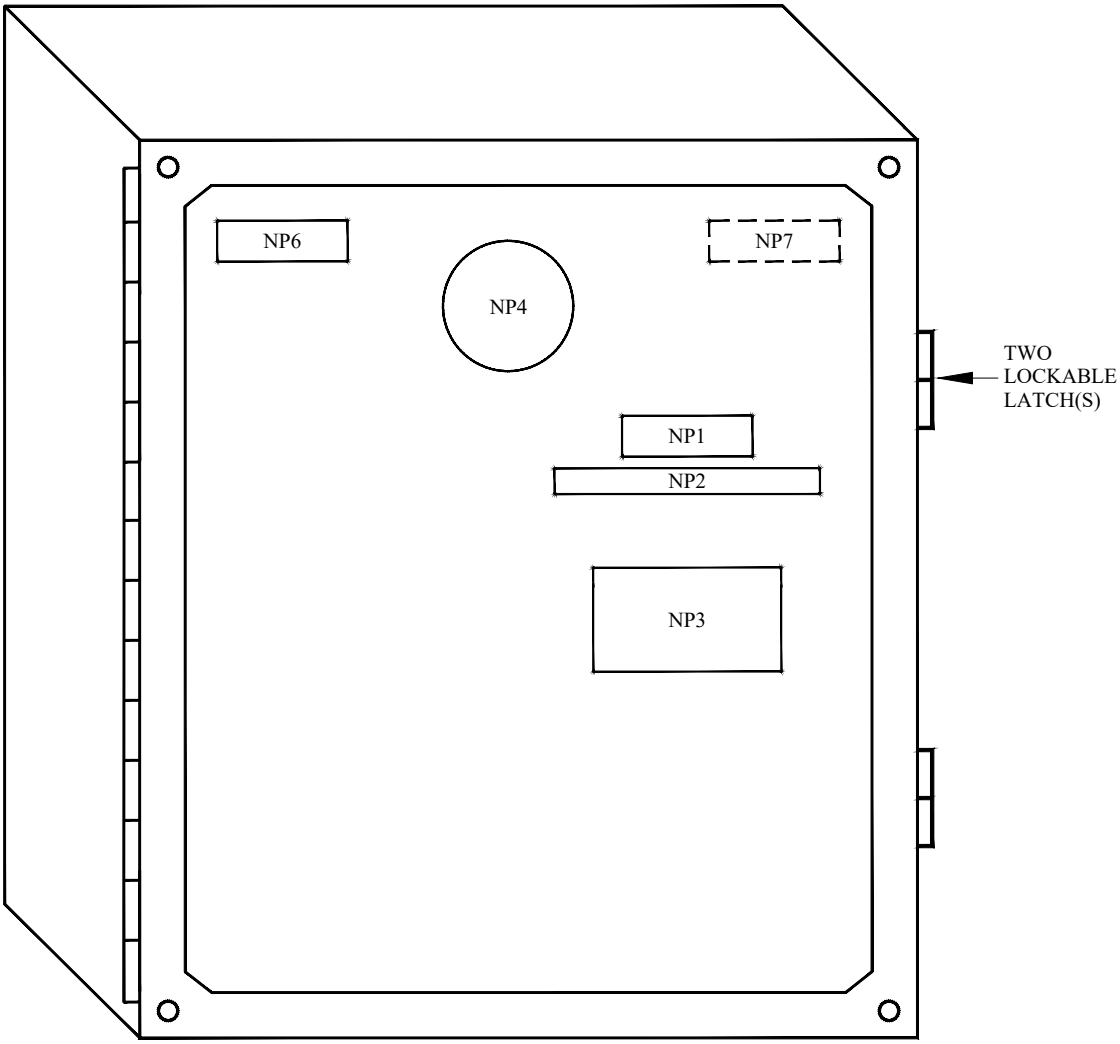
CONTROL SYSTEMS, INC.
JACKSON, MS
JOB NUMBER: 56276 – TAB 2P
DATE OF MFR: ?
120 VOLTS, 1 PHASE, 2 WIRE, 60 Hz
LARGEST MOTOR HP RATING: N/A
NORMAL POWER MAX CURRENT RATING: 10
EMERG. POWER MAX CURRENT RATING: N/A
SHORT CIRCUIT CURRENT RATING: 5,000 TYPE 1
THIS CONTROL PANEL HAS BEEN SUPPLIED WITH AN ELECTRICAL WIRING DIAGRAM. IF THE DIAGRAM DOES NOT EXIST, CALL (601) 355-8594 FOR A REPLACEMENT.

NP8. UL LABEL –

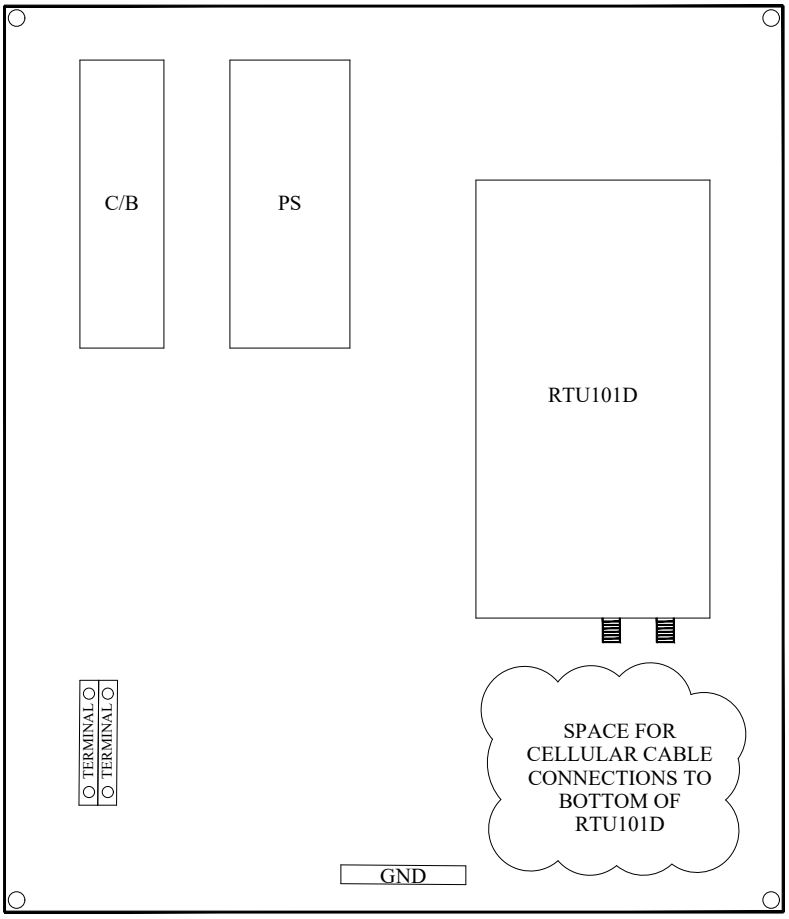
ENCLOSED INDUSTRIAL CONTROL PANEL
LISTED
NO. BT–

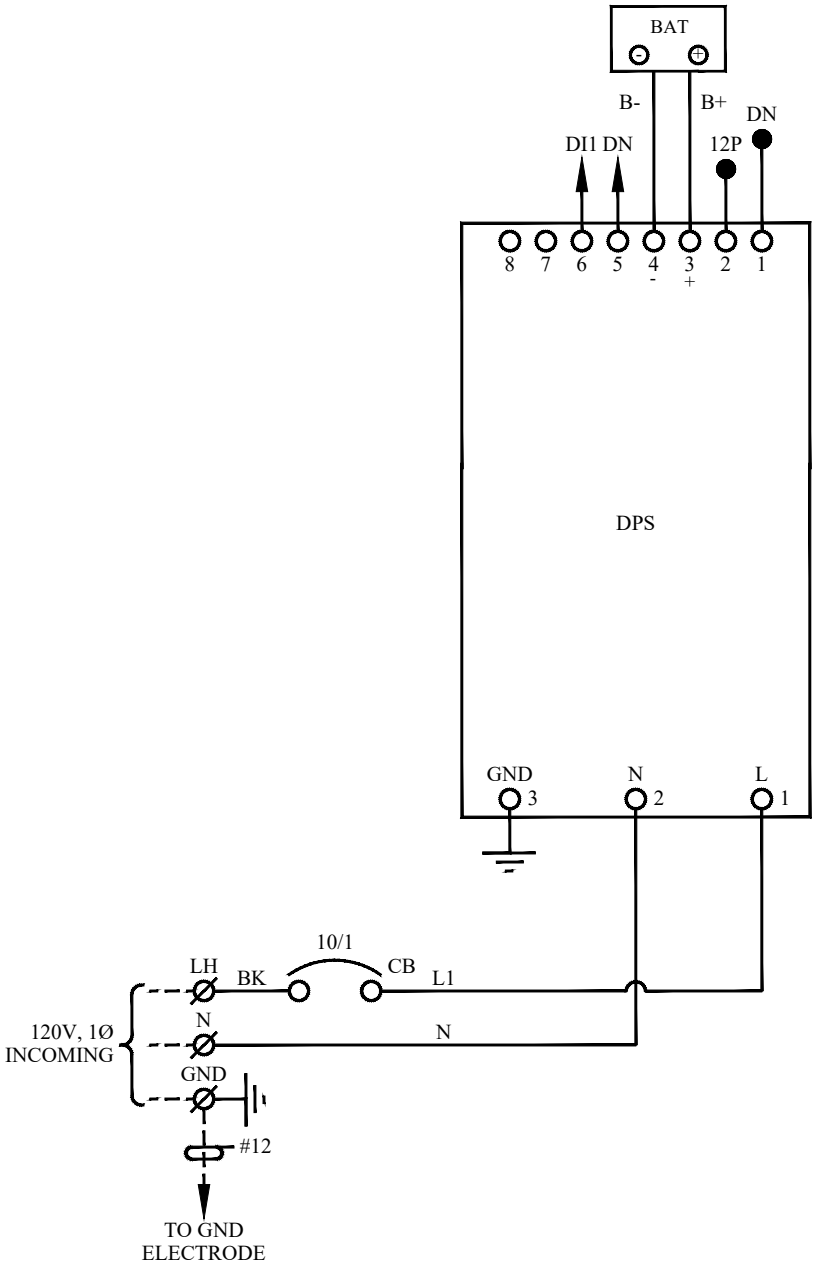
NP9. DE–ENERGIZATION LABEL –

(RED WITH WHITE LETTERING)

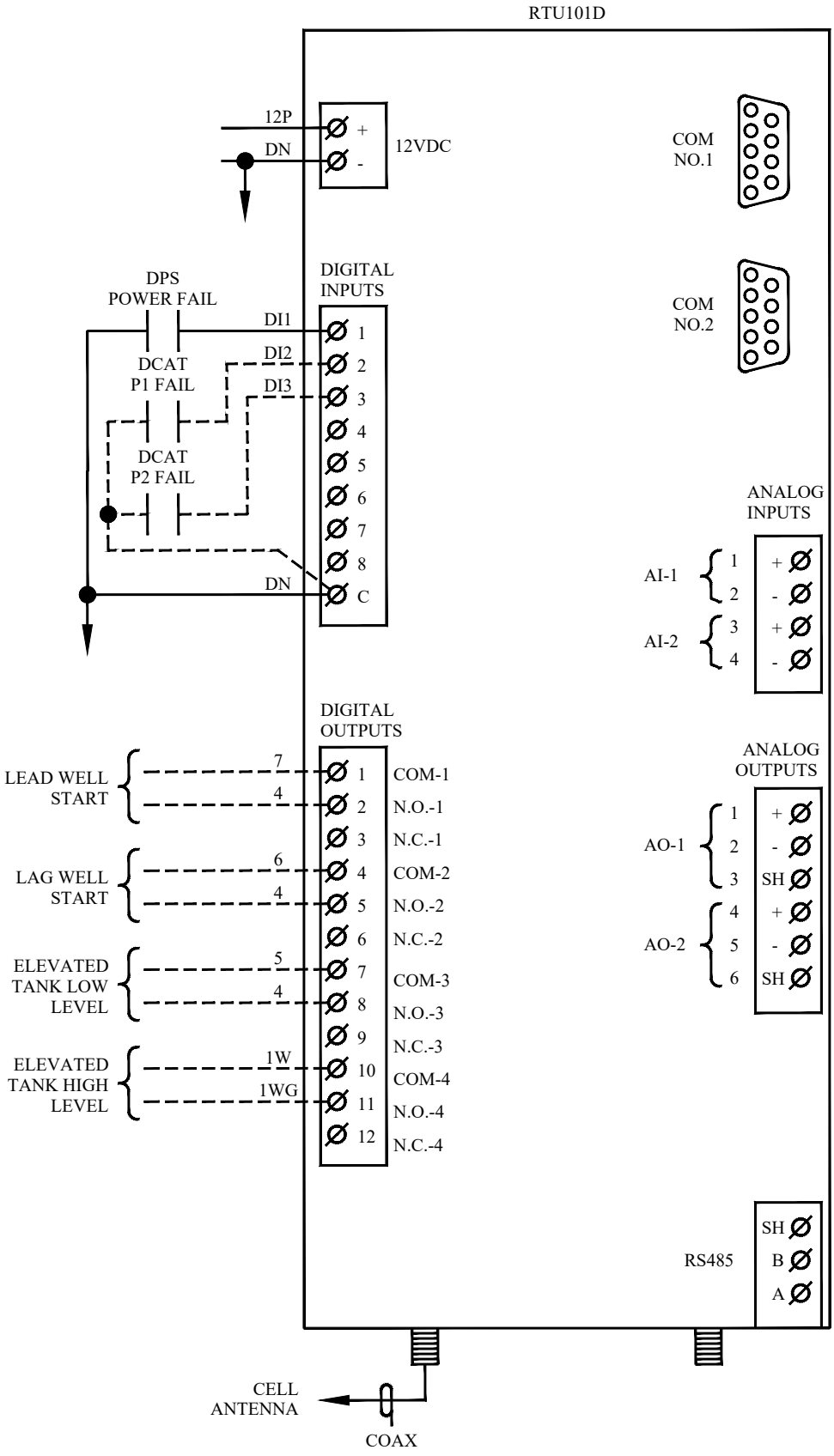


NEMA 6P ENCLOSURE (POLYCARBONATE)
(12"H X 10"W X 6"D)


C/B
PS
RTU101D
TERMINAL
TERMINAL
SPACE FOR CELLULAR CABLE CONNECTIONS TO BOTTOM OF RTU101D
GND



MEANWELL
POWER SUPPLY
DRC-40A



* NOTE: ONE ANTENNA, ANTENNA TO BE MOUNTED OUTSIDE A BUILDING/MOUNTED TO CLEAR OUTSIDE OBSTRUCTIONS.

QTY	SYM	MFR	CAT #	DESC	PAGE #
1		Buss	NFT2-WH	Terminal, 2Pole space saver	C166
1	RTU	CSI	RTU101D w/Cell Modem & Relay Output Board	Remote Telemetry Unit w/2 cell ant. conn. ports	C249-C249A
1		Fibox	AR12106CHSSL	NEMA 6P Enclosure	C432
1		Fibox	ABP1210	Backplate	C432A
1	B	Interstate	SLA-1055	12V, 5ah Battery	C567
1	DPS	Mean Well	DRC-40A	Power Supply	C594-C594D
1		Panorama	LPB-7-27-5SP "CSI Install"	Cell Antenna	C660-C660B
1	CB	Siemens	BQ1B010QLD	Circuit Breaker 10 Amp, 1 Pole, 120V	C732
1	CB	Siemens	SMB6R	Mounting Bracket	C730
1	GND	Square D	PK4GTA	Equipment Ground Bar	C823

3P

CSI WATCHDOG PANEL
(LIFT STATION NO.2)

CSI WATCHDOG PANEL
STANDARD NAMEPLATE LEGEND DETAIL

NP1. VOLTAGE LABEL –

DANGER HIGH VOLTAGE
120 VOLTS

(RED WITH WHITE LETTERING)

NP2. AUTHORIZED PERSONNEL LABEL –

AUTHORIZED PERSONNEL ONLY

(RED WITH WHITE LETTERING)

NP3. ARC FLASH LABEL –

NP4. CSI LOGO LABEL –

NP5. SERVICE ENTRANCE LABEL –

SUITABLE FOR USE AS SERVICE ENTRANCE
CONTROL SYSTEMS, INC.

(BLACK WITH WHITE LETTERING)

NP6. STATION NAME OR NUMBER LABEL –

CSI WATCHDOG
LIFT STATION NO.2

(BLACK WITH WHITE LETTERING)

NP7. CSI JOB NUMBER LABEL –

CONTROL SYSTEMS, INC.
JACKSON, MS
JOB NUMBER: 56276 – TAB 3P
DATE OF MFR: _____
120 VOLTS, 1 PHASE, 2 WIRE, 60 Hz
LARGEST MOTOR HP RATING: N/A
NORMAL POWER MAX CURRENT RATING: 10
EMERG. POWER MAX CURRENT RATING: N/A
SHORT CIRCUIT CURRENT RATING: 5000 TYPE 1
THIS CONTROL PANEL HAS BEEN SUPPLIED WITH AN ELECTRICAL WIRING DIAGRAM. IF THE DIAGRAM DOES NOT EXIST, CALL (601) 355-8594 FOR A REPLACEMENT.

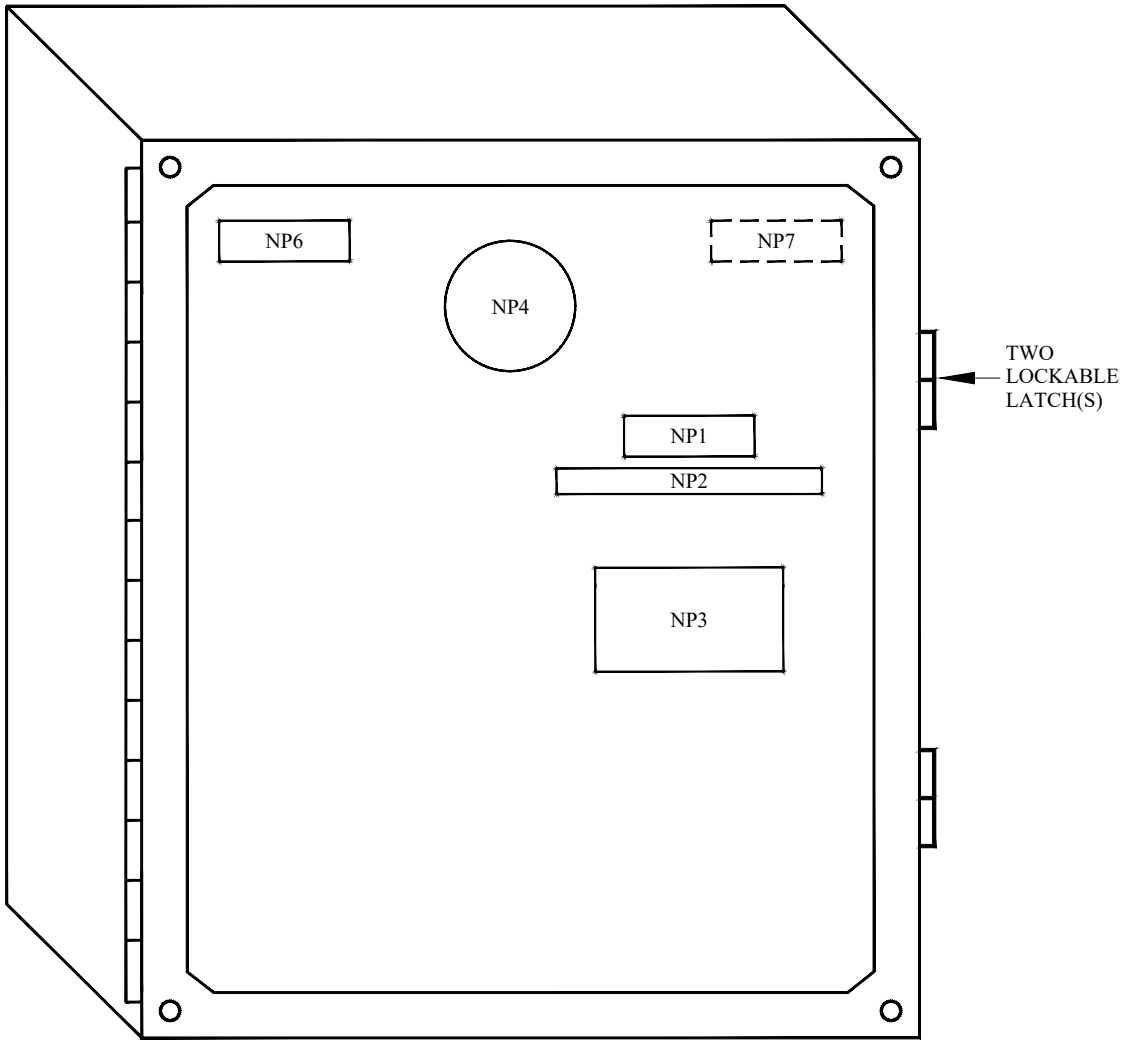
NP8. UL LABEL –

ENCLOSED
INDUSTRIAL
CONTROL
PANEL
LISTED
NO. BT–

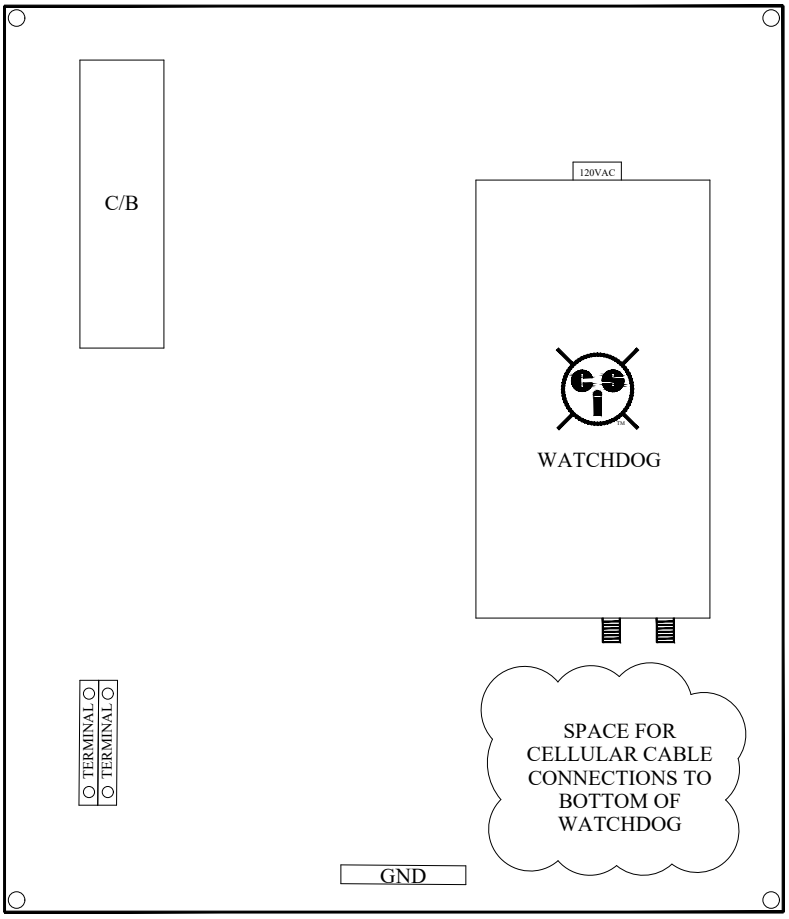
NP9. DE–ENERGIZATION LABEL –

NORMAL MAIN AND EMERGENCY MAIN
BREAKERS HAVE BEEN IN THE "OFF"
POSITION TO DE–ENERGIZE THE EQUIPMENT

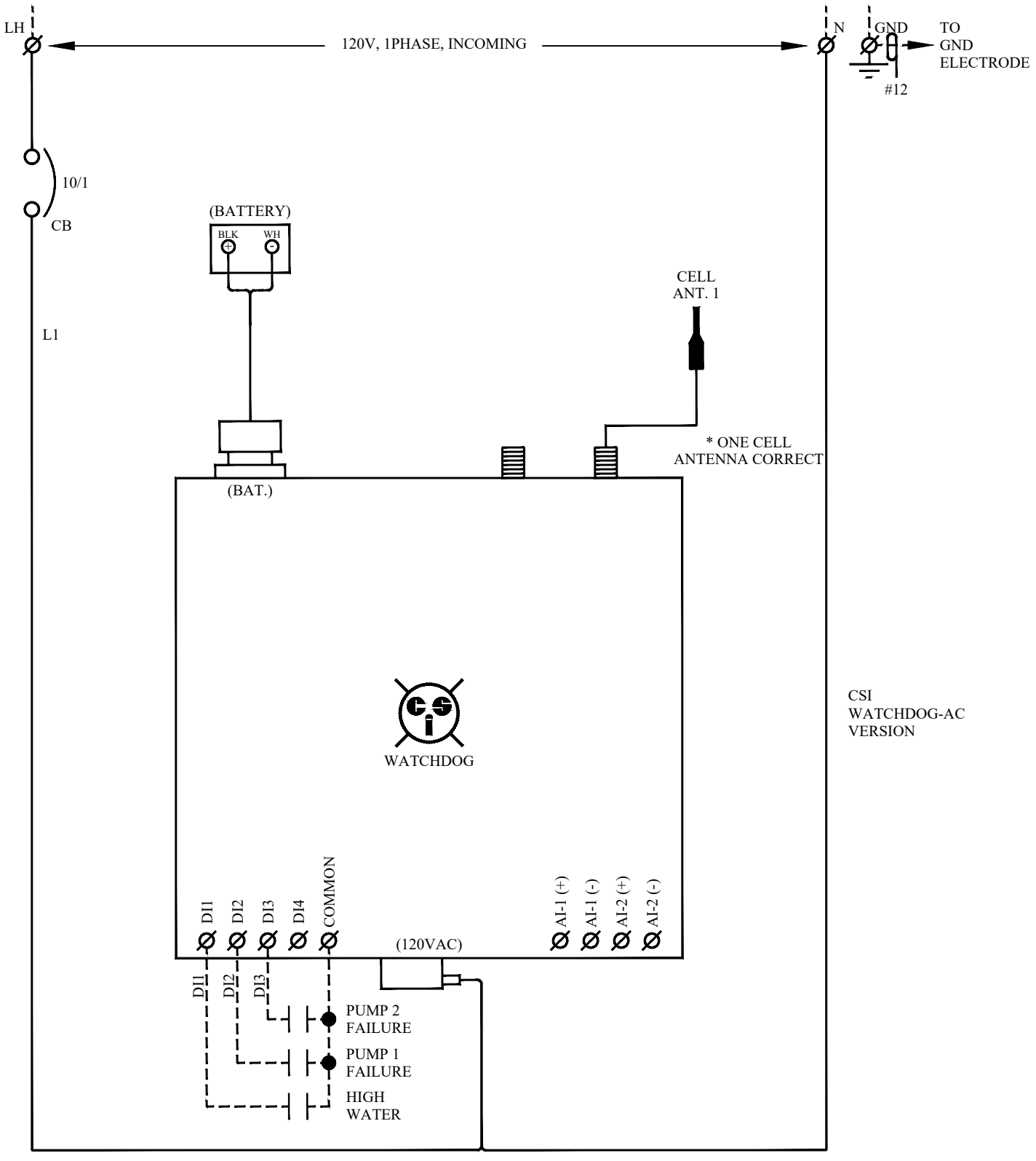
(RED WITH WHITE LETTERING)



NEMA 6P ENCLOSURE (POLYCARBONATE)
(12"H X 10"W X 6"D)


C/B
120VAC
WATCHDOG
TERMINAL
TERMINAL
SPACE FOR CELLULAR CABLE CONNECTIONS TO BOTTOM OF WATCHDOG
GND

CSI WATCHDOG PANEL
CONTROL SCHEMATIC



✳ NOTE: 1. POWER FAILURE GENERATED INTERNALLY
2. MOUNT WITH CELLULAR ANT. CONNECTION TOWARD BOTTOM
3. ONE ANTENNA TO BE MOUNTED OUTSIDE A BUILDING/MOUNTED TO CLEAR OUTSIDE OBSTRUCTIONS.

