DEPARTMENT OF HAWAIIAN HOME LANDS
STATE OF HAWAII

July 31, 2014

ADDENDUM NO. 1

TO

PLANS, BID FORM, SPECIFICATIONS, CONTRACT AND BOND

FOR

OPERATION AND MAINTENANCE
OF THE LEIALII IRRIGATION WATER SEWER SYSTEM

IFB NO.: IFB-15-HHL-002

LAHAINA, ISLAND OF MAUI, HAWAII

NOTICE TO ALL PROSPECTIVE BIDDERS

This addendum is hereby made a part of the PLANS, BID FORM, SPECIFICATIONS, CONTRACT AND BOND for the OPERATION AND MAINTENANCE OF THE LEIALII IRRIGATION WATER SYSTEM, LAHAINA, COUNTY OF MAUI, HAWAII, and it shall amend the said contract documents as detailed within this Addendum document.

APPROVED:

Sandra Pfund, Administrator
Land Development Division

Date 7-31-14

Please detach, execute, and return immediately, the receipt below, to the Department of Hawaiian Home Lands, P. O. Box 1879, Honolulu, HI 96805, or transmit facsimile to (808) 620-9299.

Receipt of Addendum No. 1 for the OPERATION AND MAINTENANCE OF THE LEIALII IRRIGATION WATER SYSTEM, LAHAINA, COUNTY OF MAUI, HAWAII, is hereby acknowledged.

Signed_____ Title_____

Firm_____ Date_____

ADDENDUM NO. 1
JULY 31, 2014

TO

PLANS, BID FORM, SPECIFICATIONS, CONTRACT AND BOND

FOR

OPERATION AND MAINTENANCE
OF THE LEIALII IRRIGATION WATER SYSTEM

LAHAINA, COUNTY OF MAUI, HAWAII

IFB NO.: IFB-15-HHL-002

ITEM NO. 1 PRE-BID MEETING MINUTES AND REPLIES TO QUESTIONS.

1. A non-mandatory Pre-bid meeting was held at the Maui District Office; 655 Kaumualii Street, Suite 1, Wailuku, HI 96793 on July 23, 2014, at 9:30 am. The meeting minutes and sign-in sheet are attached to ADDENDUM No. 1.

ITEM NO. 2 SITE PLANS

1. A pdf of the site plans are attached to ADDENDUM No. 1

ITEM NO. 3 OPERATION AND INSTALLATION MANUAL

1. The Operation and Installation Manual for Pump and Controls are attached to ADDENDUM No. 1

Operation & Maintenance of The Leialii Irrigation Water System
IFB-15-HHL-002
Minutes of Pre-bid Informational Conference

Date: July 23, 2014
Time: 9:30 AM
Location: Maui District Office
655 Kaumualii Street, Suite 1
Wailuku, HI 96793

LIST OF ATTENDEES

State of Hawaii, Department of Hawaiian Home Lands
Stewart Matsunaga
Kehaulani Quartero

INTRODUCTION

Kehaulani Quartero, DHHL called the meeting to order and welcomed everyone to the pre-bid conference. Kehaulani stated that the purpose of this meeting was to:

- To provide potential bidders with a project overview and job site visit.
- To review procurement requirements and allow potential bidders to ask questions and obtain clarification on the bid documents. A written summary of this pre-bid conference will be issued to all plan holders as an Addendum.
- Requests for clarifications and any questions after this meeting shall be made in writing and faxed to 808-620-9299, no later than 12:00 pm, August 1, 2014, written response to requests will be issued to all plan holders via addenda.

SCOPE OF WORK

- This project consists furnishing labor, equipment, cleaning supplies, materials, and supervision to maintain, test, operate and repair the Leialii Irrigation Water System

PROCUREMENT REMINDERS

Kehaulani reviewed with potential bidders present the following procurement reminders:

- This project is not tax exempt. Your bid proposal must be inclusive of General Excise Tax.
- This project is subject to Chapter 103-55 HRS, Wages, hours, and working conditions of employees of contractors performing services.
- After bid opening and prior to award of the contract, the Department shall verify compliance with Sections 103D-310 and 103D-328 HRS via Hawaii Compliance Express (HCE) for the bidder and all subcontractors. It is recommended that the bidder and all subcontractors be registered with HCE.

Instructions for registration are at the HCE website: http://vendors.ehawaii.gov.

- Failure by the bidder and/or any subcontractor to rectify a non-compliant status within ten business days of notification will be considered as sufficient for the disqualification of the bidder and rejection of its proposal.

COMPLETION SCHEDULE

- Time of Performance: 24 month contract with one option to extend for an additional 24 month period or parts thereof, without the necessity of rebidding.
- The contract time of performance will be September 1, 2014 through August 31, 2016.

QUESTIONS/ANSWERS ISSUED BY ADDENDA

Kehaulani stated that any questions should be submitted in writing and the answers will be issued in an addendum.

- A pdf of the site plans and Operation and Installation Manual will be included in the addendum.
- Interested bidders are responsible to check the DHHL website for issuance of any addenda.

DEADLINES

Kehaulani reviewed the following deadlines:

SUBMITTAL	DEADLINE
Hawaii Products Preference Request	2:00 pm, July 17, 2014
Request for Substitutions	4:00 pm, August 1, 2014
Notice of Intention to Bid	2:00 pm, August 4, 2014
Standard Qualification Questionnaire • SQQ submittals for previous projects not valid	4:00 pm, August 4, 2014
Written questions	4:00 pm, August 1, 2014
Issuance of Addenda • Interested bidders are required to check the DHHL procurement website for any Addenda issued.	COB, August 6, 2014
Bid Opening • Sealed bids are due by 2:00 pm, according to DHHL's Maui District Office time clock. Bids will be received at DHHL's Maui District Office, 655 Kaumualii Street, Suite 1, Wailuku, Hawaii 96793. • Bids will be opened shortly and read aloud thereafter in a conference room to be	2:00 pm, August 14, 2014

determined. Bidders may attend. • Bids submitted after 2:00 pm on August 14, 2014 will not be accepted nor opened, and will be returned. • Bid Forms included in IFB package.	
Award of contract will be made to the lowest responsible and responsive "Total Sum Bid", approximately two weeks following bid opening and after certification of the bid tabulation.	

Operation & Maintenance of the Leialii Irrigation Water System
Pre-bid Meeting and Site Visit
Wednesday, July 23, 2014

	NAME	COMPANY	TITLE	PHONE	EMAIL
1	Kehaulani Quartero	DHHL - LDD	Project Manager	620-9284	kehaulani.a.quartero@hawaii.gov
2	STEWART MATSUNAGA	LDD	PROJECT MANAGER	620-9283	stewart.t.matsunaga@hawaii.gov
3	JAMES LANDGRAF	JN CONSTRUCTION	OP MANAGER	757-2610	jlandgraf@hawaiiantel.net
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					

Construction Plans for ...

VILLAGES OF LEIALI'I

IRRIGATION WELL, PUMP, CONTROLS AND APPURTENANCES

WAHIKULI, LAHAINA, MAUI, HAWAII

L. U. C. A. FILE NO. D. W. S SD NO.

Developer ...

HOUSING FINANCE AND DEVELOPMENT CORPORATION
677 QUEEN STREET, SUITE 300
HONOLULU, HAWAII, 96813

Prepared By ...

WARREN S. UNEMORI ENGINEERING, INC.
Civil & Structural Engineers - Land Surveyors
Wells Street Professional Center - Suite 403
2145 Wells Street - Wailuku, Maui, Hawaii 96793

INDEX OF DRAWINGS:

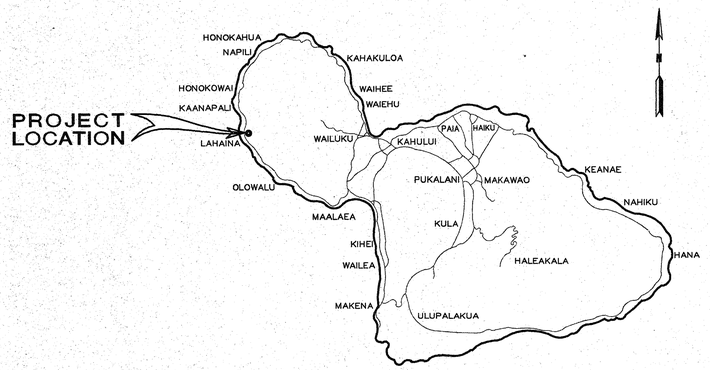
SHEET NO.	DESCRIPTION
1.	TITLE SHEET
2.	IRRIGATION WELL SITE DETAILS
3.	DEEPWELL SUBMERSIBLE PUMP & DISCHARGE LINE DETAILS
4.	PUMP CONTROL SCHEMATIC DIAGRAM
5.	MISCELLANEOUS DETAILS

APPROVED BY:

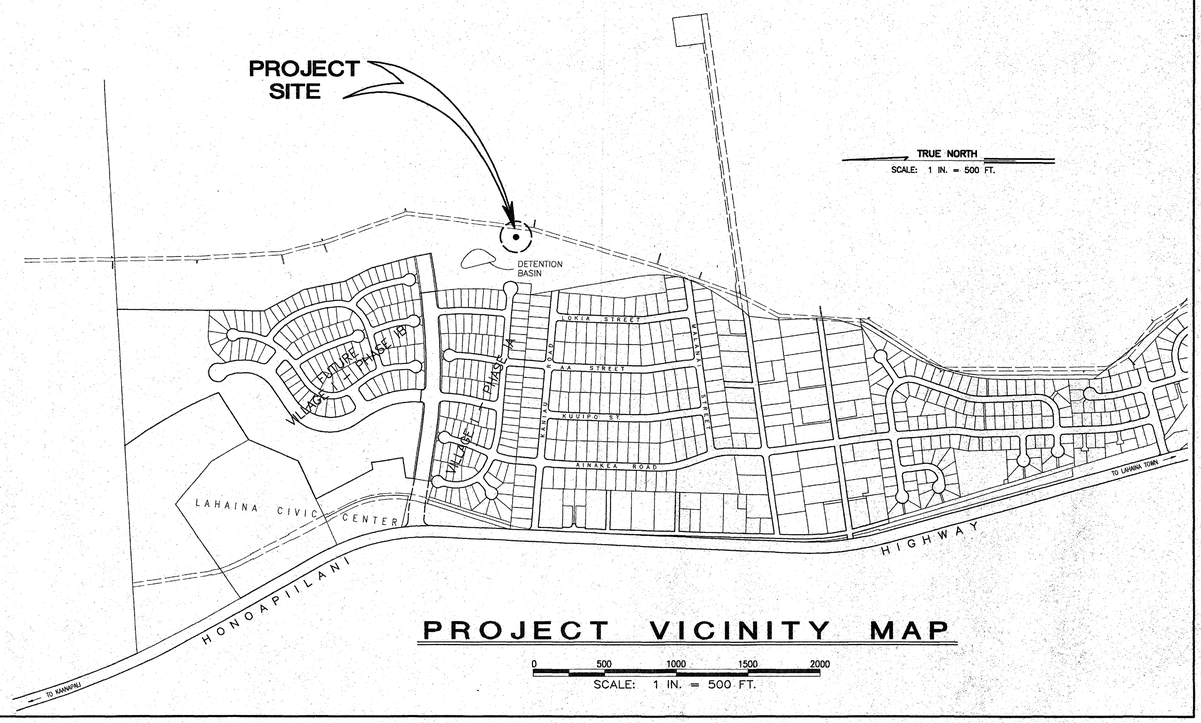
CHAIRMAN, DEPARTMENT OF LAND AND NATURAL RESOURCES — DATE

CHIEF, ENVIRONMENTAL MANAGEMENT DIVISION STATE OF HAWAII — DATE

EXECUTIVE DIRECTOR, HOUSING FINANCE AND DEVELOPMENT CORPORATION STATE OF HAWAII — DATE 4/14/93



ISLAND OF MAUI



PROJECT VICINITY MAP

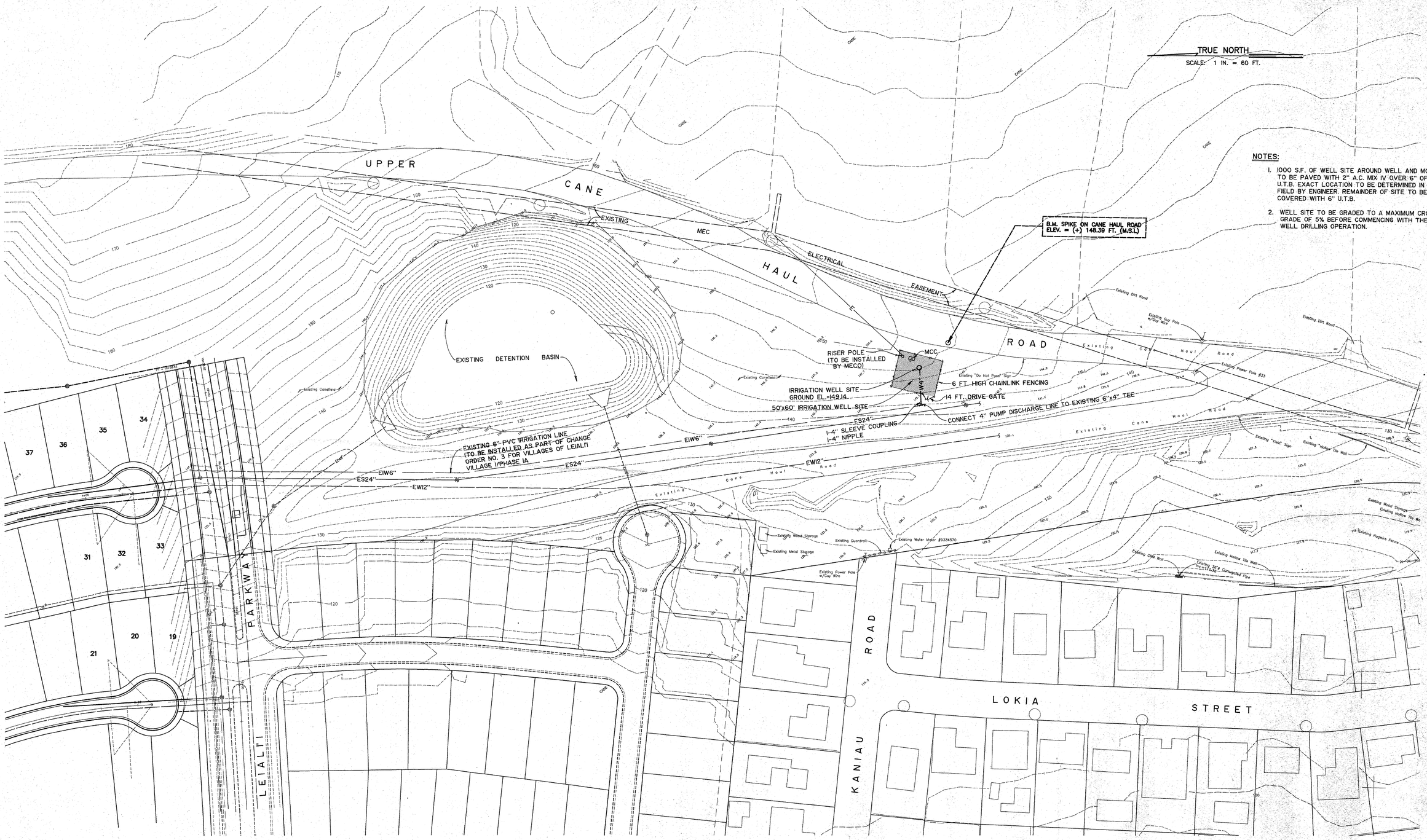
projects/92012/title001.dwg

TRUE NORTH

SCALE: 1 IN. = 60 FT.

NOTES:

1. 1000 S.F. OF WELL SITE AROUND WELL AND MCC TO BE PAVED WITH 2" A.C. MIX IV OVER 6" OF U.T.B. EXACT LOCATION TO BE DETERMINED IN FIELD BY ENGINEER. REMAINDER OF SITE TO BE COVERED WITH 6" U.T.B.
2. WELL SITE TO BE GRADED TO A MAXIMUM CROSS GRADE OF 5% BEFORE COMMENCING WITH THE WELL DRILLING OPERATION.



WARREN S. UNEMORI ENGINEERING, INC.
CIVIL & STRUCTURAL ENGINEERS/LAND SURVEYORS
WELLS STREET PROFESSIONAL CENTER, SUITE 403
2145 WELLS STREET, WAILUKU, MAUI, HAWAII 96793

WARREN S. UNEMORI
REGISTERED PROFESSIONAL ENGINEER & LAND SURVEYOR
No. 1569
HAWAII, U.S.A.