JOB NO. 56276

QTY	SYM	MFR	CAT #	DESC	PAGE #
1	F	Anchor	S30NO "CSI Install"	N.O. Float 30' Suspended	C83 - C84
1		Buss	NFT2-WH	Terminal, 2Pole space saver	C166
1		CSI	Watchdog - AC Version	Cellular Site Monitor	C288-C288A
1		Fibox	AR12106CHSSL	NEMA 6P Enclosure	C432
1		Fibox	ABP1210	Backplate	C432A
1	2R	Idec	RU2S-C-A110/SM2S-05 "CSI Install"	DPDT Relay, 120VAC With Indicating Light & Base	C547-C547J
1	B	Interstate	SLA-1005	12V, Battery	C568
1		Panorama	LPB-7-27-5SP "CSI Install"	Cell Antenna	C660-C660B
1	CB	Siemens	BQ1B010QLD	Circuit Breaker 10 Amp, 1 Pole, 120V	C732
1	CB	Siemens	SMB6R	Mounting Bracket	C730
1	GND	Square D	PK4GTA	Equipment Ground Bar	C823

4P

Field Modifications To Existing Elevated Tank Control Panel - CSI Job #45309- Tab 2P
(By CSI - Town of Mize, MS - CSI Job #56276)

1. CSI will perform necessary wiring as shown on page 2P5 to/from the MPCT6 along with wire and conduit to/from the new RTU/monitoring panel tab 1P of this project to acquire the high level, lead well start, lag well start and low level signals along with the tank level signal.

2. CSI will add a label to the MPCT6 as shown on page 2P3 for high water.

3. CSI will remove/disable the existing TR401 inside the existing elevated tank control panel since this project is eliminating that communication. The communication will be by cellular now.

4. CSI will make sure all is working properly before leaving this site as a necessary startup.

5. Material required for these field modifications can be found at the end of this tab.

ELEVATED TANK CONTROL PANEL
STANDARD NAMEPLATE LEGEND DETAIL

NP1. VOLTAGE LABEL –

DANGER
120 VOLTS

(RED WITH WHITE LETTERING)

NP2. AUTHORIZED PERSONNEL LABEL –

AUTHORIZED PERSONNEL ONLY

(RED WITH WHITE LETTERING)

NP4. CSI LOGO LABEL –

CONTROL SYSTEMS INC.
JACKSON, MS

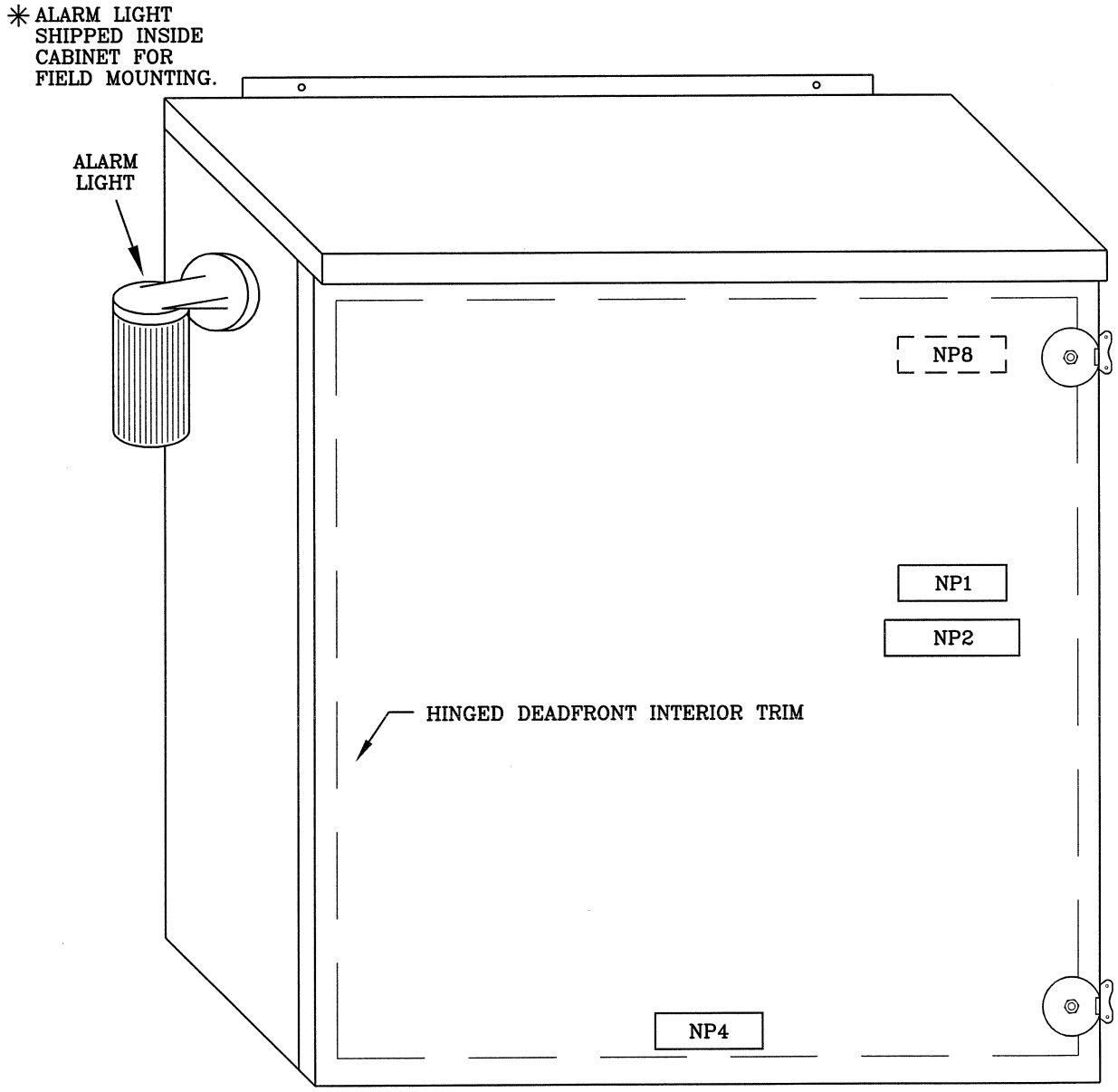
INSIDE OF OUTSIDE DOOR NAMEPLATE LEGEND DETAIL

NP8. CSI JOB # LABEL –

CONTROL SYSTEMS, INC. – JACKSON, MS
JOB NO.: 45309-TAB 2P
DATE OF MFR: ?
120 VOLTS, 1 PHASE, 2 WIRE 60Hz
LARGEST MOTOR HP RATING: N/A
NORMAL POWER MAX AMP RATING: 20
EMERGENCY POWER MAX AMP RATING: N/A
SHORT CIRCUIT CURRENT RATING: 5000 TYPE 1

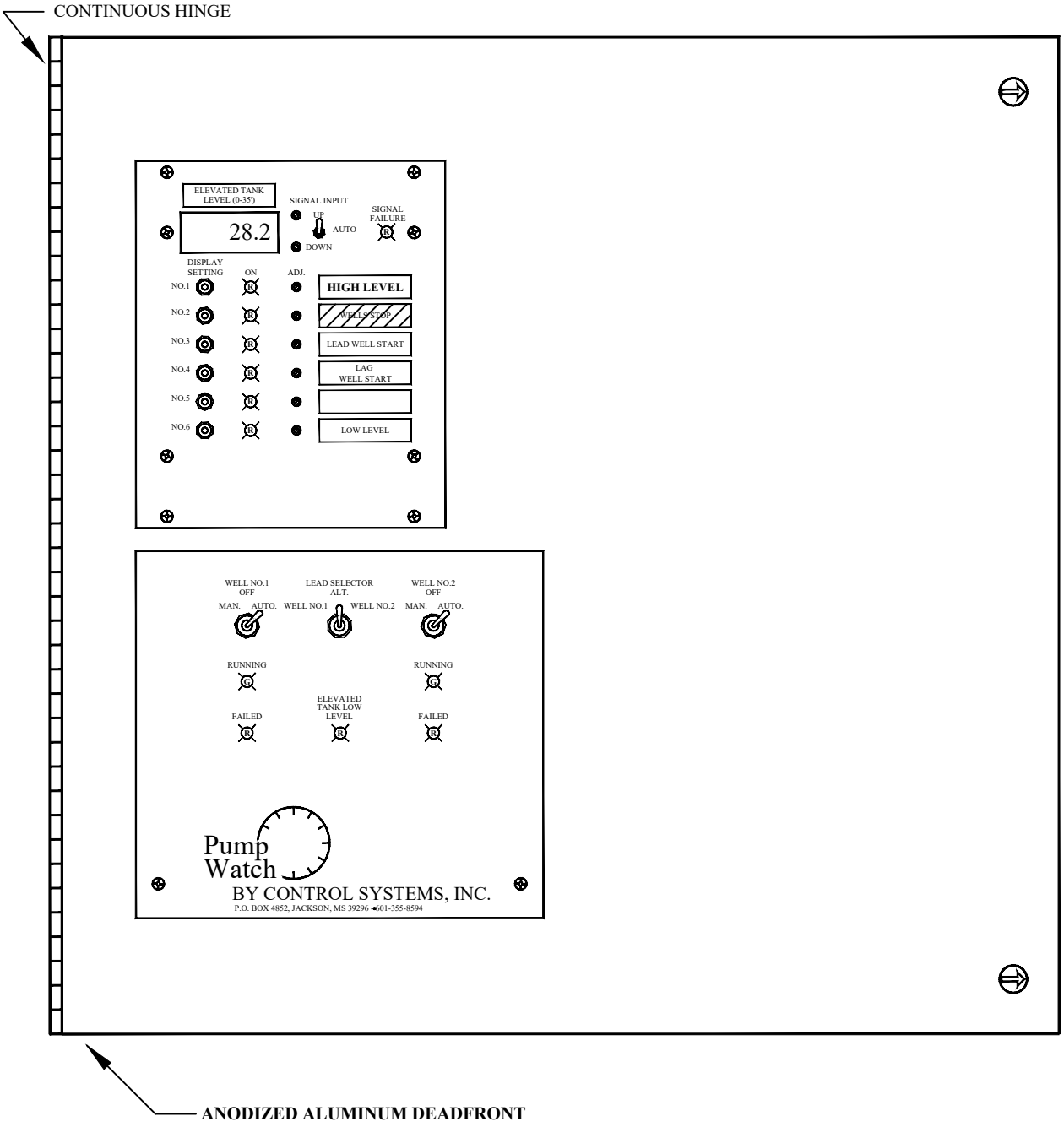
THIS CONTROL PANEL HAS BEEN SUPPLIED WITH AN ELECTRICAL WIRING DIAGRAM.
IF THE DIAGRAM DOES NOT EXIST, CALL (601) 355-8594 FOR A REPLACEMENT.

ELEVATED TANK CONTROL PANEL
PHYSICAL LAYOUT



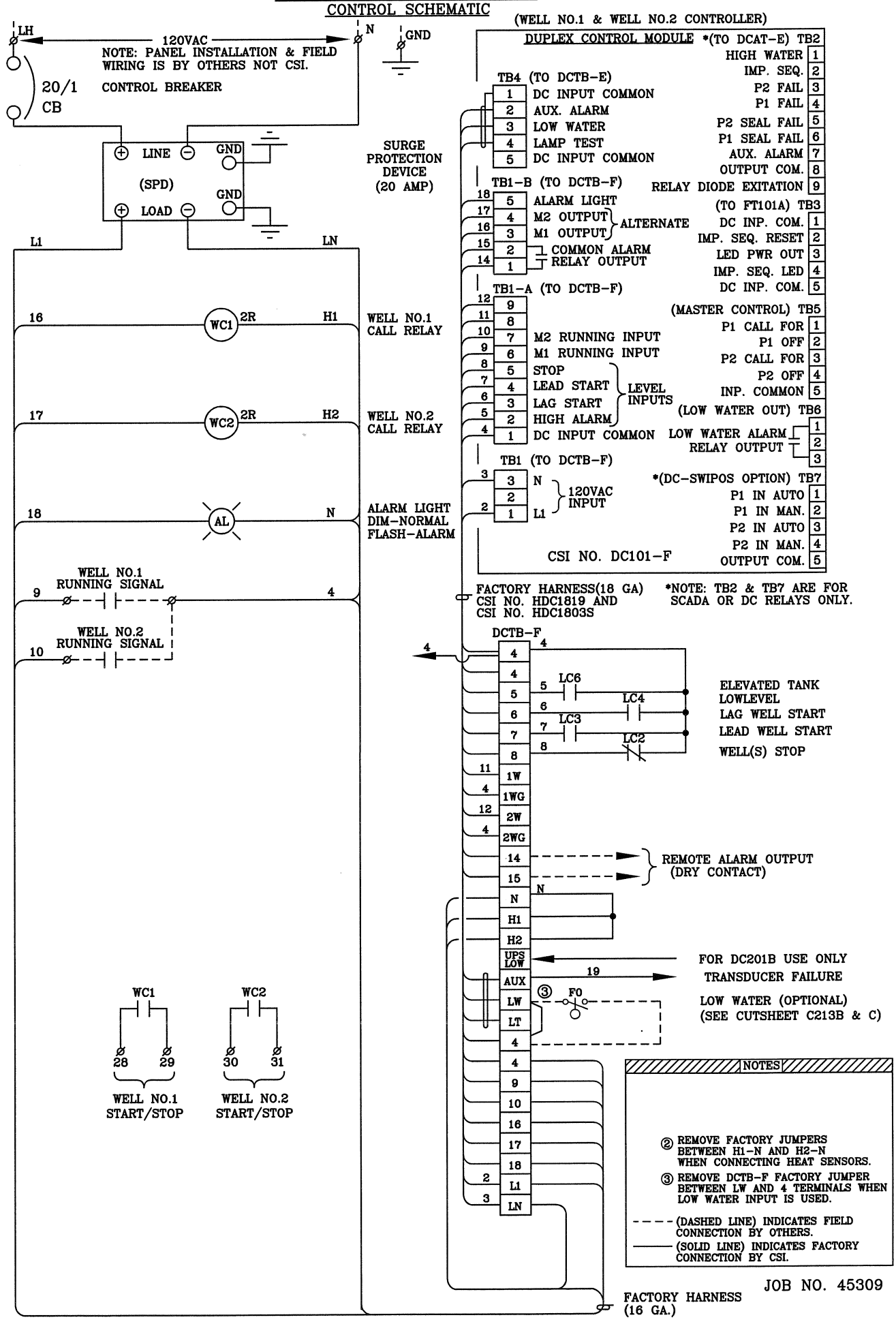
NEMA 3R ENCLOSURE
(20"H X 20"W X 8"D)

ELEVATED TANK CONTROL PANEL
DEADFRONT DETAIL



JOB NO. 45309
REVISED: 6-14-21

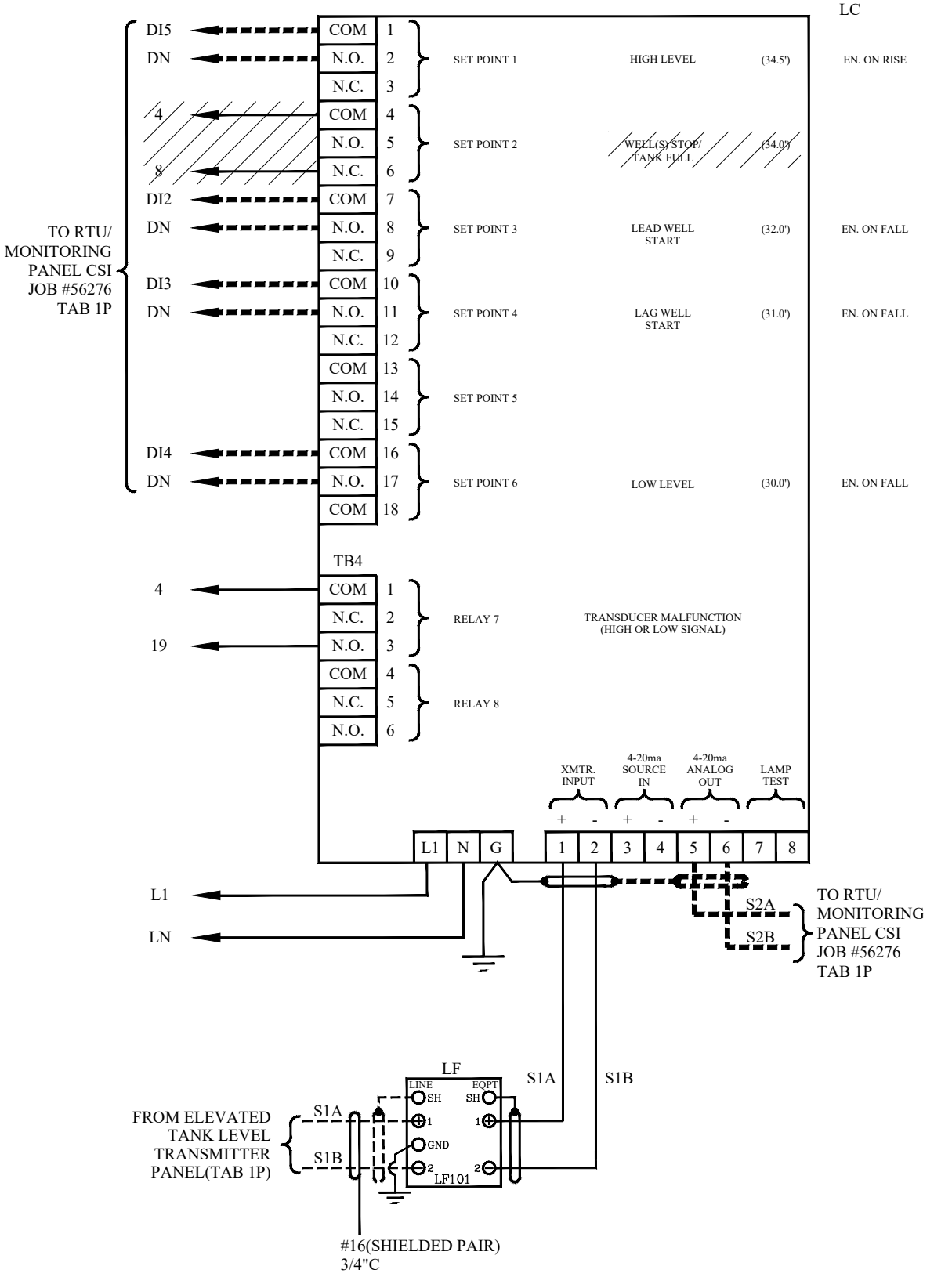
ELEVATED TANK CONTROL PANEL
CONTROL SCHEMATIC



JOB NO. 45309

ELEVATED TANK CONTROL PANEL
CONTROL SCHEMATIC

ELEVATED
TANK LEVEL
CONTROLLER
LC



QTY	SYM	MFR	CAT #	DESC	PAGE #
1		CSI Stock	MPCT6 Label "CSI Install"	See Page 2P3 For Detail "High Level"	N/A

5P

Field Modifications To Existing Well Control Panel #1- CSI Job #46133- Tab 1P
(By CSI - Town of Mize, MS - CSI Job #56276)

1. CSI will perform necessary wiring as shown on page 1P5 to/from the DC101F along with wire and conduit to/from the new RTU/monitoring panel tab 2P of this project to apply the tank low level, lead well start, lag well start and tank high level to the DC101F controller. CSI will perform necessary wiring as shown on page 1P5 to/from the DC101 along with wire and conduit to/from the new RTU/monitoring panel tab 2P of this project to acquire the well no.1 and well no.2 failure signals. CSI will need to apply a TB2 green DCAT option terminal board to accomplish this task.

2. CSI will add a label to the DC101F as shown on page 1P3 for high water.

3. CSI will remove/disable the existing TR401 as shown on page 1P6 inside the existing well control panel no.1 since this project is eliminating that communication. The communication will be by cellular now.

4. CSI will make sure all is working properly before leaving this site as a necessary startup.

5. Material required for these field modifications can be found at the end of this tab.

Note: A. CSI will need set "No SF ALT" dipswitch to the on position on the DC101F since applying the elevated tank high level into the seal failure 1 input.

B. It is correct that the existing TR401 will still remain in service to communicate between well no.1 and well no.2 site(s).

WELL NO.1 CONTROL PANEL
STANDARD NAMEPLATE LEGEND DETAIL

NP1. VOLTAGE LABEL –

DANGER HIGH VOLTAGE
120/240 VOLTS

(RED WITH WHITE LETTERING)

NP2. AUTHORIZED PERSONNEL LABEL –

AUTHORIZED PERSONNEL ONLY

(RED WITH WHITE LETTERING)

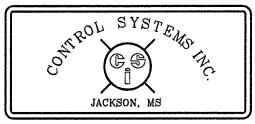
NP3. ARC FLASH LABEL –

⚠ WARNING
ARC FLASH & SHOCK HAZARD
APPROPRIATE PERSONAL PROTECTION EQUIPMENT REQUIRED

APPROPRIATE PERSONAL PROTECTION AND TOOLS REQUIRED WHEN WORKING ON THIS EQUIPMENT.

EQUIPMENT ID:

NP4. CSI LOGO LABEL –



NP5. SERVICE ENTRANCE LABEL –

SUITABLE FOR USE AS SERVICE ENTRANCE
CONTROL SYSTEMS, INC.

(BLACK WITH WHITE LETTERING)

NP6. STATION NAME OR NUMBER LABEL –

WELL NO.1

(BLACK WITH WHITE LETTERING)

NP7. CSI JOB NUMBER LABEL –

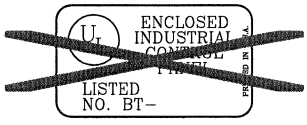
UL E84696

CONTROL SYSTEMS, INC.
JACKSON, MS

JOB NUMBER: 46133 – TAB 1P
DATE OF MFR: ?
120/240 VOLTS, 3 PHASE, 4 WIRE, 60 Hz
LARGEST MOTOR HP RATING: 20
NORMAL POWER MAX CURRENT RATING: 115
EMERG. POWER MAX CURRENT RATING: N/A
SHORT CIRCUIT CURRENT RATING: 5,000 TYPE 1

THIS CONTROL PANEL HAS BEEN SUPPLIED WITH AN ELECTRICAL WIRING DIAGRAM. IF THE DIAGRAM DOES NOT EXIST, CALL (601) 355-8594 FOR A REPLACEMENT.