SIGNATURE: Warren S. Unemori DATE: 3/16/93

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

LETTER	DESCRIPTION	DATE

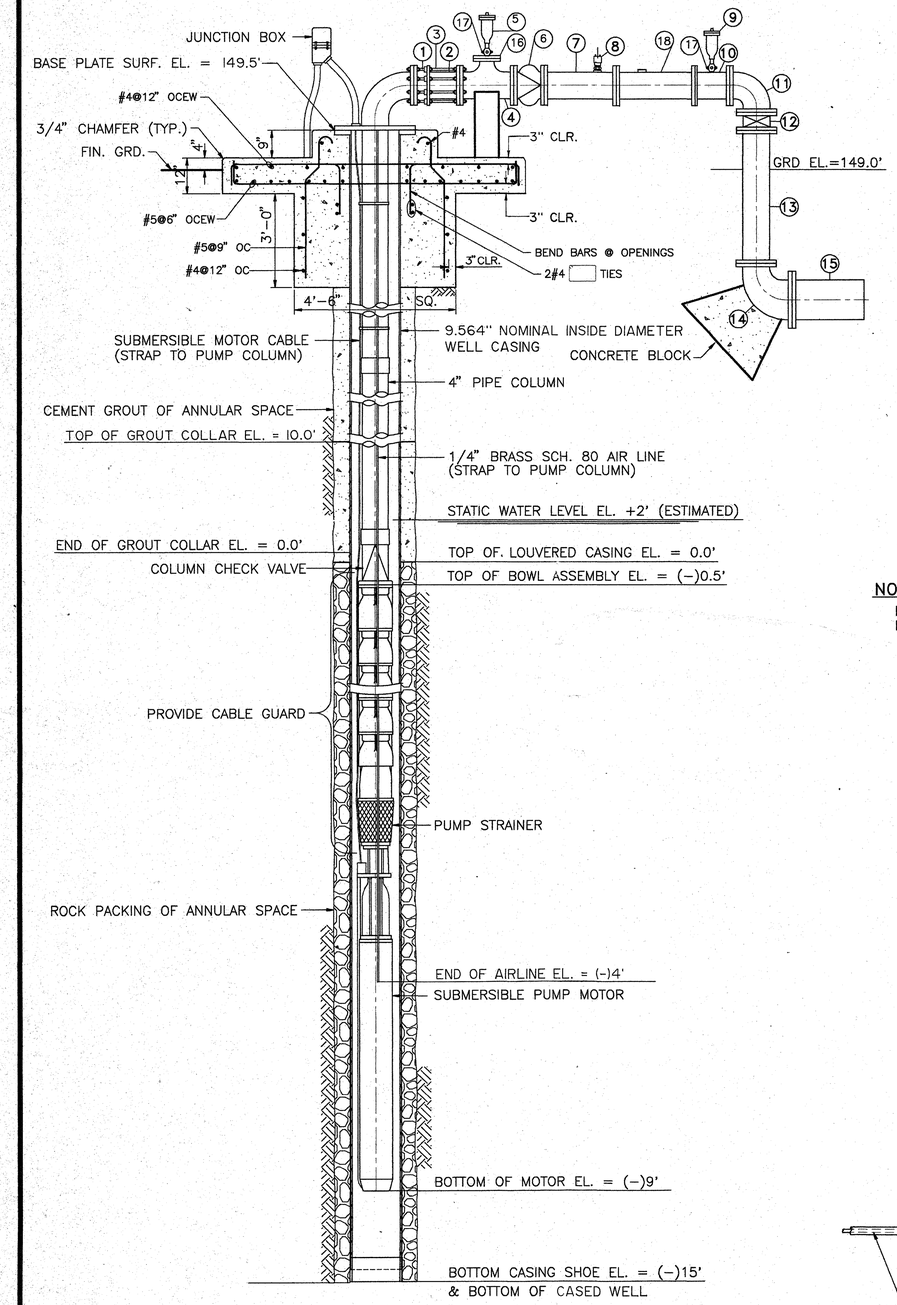
VILLAGES OF LEIALI'I

IRRIGATION WELL, PUMP, CONTROLS AND APPURTENANCES

WAHIKULI, LAHAINA, MAUI, HAWAII

TITLE IRRIGATION WELL SITE DETAILS

DESIGNED BY: WSU	CHECKED BY: WSU	JOB NUMBER: 92012	SHEET 2
DRAWN BY: WSK	APPROVED BY: WSU	DATE: 3/16/93	OF SHEETS
SCALE: 1 IN. = 60 FT.			



SECTION A

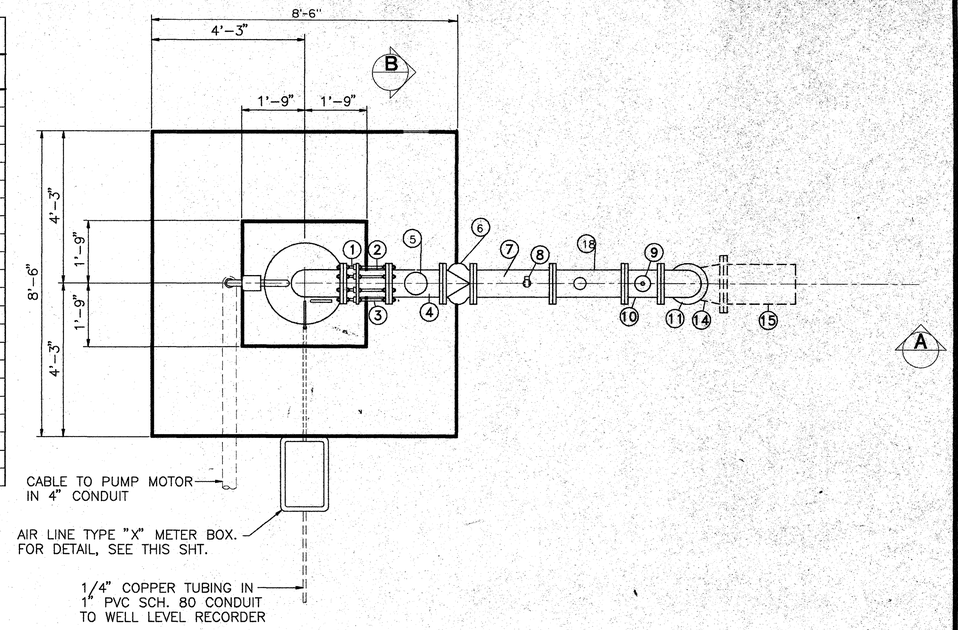
NOT TO SCALE

MATERIALS LIST

ITEM NO.	QUAN.	DESCRIPTION
1	1	4" FLANGE COUPLING ADAPTOR
2	1	4" F.E.-P.E. PIPE 12" LONG
3	4	5/8" TIE BOLTS (GALVANIZED)
4	1	4"X2" F.E. TEE
5	1	1/2" APCO MODEL 141 AIR AND VACUUM VALVE
6	1	4" F.E. CENTER-GUIDED CHECK VALVE
7	1	4" F.E. PIPE 24" F-F
8	1	FLOW SWITCH
9	1	1/2" APCO MODEL 50 AIR RELEASE VALVE
10	1	4" F.E. PIPE 12" F-F
11	1	4" F.E. 1/4 BEND
12	1	4" F.E. GATE VALVE
13	1	4" F.E. PIPE LENGTH TO FIT
14	1	6"X4" REDUCING 1/4 BEND
15	1	6" F.E.-P.E. PIPE, 12" LONG
16	1	2" BLIND FLANGE TAPPED FOR 3/8" IPT
17	2	3/8" STOPCOCK
18	1	4" WATER SPECIALTIES PROP FLOW METER

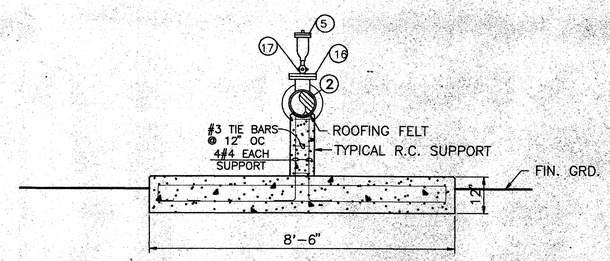
NOTE (FLANGED PIPING):

FLANGED PIPE AND FITTINGS SHALL CONFORM TO ALL REQUIREMENTS OF PROJECT SPECIFICATIONS.



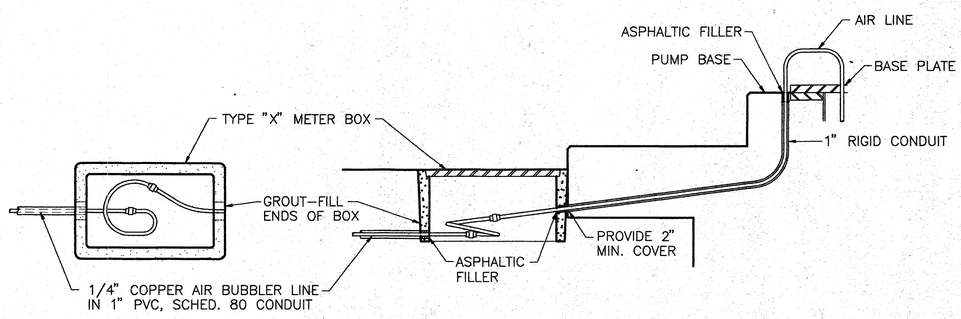
PUMP UNIT AND PIPING PLAN

SCALE: 1/2" = 1'-0"



SECTION B

SCALE: 1/2" = 1'-0"



PLAN

SECTION

AIR LINE DETAILS AT PUMP

NOT TO SCALE

LETTER	DESCRIPTION	DATE

CLIFFORD S. JAMILE REGISTERED PROFESSIONAL ENGINEER No. 2004-E HAWAII, U.S.A.

SIGNATURE DATE 3/3/93

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

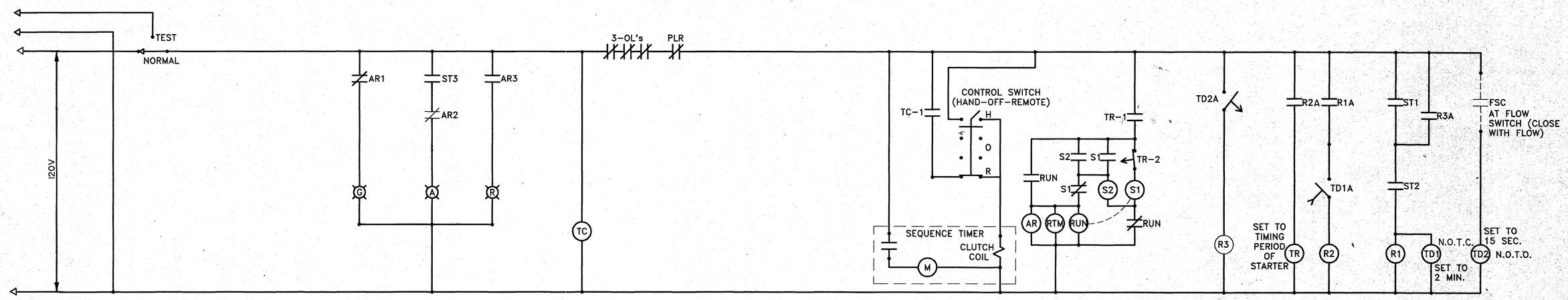
WARREN S. UNEMORI ENGINEERING, INC.
CIVIL & STRUCTURAL ENGINEERS/LAND SURVEYORS
WELLS STREET PROFESSIONAL CENTER, SUITE 403
2145 WELLS STREET, WAILUKU, MAUI, HAWAII 96793

VILLAGES OF LEIALI'I
IRRIGATION WELL, PUMP, CONTROLS AND APPURTENANCES
WAHIKULI, LAHAINA, MAUI, HAWAII

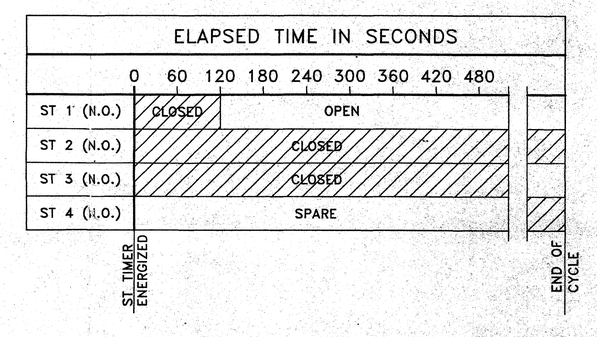
TITLE DEEPWELL SUBMERSIBLE PUMP & DISCHARGE LINE DETAILS

DESIGNED BY C.S.J.	CHECKED BY C.S.J.	JOB NUMBER 92012	SHEET 3
DRAWN BY C.S.J.	APPROVED BY C.S.J.		OF SHEETS
SCALE AS NOTED		DATE 2/25/93	

PROJECTS/92012/LEIPMP.DWG



PUMP CONTROL SCHEMATIC DIAGRAM



SEQUENCE TIMER (ST) BAR GRAPH

NOTE: READJUST TIME SETTINGS FOR PROPER OPERATION AS CALLED FOR BY ACTUAL FIELD CONDITIONS.

Starting:

Manual: HOR switch is placed in the "hand" position, energizing the sequence times ST, closing contacts ST1, ST2, and ST3. ST1 and ST2 energize relays R1 and TD1, closing contacts R1A and, after a time delay of up to 2 minutes, TD1A, which in turn energizes relay R2. TD1A is delayed to prevent premature restarting of the unit too soon after initially shutting down. Contact R2A closes, permitting the motor starter to start the pump via the TR (transfer) relay. Air in the pump column is vented to atmosphere through the air release valve as the pump comes up to speed. Water is now flowing into the discharge line, closing flow switch contact FSC, energizing relay TD2 closing contact TD2A, energizing relay R3, closing contact R3A "sealing" in relays R1 and TD1 after ST1 opens (120 seconds after energizing). If there was a malfunction with the pump unit, contact FSC would not close, and no "sealing" would take place, so that when ST1 opens, the unit would shut down to prevent further damage to the unit.

Auto: Time clock TC closes contact TC1 at the prescribed time, energizing sequence time ST. The balance of the starting sequence is the same as described in manual startup.

Stopping:

Manual: HOR switch is placed in "OFF" position, deenergized sequence time ST, opening contacts ST2 and ST3, shutting down the unit.

Auto: Time clock TC opens contact TC1 at the prescribed time, deenergizing sequence timer ST, opening contacts ST2 and ST3, shutting down the unit.

SEQUENCE OF OPERATION

LETTER	DESCRIPTION	DATE

CLIFFORD S. JAMIESON REGISTERED PROFESSIONAL ENGINEER No. 10046-E HAWAII, U.S.A.