NP8. UL LABEL –

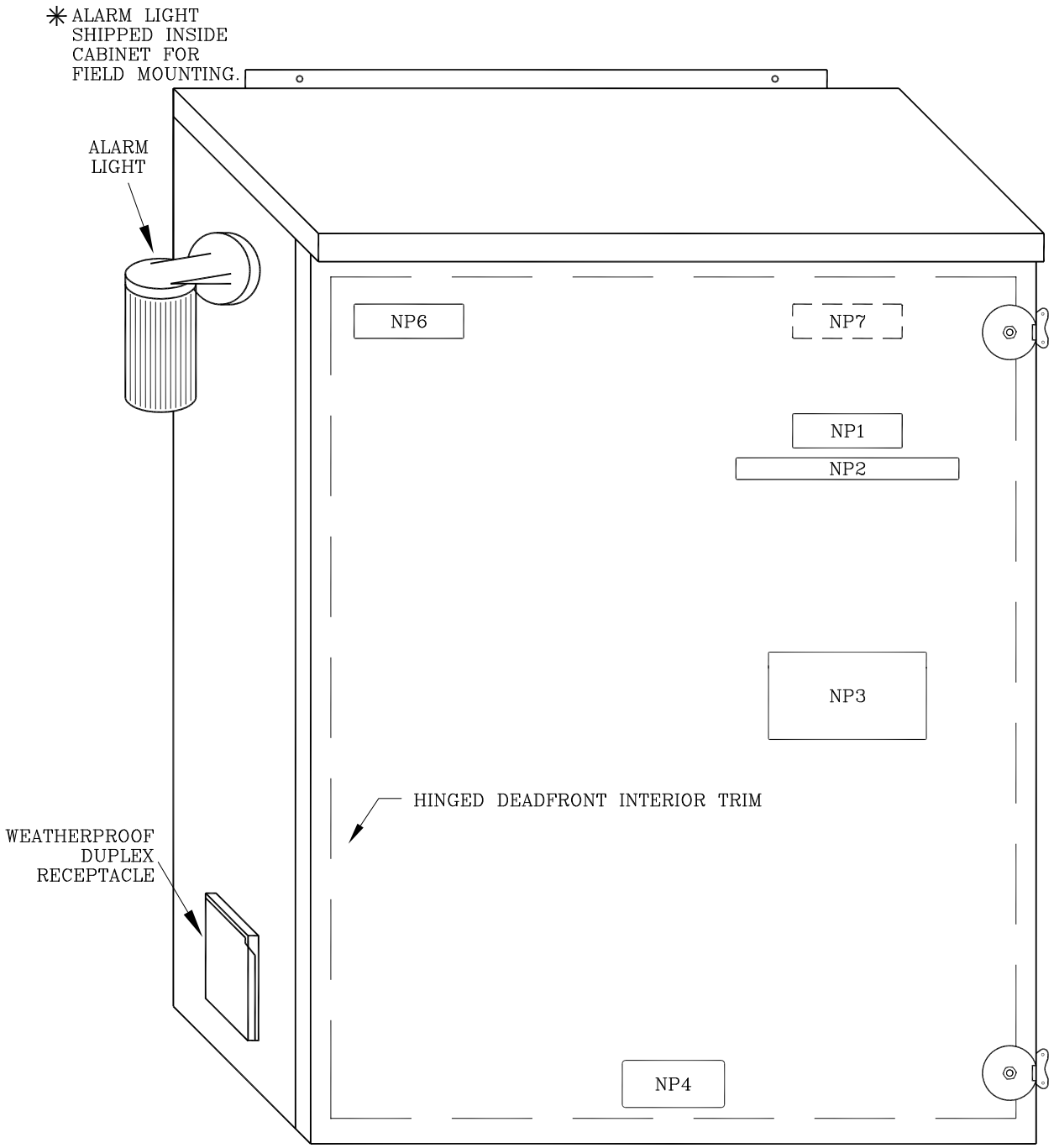


NP9. DE-ENERGIZATION LABEL –

NORMAL MAIN AND EMERGENCY MAIN
BREAKERS HAVE TO BE IN THE "OFF"
POSITION TO DE-ENERGIZE THE EQUIPMENT

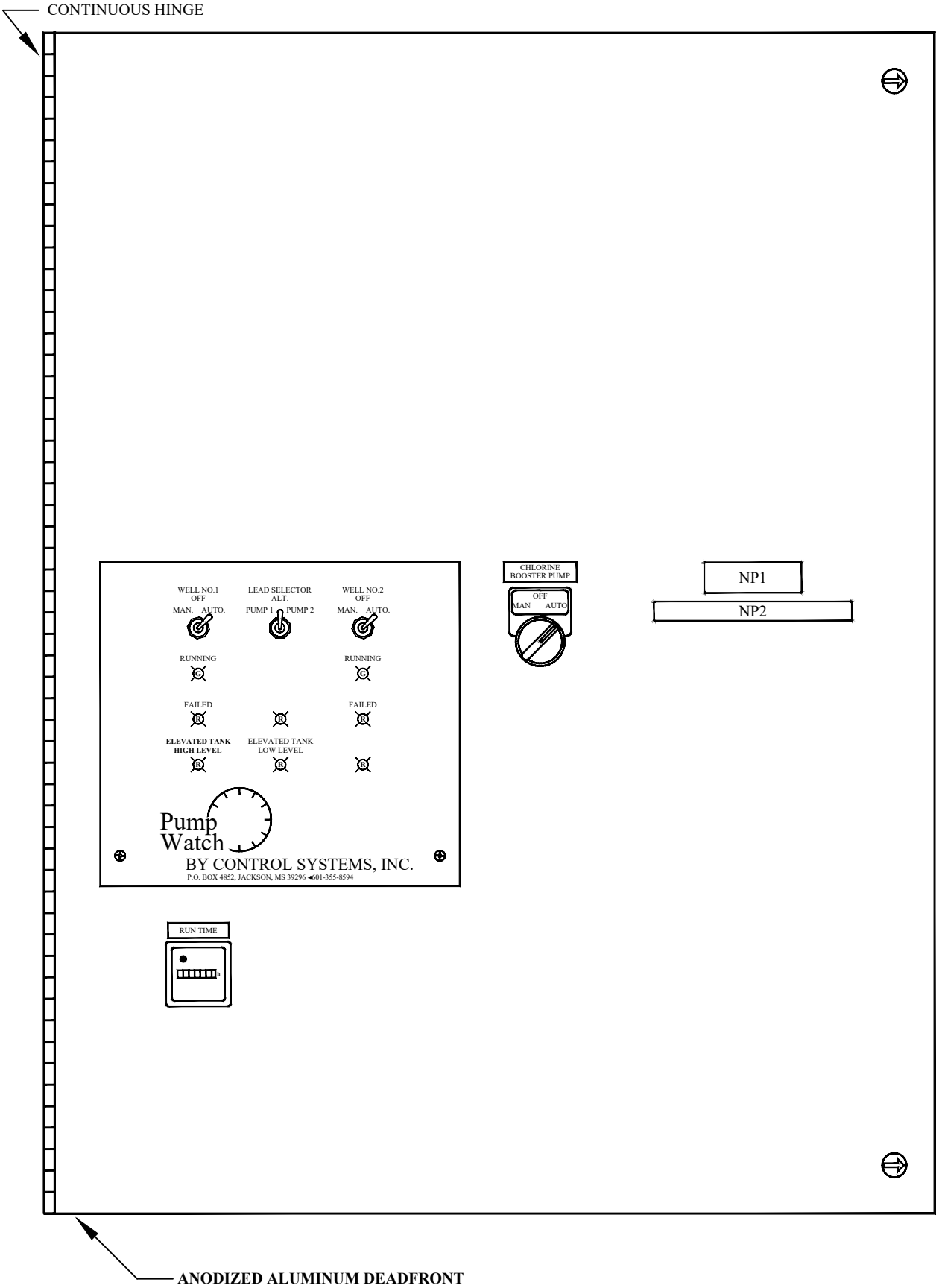
(RED WITH WHITE LETTERING)

WELL NO.1 CONTROL PANEL
PHYSICAL LAYOUT



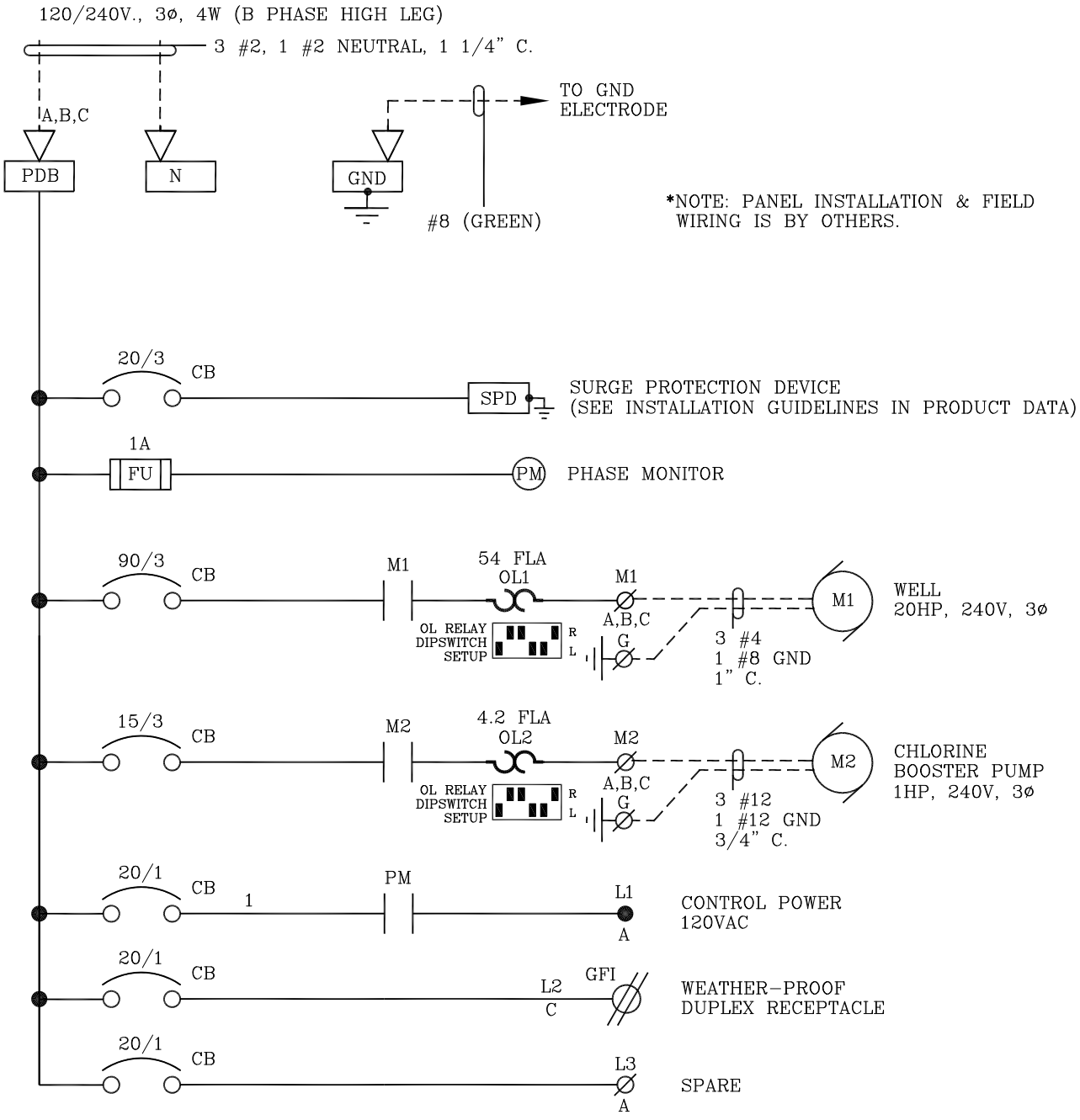
NEMA 3R ENCLOSURE
(36"H X 30"W X 12"D)

WELL NO.1 CONTROL PANEL
DEADFRONT DETAIL

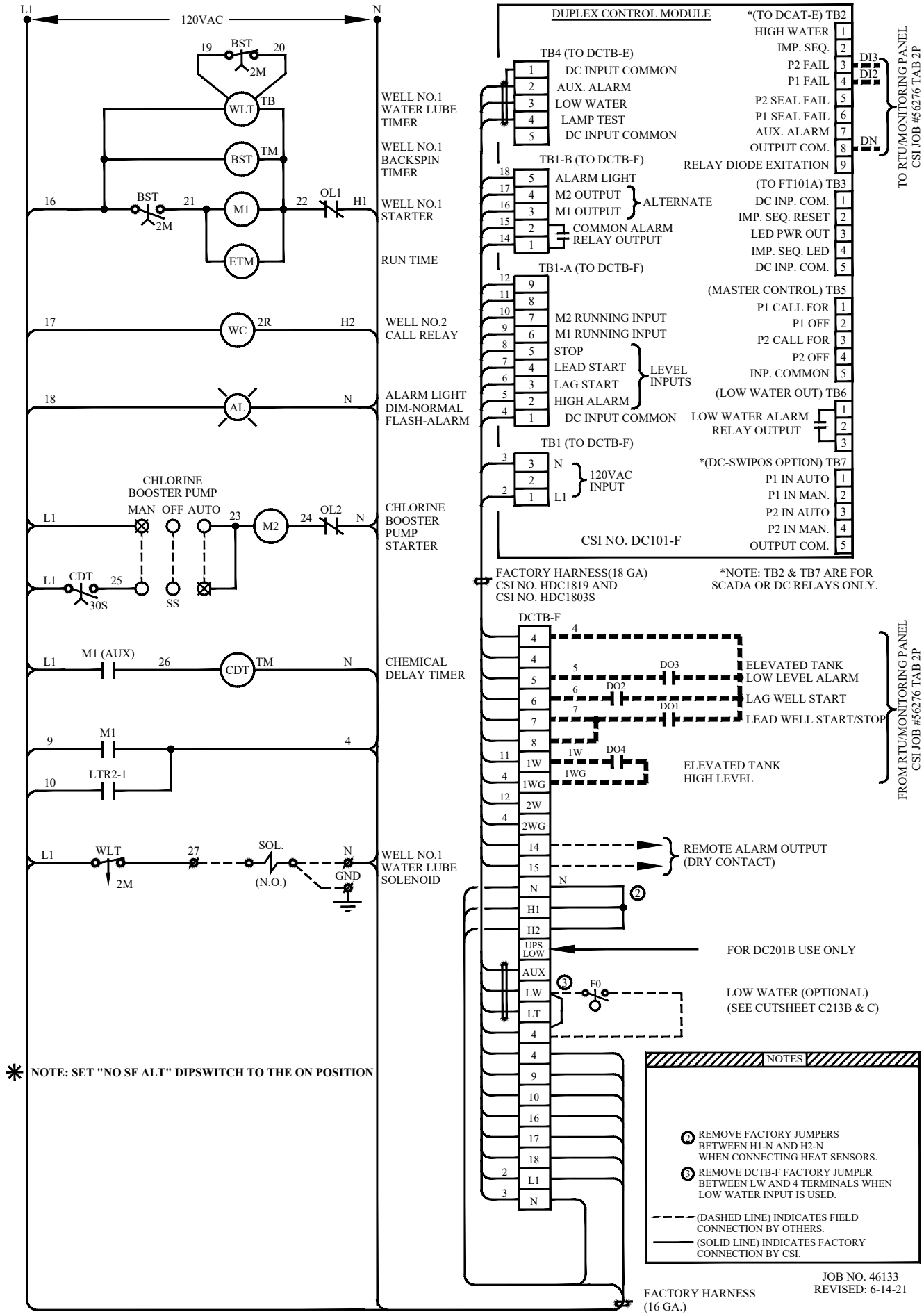


JOB NO. 46133
REVISED: 6-14-21

WELL NO.1 CONTROL PANEL
ONE LINE POWER SCHEMATIC

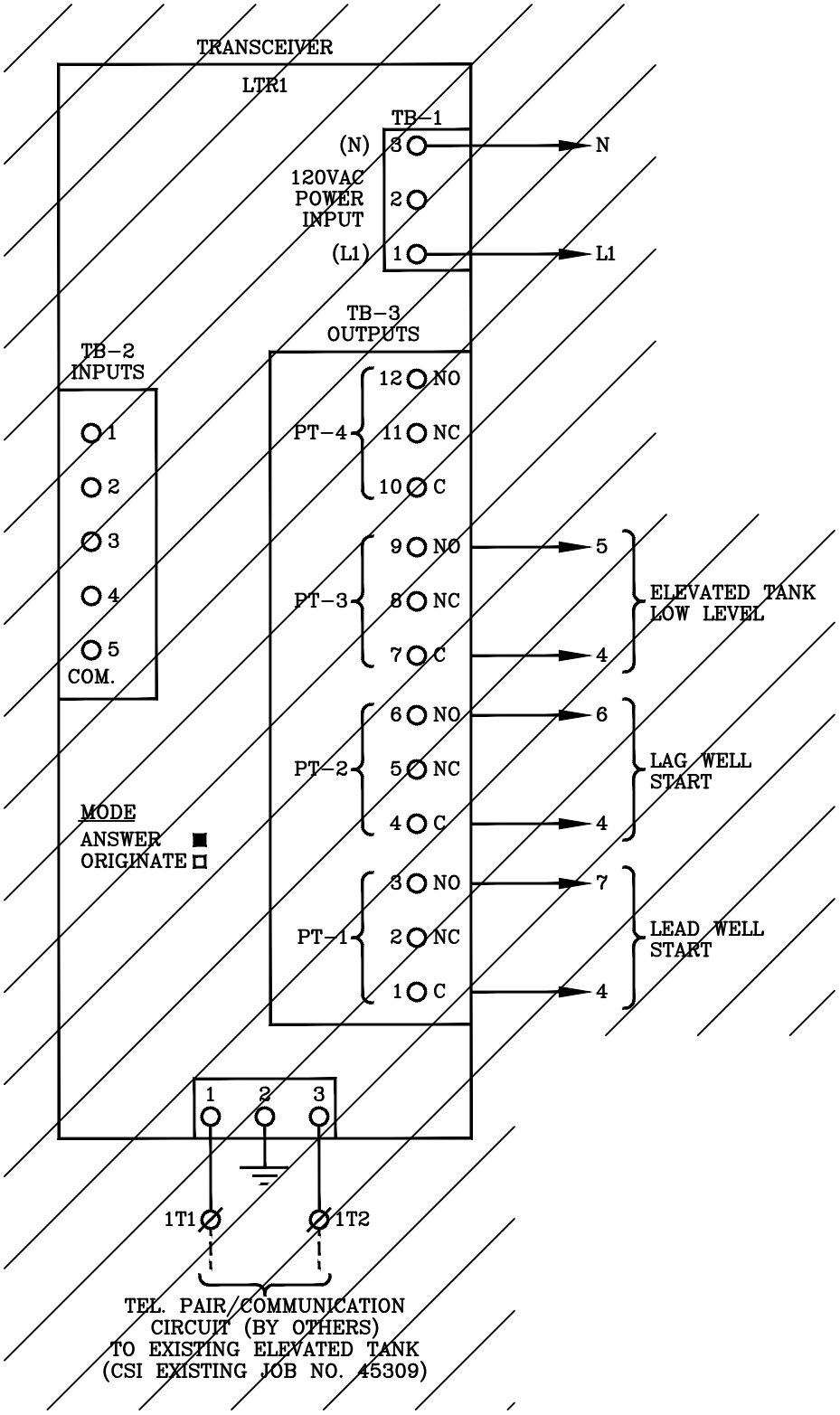


WELL NO.1 CONTROL PANEL
CONTROL SCHEMATIC

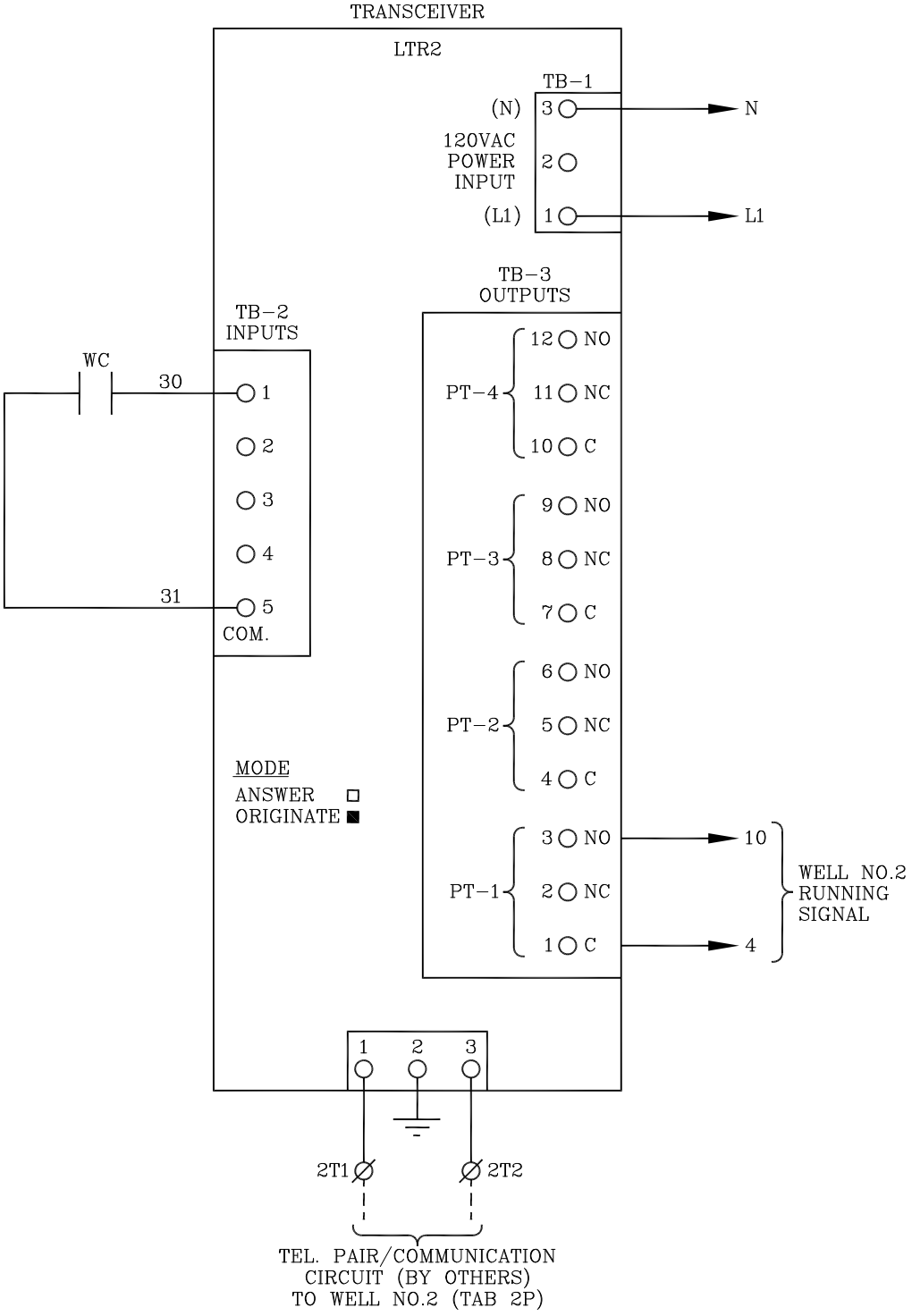


JOB NO. 46133
REVISED: 6-14-21

WELL NO.1 CONTROL PANEL
CONTROL SCHEMATIC



WELL NO.1 CONTROL PANEL
CONTROL SCHEMATIC



QTY	SYM	MFR	CAT #	DESC	PAGE #
1		CSI	TB2 Opt Board "CSI Install"	DC101 Green Terminal Board	N/A
1		CSI Stock	DC101 Label "CSI Install"	See Page 1P3 For Detail "E.T. High Level"	N/A

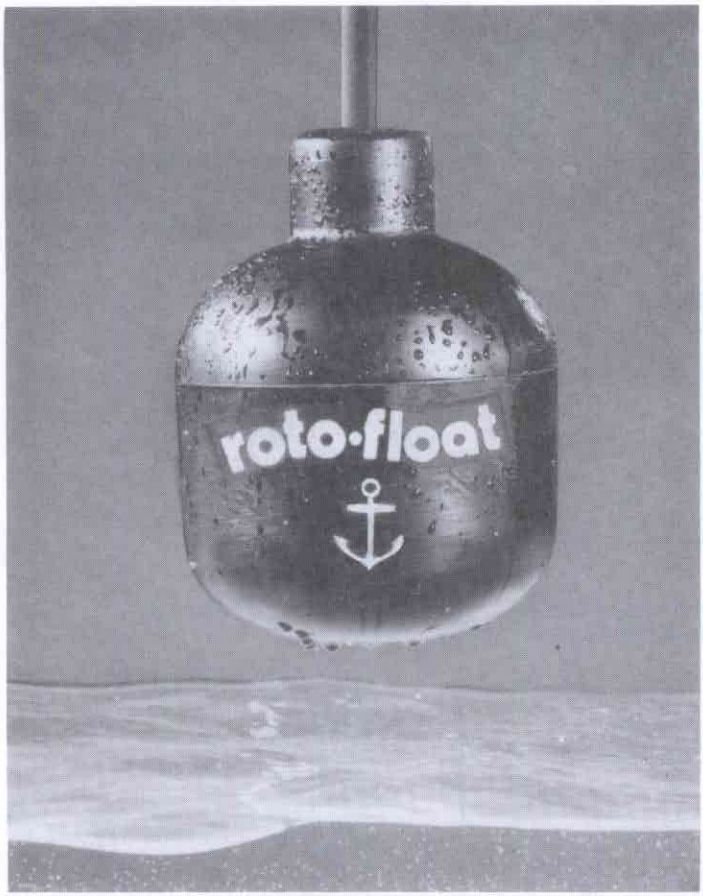
C

CATALOG DATA

anchor scientific inc.
Box 378, Long Lake, MN 55356 • 952-473-7115 • FAX 952-473-6002

roto-float
Type S - Suspended
Form 2700-B

TYPE S



The ROTO-FLOAT is a direct acting float switch. Each ROTO-FLOAT contains a single pole mercury switch which actuates when the longitudinal axis of the float is horizontal, and deactuates when the liquid level falls 1" below the actuation elevation.