SIGNATURE DATE 3/3/93

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

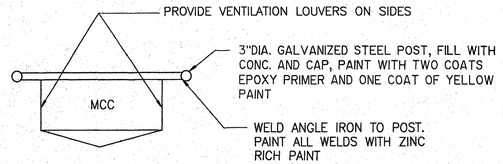
WARREN S. UNEMORI ENGINEERING, INC.
CIVIL & STRUCTURAL ENGINEERS/LAND SURVEYORS
WELLS STREET PROFESSIONAL CENTER, SUITE 403
2145 WELLS STREET, WAILUKU, MAUI, HAWAII 96793

VILLAGES OF LEIALI'I
IRRIGATION WELL, PUMP, CONTROLS AND APPURTENANCES
WAHIKULI, LAHAINA, MAUI, HAWAII

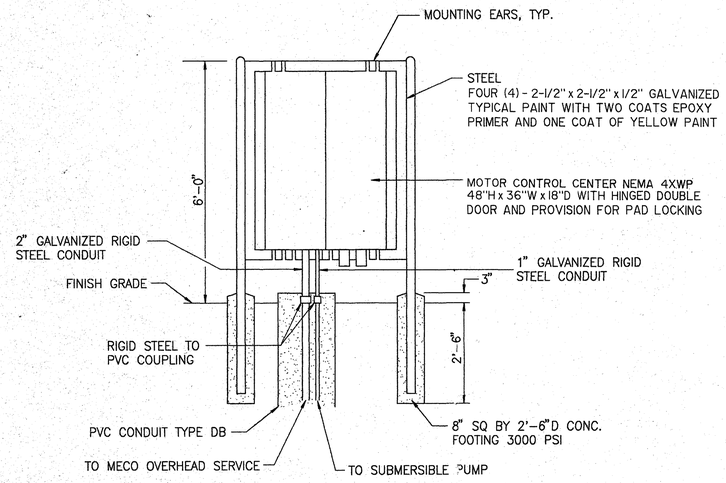
TITLE PUMP CONTROL SCHEMATIC DIAGRAM

C.S.J. DESIGNED BY	C.S.J. CHECKED BY	92012 JOB NUMBER	4 SHEET
C.S.J. DRAWN BY	C.S.J. APPROVED BY		OF SHEETS
SCALE AS NOTED		DATE 2/25/93	

PROJECTS/92012/PUMPCON.DWG



PLAN



ELEVATION

MOTOR CONTROL CENTER

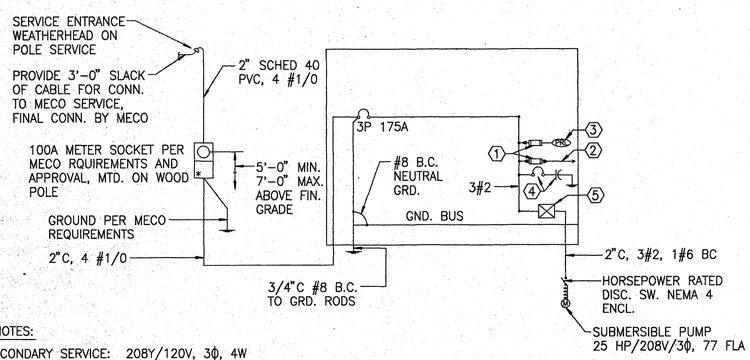
NOT TO SCALE

SCHEDULE OF INSTRUMENTS

1. FUSE HOLDER WITH FUSE, 600V; SIZE BY MANUFACTURER. QUANTITY AS REQUIRED.
2. TO CONTROL CIRCUIT.
3. PHASE REVERSAL/LOSS RELAY, SEE SPECS.
4. CAPACITOR AND CAPACITOR CIRCUIT BREAKER AND WIRING PER PUMP MOTOR MANUFACTURER'S RECOMMENDATION.
5. REDUCED VOLTAGE COMBINATION STARTER; NEMA SIZE 3.

NOTES:

1. CONTROL SEQUENCE TIMER AND BACKSPIN TIMER SHALL BE MOUNTED IN A REMOTE CABINET FROM THE PUMP STARTER CABINET AND SHALL BE PANEL MOUNTED WITH RUBBER BUSHING TYPE INSULATORS TO ABSORB SHOCKS, JOLTS, ETC., AND STILL OPERATE PROPERLY.



GENERAL NOTES:

A. SECONDARY SERVICE: 208Y/120V, 3ϕ, 4W VERIFY Isc REQUIREMENTS WITH MECO.

B. * INDICATES PROVISIONS FOR MECO SEAL.

ONE-LINE DIAGRAM, WELL SITE

NOT TO SCALE

LETTER	DESCRIPTION	DATE

CLIFFORD S. JAMILE REGISTERED PROFESSIONAL ENGINEER No. 2004-E HAWAII, U.S.A.

SIGNATURE DATE 3/3/93

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

WARREN S. UNEMORI ENGINEERING, INC.
CIVIL & STRUCTURAL ENGINEERS/LAND SURVEYORS
WELLS STREET PROFESSIONAL CENTER, SUITE 403
2145 WELLS STREET, WAILUKU, MAUI, HAWAII 96793

VILLAGES OF LEIALI'I

IRRIGATION WELL, PUMP, CONTROLS AND APPURTENANCES

WAHIKULI, LAHAINA, MAUI, HAWAII

TITLE MISCELLANEOUS DETAILS

C.S.J. DESIGNED BY	C.S.J. CHECKED BY	92012 JOB NUMBER	5 SHEET
L.C.O. DRAWN BY	C.S.J. APPROVED BY	2/25/93 DATE	OF SHEETS
SCALE AS NOTED			

PROJECTS/92012/ELECDET1.DWG

Irragation Well, pump, Controls
and Appurtenances

Roscoe Moss Hawaii, Inc.

Making Water Work For Hawaii Since 1965

VILLAGES OF LEIALI'I

Irragation Well, pump, Controls
and Appurtenances

Operation and Installation

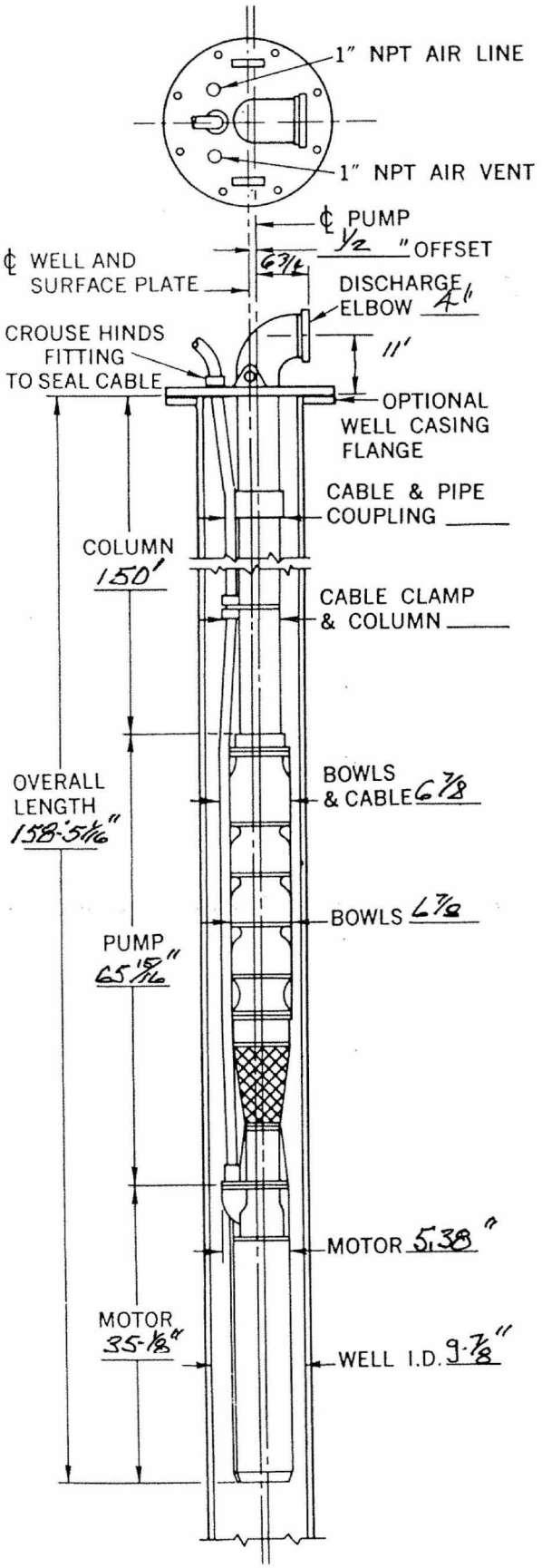
Manuals for Pump and Controls

Contractor Roscoe Moss Hawaii, Inc.

Byron Jackson Pump Division
BORG-WARNER CORPORATION

SUBMERSIBLE OUTLINE

STANDARD WELL SEAL CONSTRUCTION



DATE 10 OCTOBER 1993

NAME OF CUSTOMER STATE OF HAWAII

IRRIGATION WELL

PROPOSITION NO. LEIALI'I VILLAGE

ORDER NO. _____

PURCHASE ORDER NO. _____

NO. OF UNITS ONE

SURFACE PLATE 16" O.D. 1 1/4 TH'K

8–7/8" FOUNDATION HOLES. STR. ℄ ON 14 1/4" B.C.

4 "–8 T.P.I. –3/4" TAPER T&C ST'D. COLUMN

4" "–150# F.F. (STEEL) DISCHARGE FLANGE

BOWL ASSEMBLY 6MQL / 6 STGS.

25 H.P. 3450 RPM **B. J.** SUBM. MOTOR TYPE _____

6 SIZE 3 PH. 60 CYCLE 200 VOLT

200 GPM 340 TDH

CABLE SIZE #2 VOLTAGE 600 LENGTH 160

REMARKS: _____

DO NOT USE FOR CONSTRUCTION UNLESS CERTIFIED

JOB NO. _____ **PROP. NO.** _____

CERTIFIED CORRECT _____ **DATE** _____

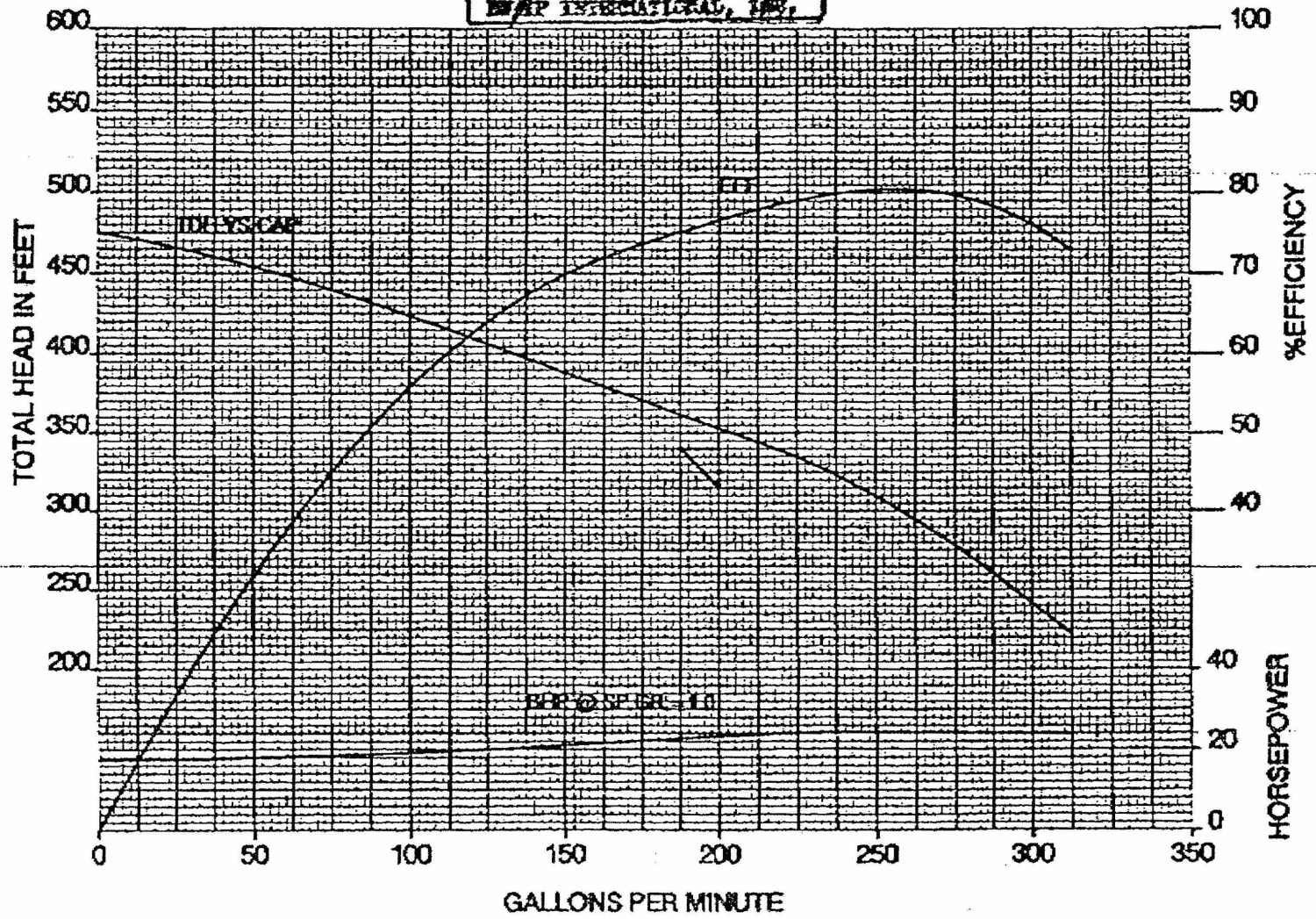
BW/IP International, Inc.

BYRON JACKSON Products

IMPELLER LIFT 1/4"

8" COLUMN TAP

CERTIFIED CORRECT
BY: Jana Bro
TEST ENGINEER
BW/IP INTERNATIONAL, INC.



Pump Size & Type		RPM	Imp. Number	Vanes	Diameter	Impeller	Stages
6MQ LS SUBM.	6 STG. H1 L5	3450	170250VE	6	FULL	STD. #1.5	1H
			170251VE	5	FULL	STD. #1.5	5L
Date By: RW		Date: 22 APR 94					
Data By: RW							

Factory No.	Customer No.	Item No.	Imp. Material	Motor H.P.	Curve No.
94-WR-0005			VE	50	6MQ-206
			Case Material: LY		

BW/IP International, Inc.

PUMP TEST DATA

BYRON JACKSON Products

PUMP SIZE AND TYPE					
6MQ LS SUBM.				6 STG. H1 L5	
IMPELLER DRAWING	DIAMETER	VANES	UNDER FILE	STGS.	
170250VE	FULL	6	STD. #1.5	1H	
170251VE	FULL	5	STD. #1.5	5L	

GUARANTEED PUMPING CONDITIONS	R.P.M.	CAPACITY	T.D.HEAD	PUMP EFF.	OVERALL EFF.	NPSH	SP.GR.
FIELD SPEED	3450	200	340	75.0%			1.0
TEST SPEED	2P/60HZ						.9966

DIFFERENTIAL VELOCITY HEAD FOR 8 INCH I.D. COLUMN EQUALS .64 FEET AT 1000.0 G.P.M. 9966

TEST MOTOR NO. 150 - 50 H.P. 2 POLES 460 VOLTS

MOTOR EFF. 5/4 4/4 3/4 1/2 1/4

BAROMETRIC PRESSURE IN. HG. TEST WATER TEMP. 80.0 IN DEG. F.

TESTED BY- RW

WITNESSED BY-

FOR- Lelah Pump

CUSTOMER'S ORDER NO.-

ITEM NO.- JOB NO.- 94-WR-0005

NOTES- Impeller lift = 1/4"

READING NO.	PUMP SPEED R.P.M.	DISCHARGE HEAD GAUGE USED T300 PSI READ	PSI CORRECTED	FEET OF WATER	ELEVATION HEAD	DIFFERENTIAL VELOCITY HEAD	TOTAL DYNAMIC HEAD IN FEET OF WATER	CAPACITY MEASURED WITH 4" MAGNETIC FLOWMETER READ	G.P.M.	POWER WATER HORSE POWER	BRAKE HORSE POWER	WATT METER READING	KILOWATTS INPUT	B.H.P. SP.GR. 1.0000	PUMP EFFICIENCY
1	3560.0	215.4	215.4	499.3	6.46	.00	505.7		.0	.0	19.0	24.2	19.5	19.0	.0
2	3557.0	205.6	205.6	476.6		.00	483.0		51.0	6.2	19.7	24.9	20.0	19.7	31.5
3	3553.0	191.7	191.7	444.3		.01	450.8		101.0	11.5	20.8	26.0	20.9	20.9	55.1
4	3550.0	175.8	175.8	407.5		.01	414.0		151.0	15.7	22.7	27.9	22.4	22.8	69.3
5	3546.0	159.4	159.4	369.5		.03	376.0		201.0	19.0	25.0	30.2	24.3	25.1	76.1
6	3542.0	146.3	146.3	339.1		.04	345.6		239.0	20.8	26.1	31.3	25.2	26.2	79.6
7	3542.0	122.6	122.6	284.2		.05	290.7		284.0	20.8	26.1	31.3	25.2	26.2	79.6
8	3543.0	98.0	98.0	227.2		.07	233.7		321.0	18.9	25.9	31.1	25.0	26.0	72.9
9															
10															
11															
12															
1	DATA COMPUTED TO A CONSTANT SPEED OF 3450 RPM						475.0		.0					17.3	.0
2							454.4		49.5					18.0	31.5
3							425.0		98.1					19.1	55.1
4							391.0		146.7					20.9	69.3
5							356.1		195.4					23.1	76.1
6							327.9		232.8					24.2	79.6
7							275.8		276.6					24.2	79.6
8							221.6		312.6					24.0	72.9
9															
10															
11															
12															

DATE OF TEST: 22 APR 94 PUMP SERIAL NO. 94-WR-0005 T-6MQ-206

VILLAGES OF LEIALI'I

Irrigation Well, Pump, Controls and Appurtenances

Motor Control Center

Solid State Reduced Voltages Starter, 25HP, 208 volts/3-phase/60Hz

Includes: Saftronics #EZ-80 Solid State Reduced Voltage Starter
Includes: By-pass Contractor, Circuit Breaker
Replaces: Reduced Voltage Auto Transformer Starter

GE #SRBA120A10A Smart Relay
Replaces: Eagle Sequence Timer, Timedelay Relays TD1, TD2, TR, Relays R1, R2, R3, and AR

GE #65L808TN Power Capacitors
Includes: 3-fuses and Thermal Magnetic Circuit Breaker

Paragon #EC7000 Timeclock

Yokogawa #240 211 AAAB Elapsed Time Meters

Timemark #B265 3-Phase Power Monitor

Control Switches International Inc #61025 HOA Switch

GE #PLT32 Pilot Lights

Enclosure 48" x 36" x 18"
Includes: Surface Mount, Hinged-Double Door, Removable Center Post, Louvers on Side with Deflection Baffles, 12 Gauge Steel White Back Panel, Provisions for Locking.