The float is a chemical resistant polypropylene casing with a firmly bonded electrical cable protruding. One end of the cable is permanently connected to the enclosed mercury switch and the entire assembly is encapsulated to form a completely water tight and impact resistant unit. Type S — Suspended has built in weight.

ROTO-FLOATS can be mounted on a support pipe (type P) or suspended from above (type S). Advantages of the ROTO-FLOAT are low cost, simplicity and reliability.

UL Listed

- Pilot Duty
- Industrial Control Equipment

CABLE

P.V.C. type STO #18 conductors (41 strand) rated 600 volts • Various lengths available • See table of models • Non-standard lengths also available on special order.

Switch Arrangement	Cable Length	Suspended Type S Model No.	Ship. Wt.
Normally Open	20	S20NO	4#
	30	S30NO	4 1/2#
	40	S40NO	5 1/4#
Normally Closed	20	S20NC	4#
	30	S30NC	4 1/2#
	40	S40NC	5 1/4#

Effective 4/93

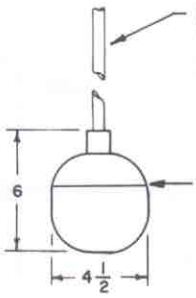
GENERAL DESCRIPTION:

THE ROTO-FLOAT IS A DIRECT ACTING FLOAT SWITCH. EACH ROTO-FLOAT CONTAINS A SINGLE POLE MERCURY SWITCH WHICH ACTUATES WHEN THE LONGITUDINAL AXIS OF THE FLOAT IS HORIZONTAL, AND DEACTUATES WHEN THE LIQUID FALLS 1" BELOW THE ACTUATION ELEVATION.

THE FLOAT IS A CHEMICAL RESISTANT POLPROPYLENE CASING WITH A FIRMLY BONDED ELECTRICAL CABLE PROTRUDING. ONE END OF THE CABLE IS PERMANENTLY CONNECTED TO THE GLASS ENCLOSED MERCURY SWITCH AND THE ENTIRE ASSEMBLY IS ENCAPSULATED TO FORM A COMPLETELY WATER TIGHT AND IMPACT RESISTANT UNIT.

ROTO-FLOATS CAN BE MOUNTED ON A SUPPORT PIPE, (TYPE P); OR SUSPENDED FROM ABOVE, (TYPE S). ADVANTAGES OF THE ROTO-FLOAT ARE LOW COST, SIMPLICITY AND RELIABILITY. VARIOUS CIRCUIT CONFIGURATIONS, OTHER THAN THE ONES LISTED BELOW, ARE AVAILABLE.

SPECIFICATIONS:



PVC TYPE STO, 2- #18 AWG 41 STRAND 600V, 60°C CONDUCTORS 20', 30', 40' LENGTHS STANDARD, OTHER LENGTHS AVAILABLE. UL & CSA LISTED.

POLYPROPYLENE CASING CONTAINS HERMETICALLY SEALED MERCURY SWITCH.

USE: N.O. FOR PUMP OUT
N.C. FOR PUMP IN

- UL LISTED, IND. CONT. EQ.
  PILOT DUTY
  4.5 AMPS 120 VAC
  2.25 AMPS 240 VAC
- FLOAT COLOR
  N.O., BLACK
  N.C., RED
- MOUNTING ARRANGEMENT
  TYPE P - PIPE MOUNTED MODEL INCLUDES POLYPROPYLENE CLAMP

  TYPE S - SUSPENDED MODEL WITH STABILIZING WEIGHT.

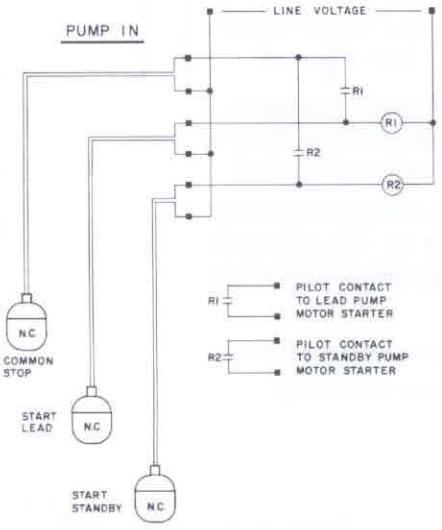
MODELS:

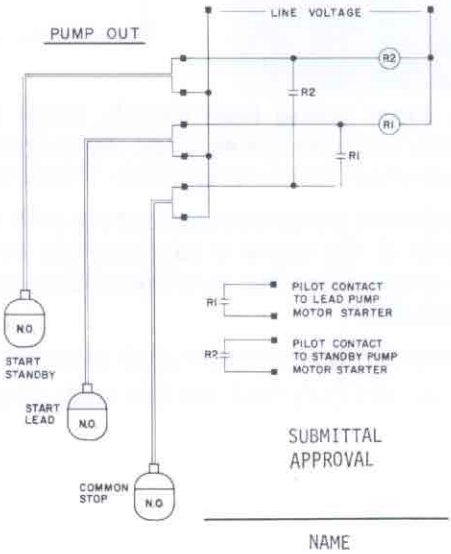
SWITCH ARRANGEMENT	CABLE LENGTH	SUSPENDED TYPE S		PIPE MOUNTED TYPE P	
		MODEL NO.	SHIP WT.	MODEL NO.	SHIP WT.
NORMALLY OPEN	20	S20NO	4#	P20NO	2#
	30	S30NO	4 ½#	P30NO	2 ¾#
	40	S40NO	5 ¼#	P40NO	3 ½#
NORMALLY CLOSED	20	S20NC	4#	P20NC	2#
	30	S30NC	4 ½#	P30NC	2 ¾#
	40	S40NC	5 ¼#	P40NC	3 ½#

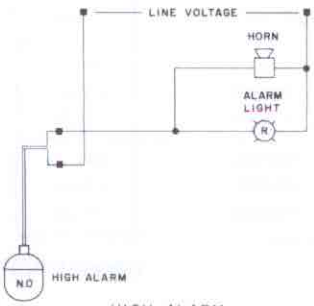
APPLICATIONS:

FOR USE IN CONTROLLING PUMPS OR OTHER MACHINES AND MEASURING ALARM LEVELS IN WATER, SEWAGE AND MANY OTHER LIQUIDS. ROTO-FLOATS MAY BE USED FOR PUMP IN OR PUMP OUT CONTROL, FOR LOW LEVEL CUTOUT, OR FOR LOW AND HIGH LEVEL ALARMS.

TYPICAL 2 PUMP CIRCUITS







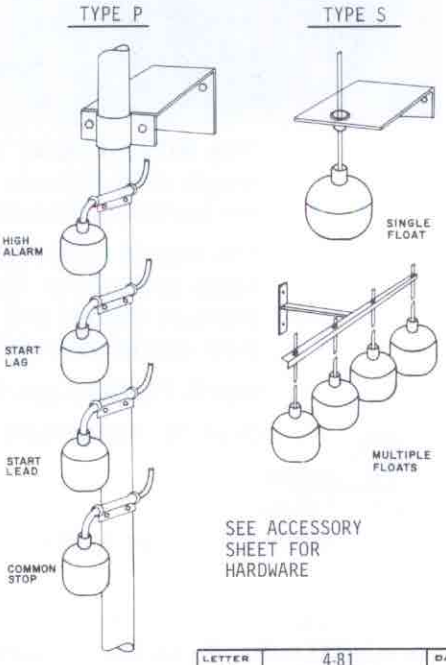
HIGH ALARM

SUBMITTAL APPROVAL

NAME

DATE

TYPICAL MOUNTING



SEE ACCESSORY SHEET FOR HARDWARE

IMPORTANT NOTE: Use in accordance with local electrical code and authority having jurisdiction. Do not use Roto-Floats in gasoline, volatiles or other combustibles.

This product contains mercury. Dispose of in accordance with Local, State and Federal Regulations so that mercury does not contaminate the environment.

LETTER	REVISIONS	DATE
A	4-81	

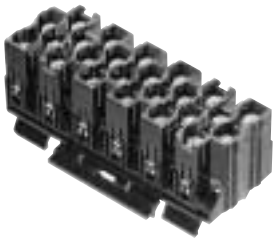
DWN BY	PD	DATE 1-9-74
CKD BY	JA	DATE 1-9-74
APPD BY	DS	DATE 4-30-76
PROJECT NAME	ROTO-FLOAT	
FACTORY ORDER NO.		

anchor scientific inc.
Box 378, Long Lake, MN 55356
612/473-7115

SPECIFICATION DATA SUBMITTAL AND INSTRUCTION SHEET

DWG. NO. 174 - 4

Rail Mount Terminal Blocks



N512-BK

Ratings: 5A, 600V; UL/CSA
20A, 300V; UL/CSA
Center Spacing: .197″ (5.00)
Number of Poles: 12
Circuits per Foot: 60
Circuit Jumper: JN512, 12 circuits
Wire Size: AWG #12-22 CU
Screw Size: #4-48
Mounting Options: C-rail, 15mm DIN rail
Marking Tape: AT512
Torque Rating: 12 in/lb max.
Color: Black-BK

CE CE logo denotes compliance with European Union Low Voltage Directive (50-1000Vac, 75-1500Vdc). Refer to Data Sheet: 8002 or contact Bussmann Application Engineering at 636-527-1270 for more information.

NFT2-__ __(color)

Ratings: 40A, 600V; UL/CSA; 55A factory wired.
Center Spacing: .281″ (7.13)
Number of Poles: 2
Circuits per Foot: 38
Circuit Jumper: JN2, 2 circuits
Wire Size: AWG #8-22 CU
Screw Size: #8-32
Mounting Options: C-rail
Marking Tape: MT12-½
Torque Rating: 18 in/lb max.
NFT2 Colors: WH - White

CE CE logo denotes compliance with European Union Low Voltage Directive (50-1000Vac, 75-1500Vdc). Refer to Data Sheet: 8002 or contact Bussmann Application Engineering at 636-527-1270 for more information.

NFT3-__ __(color)

Ratings: 40A, 600V; UL/CSA; 55A factory wired.
Center Spacing: .390″ (9.91)
Number of Poles: 3
Circuits per Foot: 28
Circuit Jumper: JN3, 2 circuits
Wire Size: AWG #8-22 CU
Screw Size: #8-32
Mounting Options: C-rail
Marking Tape: MT12-½
Torque Rating: 18 in/lb max.
NFT3 Colors:
YE - Yellow WH - White

CE CE logo denotes compliance with European Union Low Voltage Directive (50-1000Vac, 75-1500Vdc). Refer to Data Sheet: 8002 or contact Bussmann Application Engineering at 636-527-1270 for more information.

NC3-WH

Ratings: 175A, 600V; UL/CSA
Center Spacing: 1.06″ (26.92)
Number of Poles: 3
Circuits per Foot: 11
Wire Size: 2/0-#14 CU/AL
Screw Size: $\frac{5}{16}$-24
Mounting Options: C-rail, Base Mount
Marking Tape: MT12-½
Torque Rating: 45 in/lb max.
NC3 Colors: WH - White

CE CE logo denotes compliance with European Union Low Voltage Directive (50-1000Vac, 75-1500Vdc). Refer to Data Sheet: 8002 or contact Bussmann Application Engineering at 636-527-1270 for more information.

NSE3-WH

Ratings: 115A, 600V; UL/CSA
Center Spacing: 1.06″ (26.92)
Number of Poles: 3
Circuits per Foot: 11
Wire Size: For use with wire crimped to ring terminal.
Screw Size: ¼-28
Mounting Options: C-rail, Base Mount
Marking Tape: MT12-½

CE CE logo denotes compliance with European Union Low Voltage Directive (50-1000Vac, 75-1500Vdc). Refer to Data Sheet: 8002 or contact Bussmann Application Engineering at 636-527-1270 for more information.

NSS3-WH

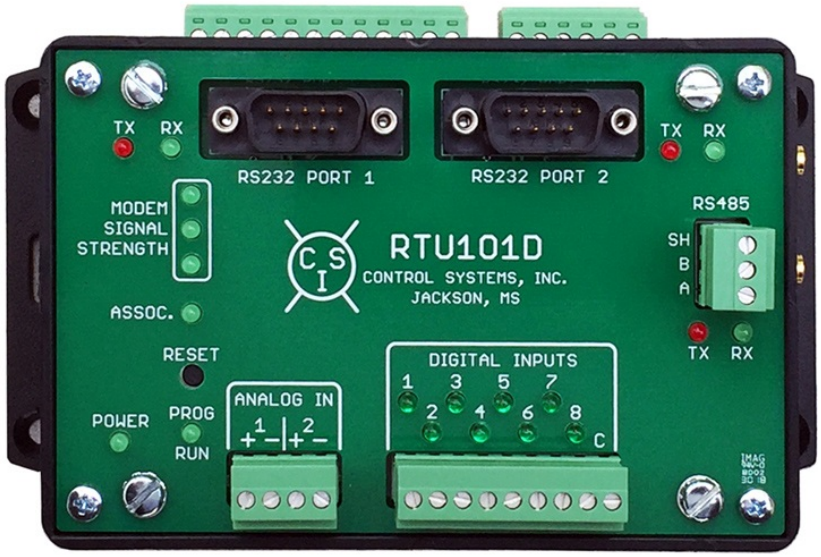
Ratings: 30A, 600V; UL/CSA
Center Spacing: .385″ (9.77)
Number of Poles: 3
Circuits per Foot: 28
Circuit Jumper: JNSS3, 2 circuits
Wire Size: For use with wire crimped to ring terminal.
Screw Size: #6-32
Mounting Options: C-rail
Marking Tape: MT12-½
NSS3 Colors: WH - White

CE CE logo denotes compliance with European Union Low Voltage Directive (50-1000Vac, 75-1500Vdc). Refer to Data Sheet: 8002 or contact Bussmann Application Engineering at 636-527-1270 for more information.

Control Systems, Inc.

PRODUCT DATA BULLETIN

RTU101D
REMOTE
TELEMETRY
UNIT



STANDARD FEATURES

- 160MHZ 16-BIT PROCESSOR
- 10/100 ETHERNET PORT STANDARD
- EIGHT DIGITAL INPUTS (WITH LEDS)
- OPTIONAL RELAY OUTPUTS (4)
- TWO 4-20MA ANALOG INPUTS
- OPTIONAL ISOLATED 4-20MA OUTS (2)
- TWENTY STATUS LED'S
- TWO RS232 SERIAL PORTS WITH LEDS
- ONE RS485 PORT WITH LED'S
- INTERNAL CELLULAR MODEM OPTION WITH SIGNAL STRENGTH INDICATORS
- DEDICATED PROGRAMMING PORT
- CUSTOM PROGRAMMABLE IN "C"
- STANDARD COMMUNICATIONS PROTOCOLS
- BATTERY-BACKED REAL-TIME CLOCK
- LOW BATTERY ALARM CIRCUITRY
- TEMPERATURE MONITORING
- QUICK-CONNECT PLUGS
- BACKPLATE MOUNTING
- BLACK ABS PLASTC UL94-V0 RATED CASE SIZE: 5.75" x 3.2" x 2.4"
- +12 VDC POWERED

DESCRIPTION

The RTU10D Remote Telemetry Unit (RTU) is a programmable, multi-function unit featuring eight digital inputs with status LEDs, four form C relay outputs, two 4-20ma analog inputs, two isolated 4-20ma analog outputs two RS232 and one RS485 serial ports. A built-in temperature monitoring circuit is included to measure the controller/panel temperature. The unit is back-plate mounted and +12vdc powered. Using 12 volts for the power makes this unit easily battery backed up for alarming when normal power has failed. A lithium battery is provided to maintain the onboard real-time clock along with a low battery alarm circuit. Programmable in the 'C' programing language for the most flexibility. LED indicators are provided for all serial ports. Digital inputs are dry-contact type with a maximum voltage potential of 12vdc. The RTU101D uses a 16-bit microprocessor running at 160Mhz, with a standard 10/100 Ethernet port. The processor has 4MBytes of Flash memory and a real-time-clock.

SUGGESTED SPECIFICATIONS

Provide a Remote Telemetry Unit (RTU) featuring eight digital inputs, four digital outputs, two 4-20ma analog inputs and two isolated 4-20ma analog outputs. For communications, provide one 10/100 BaseT Ethernet port, two 9-pin RS232 serial ports, one RS485 port and provide an internal cellular modem option. Provide separate LED indicators for all serial ports and digital inputs. An internal monitoring circuit shall be included for panel temperature monitoring which can be programmed for control and alarming. The temperature circuit shall be capable of measuring at least 0 to 200 degrees Fahrenheit. The unit should be back-plate mounted and +12vdc powered. The unit shall be capable of being programmed in industry standard 'C'. The microprocessor shall have 4MB of serial Flash memory for data logging and 1MB of RAM for program storage, and a Real-Time-Clock with battery backup. The microprocessor shall be capable of operating at 160 Mhz. The SRAM and Real-Time-Clock shall be maintained by a user-replaceable lithium battery. Provide low-battery monitoring circuitry for the lithium battery. Digital inputs shall be dry-contact type with a maximum voltage potential of 12vdc and current limited to approximately 12ma. The digital inputs shall be switched to common to energize. Digital outputs shall be form C relay contacts. Provide the capability of two optional, internal, isolated 4-20ma analog outputs. All A/D and D/A analog converters shall be at least 16-bits. Provide the capability of an internal cellular communications modem. The cellular modem shall be FCC certified and carrier end-device certified for AT&T or Verizon as needed. The RTU shall have quick-connect plugs for all I/O. Standard communications protocols including, but not limited to: Modbus RTU, Allen Bradley DF1 and Bricknet shall be available.

RTU101
REMOTE
TELEMETRY
UNIT

OPERATING SPECIFICATIONS

- EXT. POWER SUPPLY REQUIREMENT: +12VDC
- VOLTAGE OPERATING LIMITS: 9 TO 15vdc
- CURRENT REQUIREMENTS: 1 amp @ 12vdc
- ENCLOSURE DIMENSIONS: 5.75" long x 3.2" wide x 2.4" high
- HUMIDITY: 5-95% NON-CONDENSING

RTU101D I/O TERMINALS

DIGITAL INPUTS	
1	DI-1
2	DI-2
3	DI-3
4	DI-4
5	DI-5
6	DI-6
7	DI-7
8	DI-8
9	COMMON

RELAY OUTPUTS	
1	COMMON-1
2	N.O.-1
3	N.C-1
4	COMMON-2
5	N.O.-2
6	N.C-2
7	COMMON-3
8	N.O.-3
9	N.C-3
10	COMMON-4
11	N.O.-4
12	N.C-4

ANALOG INPUTS	
1	AI-1 (+)
2	AI-1 (-)
3	AI-2 (+)
4	AI-2 (-)

ANALOG OUTPUTS	
1	AO-1 (+)
2	AO-1 (-)
3	shield
4	AO-2 (+)
5	AO-2
6	shield

ORDERING INFORMATION: Model # RTU101D (Relay and Analog Output board is optional) (cellular modem is optional)

CONTROL SYSTEMS, INC.
P.O. Box 4852, Jackson, MS 39296-4852
Telephone: (601) 355-8594
FAX: (601) 355-8774

Document Revision: A

Control Systems, Inc.

PRODUCT DATA BULLETIN

WATCHDOG
CELLULAR
SITE
MONITOR

STANDARD FEATURES

- TEXT (SMS) MESSAGE DELIVERY DIRECTLY FROM THE DEVICE BASED UPON USER CONFIGURATION
- INTERNAL CELLULAR MODEM WITH SIGNAL STRENGTH INDICATORS
- FOUR DIGITAL INPUTS (WITH LEDS)
- TWO RELAY OUTPUTS
- TWO 4-20MA ANALOG INPUTS
- RS232 SERIAL PORT WITH LED'S
- QUICK-CONNECT PLUGS
- SMA CONNECTORS FOR ANTENNAS
- BACKPLATE MOUNTING
- BLACK ABS PLASTIC UL94-V0 RATED CASE SIZE: 5.75" x 3.2" x 2.4"
- 12 VDC OR 120VAC POWER OPTIONS
- EXTERNAL BATTERY BACKUP OPTIONS

DESCRIPTION

CSI-iot Alarm Messaging and Site Monitor

The Alarm Messaging and Site Monitor is built on the CSI WATCHDOG platform and is an efficient alarm notification system to monitor two analog inputs (4-20 mA) and four dry contact digital inputs via cellular communications. Text messages are sent via an integrated 4G cellular modem directly from the monitor.

Configuration of the monitor is accomplished via a user accessible website thereby allowing the user to reconfigure the monitor to meet changing demands. The monitor can store up to nine global destination telephone numbers which can be grouped into call lists by assigning to an alarm input. Each call list can contain a combination of the nine global numbers and inputs can have a unique group of notification numbers.

The monitor uses two-way text messaging with several top-level commands. The commands are not case sensitive and include: OK, ACK, STAT, STATUS, and LIST. The ACK command acknowledges all currently active and unacknowledged alarms. When the monitor receives the ACK command it immediately sends an acknowledgment message to all numbers in the input call group thereby notifying other group members the alarm has been acknowledged. The acknowledgment message includes the phone number that acknowledged the alarm.

The OK command will return the station name and if there are any unacknowledged alarms. The STAT command will return a detailed list of the status of the monitor including: the site name, the scaled analog inputs, the cellular RSSI, and the status of the individual alarm points. Finally, the LIST command will return the global telephone number list. As mentioned above, all configuration is accomplished via a user accessible website.

Digital inputs can be configured with a unique name thereby allowing a meaningful text message. Additionally, digital inputs can be individually enabled and disabled as well as inverted logically. Inversion allows the alarm condition to be true upon a closed or open digital input. Each input has both an on and off activation delay configurable between 0 and 65535 seconds to prevent nuisance alarms.

The digital output can be controlled via text commands "on" and "off." It is important to note, there is no user authentication prior to execution of the on/off command.

Analog inputs can also be given a unique name and engineering units. Each input can have custom low and high scaling factor allowing the user to scale the input to the expected signal. The scaling factor and engineering units allows the user to configure the input to deliver a meaningful message. Each analog input has 4 alarm setpoints: low, low low, high, and high high. The low alarm setpoints are active when the input signal falls below the setpoint and the high alarms are active when the input signal rises above the setpoint. The analog setpoints must be set between the low and high scaling factors. Each input has both an on and off activation delay applicable across all input setpoints and configurable between 0 and 65535 seconds.

The monitor is a CSI-iot building block and can be factory reconfigured to integrate into an CSI-iot SCADA system.

The WATCHDOG is a programmable, cellular modem alarm telemetry unit featuring four digital inputs with status LEDs, one relay outputs, two 4-20ma analog inputs and one RS232 serial port. The unit is back-plate mounted and +12vdc powered. LED transmit and receive indicators are provided for the serial port. Digital inputs are dry-contact type with a maximum voltage potential of 12vdc.

WATCHDOG
CELLULAR
SITE
MONITOR

SUGGESTED SPECIFICATIONS
Alarm Messaging and Site Monitor

Provide an Alarm Messaging and Site Monitor system with an integrated 4G cellular modem that provides two analog inputs (4-20 mA) and four dry contact digital inputs for monitoring. Analog inputs shall be configurable to include a unique name, engineering units, low and high scaling factor, four alarm setpoints: low, low low, high, and high high. The low alarm setpoints shall activate when the input signal falls below the setpoint and the high alarms shall activate when the input signal rises above the setpoint. Provide constraints on the analog setpoints to prevent setting outside the range of the low and high scaling factors. Additionally provide a configurable activation delay between 0 and 65535 seconds for each digital input to prevent nuisance alarms.

Digital inputs shall configurable to include a unique name, individually enabled and disabled as well as inverted logically. Additionally provide a configurable activation delay between 0 and 65535 seconds for each digital input to prevent nuisance alarms.

Provide a system of several top-level commands accessible via two-way text messaging. The commands shall not be case sensitive and shall include at a minimum: OK, ACK, STAT, STATUS, and LIST. The ACK command shall acknowledge all currently active and unacknowledged alarms. When the monitor receives the ACK command it shall immediately send an acknowledgment message to all numbers in the input call group thereby notifying other group members the alarm has been acknowledged. The acknowledgment message shall include phone number that acknowledged the alarm. The OK command shall return the station name and if there are any unacknowledged alarms. The STAT command shall return a detailed list of the status of the monitor including: the site name, the scaled analog inputs, the cellular RSSI, and the status of the individual alarm points. The LIST command shall return the global telephone number list.

Provide a configuration website that allows the user to reconfigure the monitor to meet changing demands. Provide a global destination telephone number list of up to nine numbers which can be grouped into call lists by assigning to an alarm input thereby creating a unique group of notification numbers for the associated input.

OPERATING SPECIFICATIONS

- DC POWER SUPPLY: +12VDC
- CURRENT REQUIREMENTS: 1.5 amps @ 12vdc
- HUMIDITY: 5-95% NON-CONDENSING
- OPTIONAL AC POWER SUPPLY: 120VAC, 60 HZ.
- ENCLOSURE DIMENSIONS: 5.75" long x 3.2" wide x 2.4" high

WATCHDOG I/O TERMINALS

DIGITAL I/O		ANALOG INPUTS	
1	DI-1	1	AI-1 (+)
2	DI-2	2	AI-1 (-)
3	DI-3	3	AI-2 (+)
4	DI-4	4	AI-2 (-)
5	DI-COMMON		

RELAY #1 OUTPUT		RELAY #2 OUTPUT	
1	NORMALLY OPEN	1	NORMALLY CLOSED
2	COMMON	2	COMMON
		3	NORMALLY OPEN

ORDERING INFORMATION: Model # WATCHDOG

WARRANTY: Control Systems, Inc. (CSI) warrants equipment of its own manufacture to be free from defects in material and workmanship, under normal conditions of use and service, and will replace any component found to be defective on its return to CSI, transportation charges prepaid, within one year of its original purchase. CSI will extend the same warranty protection on accessories which is extended to CSI by the original manufacturer. CSI also assumes no liability, express or implied, beyond its obligation to replace any component involved. Such warranty is in lieu of all other warranties express or implied.

CONTROL SYSTEMS, INC.
P.O. Box 4852, Jackson, MS 39296-4852
Telephone: (601) 355-8594
FAX: (601) 355-8774

Document Revision: A

FIBOX
Enclosing innovations

ARCA AR12106CHSSL

Sample photo

Order symbol:	AR12106CHSSL	**EAN**:	6418074066794
Product nbr:	8561029	**El. number**:	
Description:	PC Enclosure	Finland:	
Remarks:	Hinged opaque cover w/S.S. Lockable latch		

Including: Hinged cover base with 10-32 brass inserts, latched cover with formed in place PUR gasket, and stainless hinge pin. Quick release latches. (Latch options available.) Enclosure mounting foot kit. Accessory 10-32 screws for panel mounting.

Dimensions:	Length	Width	Height
mm:	305	254	152
inch:	12.0	10.0	6.0

Materials:	
Material:	Polycarbonate
Base colour:	RAL 7035 -light grey
Cover screws material:	Stainless steel
Cover colour:	RAL 7035 -light grey
Gasket material:	Polyurethane

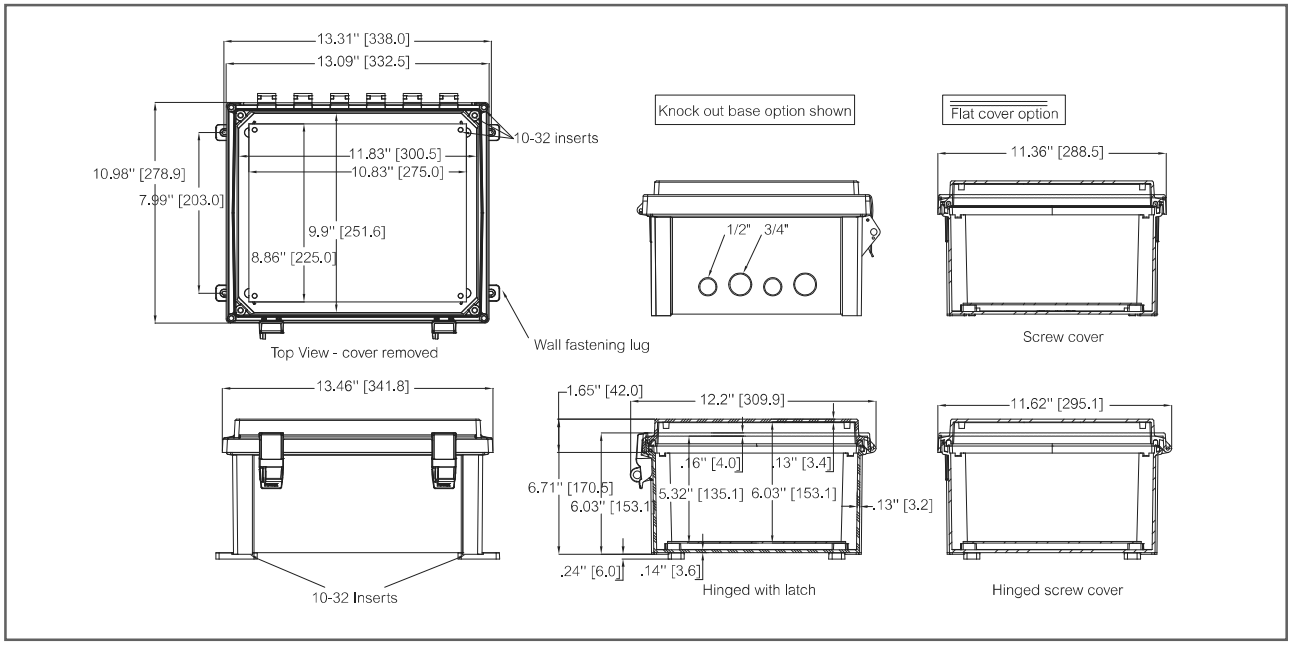
Temperatures:	
Temperature °C (short term):	-40 … 140 °C
Temperature °C (continuous):	-40 … 80 °C
Temperature °F (short term):	-40 … 284 °F
Temperature °F (continuous):	-40 … 175 °F

Accessories:	
ABP1210	Painted Steel Back Panel

Accessories:	
ALBP1210	Aluminum Back Panel
ADFP1210	Dead Front Panel w/ screws
ASP1210	Aluminum Swing Panel
ASPK1210	Swing Panel Kit incl. Panel
ASPHK12	Swing Panel Kit w/o Panel
AMFL10	10" Mounting Flange Set

Rating:

Ingress Protection (EN 60529): IP66/IP67
Impact Resistance (EN 62262): IK09
Electrical insulation: Totally insulated
Halogen free (DIN/VDE 0472, Part 815): 1
UV resistance: UL 508
Flammability Rating: UL 508
Glow Wire Test (IEC 695-2-1) °C: 960
NEMA Class: NEMA 4, 4X, 6, 6P, 12, 13



ACCESSORIES

Order symbol	Description
PVC Back Panels	
APBP66	4.9 x 4.9 inch ▪ 124 x 124 mm
APBP86	6.9 x 4.9 inch ▪ 175 x 124 mm
APBP88	6.9 x 6.9 inch ▪ 175 x 175 mm
APBP108	8.9 x 6.9 inch ▪ 226 x 175 mm
APBP1010	8.9 x 8.9 inch ▪ 226 x 226 mm
APBP1210	10.8 x 8.9 inch ▪ 274 x 226 mm
APBP1412	12.8 x 10.8 inch ▪ 325 x 274 mm
APBP1614	14.8 x 12.9 inch ▪ 376 x 328 mm
APBP1816	16.7 x 14.9 inch ▪ 424 x 378 mm
Painted Steel Back Panels	
ABP66	4.9 x 4.9 inch ▪ 124 x 124 mm
ABP86	6.9 x 4.9 inch ▪ 175 x 124 mm
ABP88	6.9 x 6.9 inch ▪ 175 x 175 mm
ABP108	8.9 x 6.9 inch ▪ 226 x 175 mm
ABP1010	8.9 x 8.9 inch ▪ 226 x 226 mm
ABP1210	10.8 x 8.9 inch ▪ 274 x 226 mm
ABP1412	12.8 x 10.8 inch ▪ 325 x 274 mm
ABP1614	14.8 x 12.9 inch ▪ 376 x 328 mm
ABP1816	16.7 x 14.9 inch ▪ 424 x 378 mm
Aluminum Back Panels	
ALBP66	4.9 x 4.9 inch ▪ 124 x 124 mm
ALBP86	6.9 x 4.9 inch ▪ 175 x 124 mm
ALBP88	6.9 x 6.9 inch ▪ 175 x 175 mm
ALBP108	8.9 x 6.9 inch ▪ 226 x 175 mm
ALBP1210	10.8 x 8.9 inch ▪ 274 x 226 mm
ALBP1010	8.9 x 8.9 inch ▪ 226 x 226 mm
ALBP1412	12.8 x 10.8 inch ▪ 325 x 274 mm
ALBP1614	14.8 x 12.9 inch ▪ 376 x 328 mm
ALBP1816	16.7 x 14.9 inch ▪ 424 x 378 mm
Fixed Aluminum Dead Front Panels	
ADFP66	6.1 x 6.2 inch ▪ 155 x 157 mm
ADFP86	6.2 x 8.1 inch ▪ 157 x 205 mm
ADFP88	6.9 x 6.9 inch ▪ 175 x 175 mm
ADFP108	8.2 x 10.1 inch ▪ 208 x 256 mm
ADFP1010	10.1 x 10.1 inch ▪ 256 x 256 mm
ADFP1210	10.1 x 12.1 inch ▪ 257 x 307 mm
ADFP1412	12.1 x 14.1 inch ▪ 308 x 357 mm
ADFP1614	14.3 x 16.3 inch ▪ 362 x 415 mm
ADFP1816	16.2 x 18.3 inch ▪ 412 x 465 mm
Mounting Foot Kits	
AMFK	Mounting Foot Kit - ARCA
AMFKSS	SS Mounting Foot Kit - ARCA
Mounting Flange Sets	
AMFL6	Mounting Flange Set for 6" wide enclosure
AMFL8	Mounting Flange Set for 8" wide enclosure
AMFL10	Mounting Flange Set for 10" wide enclosure
AMFL12	Mounting Flange Set for 12" wide enclosure
AMFL14	Mounting Flange Set for 14" wide enclosure
AMFL16	Mounting Flange Set for 16" wide enclosure

RU Series Universal Relays

Key features:

- Full featured universal miniature relays
- Designed with environment taken into consideration
- Two terminal styles: plug-in and PCB mount
- Non-polarized LED indicator
- No internal wires, lead-free construction
- Cadmium-free contacts
- Mechanical flag indicator
- Manual latching lever with color coding for AC or DC coil
- Snap-on yellow marking plate; optional marking plates are available in four other colors
- Maximum contact ratings: 10A (RU2), 6A (RU4), 3A (RU42)
- UL Recognized, CSA Certified, EN Compliant

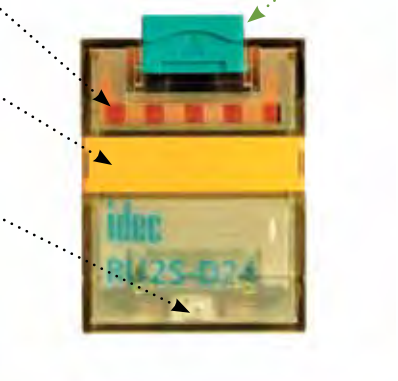
EN61810-1

With Latching or Momentary Lever

Mechanical Indicator*
The contact position can be confirmed through the five small windows.

Marking Plate
Standard yellow marking plate is easily replaced with optional marking plates in four colors for easy identification of relays.

LED Indicator*
Non-polarized green LED indicator is standard provision for plug-in terminal, latching lever types



Latching and Momentary Lever
Using the lever, operation can be checked without energizing the coil. The lever is color coded for AC and DC coils.

	Latching	Momentary
AC coil:	Orange	Red
DC coil:	Green	Blue

In Normal Operation

Note: Turn off the power to the relay coil when using the latching lever. After checking the operation, return the latching lever in the normal position.

Standard (without lever)

AC/DC Color Marking
For identification of AC or DC coils.
AC coil: Yellow
DC coil: Blue

Mechanical Indicator*

Marking Plate

LED Indicator*
Non-polarized green LED indicator is standard provision for plug-in terminal types.

AC Coil DC Coil

Coil Voltage	Tape Color
24V AC	White
100 to 110V AC	Clear
110 to 120V AC	Blue
200 to 220V AC	Black
220 to 240V AC	Red
24V DC	Green
6V DC	Voltage marking on yellow tape
12V DC	
48V DC	
110V DC	

*Not available on PCB type.

Part Number Selection

Contact	Model	Part Number: Standard	Part Number: With Latching Lever	Part Number: With Momentary Lever	Coil Voltage Code (Standard Stock in bold)
DPDT (10A) 	Standard	RU2S-C-☐	RU2S-☐	RU2S-M-☐	A24, **A110**, **A220** D6, D12, **D24**, D48, D110
	With RC (AC coil only)	RU2S-CR-☐	RU2S-R-☐	RU2S-MR-☐	A110, A220
	With diode (DC coil only)	RU2S-CD-☐	RU2S-D-☐	RU2S-MD-☐	D6, D12, **D24**, D48, D110
	PCB	RU2V-NF-☐	—	—	A24, A110, A220 D6, D12, **D24**, D48, D110
4PDT (6A) 	Standard	RU4S-C-☐	RU4S-☐	RU4S-M-☐	A24, **A110**, **A220** D6, D12, **D24**, D48, D110
	With RC (AC coil only)	RU4S-CR-☐	RU4S-R-☐	RU4S-MR-☐	A110, A220
	With diode (DC coil only)	RU4S-CD-☐	RU4S-D-☐	RU4S-MD-☐	D6, D12, D24, D48, D110
	PCB	RU4V-NF-☐	—	—	A24, **A110**, A220 D6, D12, **D24**, D48, D110
4PDT Bifurcated (3A) 	Standard	RU42S-C-☐	RU42S-☐	RU42S-M-☐	A24, A110, A220 D6, D12, **D24**, D48, D110
	With RC (AC coil only)	RU42S-CR-☐	RU42S-R-☐	RU42S-MR-☐	A110, A220
	With diode (DC coil only)	RU42S-CD-☐	RU42S-D-☐	RU42S-MD-☐	D6, D12, D24, D48, D110
	PCB	RU42V-NF-☐	—	—	A24, A110, A220 D6, D12, **D24**, D48, D110

1. Plug-in terminal models have an LED indicator and a mechanical indicator as standard.
2. PCB models do not have an LED indicator or a mechanical indicator.

Ordering Information
When ordering, specify the Part No. and coil voltage code:
(example) **RU2S-C** **A110**
Part No. — Coil Voltage Code

Coil Voltage Table

Coil Voltage Code	A24	A110	A220	D6	D12	D24	D48	D110
Coil Rating	24V AC	110-120V AC	220-240V AC	6V DC	12V DC	24V DC	48V DC	110V DC

Sockets

Relays	Spring Clamp DIN Rail Mount	Standard DIN Rail Mount	Finger-safe DIN Rail Mount	Panel Mount	PCB Mount
RU2S (DPDT)	SU2S-11L	SM2S-05	SM2S-05C	SY4S-51	SM2S-61 SM2S-62
RU4S (4PDT) RU42S (4PDT)	SU4S-11L	SY4S-05	SY4S-05C		SY4S-61 SY4S-62
					

Hold Down Springs & Clips

Appearance	Item	Relay	For DIN Mount Socket	For Through Panel & PCB Mount Socket
	Pullover Wire Spring	RU2S/RU4S/ RU42S	SY4S-02F1	SY4S-51F1
	Leaf Spring (side latch)	RU2S/RU4S/ RU42S	SFA-202*	SFA-302*
	Leaf Spring (top latch)	RU2S/RU4S/ RU42S	SFA-101*	SFA-301*

Note: Order 2 pieces for each relay

Accessories

Name	Part Number	Color Code *
Marking Plate	RU9Z-P*	A (orange), G (green), S (blue), W (white), Y (yellow)

Specify a color code when ordering. The marking plate can be removed from the relay by inserting a flat screwdriver under the marking plate.

Specifications

Model (Contact)	RU2 (DPDT)	RU4 (4PDT)	RU42 (4PDT-bifurcated)
Contact Material	Silver alloy	Silver (gold clad)	Silver-nickel (gold clad)
Contact Resistance [1]	50 mΩ maximum		
Minimum Applicable Load [2]	24V DC, 5 mA (reference value)	1V DC, 1 mA	1V DC, 0.1 mA
Operating Time [3]	20 ms maximum		
Release Time [3]	20 ms maximum		
Power Consumption	AC: 1.1 to 1.4VA (50 Hz), 0.9 to 1.2VA (60 Hz) DC: 0.9 to 1.0W		
Insulation Resistance	100MΩ minimum (500V DC megger)		
Dielectric Strength	Between contact and coil: 2500V AC, 1 minute		
	Between contacts of different poles:		
	2500V AC, 1 minute	2000V AC, 1 minute	
	Between contacts of the same pole: 1000V AC, 1 minute		
Operating Frequency	Electrical: 1800 operations/h maximum Mechanical: 18,000 operations/h maximum		
Vibration Resistance	Damage limits: 10 to 55 Hz, amplitude 0.5 mm Operating extremes: 10 to 55 Hz, amplitude 0.5 mm		
Shock Resistance	Damage limits: 1000 m/s^2 (100G) Operating extremes: 150 m/s^2 (15G)		
Mechanical Life	AC: 50,000,000 operations DC: 100,000,000 operations		50,000,000 operations
Electrical Life [4]	See table on page 794		
Operating Temperature [5]	PCB model: –55 to +70°C (no freezing) Blade model: –55 to +60°C (no freezing)		
Operating Humidity	5 to 85% RH (no condensation)		
Weight	Approx. 35g		

1. Measured using 5V DC, 1A voltage drop method
2. Measured at operating frequency of 120 operations/min (failure rate level P, reference value)
3. Measured at the rated voltage (at 20°C), excluding contact bouncing;
   Release time of AC relays with RC: 25 ms maximum
   Release time of DC relays with diode: 40 ms maximum
4. Contact Load and Electrical Life (at ambient temperature 20°C)
5. Measured at the rated voltage.

Accessories

Item	Appearance	Use with	Part No.	Remarks
Aluminum DIN Rail (1 meter length)		All DIN rail sockets	BNDN1000	The BNDN1000 is designed to accommodate DIN mount sockets. Made of durable extruded aluminum, the BNDN1000 measures 0.413 (10.5mm) in height and 1.37 (35mm) in width (DIN standard). Standard length is 39" (1,000mm).
DIN Rail End Stop		DIN rail	BNL5	9.1 mm wide.
Replacement Hold-Down Spring Anchor		Horseshoe clip for DIN rail sockets	Y778-011	For use on DIN rail mount socket when using pullover wire hold down spring. 2 pieces included with each socket.

Coil Ratings

Rated Voltage (V)		Coil Voltage Code	Rated Current (mA) ±15% (at 20°C)		Coil Resistance (Ω) ±10% (at 20°C)	Operating Characteristics (values at 20°C)		
			50 Hz	60 Hz		Maximum Continuous Applied Voltage	Pickup Voltage	Dropout Voltage
AC (50/60 Hz)	24	A24	49.3	42.5	164	110%	80% maximum	30% minimum
	110-120	A110	8.4-10.0	7.1-8.2	4,550			
	220-240	A220	4.2-5.0	3.6-4.2	18,230			
DC	6	D6	155		40	110%	80% maximum	10% minimum
	12	D12	80		160			
	24	D24	44.7		605			
	48	D48	18		2,560			
	110	D110	8.9		12,100			

1. The rated current includes the current of the LED indicator.

Surge Suppressor Ratings

Model		Ratings
AC Coil	With RC	RC series circuit R: 20 kΩ, C: 0.033 µF
DC Coil	With Diode	Diode reverse voltage: 1000V Diode forward current: 1A

Contact Ratings

Maximum Contact Capacity						
Contact	Continuous Current	Allowable Contact Power		Voltage (V)	Rated Load	
		Resistive Load	Inductive Load		Res. Load	Ind. Load
DPDT	10A	2500VA AC	1250VA AC	250 AC	10A	5A
		300W DC	150W DC	30 DC	10A	5A
4PDT	6A	1500VA AC	600VA AC	250 AC	6A	0.8A
		180W DC	90W DC	30 DC	6A	1.5A
4PDT bifurcated	3A	750VA AC	200VA AC	250 AC	3A	0.8A
		90W DC	45W DC	30 DC	3A	1.5A

1. On 4PDT relays, the maximum allowable total current of neighboring two poles is 6A. At the rated load, make sure that the total current of neighboring two poles does not exceed 6A (3A + 3A = 6A).
2. Inductive load for the rated load — cos ø = 0.3, L/R = 7 ms

UL and c-UL Ratings

Voltage	Resistive			General Use			Horse Power Rating		
	RU2	RU4	RU42	RU2	RU4	RU42	RU2	RU4	RU42
250V AC	10A	—	3A	—	6A	—	—	1/10HP	—
30V DC	10A	6A	3A	—	—	—	—	—	—

CSA Ratings

Voltage	Resistive
	RU42
250V AC	3A
30V DC	3A

TÜV Ratings

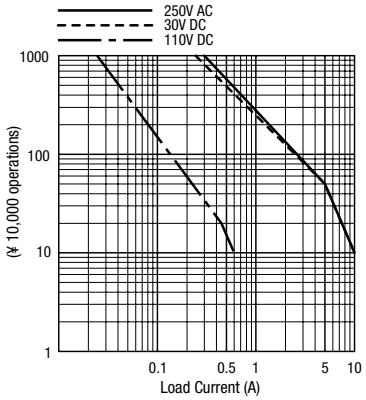
Voltage	Resistive			Inductive		
	RU2	RU4	RU42	RU2	RU4	RU42
250V AC	10A	6A	3A	5A	0.8A	0.8A
30V DC	10A	6A	3A	5A	1.5A	1.5A

Socket Specifications

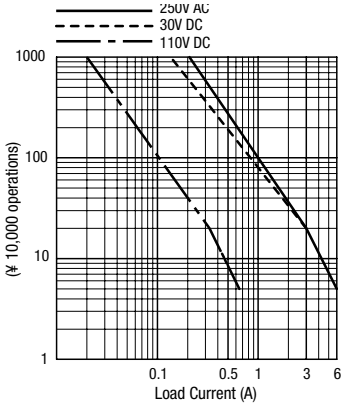
	Sockets	Terminal	Electrical Rating	Wire Size	Torque
DIN Rail Mount Sockets	SU2S-11L	Spring clamp terminals	250V/10A	24-16 AWG	—
	SU4S-11L	Spring clamp terminals	250V/6A (using RU4), 10A (using RU2)	24-16 AWG	—
	SM2S-05	M3 screw with captive wire clamp	300V, 10A	Maximum up to 2–#14AWG	5.5 - 9in•lbs
	SM2S-05C	M3 screw with captive wire clamp, fingersafe	300V, 10A	Maximum up to 2–#14AWG	5.5 - 9in•lbs
	SY4S-05	M3 screw with captive wire clamp	300V, 7A (using RU4), 10A (using RU2)	Maximum up to 2–#14AWG	5.5 - 9in•lbs
	SY4S-05C	M3 screw with captive wire clamp, fingersafe	300V, 7A (using RU4), 10A (using RU2)	Maximum up to 2–#14AWG	5.5 - 9in•lbs
Through Panel Mount Socket	SY4S-51	Solder	300V, 7A	—	—
PCB Mount Socket	SY4S-61	PCB mount	300V, 7A	—	—
	SY4S-62	PCB mount	250V, 7A	—	—

Electrical Life Curves

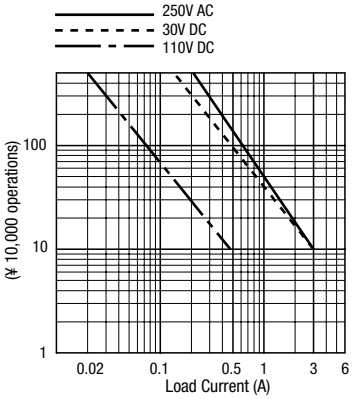
RU2 (Resistive Load)



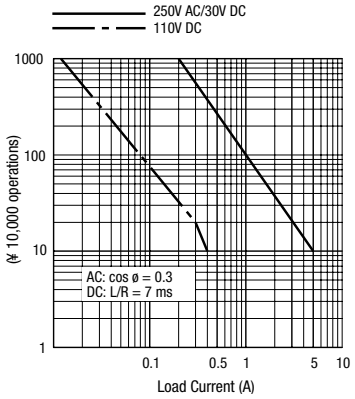
RU4 (Resistive Load)



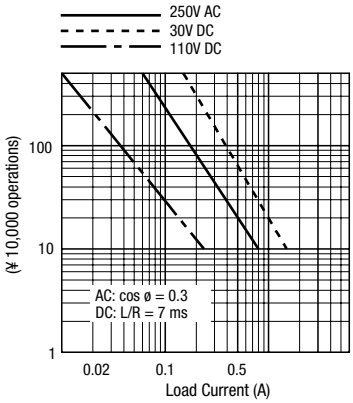
RU42 (Resistive Load)