*The GE Smart Relay will be mounted in the Motor Control Center as part of the complete control package.

Submitted by: Clemco Pacific

UNIT OPERATION

JOB NAME: VILLAGES OF LEIALI'I
IRRIGATION WELL PUMP CONTROLS

The following is a sequence of events for pump control:

MANUAL MODE
HOR switch is placed in the "HAND" position energizing timedelay #1 after a specified time period AUX 1 is energized this energizes AUX 4 which starts a back spin timer when back spin timer closes it energizes AUX 5 which then closes OUTPUT 1 permitting the starter to start the pump. Water is now flowing into the discharge line closing the flow switch contact. Timedelay 3 is then energized and once time out energizes AUX 6 sealing around AUX 1 which opens with timedelay #1 timing out

SHUT DOWN MODE
Flow switch opens de energizing AUX 6 which de energizes AUX 4 which in turn de energizes AUX 5 which feeds the OUTPUT 1 contact shutting the pump down.

AUTO MODE
With the HOR switch in the "REMOTE" position time clock TC closes contact TC at the prescribed time energizing AUX 2 which energizes timedelay 2 after a specified tine period AUX 3 which energizes AUX 4. The balance of the start up sequence is the same as described in the manual startup.

STARTER PRODUCT GUIDE

EZ6 SPECIFICATIONS:

- Universally Source Matched 200 to 600VAC, 45 to 65Hz
- 7½ to 1000HP (5 to 750kW)
- Ambient Temperature (operating) 0 to 40°C
- Control Voltage 120VAC, 45 to 65Hz
- Overload Capacity 600% for 6 seconds, 500% for 30 seconds, 125% continuous
- U.L. listed and CSA* approved

EZ6 STANDARD FEATURES:

- Dual Starting Mode: Current Limit or Current Ramp
- Instantaneous Overcurrent Trip (900% FLA)
- Class 20 Electronic Thermal Overload
- Class 10 Bimetallic Thermal Overload
- Heatsink overtemperature detection and shutdown
- Shorted SCR detection, lockout and annunciation
- Fault Relay Output Form C Rated 10A at 220VAC
- Run Relay (Latching) Contact N.O. Rated 10A at 220VAC
- Phase Loss Detection, Shutdown and Lockout
- 1600V PIV SCR's with MOV Surge Suppressors
- Adjustable Jog Voltage
- Common Control Board
- Diagnostic LED's to indicate
  - Control Power
  - Line Power
  - Healthy SCR's
  - Phase Locked Loop
  - Motor Overload (Electronic)
  - Instantaneous Overcurrent
  - Ready to Run
  - Running (Starter Latched)
  - Starter ON (Output is present)

*All ratings except 40, 80 and 125

SAFTRONICS

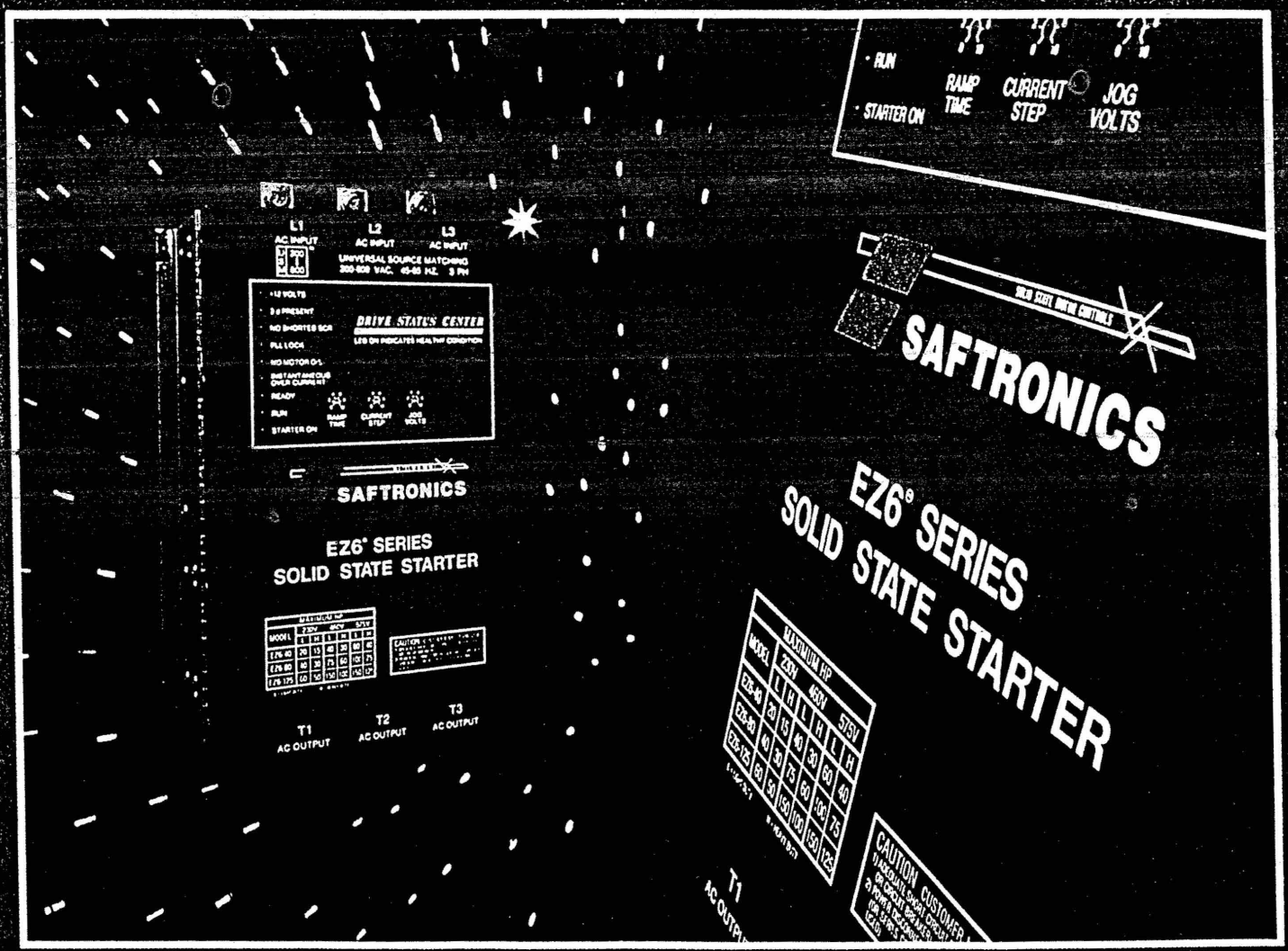
EZ 6™

SOLID STATE REDUCED VOLTAGE STARTERS

Duty Matched International Series of Solid-State Reduced Voltage Starters for Induction Motors from 7½ HP-1000 HP (5kW-750kW) 200-600 VAC 50/60Hz with Universal Source Matching.™

UNIVERSAL SOURCE MATCHING

- 200V
- 200V 50Hz Japan
- 208V 60Hz USA
- 230V 60Hz USA
- 380V 50Hz Europe
- 415V 50Hz UK
- 460V 60Hz USA
- 575V 60Hz Canada
- 600V



EZ 6™ SELECTION CHART

HEAVY DUTY (HD) (600% FOR 30 SECS.)					
HP	200V	230V	380V/415V	460V	575V
7½	EZ6-40	EZ6-40	EZ6-40	EZ6-40	EZ6-40
10	-40	-40	-40	-40	-40
15	-80	-40	-40	-40	-40
20	-80	-80	-40	-40	-40
25	-80	-80	-40	-40	-40
30	-125	-80	-80	-40	-40
40	-125	-125	-80	-80	-40
50	-180	-125	-80	-80	-80
60	-180	-180	-125	-80	-80
75	-240	-180	-125	-125	-80
100	-360	-240	-180	-125	-125
125	-360	-360	-240	-180	-125
150	-500	-360	-240	-180	-180
200	-800	-500	-360	-240	-240
250	-800	-800	-360	-360	-240
300	-800	-800	-500	-360	-360
400	—	—	-800	-500	-500
500	—	—	-800	-800	-500
600	—	—	—	-800	-800
700	—	—	—	—	-800
800	CONSULT FACTORY				
900	CONSULT FACTORY				
1000	CONSULT FACTORY				

LIGHT DUTY (LD) (350% FOR 30 SECS.)					
HP	200V	230V	380V	460V	575V
7½	EZ6-40	EZ6-40	EZ6-40	EZ6-40	EZ6-40
10	-40	-40	-40	-40	-40
15	-40	-40	-40	-40	-40
20	-80	-40	-40	-40	-40
25	-80	-80	-40	-40	-40
30	-80	-80	-40	-40	-40
40	-80	-80	-80	-40	-40
50	-125	-125	-80	-80	-40
60	-125	-125	-80	-80	-40
75	-180	-180	-80	-80	-80
100	-240	-180	-125	-125	-80
125	-240	-240	-180	-125	-125
150	-360	-240	-180	-125	-125
200	-500	-360	-240	-180	-180
250	-500	-500	-240	-240	-180
300	—	-500	-360	-240	-240
400	—	—	-500	-360	-360
500	—	—	-500	-500	-360
600	—	—	—	-500	-500
700	—	—	—	—	-500
800	CONSULT FACTORY				
900	CONSULT FACTORY				
1000	CONSULT FACTORY				

Ensure load is suitable for light duty start.

EZ 6™ DIMENSIONS

SIZE EZ6-	KITS Dimensions L" x W" x D" (MM)	CHASSIS Dimensions L" x W" x D" (MM)	NEMA 1/NEMA 12* Dimensions L" x W" x D" (MM)
40 to 125	18" x 11⅛" x 8⅜" 457 x 286 x 222	18" x 11⅛" x 8⅜" 457 x 286 x 222	Consult Factory
180	14½" x 19" x 10" 368 x 483 x 254	27" x 21" x 12" 686 x 533 x 305	30" x 24" x 16" 762 x 610 x 406
240 to 360	17½" x 20" x 10¾" 445 x 508 x 273	33" x 27" x 12" 838 x 686 x 305	36" x 30" x 16" 914 x 762 x 406
500	18¼" x 23" x 12½" 464 x 584 x 318	45" x 33" x 14½" 1143 x 838 x 368	48" x 36" x 16" 1219 x 914 x 406
800	21" x 26" x 15½" 533 x 660 x 394	Consult Factory	60" x 36" x 20" 1524 x 914 x 508

*Blown & filtered

Dimensions of enclosed units apply to basic starter. Enclosure could be larger when options are supplied.

NOTE:

UL listed under file E121753

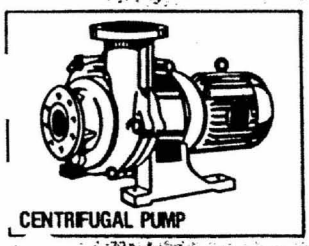
CSA approved Heavy Duty Ratings only under file LR60954

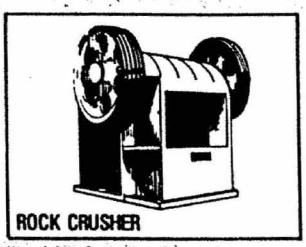
EZ 6™ WITH MORE STANDARD FEATURES TO PROVIDE SMOOTH, JOLT-FREE STARTING IN ALL INDUSTRIAL AND MINING APPLICATIONS.

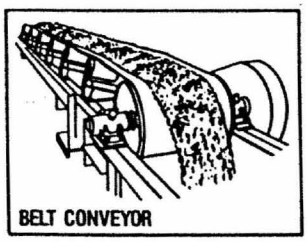
DUTY-MATCHED AVAILABLE IN TWO BASIC OPERATION MODES TO PROVIDE OPTIMUM PERFORMANCE FOR DIFFERENT APPLICATIONS.

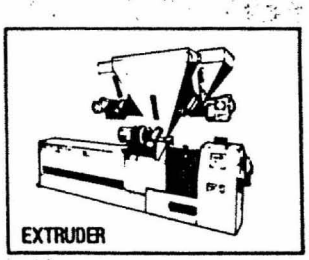
Constant Current Mode
Provides up to 400% starting current for inertia only loads, variable torque applications or where it is desirable to reduce starting currents on weak supply lines.

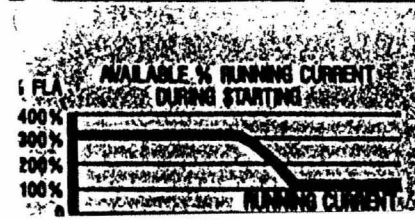
Step-Ramp Mode
Provides up to 500% starting current for high starting torque requirements and high friction loads.


CENTRIFUGAL PUMP

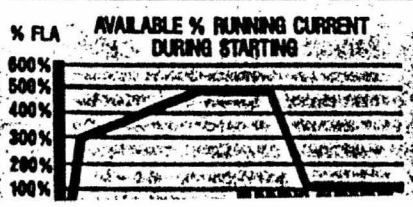

ROCK CRUSHER


BELT CONVEYOR


EXTRUDER



APPLICATIONS:
- Band Saws, Chippers
- Fans, Pumps
- Punch Presses
- Centrifuges
- Hammer Mills



APPLICATIONS:
- Conveyors
- Extruders
- Mixers
- Positive Displacement Pumps
- Cranes and Hoists

EZ 6™ STARTER WITH U S M 200 t 600 ™

EZ 6™ Solid-State Reduced Voltage Starters with U S M 200 t 600 ™ contain 6 SCR's (Silicon Controlled Rectifiers), to control the current supplied to an induction motor. The SCR's are connected in 3 back to back pairs, phase controlled over 180° of each cycle of power line frequency by a Phase Locked-Loop Digital Firing Circuit containing the Saftronics Sync Ramp which requires no customer adjustment. Since a motor's torque varies as the square of applied current, EZ 6™ starters can be programmed to provide a gradual build-up of torque from a low value up to almost full motor locked rotor torque capability, to provide gentle, jolt-free starting of any induction motor. In addition, for light load applications such as pumps and fans, they can be programmed to limit peak starting currents to a constant low value, and so prevent excessive voltage drops during motor starting. EZ 6™ starters come in 6 basic formats to provide soft starting of AC motors as well as solid-state reversing. They are available in OPEN, NEMA1 (IP10), NEMA 12 (IP52), NEMA 4 (IP56) and NEMA 3R (IP41) enclosures and are applicable to squirrel cage, wound-rotor and synchronous motors from 7½ HP (5kW) to 1000HP (750kW). Saftronic's unique U S M 200 t 600 ™ incorporates the following standard features:

- Operates on any source voltage between 200 volts and 600 volts
- Operates on any frequency between 45Hz and 65Hz
- It is phase rotation insensitive

SPECIFICATIONS

- **Power Ranges:** 7½HP-1000HP (5kW-750kW) 200V-600V 50/60Hz
- **Voltage Classes:** U S M 200 t 600 ™ 200V-600Volts
- **Input Frequency Range:** 45-65Hz
- **Ambient Temperature:** 0-40°C at rated current
- **Maximum Altitude:** 3300 ft (1000m)
- **Control Voltage:** 120 VAC, 50VA
- **Overload Capacity:** Light Duty: 100% continuous, 350% for 30 seconds; Heavy Duty: 115% continuous, 500% for 30 seconds
- **Fault Relay:** Form C 10 AMP 220 VAC
- **Run Relay:** N.O. contact 10AMP 220VAC

PROTECTION FEATURES:

- Phase loss — Will not start under single phase conditions.
- Class 20 Electronic Overload Protection matched to motor current (1)
- Class 10 Thermal Overload Relay (2)
- Instantaneous Overcurrent Trip
- Large MOV Surge Suppressors across each SCR pair
- Heatsink Overtemperature Switch
- Shorted SCR detection and lock-out

ADJUSTMENTS

Step Ramp Mode	Constant Current Mode	Jogging
Current Step	Current Step	Jog Voltage
Ramp Time		

EZ 6™ FEATURES

- Sized and priced according to current ratings only. Only 8 sizes cover the entire range 7½HP (5kW) at 200V to 1000HP (750kW) at 575V.
- Each size available with U S M 200 t 600 ™ for world wide capability. The EZ 6™ Starter automatically adjusts itself to whatever input voltage and frequency is applied between 200V to 600Volts and 45Hz-65Hz irrespective of phase rotation.
- All sizes have SCR's with a minimum rating of 1600 volts
- Sizes EZ 6-40 through EZ 6-125 are suitable for MCC mounting
- Common Control Board — Only one control board is used for all 8 sizes
- Instantaneous Overcurrent Circuit — Minimizes possibility of fuse blowing under output short-circuit conditions during starting.
- **LED Diagnostic Indication for E-Z Trouble-Shooting**
  - — +12V power supply
  - — All phases present
  - — Shorted SCR indication (In Off state only)
  - — Phase lock loop circuit in lock
  - — Motor overload circuit
  - — Instantaneous overcurrent
  - — Ready
  - — Run
  - — Starter On
  - — Individual SCR "Shorted" or "Firing" indication

EZ 6™ FEATURES

Separately Adjustable Jog Voltage

Separate adjustment provides a fixed, reduced voltage step to the motor to give smooth, instant low-speed jogging to improve drive performance in positioning applications.