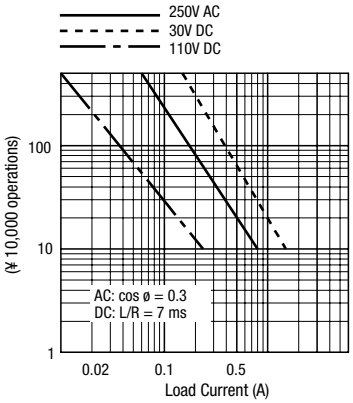
RU2 (Inductive Load)



RU4 (Inductive Load)

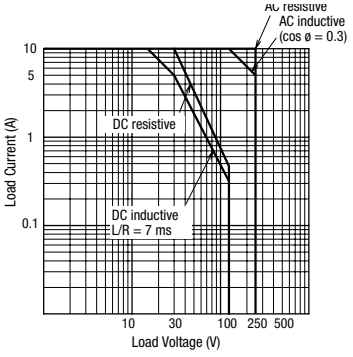


RU42 (Inductive Load)

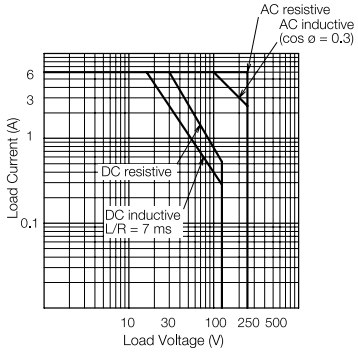


Maximum Switching Current

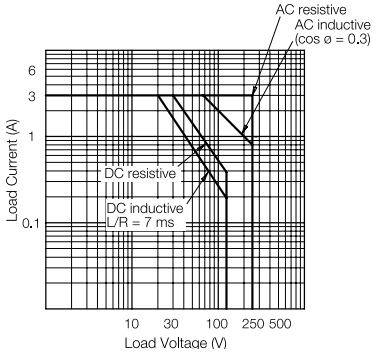
RU2



RU4

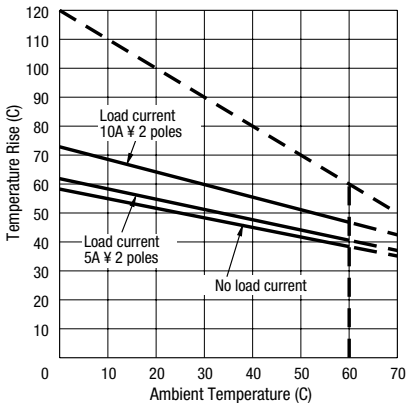


RU42 (Bifurcated)

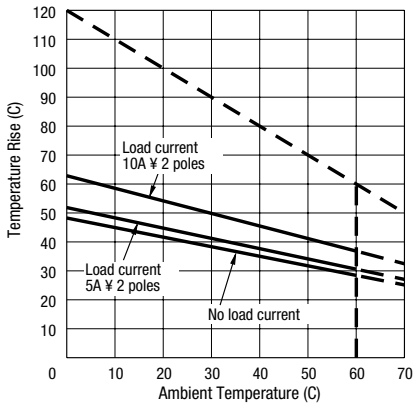


Ambient Temperature vs. Temperature Rise Curves

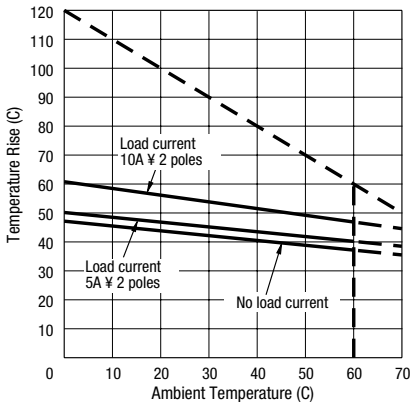
RU2 (AC Coil, 50 Hz)



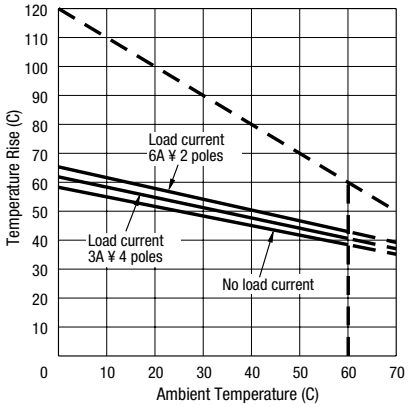
RU2 (AC Coil, 60 Hz)



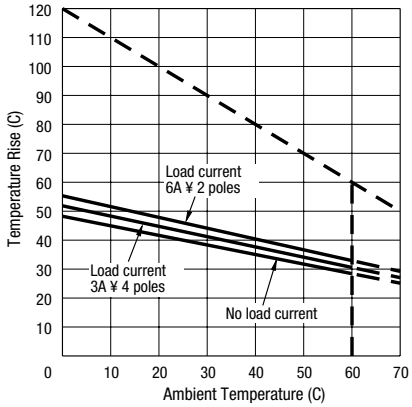
RU2 (DC Coil)



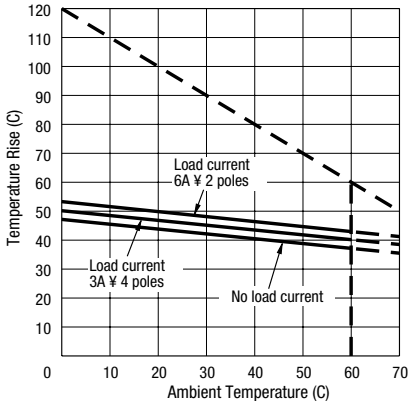
RU4/RU42 (AC Coil, 50 Hz)



RU4/RU42 (AC Coil, 60 Hz)



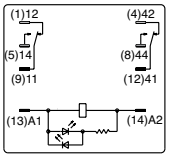
RU4/RU42 (DC Coil)



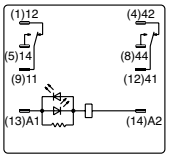
The above temperature rise curves show the characteristics when 100% the rated coil voltage is applied.
The heat resistance of the coil is 120°C. The slant dashed line indicates the allowable temperature rise for the coil at different ambient temperatures.
Load current 6A x 2 poles is for the RU4 models only.

Internal Connection (View from Bottom)

RU2S-* Standard

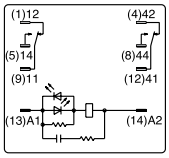


24V AC/DC coil or less

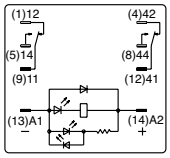


Over 24V AC/DC coil

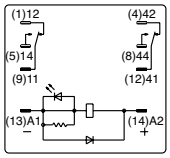
RU2S-*R with RC



RU2S-*D With Diode

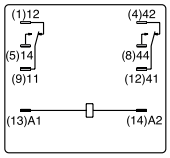


24V DC coil or less

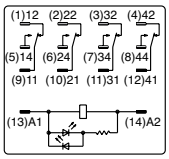


Over 24V DC coil

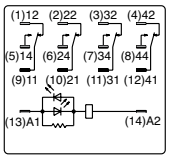
RU2V-NF-*



RU4S-*/RU42S-* Standard

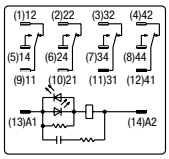


24V AC/DC coil or less

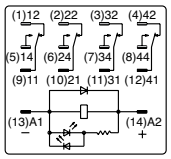


Over 24V AC/DC coil

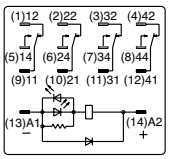
RU4S-*R/RU42S-*R With RC



RU4S-*D/RU42S-*D With Diode

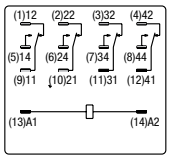


24V DC coil or less



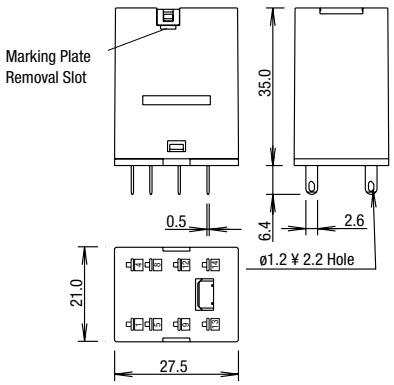
Over 24V DC coil

RU4V-NF-*/RU42V-NF-*



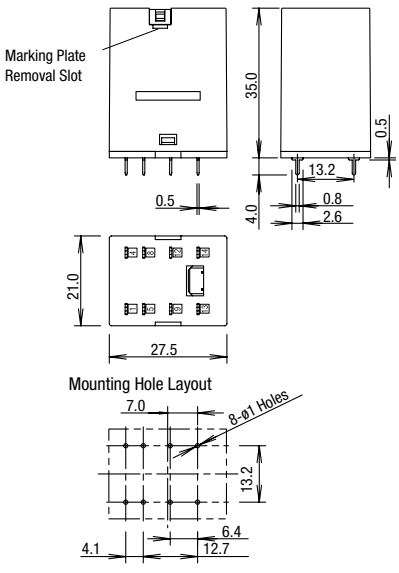
Dimensions (mm)

RU2S



Marking plate removal slot is provided only on one side. Insert a flat screwdriver into the slot to remove the marking plate.

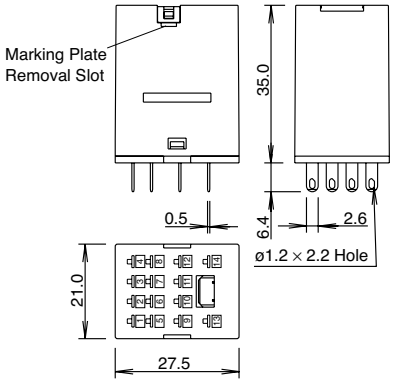
RU2V



All dimensions in mm.

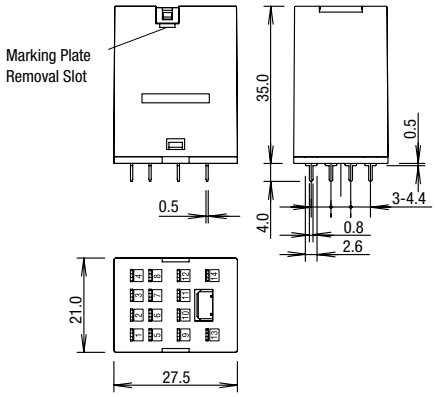
Dimensions con't (mm)

RU4S/RU42S

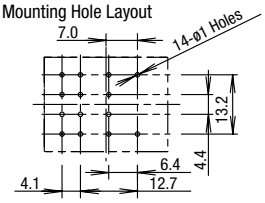


Marking plate removal slot is provided only on one side. Insert a flat screwdriver into the slot to remove the marking plate.

RU4V/RU42V



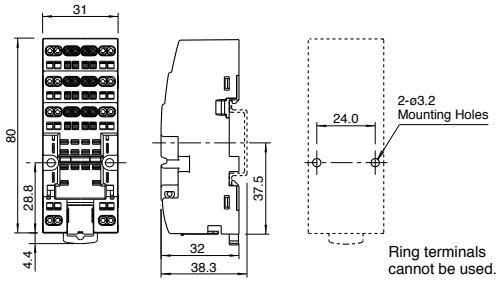
Mounting Hole Layout



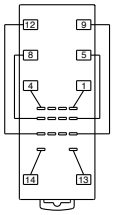
All dimensions in mm.

Spring Clamp DIN Rail Mount Sockets

SU2S-11L

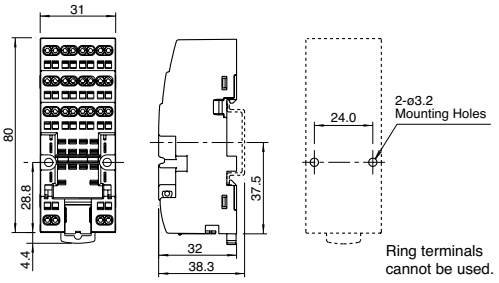


Terminal Arrangement

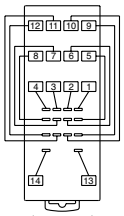


(Top View)

SU4S-11L



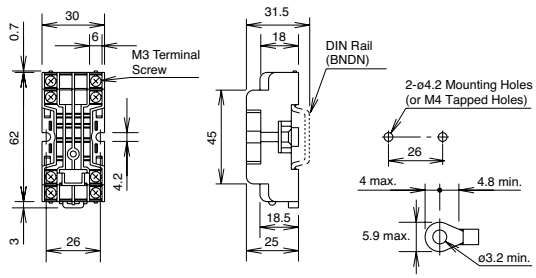
Terminal Arrangement



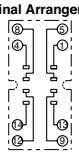
(Top View)

Standard DIN Rail Mount Sockets

SM2S-05

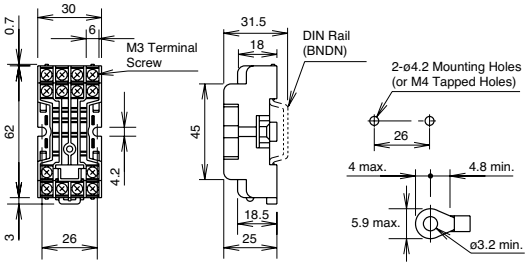


Terminal Arrangement

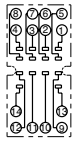


(Top View)

SY4S-05



Terminal Arrangement

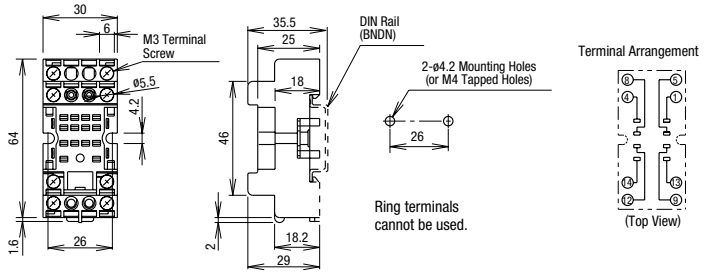


(Top View)

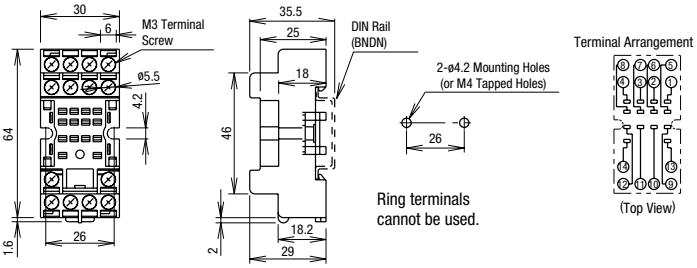
Dimensions con't (mm)

Finger-safe DIN Rail Mount Sockets

SM2S-05C

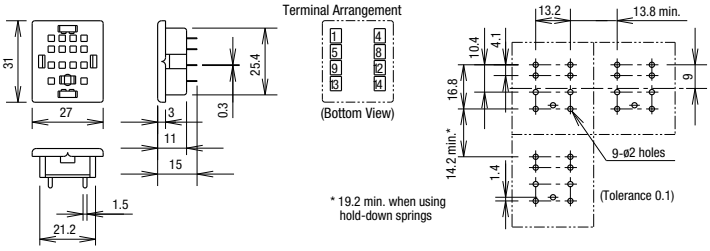


SY4S-05C

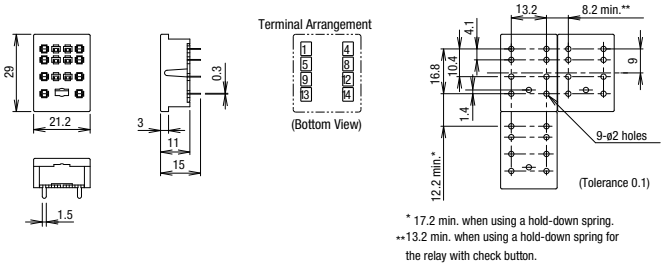


PCB Mount Sockets

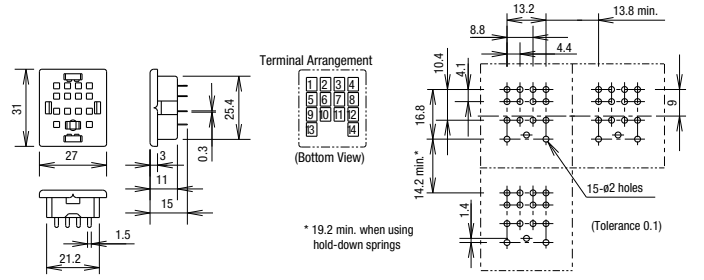
SM2S-61



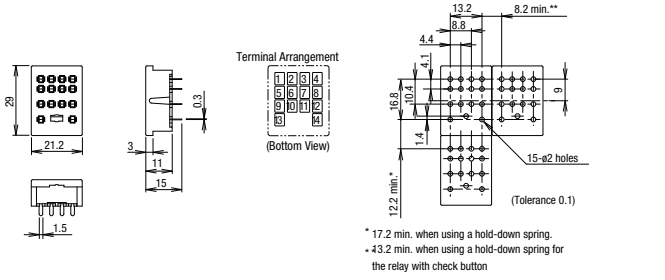
SM2S-62



SY4S-61

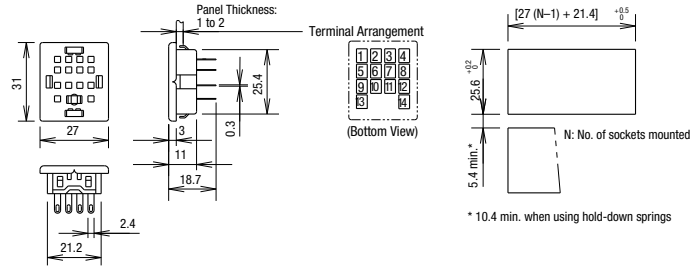


SY4S-62



Through Panel Mount Socket

SY4S-51



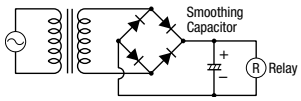
Operating Instructions

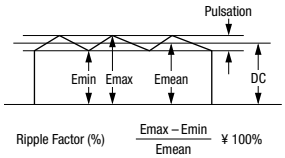
C547I

Driving Circuit for Relays

1. To ensure correct relay operation, apply rated voltage to the relay coil.

2. Input voltage for the DC coil:
   A complete DC voltage is best for the coil power to make sure of stable relay operation. When using a power supply containing a ripple voltage, suppress the ripple factor within 5%. When power is supplied through a rectification circuit, the relay operating characteristics, such as pickup voltage and dropout voltage, depend on the ripple factor. Connect a smoothing capacitor for better operating characteristics as shown below.



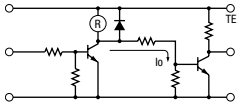


$$\text{Ripple Factor (\%)} = \frac{\text{Emax} - \text{Emin}}{\text{Emean}} \times 100\%$$

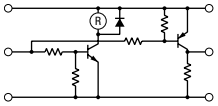
Emax = Maximum of pulsating current
Emin = Minimum of pulsating current
Emean = DC mean value

3. Leakage current while relay is off:
   When driving an element at the same time as the relay operation, special consideration is needed for the circuit design. As shown in the incorrect circuit below, leakage current (Io) flows through the relay coil while the relay is off. Leakage current causes coil release failure or adversely affects the vibration resistance and shock resistance. Design a circuit as shown in the correct example.

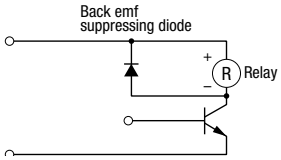
Incorrect



Correct



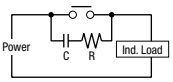
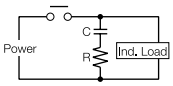
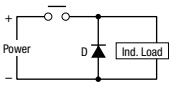
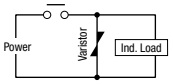
4. Surge suppression for transistor driving circuits:
   When the relay coil is turned off, a high-voltage pulse is generated, causing a transistor to deteriorate and sometimes to break. Be sure to connect a diode to suppress the back electromotive force. Then, the coil release time becomes slightly longer. To shorten the coil release time, connect a Zener diode between the collector and emitter of the transistor. Select a Zener diode with a Zener voltage slightly higher than the power voltage.



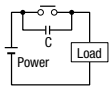
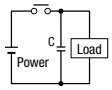
Protection for Relay Contacts

1. The contact ratings show maximum values. Make sure that these values are not exceeded. When an inrush current flows through the load, the contact may become welded. If this is the case, connect a contact protection circuit, such as a current limiting resistor.

2. Contact protection circuit:
   When switching an inductive load, arcing causes carbides to form on the contacts, resulting in increased contact resistance. In consideration of contact reliability, contact life, and noise suppression, use of a surge absorbing circuit is recommended. Note that the release time of the load becomes slightly longer. Check the operation using the actual load. Incorrect use of a contact protection circuit will adversely affect switching characteristics. Four typical examples of contact protection circuits are shown in the following table:

RC		This protection circuit can be used when the load impedance is smaller than the RC impedance in an AC load power circuit. • R: Resistor of approximately the same resistance value as the load • C:0.1 to 1 µF
		This protection circuit can be used for both AC and DC load power circuits. R: Resistor of approximately the same resistance value as the load C: 0.1 to 1 µF
Diode		This protection circuit can be used for DC load power circuits. Use a diode with the following ratings. Reverse withstand voltage: Power voltage of the load circuit x 10 Forward current: More than the load current
Varistor		This protection circuit can be used for both AC and DC load power circuits. For a best result, when using a power voltage of 24 to 48V AC/DC, connect a varistor across the load. When using a power voltage of 100 to 240V AC/DC, connect a varistor across the contacts.

3. Do not use a contact protection circuit as shown below:

	This protection circuit is very effective in arc suppression when opening the contacts. But, the capacitor is charged while the contacts are opened. When the contacts are closed, the capacitor is discharged through the contacts, increasing the possibility of contact welding.
	This protection circuit is very effective in arc suppression when opening the contacts. But, when the contacts are closed, a current flows to charge the capacitor, causing contact welding.

Generally, switching a DC inductive load is more difficult than switching a DC resistive load. Using an appropriate arc suppressor, however, will improve the switching characteristics of a DC inductive load.

Soldering

1. When soldering the relay terminals, use a soldering iron of 30 to 60W, and quickly complete soldering (within approximately 3 seconds).

2. Use a non-corrosive rosin flux.

Operating Instructions con't

Other Precautions

1. General notice:
   To maintain the initial characteristics, do not drop or shock the relay.

   The relay cover cannot be removed from the base during normal operation. To maintain the initial characteristics, do not remove the relay cover.

   Use the relay in environments free from condensation, dust, sulfur dioxide (SO_2), and hydrogen sulfide (H_2S).

   Make sure that the coil voltage does not exceed applicable coil voltage range.

2. UL and CSA ratings may differ from product rated values determined by IDEC.

3. Do not use relays in the vicinity of strong magnetic field, as this may affect relay operation.

Safety Precautions

- Turn off the power to the relay before starting installation, removal, wiring, maintenance, and inspection of the relays. Failure to turn power off may cause electrical shock or fire hazard.
- Observe specifications and rated values, otherwise electrical shock or fire hazard may be caused.
- Use wires of the proper size to meet voltage and current requirements. Tighten the terminal screws on the relay socket to the proper tightening torque.
- Surge absorbing elements on AC relays with RC or DC relays with diode are provided to absorb the back electromotive force generated by the coil. When the relay is subject to an excessive external surge voltage, the surge absorbing element may be damaged. Add another surge absorbing provision to the relay to prevent damage.

Precautions for the RU Relays

- Before operating the latching lever of the RU relay, turn off the power to the RU relay. After checking the circuit, return the latching lever to the original position.
- Do not use the latching lever as a switch. The durability of the latching lever is a minimum of 100 operations.
- When using DC loads on 4PDT relays, apply a positive voltage to terminals of neighboring poles and a negative voltage to the other terminals of neighboring poles to prevent the possibility of short circuits.
- DC relays with a diode have a polarity in the coil terminals. Apply the DC voltage to the correct terminals.

SLA Batteries

Sealed Lead-Acid

Power You Need

Interstate All Battery Center offers premium sealed lead-acid batteries designed to handle the toughest demands of emergency, fire, safety, security and UPS systems to provide the power you need when you need it most.

Interstate Sealed Lead-Acid Batteries

PART #	VOLTS	CAPACITY	DIMENSIONS	TERMINAL
BSL0905	6V	4.5 Ah	1.89 x 2.76 x 4.25"	.187 Spade Protected
BSL0955	6V	10 Ah	1.96 x 5.96 x 3.87"	.187 Spade Protected
BSL1055	12V	5 Ah	2.76 x 3.54 x 4.13"	.187 Spade Protected
BSL1075	12V	7.2 Ah	2.56 x 5.95 x 3.86"	.187 Spade Protected
BSL1079	12V	7.2 Ah	2.56 x 5.95 x 3.86"	#250 (Large) Male Faston
BSL1105	12V	12 Ah	3.86 x 5.94 x 3.94"	.187 Spade Protected
BSL1116	12V	18 Ah	2.99 x 7.13 x 6.57"	Nut and Bolt With Faston
BSL1146	12V	26 Ah	6.54 x 6.89 x 4.92"	Nut and Bolt With Faston

Power Patrol Sealed Lead-Acid Batteries

PART #	VOLTS	CAPACITY	DIMENSIONS	TERMINAL
SLA0905	6V	4.5 Ah	1.89 x 2.76 x 4.25"	.187 Spade Protected
SLA0925	6V	7 Ah	1.32 x 5.91 x 3.98"	.187 Male Push On
SLA0955	6V	10 Ah	1.96 x 5.92 x 3.88"	.187 Spade Protected
SLA1055	12V	5 Ah	2.76 x 3.54 x 4.13"	.#187 (Small) Male Faston
SLA1075	12V	8 Ah	2.57 x 5.94 x 4.0"	.187 Spade Protected
SLA1079	12V	7.2 Ah	2.56 x 5.95 x 3.86"	#250 (Large) Male Faston

General Purpose

The Power of a Perfect Fit

Interstate's SLA battery family powers more than devices. They empower the people who use them—and choose them.