Electronic Overload Protection

1. Class 20 Inverse Time Electronic Motor Overload Protection (1)
Precision Class 20 thermal overload circuit, matched to Nema-sized motors, provides excellent, nuisance-trip-free protection for most applications (See Fig. 1). The correct overload characteristic is selected when the motor nameplate current rating is entered into the starter. The thermal overload trip shuts down the EZ-6™ and in addition, provides a contact (N.O. or N.C.) output, to trip shunt trip on a circuit breaker, or a series contactor.

Class 10 Thermal Overload Relay (2)

Easy Setup Procedure

No calibration resistors required

Fault Relay

One Form "C" contact (N.O./N.C.) is used to activate a circuit breaker shunt trip, or to drop out a series contactor in the event of one or more of the following faults:

— Electronic overload trip

— Instantaneous overcurrent

— Presence of shorted SCR in "OFF" condition

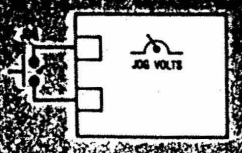
Short Circuit Protection

As with any starter the N.E.C. (Sect. 430-D) requires short circuit protection, which can be supplied as an option. See Fig. 2A & 2B.

Options:

- Tach feedback for linear accel/decel irrespective of load
- Mounted and wired in-line contactor
- Mounted and wired by-pass contactor
- Overload bypass during ramp up for high inertia loads
- Combination starter using fusible disconnect or circuit breaker
- Energy Saving Option
- DC Injection Dynamic braking
- Phase rotation detection and lockout
- Synchronous motor soft start and jogging
- FWD/REV synchronous jogging adjustable from 2% to 15% of motor speed
- Static Reversing with adjustable plug braking
- Soft Start and Soft Stop, with Kick start for pumping applications to reduce waterhammer
- Wound-rotor motor Soft Starting
- Dual speed motor Soft Start
- Variable voltage control for heater and torque motor applications

Many other options available



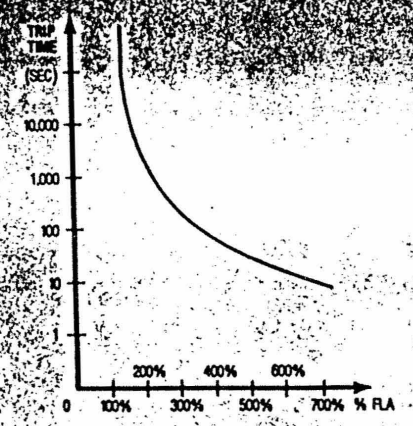


FIG. 1 EZ 6 Electronic Overload Characteristic

Short Circuit Protection

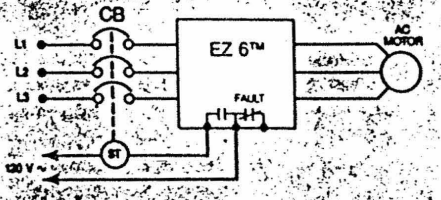


FIG. 2A
Optional Circuit Breaker with Shunt Trip

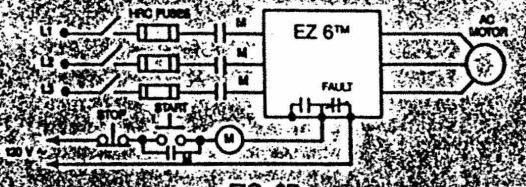


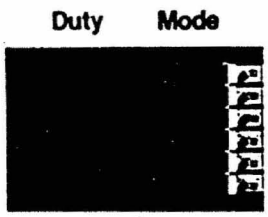
FIG. 2B
Optional Fused Disconnect with Inline Contactor

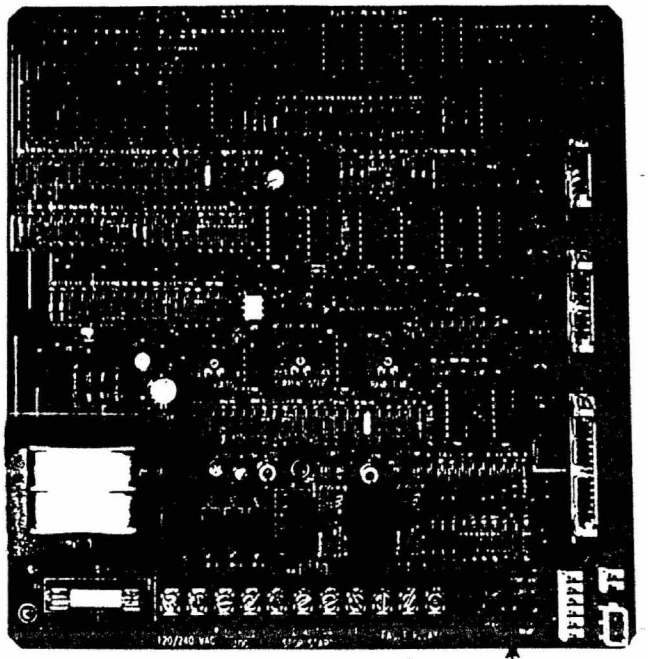
Motor Selection

It is important to select motors with good [illegible] provide optimum torque/amperes. For [illegible] Nema-Type Motors up to 200 HP. Above 200 HP [illegible] capacity of 180-220% [illegible] breakdown torque [illegible] Wound rotor motors [illegible] by-pass contactor [illegible] "Special" motors [illegible] only provide 60% [illegible] [illegible]

EZ 6 SET UP PROCEDURE - IT'S EASY AS 1-2-3

STEP 1 Set starting mode



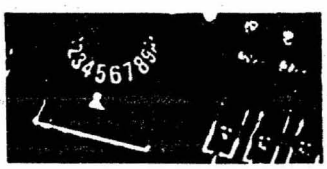


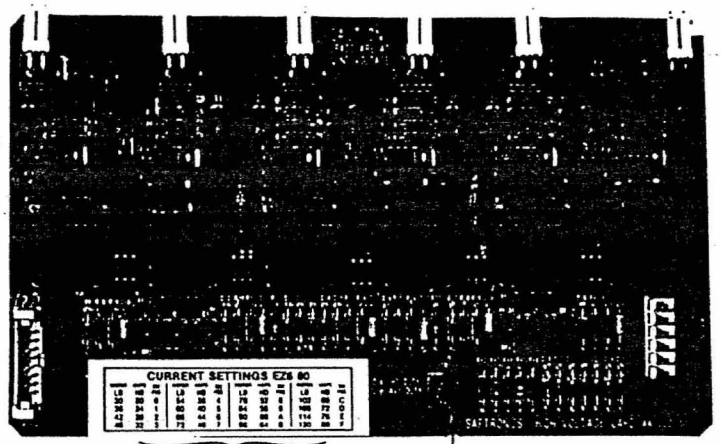
STEP 2 Select motor nameplate current

Read motor nameplate current
(For example 60A)

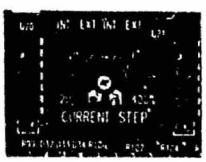
Look up setting corresponding to
60A in the table next to switch 1
on high voltage P.C. board (position 5)

Set switch to
position 5

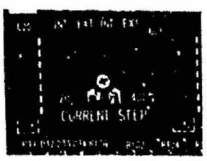




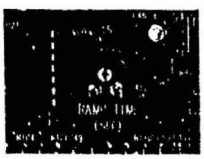
STEP 3 Set starting conditions



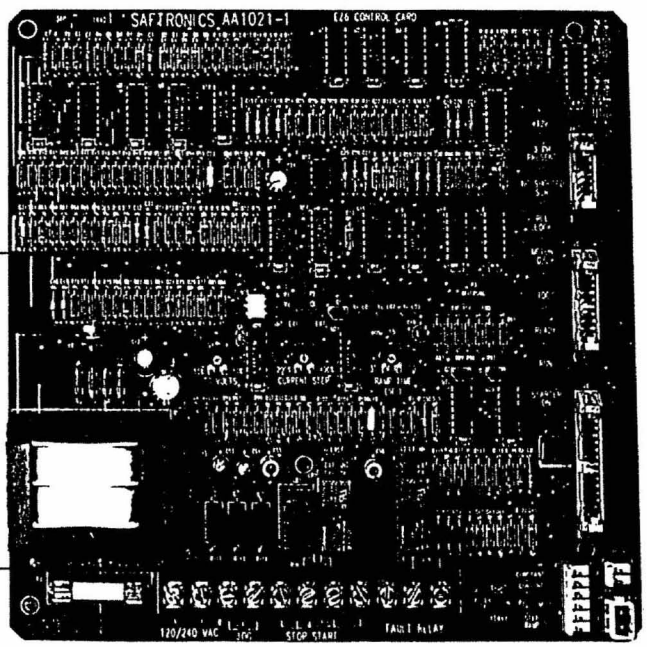
FOR CONSTANT CURRENT
(A) Set starting current
(usually 300% FLA)



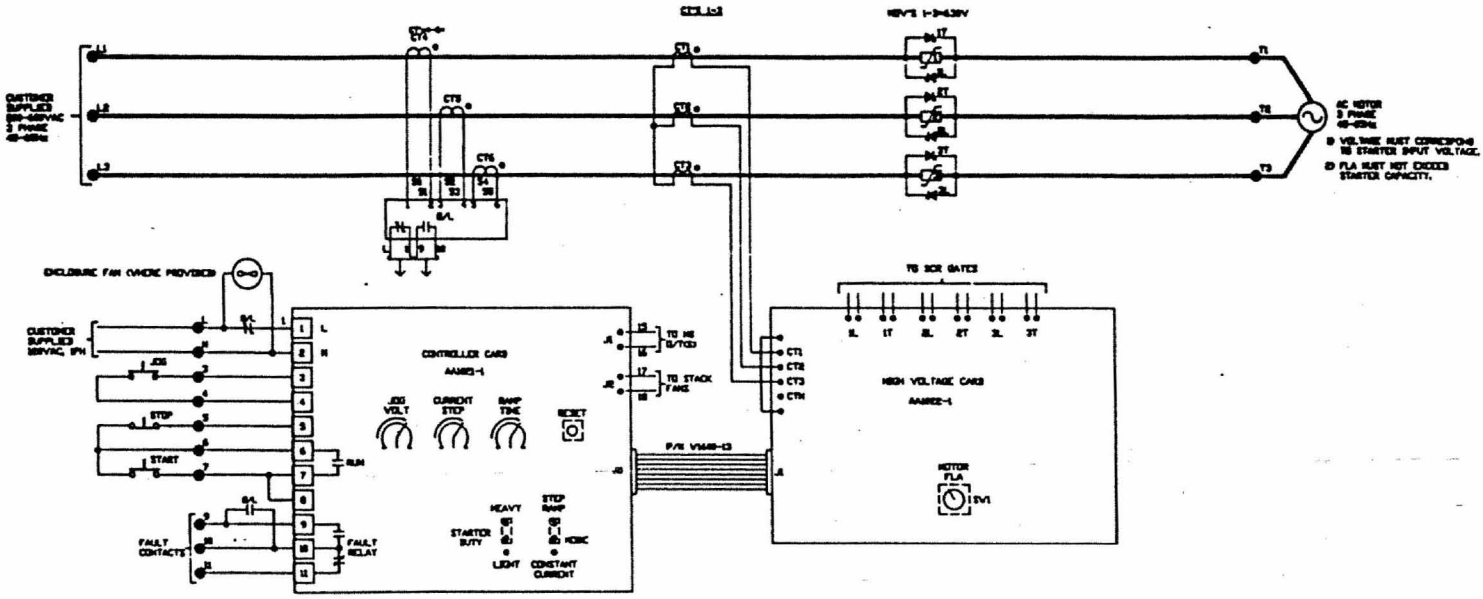
FOR STEP RAMP MODE
(A) Set current step
(usually 350% FLA)



(B) Set ramp time
(usually 6-10 Secs)



TYPICAL EZ 6" CONNECTION DIAGRAM



Other Products From Saftronics:

- DC Drives 1/4 HP-2000HP (0.182kW-1500kW)
- Brushless Motors and Drives
- DC Drive Systems
- AC Variable Frequency Drives 1-800HP (0.75-600kW)
- DC/DC Choppers
- Customized Control Products
- Mining Vehicle Controls
- DC Injection Brakes for AC Motors

Specification subject to change without notice.

SAFTRONICS Inc.
5580 Enterprise Pkwy., Fort Myers, Florida 33905
Telephone (813) 693-7200
Toll Free: 1-800-533-0031
Fax: (813) 693-2431

SAFTRONICS B.V.
Groot Terkooyen #3
5531 NV Bladel, Holland
Telephone: 011-31-4977-83225
Fax: 011-31-4977-84319

12/91 REV
P/N X030005

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SAFTRONICS

SUGGESTED
EZ6 SERIES
Spare Parts

STARTER PRODUCT GUIDE

Size	Part Number	Description	Qty. Used	Qty. Sugg.	List Ea.
40	A1AA1021B	Control Board EZ6-40/80/125	1	1	$ 600.00
	A1AA1022A	High Voltage Board EZ6-40	1	1	283.00
	N10SP06A	SCR Module	3	1	150.00
	W1600-13	Ribbon Cable 13 inch	1	1	18.00
	T5004-01	Current Transformer 1500:1	3	1	27.00
	S523002-03	Overtemp Sensor 85°C	1	1	20.00
	O210050	MOV 630V 20mm	3	3	4.50
80	A1AA1021B	Control Board EZ6-40/80/125	1	1	600.00
	A1AA1022B	High Voltage Board EZ6-80	1	1	283.00
	N20SP10	SCR Module	3	1	285.00
	W1600-13	Ribbon Cable 13 inch	1	1	18.00
	T5003-02	Current Transformer 2500:1	3	1	52.00
	S523002-03	Overtemp Sensor 85°C	1	1	20.00
	O210050	MOV 630V 20mm	3	3	4.50
	G010001	Fan 4.0 inch 115VAC	2	1	53.00
125	A1AA1021B	Control Board EZ6-40/80/125	1	1	600.00
	A1AA1022C	High Voltage Board EZ6-125	1	1	283.00
	N20SP08	SCR Module	3	1	475.00
	W1600-13	Ribbon Cable 13 inch	1	1	18.00
	T5003-02	Current Transformer 2500:1	3	1	52.00
	S523002-03	Overtemp Sensor 85°C	1	1	20.00
	O210050	MOV 630V 20mm	3	3	4.50
	G010001	Fan 4.0 inch 115VAC	2	1	53.00
180	A1AA1021T	Control Board EZ6 180 thru 1250	1	1	600.00
	A1AA1022D	High Voltage Card EZ6-180	1	1	283.00
	N728452	SCR, Puck Type	6	3	225.00
	W1600-04	Ribbon Cable 4 inch	1	1	16.00
	T5003-02	Current Transformer 2500:1	3	1	52.00
	T300001	Current Transformer 250:5	3	1	60.00
	S523002-03	Overtermp Sensor 85°C	3	1	20.00
	O210050	MOV 630V 20mm	3	3	4.50
	G010001	Fan 4.0 inch 115V	3	1	53.00

SAFTRONICS Inc.

EFFECTIVE: 21 JUN 90
SUPERSEDES: 15 MAY 90

SAFTRONICS EZ6 SERIES
AA1024 BY-PASS CONTACTOR CARD

1. DESCRIPTION

AA1024 Card has been designed to be used in conjunction with the EZ6 starter to control a by-pass contactor, which is used in applications requiring a non-ventilated enclosure. The by-pass contactor eliminates the heat generated by the SCR's by carrying the motor current after the motor has reached full speed.

When start is initiated, LED "Run" comes "ON" and the EZ6 accelerates the motor in the normal mode. After an adjustable time delay, LED "By-Pass" comes "ON" and the by-pass contactor is energized shorting out all SCR's.

When stop is commanded, the by-pass contactor opens immediately and after a fraction of a second delay, the SCR's are turned off.

2. SPECIFICATIONS

2.1 Power - all power required is supplied by the EZ6 AA1021 controller card.

2.2 Operator Devices - supplied by customer
- -Start/stop pushbuttons for 3-wire control
- -Run contact or On/Off selector switch for 2-wire control
- -Fault interlock (or motor overtemperature switch)

2.3 Output Contact - N.O., dry contact rated at 5A, 220VAC.

3. SET-UP

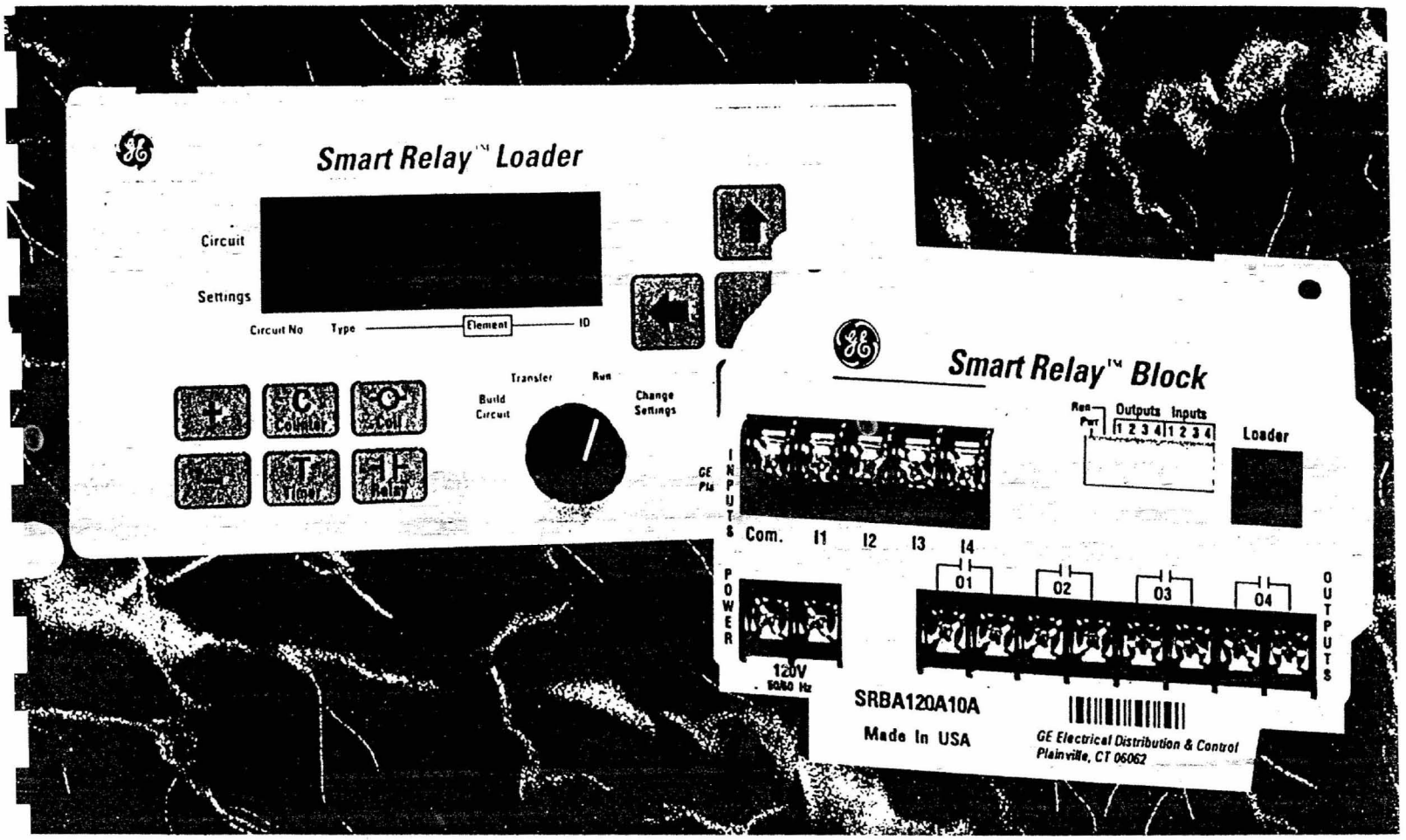
The AA1024 Card has a single adjustment, RV1 "By-Pass Delay". As initial setting, adjust RV1 to 90 seconds, i.e. fully CW. When the motor is started, time the acceleration and readjust RV1 to the measured time plus 10 seconds.

Note: A current surge will occur if the by-pass contactor is energized before the motor is at full speed.

4. DIAGRAMS

Drawing DCN035 shows the typical connection diagram of an EZ6 starter with the by-pass contactor option. Refer to the specific job drawing for exact connection diagram.

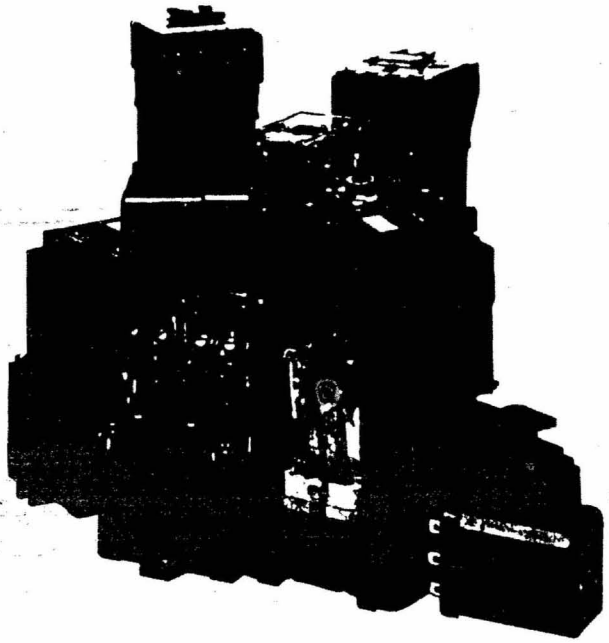
Smart Relay™ Industrial Control Product Line



One Smart Relay

- *Easy* • *Compact*
- *Powerful* • *Economical*

Introducing a new concept for control circuits

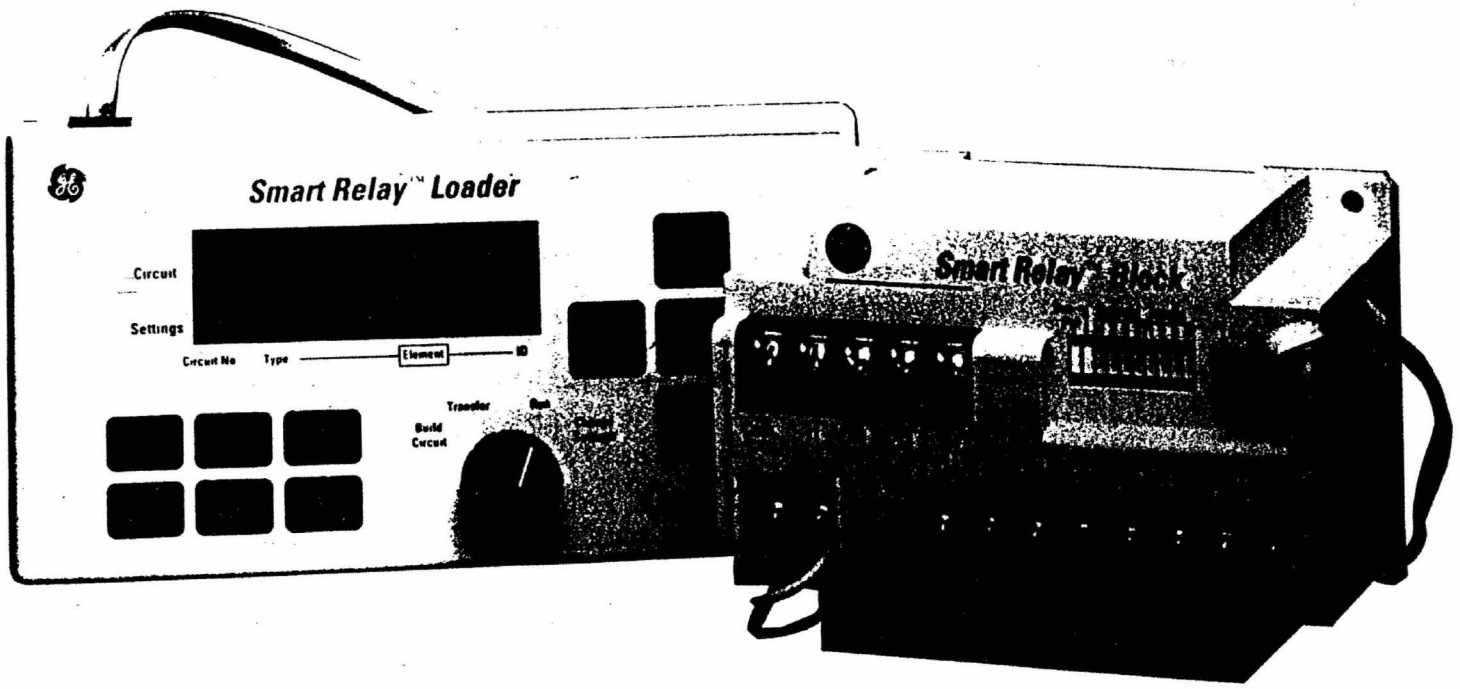


Out of the past

Conventional control circuitry components have always had inherent disadvantages. They require complicated and time-consuming wiring, expansive and expensive panel space, and cumbersome and costly product inventories. Translation: they do the job, but create headaches and hassles when being installed or modified.

Into the future

Now there's a better alternative: the Smart Relay™ Industrial Control Product Line. In most applications, *it eliminates the need for multi-function relays, timers and counters!* Compared to the conventional control circuitry it replaces, the Smart Relay product line is easier, smaller, more powerful, and more economical.



The Smart Relay™ product

Easy Operation Simplifies Installation

With the Smart Relay Loader, the "brains" of the Smart Relay product line, you can quickly build and store control circuit definitions without lifting a wire — and by using familiar line diagram format. (No complicated computer-language programming or interface is required!)

Select normally open, normally closed, positive and negative triggered relays, on or off timers, counters and coils. Simply connect these elements as if you were sketching them on paper — then transfer your circuits to Smart Relay Blocks.

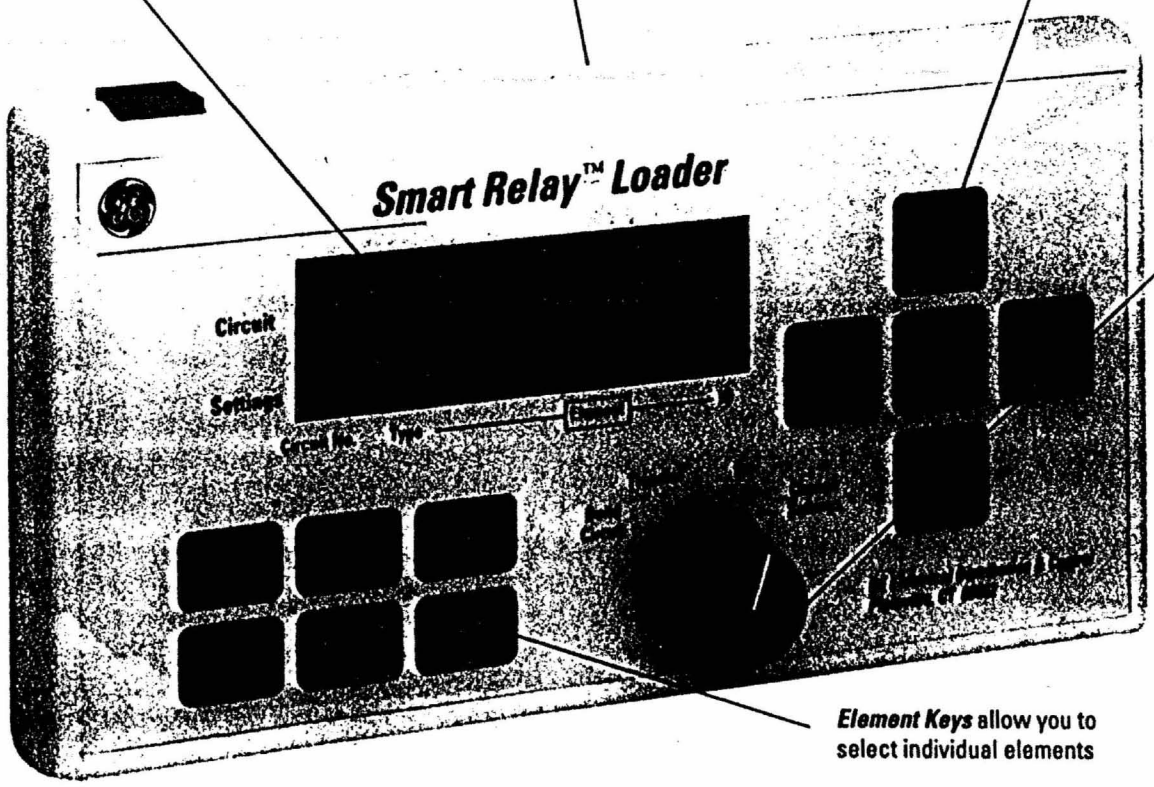
Look at the Loader's front panel, and you'll see why it's easy to learn and use.

Smart Relay Loader

Liquid Crystal Display (LCD) displays the circuit being built or circuits that are stored in memory

Ergonomic Housing is designed for convenient hand-held use.

Scroll & Enter Keys are used to place elements on the circuit line



Function Knob lets you select one of four functions:

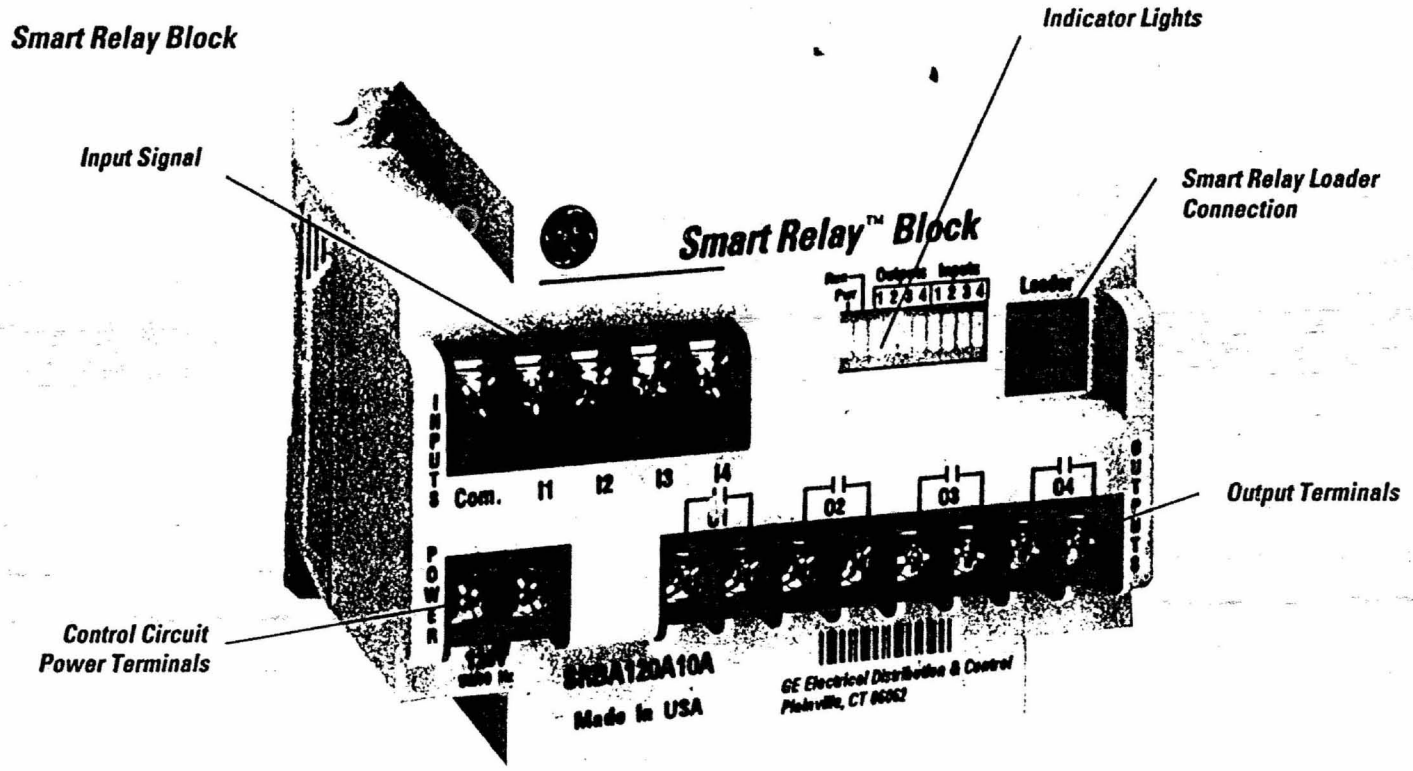
- building a circuit
- transferring the circuit between the Loader and memory or between the Loader and a Block
- running the circuit
- changing the settings of the circuit elements

Element Keys allow you to select individual elements

line is the smart solution

Small Size Saves Space

Each Smart Relay Block performs the functions of up to 100 different relays, counters and timers. By replacing these conventional control devices, it frees up expensive panel space.