Part #	Volts	Ah Capacity*	Dimensions				Terminal
			L	W	H	TH	
SLA0826	4V	4.5 Ah	1.89	2.07	3.70	3.94	F1
SLA0833	4V	8 Ah	3.58	1.97	3.98	3.98	F2
SLA0836	4V	10 Ah	4.02	1.97	3.70	3.94	F2
SLA0855	6V	1.1 Ah	2.01	1.65	2.01	2.24	F1
SLA0865	6V	1.2 Ah	3.82	0.98	2.05	2.24	F1
SLA0184	6V	2.0 Ah	1.69	1.46	2.99	2.99	F1
SLA0902	6V	2.8 Ah	2.60	1.30	3.82	4.06	F1
SLA0885	6V	3.2 Ah	5.28	1.34	2.36	2.60	F1
SLA0905	6V	4.5 Ah	2.76	1.85	4.02	4.17	F1
SLA0906	6V	5 Ah	2.64	2.64	3.78	3.98	F1
SLA0916	6V	5 Ah	2.64	2.64	3.82	4.65	SPR
SLA0935	6V	7 Ah	3.86	2.20	4.02	4.02	F1
SLA0925	6V	7 Ah	5.94	1.34	3.70	3.94	F1
SLA0945	6V	9 Ah	3.86	2.20	4.65	4.72	F1
SLA0955	6V	10 Ah	5.94	1.97	3.70	3.90	F1
SLA0959	6V	12 Ah	5.94	1.97	3.70	3.90	F2
SLA0961	6V	12 Ah	5.94	1.97	3.70	3.90	F1
SLA0986	6V	20 Ah	6.18	3.27	4.92	4.92	NB
SLA0993	6V	42 Ah	6.38	3.46	6.42	6.69	F2
SLA0994	6V	42 Ah	6.38	3.46	6.42	6.85	NB
SLA0988	8V	3.2 Ah	5.28	1.42	2.48	2.72	F1
SLA1000	12V	700 mAh	3.78	0.98	2.44	2.44	Plug
SLA1005	12V	1.3 Ah	3.82	1.69	2.09	2.28	F1
SLA0218	12V	2 Ah	2.76	1.89	3.86	4.09	F1
SLA1020	12V	2 Ah	5.91	0.79	3.54	3.54	F1

MEAN WELL

40W Single Output with Battery Charger (UPS Function)

DRC-40 series

LPS c UL us TÜV CB CE

Features

- Universal AC input / Full range
- Protections: Short circuit / Overload / Over voltage
- Battery low protection / Battery reverse polarity protection by fuse
- Can be installed on DIN rail TS-35/7.5 or 15
- Alarm signal for AC OK and Battery low (via TTL open collector, optional via relay)
- Cooling by free air convection
- Pass LPS
- LED indicator for power on
- 100% full load burn-in test
- 3 years warranty

Applications

- Security system
- Emergency lighting system
- Alarm system
- DC UPS system
- Central monitoring system
- Access systems

Description

DRC-40 is a 40W AC/DC DIN rail type security power supply series. In addition to the primary output, there is a charger output with a smaller rated current, enabling the backup power supply application the security access systems require. DRC-40 accepts the universal input between 90VAC and 264VAC, and supplies 13.8VDC and 27.6VDC at output, respectively. With the efficiency up to 87%, it can operate with air convection cooling under -30℃ through 70℃. In addition to the key protection features such as overload protection, over voltage protection, battery low cut off, and battery reverse polarity protection (by fuse), the alarm signal for AC OK and battery low signaling is provided, via TTL open collector output for the standard model (via relay contact output as the optional model), to facilitate the system design.

Model Encoding

DRC - 40 A

- A: Output voltage
- 40: Output wattage
- DRC: Series name

40W Single Output with Battery Charger (UPS Function) **DRC-40 series**

SPECIFICATION

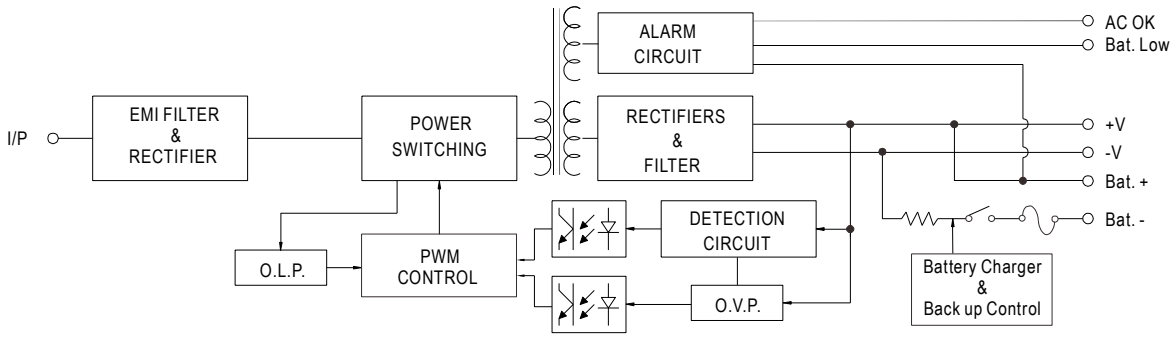
MODEL		DRC-40A		DRC-40B	
OUTPUT	OUTPUT NUMBER	CH1	CH2	CH1	CH2
	DC VOLTAGE	13.8V	13.8V	27.6V	27.6V
	RATED CURRENT	1.9A	1A	0.95A	0.5A
	CURRENT RANGE	0 ~ 2.9A	--------	0 ~ 1.45A	--------
	RATED POWER	40.02W		40.02W	
	RIPPLE & NOISE (max.) Note.2	120mVp-p	--------	200mVp-p	--------
	VOLTAGE ADJ. RANGE	CH1:12 ~ 15V		CH1:24 ~ 30V	
	VOLTAGE TOLERANCE Note.3	±1.0%	--------	±1.0%	--------
	LINE REGULATION	±0.5%	--------	±0.5%	--------
	LOAD REGULATION	±0.5%	--------	±0.5%	--------
	SETUP, RISE TIME Note.4	400ms, 50ms/230VAC 800ms, 50ms/115VAC at full load			
	HOLD UP TIME (Typ.)	50ms/230VAC 10ms/115VAC at full load			
INPUT	VOLTAGE RANGE	90 ~ 264VAC 127 ~ 370VDC [DC input operation possible by connecting AC/L(+), AC/N(-)]			
	FREQUENCY RANGE	47 ~ 63Hz			
	EFFICIENCY (Typ.)	86%		87%	
	AC CURRENT (Typ.)	0.8A/115VAC 0.6A/230VAC			
	INRUSH CURRENT (Typ.)	COLD START 30A/115VAC 60A/230VAC			
PROTECTION	OVERLOAD	105 ~ 150% rated output power			
		Protection type : Hiccup mode, recovers automatically after fault condition is removed			
	OVER VOLTAGE	CH1:14.49 ~ 18.63V		CH1:28.98 ~ 37.26V	
		Protection type : Shut down o/p voltage, re-power on to recover			
	BATTERY CUT OFF	10±0.5V		20±1V	
FUNCTION	AC OK	Open collector output, CONTACT : AC OK ; CUT OFF : AC Fail ; max. rating : 50V/30mA			
	BATTERY LOW	Open collector output, CUT OFF : Battery ; CONTACT : Battery Low ; max. rating : 50V/30mA			
		Battery low voltage : < 11V		Battery low voltage : < 22V	
ENVIRONMENT	WORKING TEMP.	-30 ~ +70℃ (Refer to "Derating Curve")			
	WORKING HUMIDITY	20 ~ 90% RH non-condensing			
	STORAGE TEMP., HUMIDITY	-40 ~ +85℃, 10 ~ 95% RH			
	TEMP. COEFFICIENT	±0.03%/℃ (0 ~ 55℃) on CH1 output			
	VIBRATION	10 ~ 500Hz, 2G 10min./1cycle, 60min. each along X, Y, Z axes			
SAFETY & EMC (Note 5)	SAFETY STANDARDS	UL60950-1, TUV EN60950-1 approved			
	WITHSTAND VOLTAGE	I/P-O/P:3KVAC I/P-FG:2KVAC O/P-FG:0.5KVAC			
	ISOLATION RESISTANCE	I/P-O/P, I/P-FG, O/P-FG:100M Ohms / 500VDC / 25℃/ 70% RH			
	EMC EMISSION	Compliance to EN55022 (CISPR22) Class B, EN61000-3-2,-3			
	EMC IMMUNITY	Compliance to EN61000-4-2,3,4,5,6,8,11, EN55024, EN61204-3, light industry level, criteria A			
OTHERS	MTBF	536.6K hrs min. MIL-HDBK-217F (25℃)			
	DIMENSION	40*90*100mm (W*H*D)			
	PACKING	0.3Kg; 42pcs/13.6Kg/0.82CUFT			

NOTE

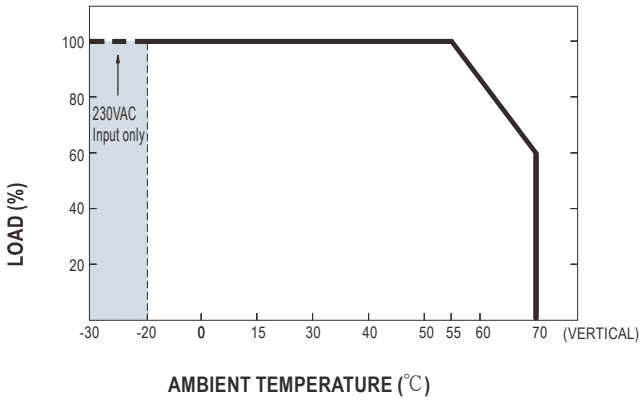
1. All parameters NOT specially mentioned are measured at 230VAC input, rated load and 25℃ of ambient temperature.
2. Ripple & noise are measured at 20MHz of bandwidth by using a 12" twisted pair-wire terminated with a 0.1uf & 47uf parallel capacitor.
3. Tolerance : includes set up tolerance, line regulation and load regulation.
4. Length of set up time is measured at cold first start. Turning ON/OFF the power supply may lead to increase of the set up time.
5. The power supply is considered a component which will be installed into a final equipment. The final equipment must be re-confirmed that it still meets EMC directives. For guidance on how to perform these EMC tests, please refer to “EMI testing of component power supplies.” (as available on http://www.meanwell.com)
6. Installation clearances : 40mm on top, 20mm on the bottom, 5mm on the left and right side are recommended when loaded permanently with full power. In case the adjacent device is a heat source, 15mm clearance is recommended.

40W Single Output with Battery Charger (UPS Function) **DRC-40 series**

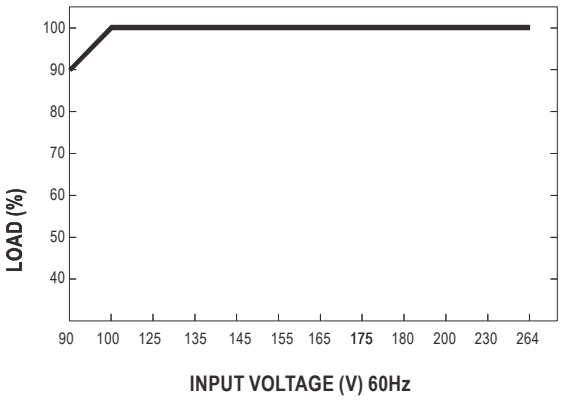
Block Diagram



Derating Curve



Static Characteristics



■ Suggested Application

1.Backup connection for AC interruption

(1) Please refer to Fig1.1 for suggested connection.

The power supply charges the battery and provides energy to the load at the same time when AC mains is OK.

The battery starts to supply power to the load when AC mains fails.

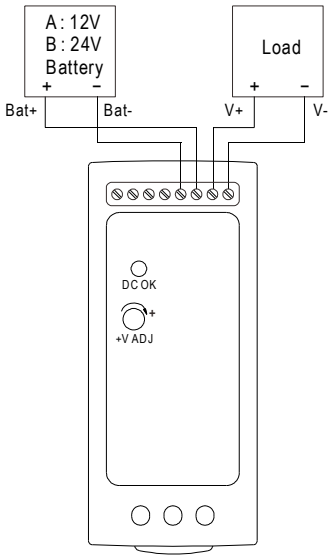


Fig 1.1 Suggested system connection

2.Alarm signal for AC OK and battery low

(1) Alarm signal is sent out through " AC OK " & " Battery Low " pins.(TTL open collector output is provided for standard model, and relay contact output is provided as optional model.)

(2) An external voltage source is required for this function. The maximum applied voltage is 50V and the maximum sink current is 30mA. Please refer to Fig 2.2.

(3) Table2.1 explains the alarm function built in the power supply

Function	Description	Output of alarm
AC OK	The signal is "Low" when the power supply turns ON.	Low (0.3V max. at 30mA)
	The signal turns to be "High" when the power supply turns OFF.	High or open (External applied voltage 50V max.)
Battery Low	The signal is "Low" when the voltage of battery is under A:11V, B:22V.	Low (0.3V max. at 30mA)
	The signal is "High" when the voltage of battery is above A:11V, B:22V.	High or open (External applied voltage 50V max.)

Table 2.1 Explanation of alarm signal

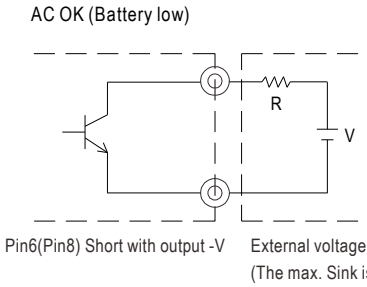


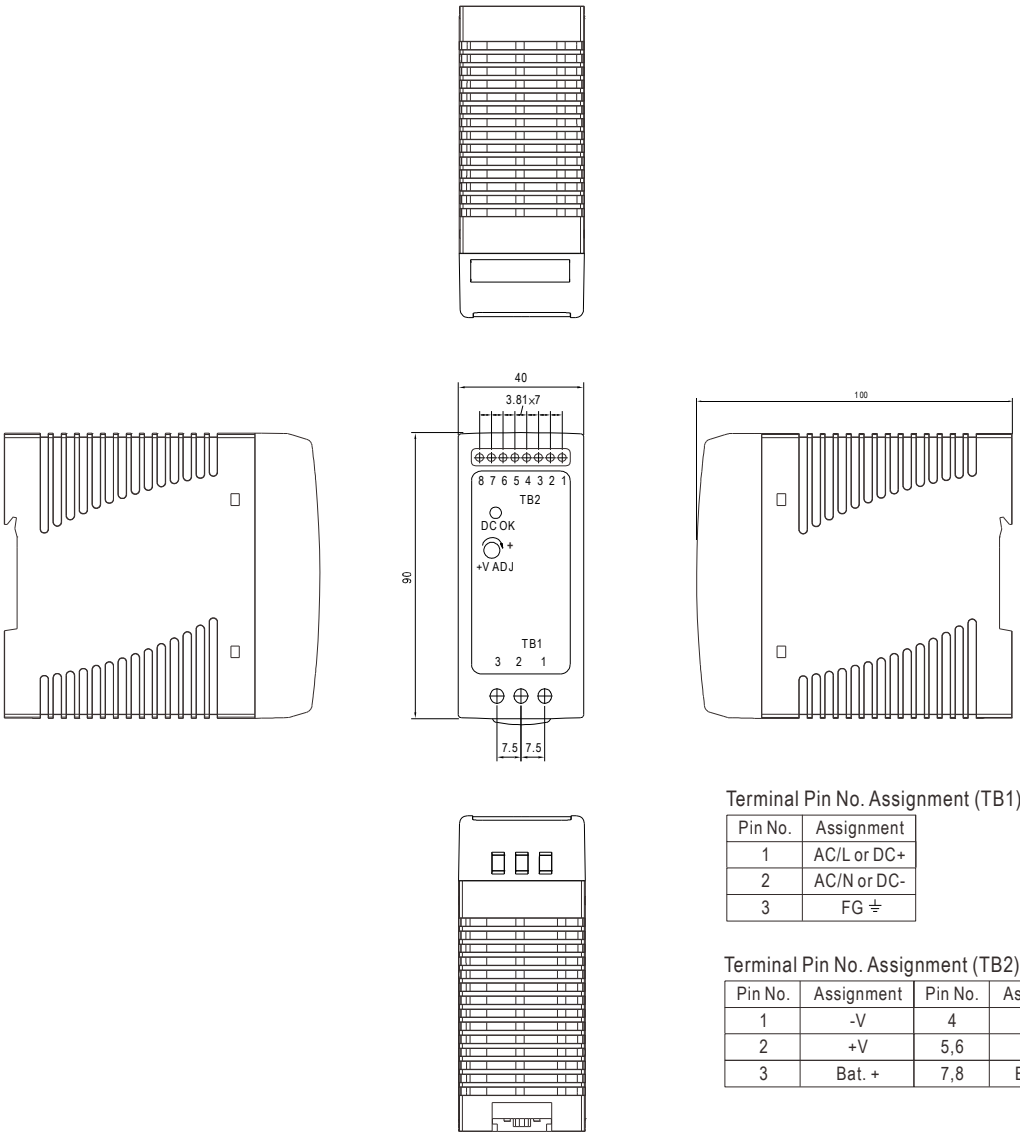
Fig 2.2 Internal circuit of AC OK (Battery Low), via TTL open collector

MEAN WELL

40W Single Output with Battery Charger (UPS Function) **DRC-40 series**

■ Mechanical Specification

Case No.962A Unit:mm



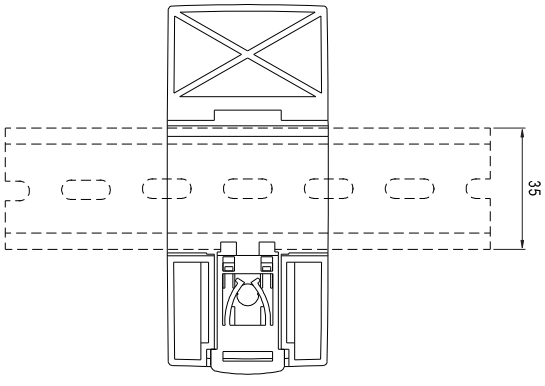
Terminal Pin No. Assignment (TB1):

Pin No.	Assignment
1	AC/L or DC+
2	AC/N or DC-
3	FG ⏚

Terminal Pin No. Assignment (TB2):

Pin No.	Assignment	Pin No.	Assignment
1	-V	4	Bat. -
2	+V	5,6	AC OK
3	Bat. +	7,8	Bat. Low

■ Installation Instruction



Back View

This series fits DIN rail TS35/7.5 or TS35/15.
(This diagram is for reference. The rail is not included with unit.)

LTE LPB Range

Low Profile Antenna

04/08/2016 v2

- Rugged low profile design
- Excellent bandwidth
- Supports 2G/3G/4G

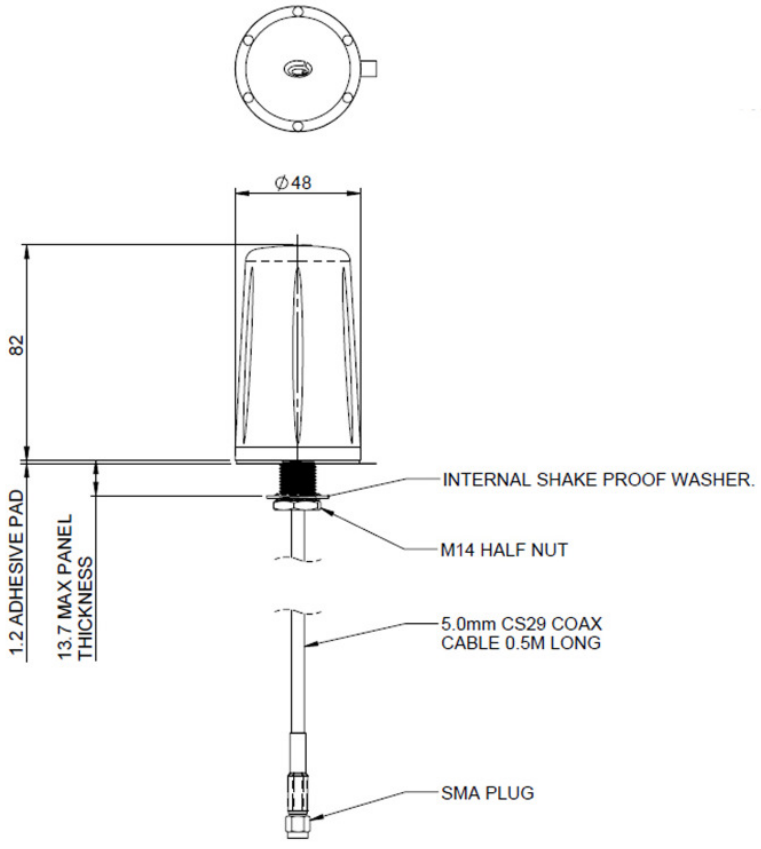
The Panorama LPB low profile antenna range has been designed to perform even in extreme enviroments. At only 82mm (3.22”) high and protected by a robust high impact radome the antenna is almost impervious to daily wear, tear and impact.

The LPB offers excellent performance across a wide bandwith. Mounted on a 400 x 400mm groundplane the LPB covers public safety / LTE frequencies across 700 and 800MHz as well as all global cellular frequencies from 698-960 MHz and 1710-2700MHz making it an extremely versatile product.

Supplied with a convenient adhesive pad and either a short pigtail for connection to a cable extension or an integrated 5m low loss cable run the antenna is cost effective to install and adaptable to any install environment.