Powerful Capabilities Ensure Versatility

The 10-amp pilot duty outputs allow each Smart Relay Block to directly control output loads, including pilot lights, large contactor coils, lighting loads, solenoids, and even fractional horsepower single-phase motors.

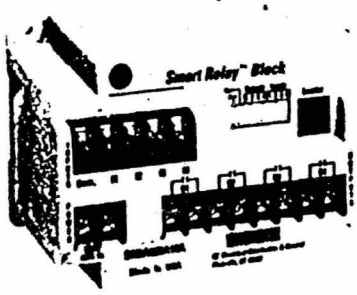
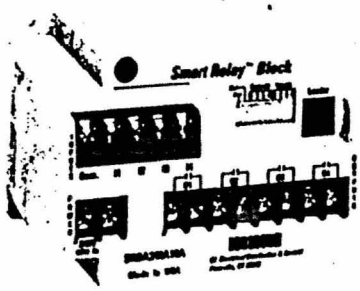
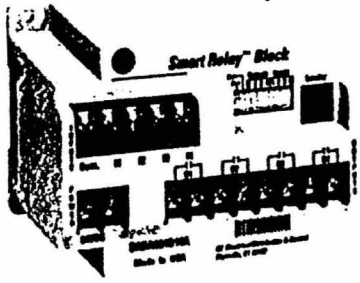
The Smart Relay Block/Loader system is designed to meet the needs of OEMs and panel builders that design and build production and process equipment for all industries — especially the Food and Beverage, Pharmaceutical, Automotive and Petro Chemical industries. It is ideally suited for small machine builders, material handling lines and packaging applications.

Inherent Advantages Save Money

GE's Smart Relay Industrial Control Product Line saves you money by reducing your mounting and wiring time and eliminating the cost of multiple control products.

Smart Relay Block

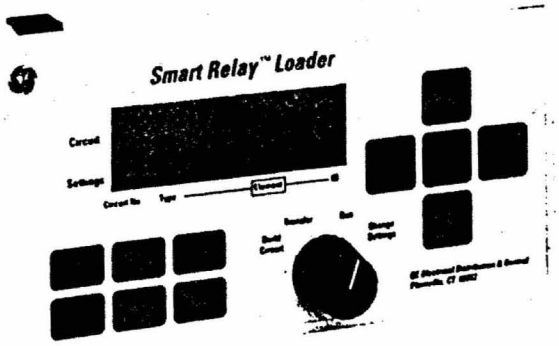
Three Smart Relay Block units are available (see table below). Each Block — which is programmed by the Smart Relay Loader (sold separately) — performs the functions of up to 100 different relays, timers, counters and coils.

Product Photo	Catalog Number	Control Circuit	Input Signal	Output Rating
	SRBA120A10A	120VAC	120VAC	10A (A300)
	SRBA240A10A	240VAC	240VAC	10A (A300)
	SRBA024D10A	24VDC	24VDC	10A (A300)

Smart Relay Loader

The Smart Relay Loader is used to build and store a complete control circuit without wiring. Equipped with easy-to-use function keys and a liquid crystal display (LCD), this hand-held unit displays your circuit as you develop it (by using familiar line diagram format). Once you have completed your circuit, you simply transfer it to a Smart Relay Block.

The Smart Relay Loader also performs other valuable functions: It can be used to monitor a circuit that is running. Or it can be disconnected and used to remotely build and store circuits (in the non-volatile memory) for additional Smart Relay Blocks. The Loader's memory will store up to 8 complete circuit configurations, each containing up to 100 elements.

Product Photo	Catalog Number	Control Voltage
	SRLA	Provided by Smart Relay Block

Specifications — Smart Relay Block

Item	Catalog Number		
	SRBA120A10A	SRBA240A10A	SRBA024D10A
Control Circuit Power			
Voltage	120VAC	240VAC	24VDC
Voltage Tolerance	+10/-25%	+10/-25%	±20%
Frequency	50/60 Hz	50/60 Hz	—
Power	10VA	10VA	6VA
Momentary Allowable Power Failure	30mSec	30mSec	30mSec
Input Signal			
Number Of Inputs	4	4	4
Voltage	120V	240V	24VDC
Voltage Tolerance	+10/-25%	+10/-25%	±20%
Frequency	50/60 Hz	50/60 Hz	—
Threshold ON			
Voltage	80 V (min.)	180V (min.)	16V (min.)
Current	8mA (±10%)	8mA (±10%)	8mA (±10%)
Threshold OFF			
Voltage	40V (max.)	90V (max.)	5V (max.)
Current	5mA (±10%)	5mA (±10%)	5mA (±10%)
Signal ON Duration (min.)	30mSec	30mSec	30mSec
Output			
Number Of Outputs	4	4	4
Type	N.O. Form 'A'	N.O. Form 'A'	N.O. Form 'A'
Rating	A300	A300	A300
Motor (Derate Oper. Temp. to -20° to +40°C)	1HP SP 120V 50/60 Hz	1HP SP 120V 50/60 Hz	1HP SP 120V 50/60 Hz
Lighting	Tungsten (5A @ 120 VAC)	Tungsten (5A @ 120 VAC)	Tungsten (5A @ 120 VAC)
DC Rating	10A @ 30VDC	10A @ 30VDC	10A @ 30VDC
Response Time (Input To Output)	70mSec (ave.)	70mSec (ave.)	70mSec (ave.)
Standards	UL (CSA, IEC Pending)	UL (CSA, IEC Pending)	UL (CSA, IEC Pending)

Technical Data Summary

Item	Catalog Number		
	SRBA120A10A	SRBA240A10A	SRBA024D10A
Mounting	35mm DIN Rail Screw Mount (four #8 screws) Clip Mount (25mm Center)	35mm DIN Rail Screw Mount (four #8 screws) Clip Mount (25mm Center)	35mm DIN Rail Screw Mount (four #8 screws) Clip Mount (25mm Center)
Dimensions	In inches: 4.92W x3.63H x 3.54D In millimeters: 125W x 92H x 90D	In inches: 4.92W x 3.63H x 3.54D In millimeters: 125W x 92H x90D	In inches: 4.92W x 3.63H x 3.54D In millimeters: 125W x 92H x 90D
Weight (Less Carton)	20 oz.	20 oz.	13 oz.
Environment			
Operating Temperature	-20° to +55° C -4° to +131° F	-20° to +55° C -4° to +131° F	-20° to +55° C -4° to +131° F
Storage Temperature	-20° to +100° C -4° to +212° F	-20° to +100° C -4° to +212° F	-20° to +100° C -4° to +212° F
Humidity (Non-Condensing)	5 to 85% RH	5 to 85% RH	5 to 85% RH
Vibration	3.0g 10-500 Hz	3.0g 10-500 Hz	3.0g 10-500 Hz
Shock	20g for 11mSec	20g for 11mSec	20g for 11mSec
Wire Size - Terminals			
60/75° C (CU) AWG	22-12	22-12	22-12
Torque lb. in. (max.)	9	9	9
Mechanical Life (Millions Of Operations)	10	10	10
Electrical Life (MCBF) (Thousands Of Operations)			
A300	1,000	1,000	1,000
IHP SP 120V 50/60/Hz	30	30	30
Tungsten	10	10	10

Specifications — Smart Relay Loader

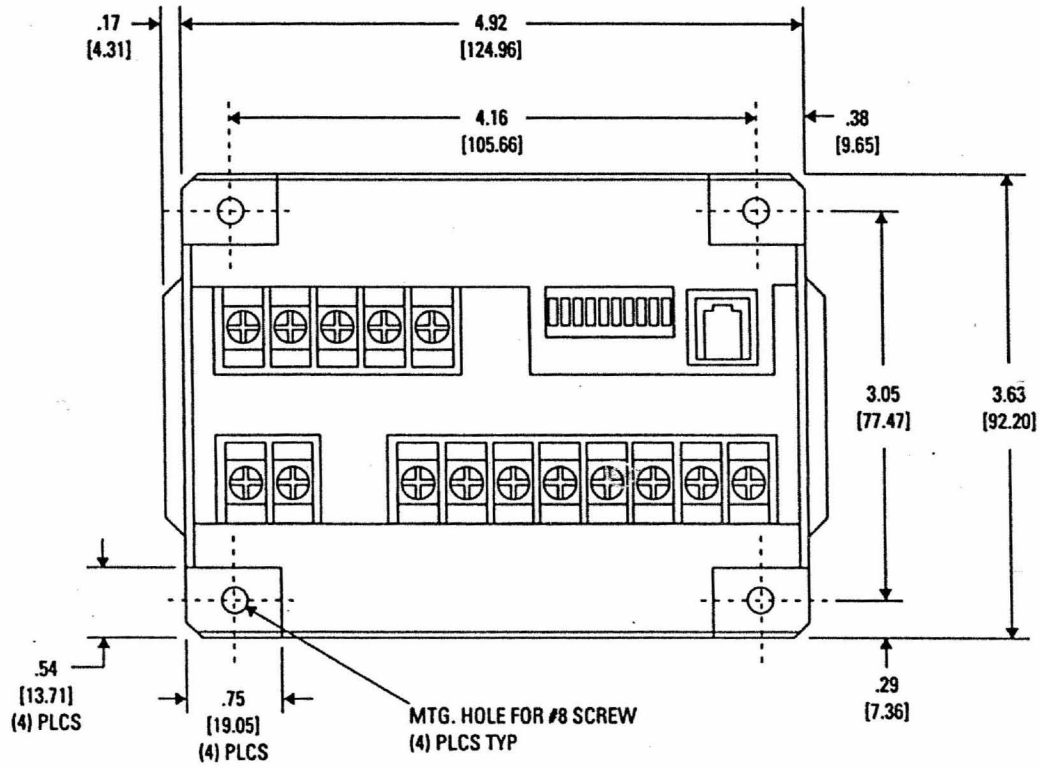
The Smart Relay Loader is an electronic-based industrial component used in conjunction with Smart Relay Blocks. The Loader provides circuit definition, circuit storing, and circuit loading capabilities. Circuits are created in the Loader and stored in Blocks in a non-volatile memory.

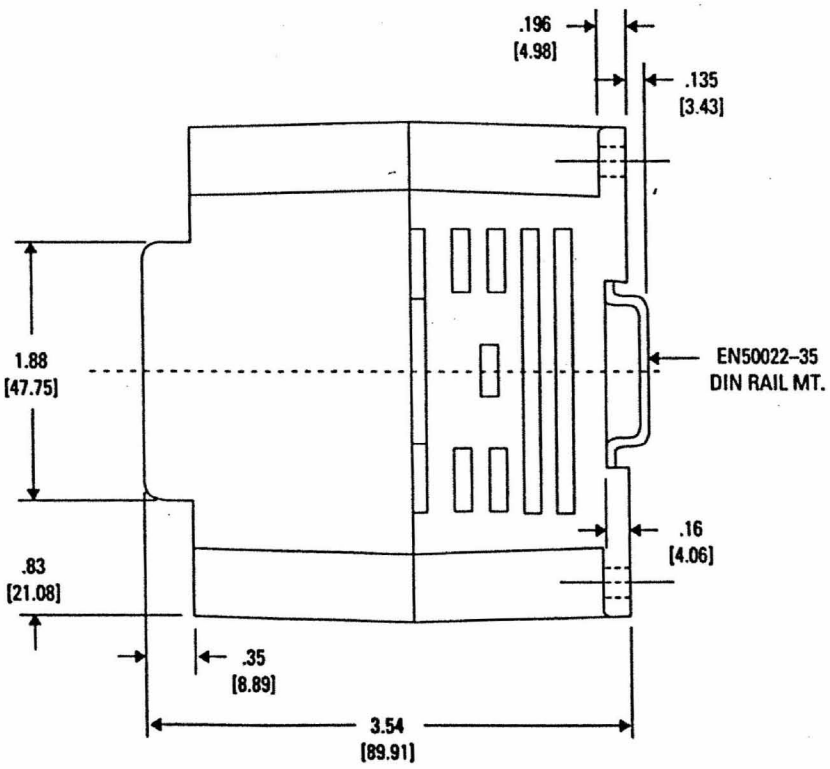
Item	Description	
Control Voltage	Provided by Smart Relay Block	
Voltage Tolerance	5 VDC ± 5%	
Power	1 W (max.)	
Operator interface:		
Display	4 lines, 20 characters per line, LCD backlight	
Function Knob	4 positions	
Membrane Keypad Switches	Tactile feedback	
Functions	Four operating modes: Build Circuit Transfer Run Change Settings	
Build Circuit Elements:	Types:	Identification:
Relays	N.O. N.C. Pos. Triggered Neg. Triggered	Auxiliary (A1 - A12) Output (O1 - O4) Input (I1 - I4)
Coils	Standard Latch Unlatch Clear Counter	Auxiliary (A1 - A12) Output (O1 - O4) Counter (C1 - C16)
Timers	On Off	Timer (T1 - T16)
Counter	Down	Counter (C1 - C16)
Parallel Build	—	
Series Build	—	
Ranges:		
Timer Range	0.1 sec. to 99 hrs. 59 min. & 59.9 sec.	
Counter Range	0000 to 9999	

Technical Data Summary

Item	Description
Application:	
Number Of Elements Per Application	100
Number Of Circuits Per Application	16
Number of Applications Stored In Memory	8
Depth Of Parallel Circuits Per Circuit	10
Transfer Options	From Loader to Block From Block to Loader From Loader to Memory From Memory to Loader
Run Options	Monitor circuit one element at a time: __ (underline cursor) → No current flowing through element ■ (solid cursor) → Current flowing through element
Change Settings Options	Change timer range Change counter range
Standards	UL (with CSA, IEC pending)
Mounting	Screw mount (four #4 screws)
Dimensions	In inches: 7.5W x 4.0H x 1.12D In millimeters: 190W x 102H x 28D
Weight (Less Carton)	11 oz.
Environment:	
Operating Temperature	0° to +50° C +32° to +122° F
Storage Temperature	-20° to +60° C -4° to +140° F
Humidity (Non-condensing)	5 to 85% RH
Vibration	3.0g 10-500 Hz
Shock	20g for 11mSec