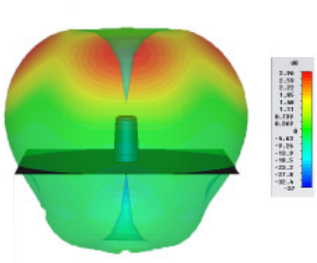
Technical Drawing

LPB-7-27-05SP shown

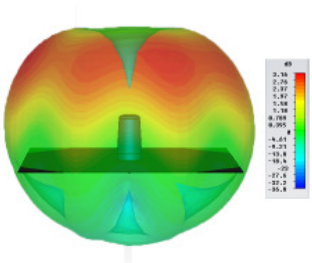


Radiation Patterns

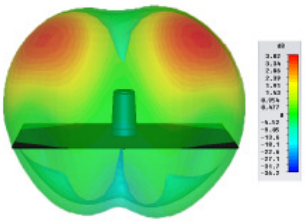
3D Gain Plot (700MHz)



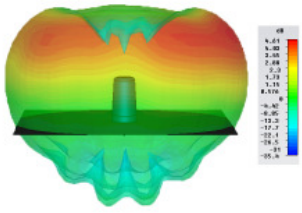
3D Gain Plot (800MHz)



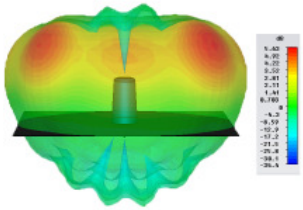
3D Gain Plot (900MHz)



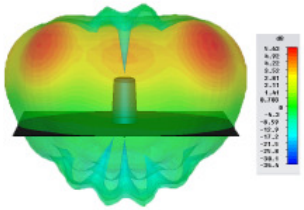
3D Gain Plot (1800MHz)



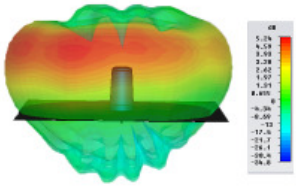
3D Gain Plot (1900MHz)



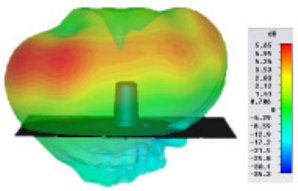
3D Gain Plot (2100MHz)



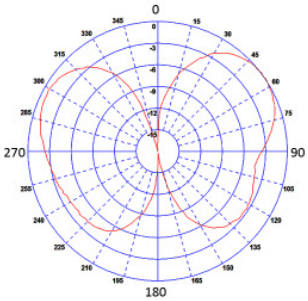
3D Gain Plot (2400MHz)



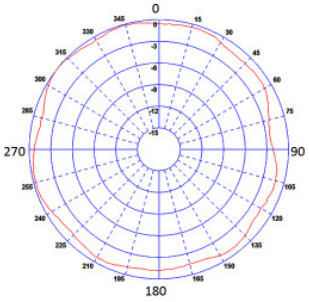
3D Gain Plot (2600MHz)



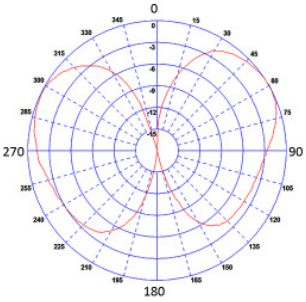
Typical E Plane (850MHz)



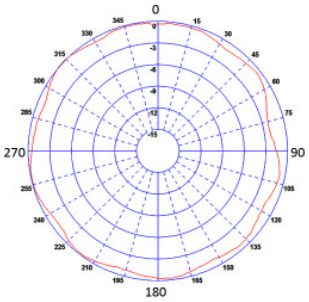
Typical H Plane (850MHz)



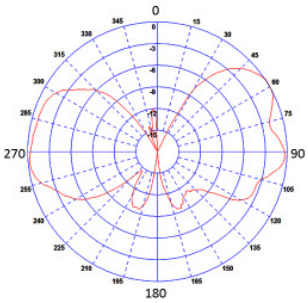
Typical E Plane (900MHz)



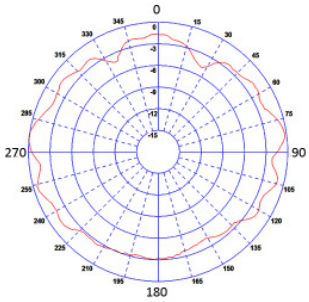
Typical H Plane (900MHz)



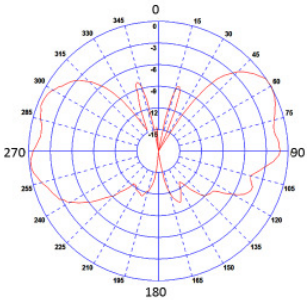
Typical E Plane (1800MHz)



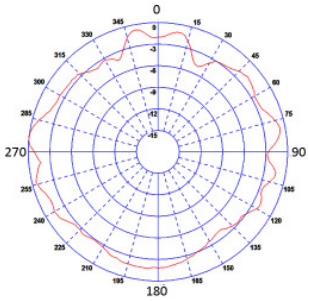
Typical H Plane (1800MHz)



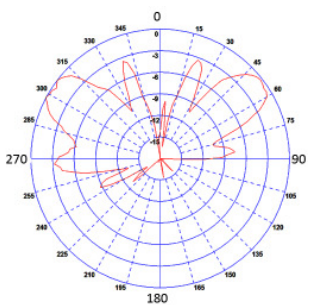
Typical E Plane (2000MHz)



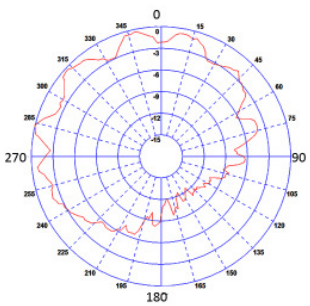
Typical H Plane (2000MHz)



Typical E Plane (2600MHz)

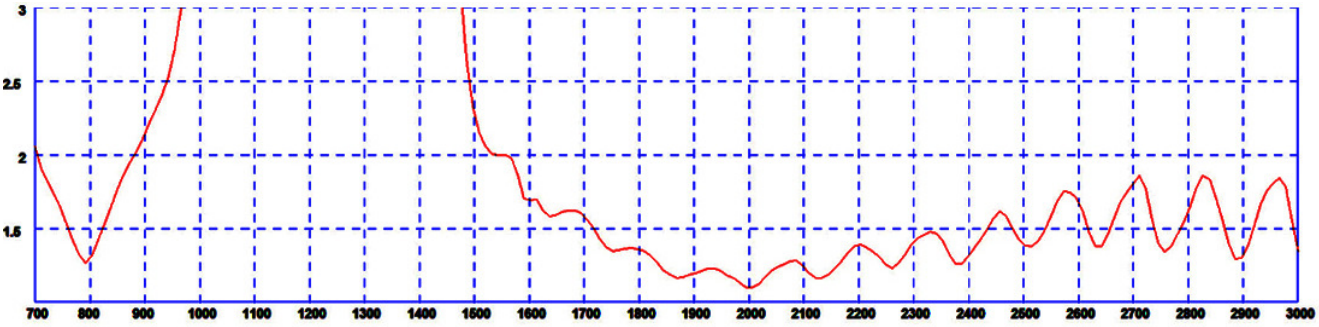


Typical H Plane (2600MHz)



All measurements taken on a 400 x 400mm groundplane with 0.5m of cable

Typical VSWR



*VSWR measured on 400x400mm (15”x15”) ground plane with 5m (16’) of CS29 cable.

Part No.		LPB-7-27-05SP	LPB-7-27-5SP	LPB-7-27-5F
Electrical Data				
Frequency Range (MHz)			698-960 / 1710-2700	
Operational Band			700/800/900/1800/1900/2100/ 2400/2600	
Peak Realised Gain: Isotropic	700 MHz		3dBi	
	800 MHz		3dBi	
	900 MHz		4dBi	
	1800 MHz		4dBi	
	1900 MHz		5dBi	
	2100 MHz		5dBi	
	2600 MHz		5dBi	
VSWR			<2.5:1	
Polarisation			Vertical	
Pattern			Omni-directional	
Impedance			50Ω	
Max Input Power (W)			30	
Mechanical Data				
Dimensions (mm)	Height		82 (3.22”)	
	Diameter		48(1.89”)	
Operating Temp (°C)			-40° / +80°C (-40° / 176°F)	
Material			High Impact UV Stable ABS	
Colour			Black	
Mounting Data				
Fixing			Panel mount	
Hole Diameter (mm)			14 (0.5”)	
Max Panel Thckness (mm)			13 (0.5”)	
Cable Data				
Type			CS29	
Diameter (mm)			5(0.19”)	
Length (m)		0.5(19.6”)	5(16’)	5(16’)
Termination		SMA plug	SMA plug	FME plug

PANORAMA ANTENNAS

Panorama Antennas Ltd
Frogmore, London, SW18 1HF, United Kingdom

T: +44 (0)20 8877 4444
F: +44 (0)20 8877 4477
E: sales@panorama-antennas.com
www.panorama-antennas.com

• Revised •
4/06/2009

Molded Case Circuit Breakers

External Accessories

Selection

Mounting Clips

For Use With Breaker Frame(s)	Number of Poles	Catalog Number	List Price $ each	Standard Package	Wt Lb Std Pkg
BQ, BQH	1	**MB120**	**8.50**	20⑥	¼

Face Mounting Plates

GFCI	1	**FP9558**	**14.50**	10⑥	½
BQ, BQH, BQXD	1 2 3	**FP9508** **FP9555** **FP9556**	**13.40** **17.00** **18.40**	10⑥ 10⑥ 10⑥	½ 1 1½
CQD, CQD6	1 2 3	**CQDFMB1** **CQDFMB2■** **CQDFMB3■**	**28.00** **31.50** **35.00**	1 1 1	¼ ¼ ¼
NGG	1 2 3	**FMPG1** **FMPG2** **FMPG3**	**27.00** **29.50** **33.50**	**1** **1** **1**	¼ ¼ ¼

Shallow Mounting Brackets

BQ, BQH	1–6	**SMB6R**	**5.30**	30⑥⑦	1½

Back Mounting Plates

All QP 1 and 2-pole	1, 2	**I0204ML1125**	**31.50**	10	¼
All QP 3-pole	3	**I0303ML3100**	**59.00**	10	¼
BQ, BQH, BQXD	2 3 4	**BR2** **BR3** **BR4**	**17.00** **17.00** **17.00**	10⑥ 10⑥ 10⑥	¼ ¼ ¼
ED2, ED4, ED6, HED4, HED6	1	**E2BMB**	**14.20**	1	¼

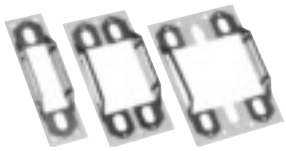
Mounting Screw Kits

CQD, CQD6	**CQDSMK**①	**17.70**	1	1¼
NGG	**MSKG4**①	**3.90**	1	¼
All QJ	**MSQJ**①	**4.40**	1	1
All ED (CED6 requires 2 kits)	**MSE6**① **MSE6100**②	**4.40** **1.10**	1 100⑥	¼ 1
All FD (CFD6 requires 2 kits)	**MSF6**① **MSF650**③	**4.40** **1.10**	1 50⑥	¼ 1
All EG 1-pole	**MSKE1**	**3.90**	—	—
All EG 2-pole	**MSKE2**	**5.00**	—	—
All EG 3 or 4-pole	**MSKE4**	**6.20**	—	—
All JD, LD	**MSJ6**①	**14.20**	1	¼
All LMD	**MSLMD**	**24.00**	1	¼
All MD, ND,	**MSMN**	**24.00**	1	¼
All PD, RD	**MSPR6**	**57.00**	1	2

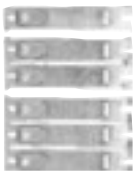
"MI" Mechanical Interlocks

For Use With Breaker Type(s)	Panel⑧ Mounted	Plug-in Mounted	List Price $ each	Standard Package	Wt Lb Std Pkg
BQ	—	**ECQML12**	**299.00**	10⑥	¼
All EG (Sliding Bar)	**HSBE**	—	**553.00**	1	—
All QJ	**CSO**	—	—		1
All FD	**MI5444**	**MI5444**	**604.00**	Complete with two breakers	—
All JD, LD	**MI5413**④	—	**604.00**	1	1
All LMD	**MI5406**④■	—	**604.00**	1	1
All MD	**MI5404**⑤■	—	**604.00**	1	3
All ND	**MI5404**⑤■	—	**604.00**	1	3
All PD, RD	**MI5405**⑤▲	—	**694.00**	—	—
STD	**STDMIF32▲**	—	**4036.00**	—	—

MB120



Face Mounting Plates
FP9508 FP9555 FP9556



SMB6R (6 shown)

QML12

Back Mounting Plate **BR2**

I0204ML1125

Mounting Screw Kit
MSE6

Mechanical Interlock
MI5444

■ Built to order. Allow 2–3 weeks for delivery.

▲ Built to order. Allow 6–8 weeks for delivery.

①Kit consists of 4 screws and washers.
②Consists of 1 screw and washers (order 100).
③Consists of 1 screw and washers (order 50).
④With mechanical interlock in place, no accessory can be installed into circuit breaker right pole.
⑤Addition of the mechanical interlock will prevent accessory installation in the left pole.
⑥Sold only in standard package quantities. Multiply List Price Each times package quantity for full price.
⑦Each package contains 5 strips of 6 each. Each strip can be broken at perforations for 1, 2 or 3-pole use.
⑧Mechanical interlock is not designed for use within Siemens panelboards.
CSO = Consult Sales Office for pricing.

Molded Case Circuit Breakers

DIN Rail Mounted Circuit Breakers

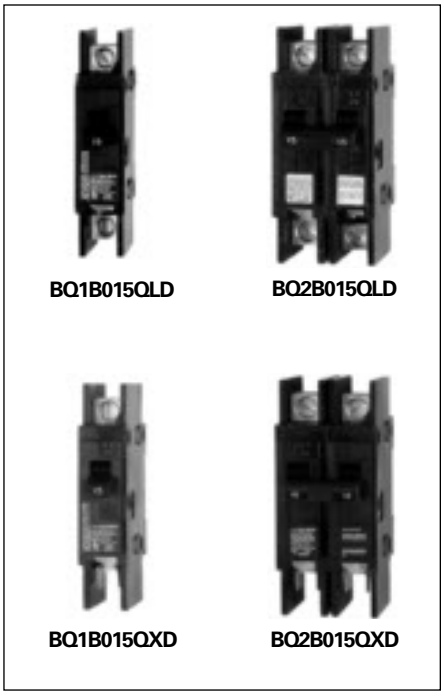
Selection/Dimensions

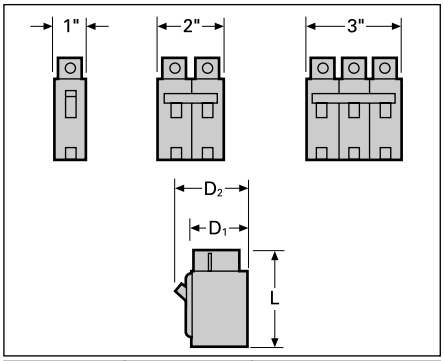
1-Pole DIN Rail (120V AC)

Breaker Type	Ampere Rating	Catalog Number	Load Side Connector	List Price $	"Interrupting Ratings (KA) (RMS Symmetrical Amperes)" Volts AC 120	120/240
"BQXD 1-Pole 120V DIN Rail"	10	**BQ1B010QLD**	TC1Q1	**33.50**	10	
	15	**BQ1B015QLD**	TC1Q1	**33.50**	10	
	20	**BQ1B020QLD**	TC1Q1	**33.50**	10	
	25	**BQ1B025QLD**	TC1Q1	**33.50**	10	
	30	**BQ1B030QLD**	TC1Q1	**33.50**	10	
	35	**BQ1B035QLD**	TC1Q1	**33.50**	10	
	40	**BQ1B040QLD**	TC1Q1	**33.50**	10	
	45	**BQ1B045QLD**	TA1Q1	**33.50**	10	
	50	**BQ1B050QLD**	TA1Q1	**33.50**	10	
	60	**BQ1B060QLD**	TA1Q1	**33.50**	10	
	10	**BQ1B010QXD**	Quick-Connect	**39.50**	10	
	15	**BQ1B015QXD**	Quick-Connect	**39.50**	10	
	20	**BQ1B020QXD**	Quick-Connect	**39.50**	10	
	25	**BQ1B025QXD**	Quick-Connect	**39.50**	10	
	30	**BQ1B030QXD**	Quick-Connect	**39.50**	10	
	35	**BQ1B035QXD**	Quick-Connect	**39.50**	10	
	40	**BQ1B040QXD**	Quick-Connect	**39.50**	10	
	45	**BQ1B045QXD**	Quick-Connect	**39.50**	10	
	50	**BQ1B050QXD**	Quick-Connect	**39.50**	10	
	60	**BQ1B060QXD**	Quick-Connect	**39.50**	10	

2-Pole DIN Rail (120/240V AC)

"BQXD 2-Pole 120/240V DIN Rail"	10	**BQ2B010QLD**	TC1Q1	**76.00**		10
	15	**BQ2B015QLD**	TC1Q1	**76.00**		10
	20	**BQ2B020QLD**	TC1Q1	**76.00**		10
	25	**BQ2B025QLD**	TC1Q1	**76.00**		10
	30	**BQ2B030QLD**	TC1Q1	**76.00**		10
	35	**BQ2B035QLD**	TC1Q1	**76.00**		10
	40	**BQ2B040QLD**	TC1Q1	**76.00**		10
	45	**BQ2B045QLD**	TA1Q1	**76.00**		10
	50	**BQ2B050QLD**	TA1Q1	**76.00**		10
	60	**BQ2B060QLD**	TA1Q1	**76.00**		10
	10	**BQ2B010QXD**	Quick-Connect	**91.00**		10
	15	**BQ2B015QXD**	Quick-Connect	**91.00**		10
	20	**BQ2B020QXD**	Quick-Connect	**91.00**		10
	25	**BQ2B025QXD**	Quick-Connect	**91.00**		10
	30	**BQ2B030QXD**	Quick-Connect	**91.00**		10
	35	**BQ2B035QXD**	Quick-Connect	**91.00**		10
	40	**BQ2B040QXD**	Quick-Connect	**91.00**		10
	45	**BQ2B045QXD**	Quick-Connect	**91.00**		10
	50	**BQ2B050QXD**	Quick-Connect	**91.00**		10
	60	**BQ2B060QXD**	Quick-Connect	**91.00**		10





Breaker Type	Amperes	Dimensions (inches) L	D1	D2
BQ, BQH	15–50	3¾	2⅜	3
BQ, BQH	55–125	4	2⅜	3
HBQ	15–125	4	2⅜	3
BQXD	15–60	4½	2⅜	3

Lugs-For Use with BQ, BQH, HBQ⑧

Circuit Breaker Amp. Rtg.	Cab. Per Lug	Lug Wire Range AWG	Catalog Number	List Price $ (Qty. 6)
Line Side				
10–40	1 1	#16–#6 Cu #12–#6 Al	**TC1Q1**①②	**2.60**
45–100	1 1	#8–#1 Cu #6–#1/0 Al	**TA1Q1**	**2.60**
Load Side				
10	2	#16 Cu	Connectors are Supplied with Circuit Breaker	
15–20	1 1	#14–#10 Cu #12–#10 Al		
25–35	1 1	#14–#6 Cu #12–#10 Al		
40–50	1 1	#8–#6 Cu #8–#4 Al		
55–70	1 1	#8–#4 Cu #8–#2 Al		
80–100	1 1	#4–#1/0 Cu #2–#1/0 Al		
110–125	1 1	#2–#1/0 Cu #1/0–#2/0 Al		

Finger Safe Terminal Shield

Protects against accidental contact with lugs–1 per lug. Fits line and load end.

Catalog Number	Qty	List Price $ each
BQFS2	2	**2.10**
BQFS1K	1000	**1.40**

Enclosures		
Type	**Catalog Number** ⑥	**List Price $**④⑤
1	**EB3100S**③⑦	**189.00**
3R	**WB3100**	**249.00**

For inches / millimeters conversion, see Application Data section.

■ Built to order. Allow 2–3 weeks for delivery.

①Terminals are UL Listed for 60°/75°C conductors. Also CSA Listed.

②Connector has steel construction.

③Surface mounted indoor. If flush mounting is required, replace suffix "S" in catalog number with suffix "F".

④Discount Schedule B.

⑤Does not include circuit breaker. Order circuit breaker separately.

⑥Neutral included in enclosure.

⑦Enclosure will not accept circuit breakers with shunt trips or auxiliary switches installed.

⑧Type BQXD uses TA1Q1 or TC1Q1 lugs on line side of circuit breaker.

Enclosures Section 5
Accessories pages 6-86 to 6-91

Discount Schedule MCCB

SQUARE D
www.SquareD.com
For the most up-to-date information

QO® Load Centers
Rainproof—Single Phase, Main Lugs, Main Circuit Breaker
Class 1130

Single Phase Three Wire—120/240 Vac—UL Listed
Main Lugs (Order QO, QOT, QO-GFI, QO-EPD, QO-AFI and QO-PL branch circuit breakers from pages 3 and 4.)

	Mains Rating (A)	Spaces	Max. Number Single Pole Circuits▲	Max. Number of Tandem Circuit Breakers	Total Price (Interior, Box and Cover)	Load Center Box and Interior		Main Wire Size AWG/kcmil		Equipment Ground Bar Kit (Order Separately)		Box No. See page 20
						Catalog Number	Price	Al	Cu	Catalog No.	Price	
RAINPROOF	**Non-Metallic Enclosure** Fixed Mains—Factory-installed Main Lugs—10,000 RMS Sym. Amperes Short Circuit Current Rating											
	60	2	4	2	**$ 68.00**	QO24L60NRNM	**$ 68.00**	#14–4	#14–4	Factory-incl.		1NM
	Metallic Enclosure Fixed Mains—Factory-installed Main Lugs—10,000 RMS Sym. Amperes Short Circuit Current Rating											
	40	2	2	0	**$ 75.00**	QO2L40RB■	**$ 75.00**	#12–6	#14–6	PK3GTA-1	**$ 7.60**	1R
	70	2	4	2	**87.00**	QO24L70RB■	**87.00**	#12–3	#14–4	PK4GTA	**7.20**	1R
	100	6	12	6	**95.00**	QO612L100RB♦	**95.00**	#8–1		PK7GTA	**7.80**	2R
		6	12	6	**105.00**	QO612L100TRB♦	**105.00**			Factory-installed	**. . .**	2R
		8	16	8	**154.00**	QO816L100RB♦	**154.00**			PK7GTA	**7.80**	2R
	100	6	12	6	**116.00**	QO612L100RBCU♦★	**116.00**	#8–1		PK7GTA	**7.80**	2R
		8	16	8	**186.00**	QO816L100RBCU♦★	**186.00**			PK7GTA	**7.80**	2R
	125	4	8	4	**101.00**	QO148L125GRB★	**101.00**	#12–2/0	#14–2/0	PK7GTA Factory-incl.		15R
	Convertible Mains—Factory-installed Main Lugs—65,000 RMS Sym. Amperes Maximum Short Circuit Current ▼ △ □ **QOM1 Main Frame Size—Convertible to Main Circuit Breaker—Copper Bus**											
	125	12	12	0	**$190.00**	QO112L125GRB	**$190.00**	#6–2/0		PK9GTA Factory-incl.		3R
		12	24	12	**243.00**	QO11224L125GRB	**243.00**			PK15GTA Factory-incl.		3R
		16	24	8	**290.00**	QO11624L125GRB	**290.00**			PK15GTA Factory-incl.		4R
		24	24	0	**348.00**	QO124L125GRB	**348.00**			PK15GTA Factory-incl.		4R
	Convertible Mains—Factory-installed Main Lugs—65,000 RMS Sym. Amperes Maximum Short Circuit Current ▼ △ □ **QOM2 Main Frame Size—Convertible to Main Circuit Breaker—Copper Bus**											
	150	30	30	0	**$391.00**	QO130L150GRB	**$391.00**	#6–250		PK23GTA & LK100AN Factory-incl.		6R
	200	12	12	0	**320.00**	QO112L200GRB	**320.00**	#6–250		PK9GTA Factory-incl.		5R
		30	30	0	**444.00**	QO130L200GRB	**444.00**			PK23GTA & LK100AN Factory-incl.		6R
		30	40	10	**476.00**	QO13040L200GRB	**476.00**			PK23GTA & LK100AN Factory-incl.		6R
		40	40	0	**647.00**	QO140L200GRB	**647.00**			PK23GTA & LK100AN Factory-incl.		7R
	225	42	42	0	**873.00**	QO142L225GRB	**873.00**	#6–300		PK23GTA & LK100AN Factory-incl.		8R

Single Phase Three Wire—120/240 Vac—UL Listed
Main Circuit Breaker Order QO, QOT, QO-GFI, QO-EPD and QO-PL branch circuit breakers from pages 3 and 4.

	Mains Rating (A)	Spaces	▲ Max. Number Single Pole Circuits	Max. Number of Tandem Circuit Breakers	Total Price (Interior, Box and Cover)	Load Center Box and Interior		Main Wire Size AWG/kcmil Al or Cu	Equipment Ground Bar Kit (Order Separately)		Box No. See page 20
						Catalog Number	Price		Catalog No.	Price	
RAINPROOF	**Convertible Mains —Factory-installed Main Circuit Breaker—22,000 RMS Sym. Amperes Short Circuit Current Rating —Convertible to Main Lugs (see page 8) or Lower Amperage Main Circuit Breaker (see page 7)◊ □** **QOM1 Main Circuit Breaker Frame Size—Copper Bus**										
	100	12	12	0	**$307.**	QO112M100RB	**$307.**	#6–2/0	PK9GTA	**$ 8.90**	3R
		16	16	0	**336.**	QO116M100RB	**336.**		PK12GTA	**10.50**	4R
		20	20	0	**368.**	QO120M100RB	**368.**		PK15GTA	**11.40**	4R
	125	24	24	0	**636.**	QO124M125RB	**636.**	#6–2/0	PK15GTA	**11.40**	4R
	Convertible Mains —Factory-installed Main Circuit Breaker—22,000 RMS Sym. Amperes Short Circuit Current Rating —Convertible to Main Lugs (see page 8) or Lower Amperage Main Circuit Breaker (see page 7) ◊ □ **QOM2 Main Circuit Breaker Frame Size—Copper Bus**										
	150	20	30	10	**$635.**	QO12030M150RB	**$635.**	#4–250	PK18GTA	**$12.50**	5R
		30	30	0	**748.**	QO130M150RB	**748.**		PK18GTA	**12.50**	6R
	200	20	40	20	**636.**	QO12040M200RB	**636.**	#4–250	PK23GTA	**14.20**	5R
		30	30	0	**769.**	QO130M200RB	**769.**		PK18GTA	**12.50**	6R
		40	40	0	**931.**	QO140M200RB	**931.**		PK23GTA	**14.20**	7R
	Feed Thru **Main Circuit Breaker With Feed-Thru Lugs—Copper Bus—22,000 RMS Sym. Amperes Short Circuit Current Rating ◊**										
	125	6	12	6	**$413.**	QO1612M125FTRB	**$413.**	#4–2/0	PK12GTA	**$10.50**	3R
	150	8	16	8	**575.**	QO1816M150FTRB	**575.**	#4–250	PK15GTA-L	**23.30**	6R
	200	8	16	8	**575.**	QO1816M200FTRB	**575.**	#4–250	PK15GTA-L	**23.30**	6R

Above listings thru 200 A mains rating meet Federal Specification W-P-115c as Type 1, Class 2.
▲ Maximum number of single pole branch circuits utilizing QO and/or QOT circuit breakers.
■ Use #10 maximum size wire for GFI circuit breaker.
♦ 70 A max. branch circuit breaker and 70 A max. back fed main circuit breaker.
★ Copper bus.
▼ UL short circuit current rating depends on lowest interrupting rating of circuit breakers installed.
△ UL Listed 5000 A short circuit current rating for corner grounded Delta systems. Use QO-H circuit breakers only.
□ Side hinge door device; allow 1¼" on left side for door to open.
◊ 22,000 AIR main circuit breaker UL Listed for use ahead of QO, QOT, QO-GFI, QO-EPD and QOPL 10,000 AIR branch circuit breakers to permit their application on systems up to 22,000 A available fault current.

For additional information, reference Catalog #1100CT9901.