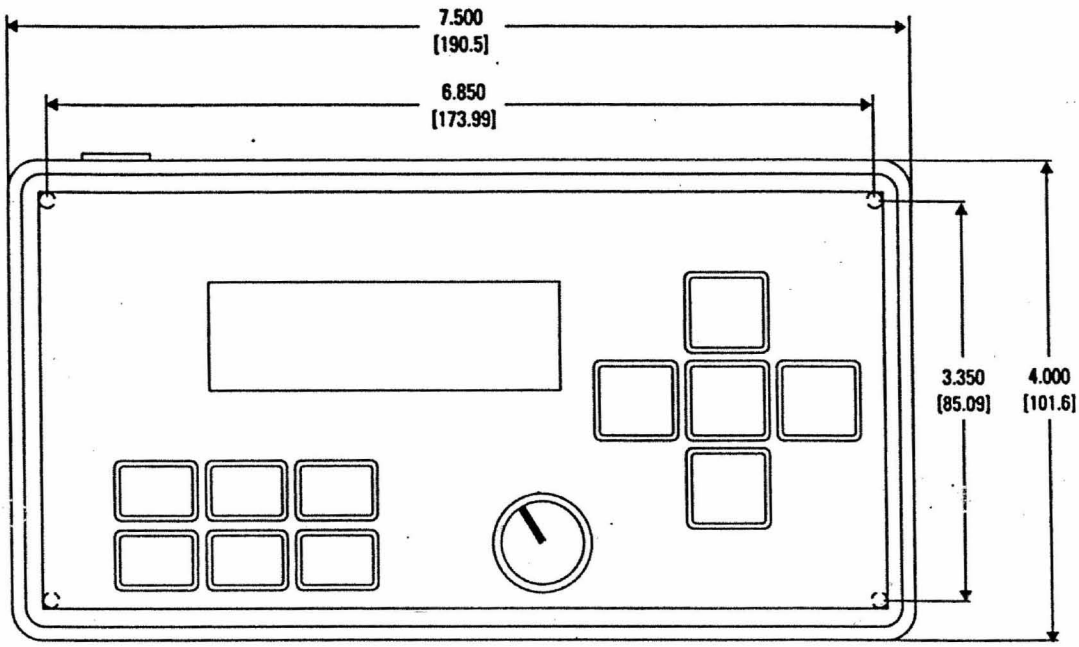
Dimensions — Smart Relay Block

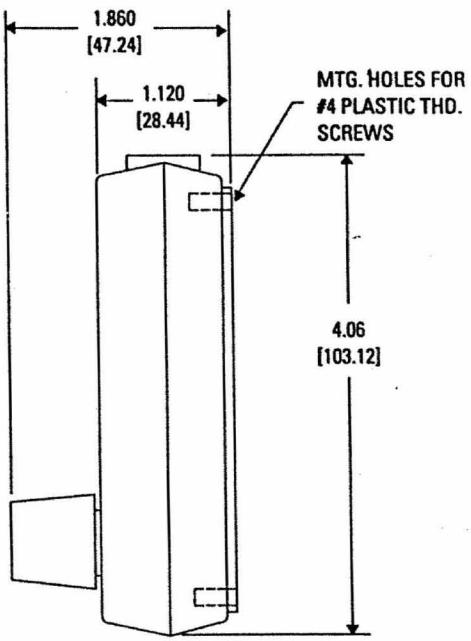




IN
[MM] (For Estimating Only)

Dimensions — Smart Relay Loader





IN
[MM] (For Estimating Only)

Guideform Specifications

Smart Relay Block Specifications

The Smart Relay Block must:

- be available in three voltages: 120VAC, 240VAC, and 24VDC
- have voltage tolerance +10/-25% AC, +20/-20% DC
- have four inputs and four outputs
- be NEMA A300 rated
- be able to direct drive a 1 hp single-phase motor
- adapt to three different mounting methods: 35mm DIN rail, standard panel screw mount, or 25mm center clip mount
- not exceed these dimensions: 4.92"W x 3.63"H x 3.54"D
- operate in temperatures ranging from -20° to +55° C
- withstand 3.0g vibration from 10-500 Hz
- have a mechanical life of 10 million operations
- accept 22-12 AWG wire sizes
- be UL listed

Smart Relay Loader Specifications

The Smart Relay Loader must:

- have a display that shows four lines (20 characters per line)
- have a four-position function knob
- have a tactile-feedback membrane keypad
- be able to build circuits with the following elements:
  - N.O./N.C. relays
  - positively triggered/negatively triggered relays
  - standard coils
  - latch/unlatch coils
  - counters
  - on/off timers
- must store (in non-volatile memory) eight separate circuits, each containing up to 100 elements
- meet UL standards
- operate in temperatures ranging from 0° to +50° C
- withstand 3.0g vibration at 10-50 Hz
- withstand 20g shock for 11 mSec

Type GEM Power Capacitors

Enclosed Indoor Dustproof NEMA 12 and Outdoor Weatherproof NEMA 3

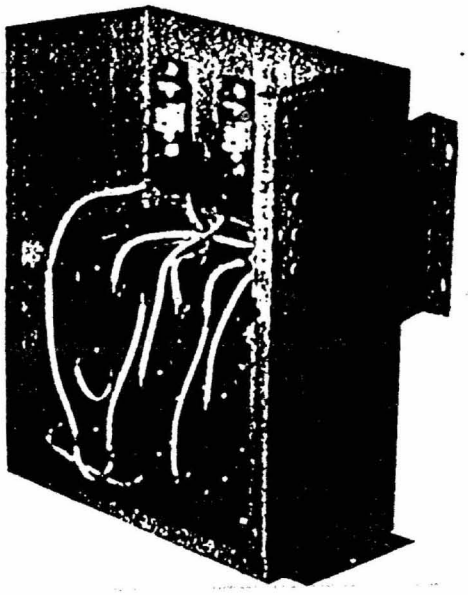
1.0-500 KVAR, 60 Hertz
240, 480, 600 Volts

Description

Type GEM Capacitors feature multiple cells which are assembled in parallel in an enclosure suitable for both indoor and outdoor applications, (NEMA 12 and NEMA 3). Each capacitor cell features the patented GE Pressure Sensitive Interrupter (PSI) that protects against cell rupture. The metallized polypropylene film dielectric system provides an instantaneous self-healing action and greatly reduced energy losses. GEM capacitors include discharge resistors to reduce voltage to 50 volts or less within one minute of de-energization. GEM also features Dielektrol® impregnant which is a biodegradable Class IIIB combustible fluid.

GEM capacitors offer high reliability and long life. They are suitable for operation over a temperature range of −40°C to +46°C.

The GEM assemblies are UL Listed.



Typical Type GEM, cover removed

Line Fuses/~~Blown Fuse Lights~~

To be specified by customer. Order by appropriate basic catalog number plus suffix for a complete catalog number.

Note: NEC Article 460-8B requires capacitors to have over-current protection in all ungrounded conductors (Except: if connected on the load side of a motor overload protective device).

Three-phase capacitors fused only on two phases will not provide adequate protection if a line-to-ground fault should occur.

Mounting

GEM 65L800 series can be mounted upright on any level surface, such as a floor, top of a motor control center, or directly to any wall with brackets provided.

GEM 65L900 series equipments can also be mounted upright on any level surface. An adapter kit is required for wall mounting. Order the wall mounting kit by Cat. No. 186C3236G5, **List Price $40.00, GO-410.**

Line Connection and Cable Entrance

Line connection and cable entrance on Figure 1 equipments must be made through the right end panel. For all other equipment figures the entrance may be made through either end panel (after first punching out the appropriate size hole).

Replacement Fuses

For 3-Phase 65L8____ and 65L9____

Unit Rating		Fuse Amps	Fuse Class	Catalog Number	List Price Each, GO-410
Volts	3-ph① KVAR				
240	1-5	30	CC	147A7816P26	$14.00
240	6-15	100	T	147A7816P28	42.00
240	17.5-40	200	T	147A7816P29	42.00
480	1-12.5	30	CC	147A7816P26	14.00
480	15-32.5	100	T	147A7816P28	42.00
480	35-100	200	T	147A7816P29	42.00
600	1-15	30	CC	147A7816P26	14.00
600	17.5-40	100	T	147A7816P28	42.00
600	42.5-60	200	T	147A7816P29	42.00

Note: Obsolete fuses 147A7816P24 and 147A7816P25 used in 65L3____, 65L6____, and 37F6____ assemblies have been replaced by fuse kit 308A3187G1, **List Price $42.00, GO-410.**

① Refer to factory for single-phase fuses.

Type GEM Power Capacitors

Enclosed Indoor Dustproof NEMA 12 and Outdoor Weatherproof NEMA 3

1.0-500 KVAR, 60 Hertz
240, 480, 600 Volts

1.0-200 KVAR, 240 Volts

KVAR	Basic Cat. No. + −	240 Volt, 3-phase Delta: No Fuses ① Suffix	No Fuses List Price, GO-410	2 Fuses ① Suffix	2 Fuses List Price, GO-410	3 Fuses ① Suffix	3 Fuses List Price, GO-410	2 Fuses 2 Lights ① Suffix	2 Fuses 2 Lights List Price, GO-410	3 Fuses 3 Lights ① Suffix	3 Fuses 3 Lights List Price, GO-410	240 Volt, 1-phase: No Fuses Suffix	No Fuses List Price, GO-410	Fuses Suffix	Fuses List Price, GO-410	Fuses & Lights Suffix	Fuses & Lights List Price, GO-410	Fig. No (See pgs. 18-13 & 18-14)	Approx. Weight Lbs	Approx. Weight Kg
1.0	65L800	TL	$144.00	–	–	TN	$164.00	–	–	TQ	$194.00	TX	$144.00	TY	$164.00	TZ	$194.00	1	9	4.1
1.5	65L801	TL	148.00	–	–	TN	168.00	–	–	TQ	198.00	TX	148.00	TY	168.00	TZ	198.00	1	9	4.1
2.0	65L802	TL	152.00	–	–	TN	172.00	–	–	TQ	202.00	TX	152.00	TY	172.00	TZ	202.00	1	9	4.1
2.5	65L803	TL	153.00	–	–	TN	173.00	–	–	TQ	203.00	TX	153.00	TY	173.00	TZ	203.00	1	9	4.1
3.0	65L804	TL	155.00	–	–	TN	175.00	–	–	TQ	205.00	TX	155.00	TY	175.00	TZ	205.00	1	9	4.1
4.0	65L805	TL	181.00	–	–	TN	201.00	–	–	TQ	231.00	TX	181.00	TY	201.00	TZ	231.00	1	10	4.5
5.0	65L806	TL	199.00	–	–	TN	219.00	–	–	TQ	249.00	TX	199.00	TY	219.00	TZ	249.00	1	10	4.5
6.0	65L807	TL	229.00	TM	$249.00	TN	273.00	TP	$269.00	TQ	303.00	TX	229.00	TY	249.00	TZ	269.00	1	11	5.0
7.5	65L808	TL	251.00	TM	271.00	TN	295.00	TP	291.00	TQ	325.00	TX	251.00	TY	271.00	TZ	291.00	1	15	6.8
10.0	65L809	TL	302.00	TM	322.00	TN	346.00	TP	342.00	TQ	376.00	TX	302.00	TY	322.00	TZ	342.00	1	15	6.8
12.5	65L810	TL	361.00	TM	381.00	TN	405.00	TP	401.00	TQ	435.00	TX	361.00	TY	381.00	TZ	401.00	2	19	8.6
15.0	65L811	TL	412.00	TM	432.00	TN	456.00	TP	452.00	TQ	486.00	TX	412.00	TY	432.00	TZ	452.00	2	19	8.6
17.5	65L812	TL	487.00	TM	487.00	TN	511.00	TP	507.00	TQ	541.00	TX	487.00	TY	487.00	TZ	507.00	2	22	10.0
20.0	65L813	TL	514.00	TM	534.00	TN	558.00	TP	554.00	TQ	588.00	TX	514.00	TY	534.00	TZ	554.00	2	22	10.0
22.5	65L814	TL	566.00	TM	586.00	TN	610.00	TP	606.00	TQ	640.00	TX	566.00	TY	586.00	TZ	606.00	3	32	14.5
25.0	65L815	TL	602.00	TM	622.00	TN	646.00	TP	642.00	TQ	676.00	TX	602.00	TY	622.00	TZ	642.00	3	32	14.5
27.5	65L816	TL	675.00	TM	695.00	TN	719.00	TP	715.00	TQ	749.00	TX	675.00	TY	695.00	TZ	715.00	3	32	14.5
30.0	65L817	TL	730.00	TM	750.00	TN	774.00	TP	770.00	TQ	804.00	TX	730.00	TY	750.00	TZ	770.00	3	32	14.5
32.5	65L818	TL	800.00	TM	820.00	TN	844.00	TP	840.00	TQ	874.00	TX	800.00	TY	820.00	TZ	840.00	3	36	16.3
35.0	65L819	TL	858.00	TM	878.00	TN	902.00	TP	898.00	TQ	932.00	TX	858.00	TY	878.00	TZ	898.00	3	38	17.2
37.5	65L820	TL	913.00	TM	933.00	TN	957.00	TP	953.00	TQ	987.00	TX	913.00	TY	933.00	TZ	953.00	3	38	17.2
40.0	65L821	TL	968.00	TM	988.00	TN	1012.00	TP	1008.00	TQ	1042.00	TX	968.00	TY	988.00	TZ	1008.00	3	38	17.2
42.5	65L900	TL	1021.00	TM	1061.00	TN	1109.00	TP	1101.00	TQ	1169.00	TX	1021.00	TY	1061.00	TZ	1101.00	4	87	39.5
45.0	65L901	TL	1096.00	TM	1136.00	TN	1183.00	TP	1175.00	TQ	1243.00	TX	1096.00	TY	1136.00	TZ	1175.00	4	87	39.5
47.5	65L902	TL	1107.00	TM	1147.00	TN	1195.00	TP	1187.00	TQ	1255.00	TX	1107.00	TY	1147.00	TZ	1187.00	4	87	39.5
50.0	65L903	TL	1120.00	TM	1160.00	TN	1208.00	TP	1200.00	TQ	1268.00	TX	1120.00	TY	1160.00	TZ	1200.00	4	87	39.5
55.0	65L904	TL	1235.00	TM	1275.00	TN	1323.00	TP	1315.00	TQ	1383.00	TX	1235.00	TY	1275.00	TZ	1315.00	4	87	39.5
60.0	65L905	TL	1351.00	TM	1391.00	TN	1439.00	TP	1431.00	TQ	1499.00	TX	1351.00	TY	1391.00	TZ	1431.00	4	87	39.5
65.0	65L906	TL	1466.00	TM	1506.00	TN	1554.00	TP	1546.00	TQ	1614.00	TX	1466.00	TY	1506.00	TZ	1546.00	4	93	42.2
70.0	65L907	TL	1581.00	TM	1621.00	TN	1669.00	TP	1661.00	TQ	1729.00	TX	1581.00	TY	1621.00	TZ	1661.00	4	99	44.9
75.0	65L908	TL	1696.00	TM	1736.00	TN	1783.00	TP	1775.00	TQ	1843.00	TX	1696.00	TY	1736.00	TZ	1775.00	4	99	44.9
80.0	65L909	TL	1808.00	TM	1848.00	TN	1896.00	TP	1888.00	TQ	1956.00	TX	1808.00	TY	1848.00	TZ	1888.00	4	99	44.9
85.0	65L910	TL	2010.00	TM	2070.00	TN	2142.00	TP	2130.00	TQ	2232.00	TX	2010.00	TY	2070.00	TZ	2130.00	5	136	61.7
90.0	65L911	TL	2231.00	TM	2291.00	TN	2363.00	TP	2351.00	TQ	2453.00	TX	2231.00	TY	2291.00	TZ	2351.00	5	130	59.0
95.0	65L912	TL	2320.00	TM	2380.00	TN	2452.00	TP	2440.00	TQ	2542.00	TX	2320.00	TY	2380.00	TZ	2440.00	5	136	61.7
100.0	65L913	TL	2410.00	TM	2470.00	TN	2542.00	TP	2530.00	TQ	2632.00	TX	2410.00	TY	2470.00	TZ	2530.00	5	136	61.7
110.0	65L914	TL	2593.00	TM	2653.00	TN	2725.00	TP	2713.00	TQ	2815.00	TX	2593.00	TY	2653.00	TZ	2713.00	5	148	67.1
120.0	65L915	TL	2777.00	TM	2837.00	TN	2909.00	TP	2897.00	TQ	2999.00	TX	2777.00	TY	2837.00	TZ	2897.00	5	148	67.1
125.0	65L916	TL	2940.00	TM	3020.00	TN	3116.00	TP	3100.00	TQ	3236.00	TX	2940.00	TY	3020.00	TZ	3100.00	6	178	80.7
130.0	65L917	TL	3040.00	TM	3120.00	TN	3216.00	TP	3200.00	TQ	3336.00	TX	3040.00	TY	3120.00	TZ	3200.00	6	178	80.7
140.0	65L918	TL	3141.00	TM	3221.00	TN	3317.00	TP	3301.00	TQ	3437.00	TX	3141.00	TY	3221.00	TZ	3301.00	6	184	83.5
150.0	65L919	TL	3368.00	TM	3448.00	TN	3544.00	TP	3528.00	TQ	3664.00	TX	3368.00	TY	3448.00	TZ	3528.00	6	196	88.9
160.0	65L920	TL	3596.00	TM	3676.00	TN	3774.00	TP	3756.00	TQ	3904.00	TX	3596.00	TY	3676.00	TZ	3756.00	6	196	88.9
170.0	65L921	TL	3800.00	TM	3900.00	TN	4020.00	TP	4000.00	TQ	4170.00	TX	3800.00	TY	3900.00	TZ	4000.00	7	233	105.7
175.0	65L922	TL	4100.00	TM	4200.00	TN	4320.00	TP	4300.00	TQ	4470.00	TX	4100.00	TY	4200.00	TZ	4300.00	7	245	111.1
180.0	65L923	TL	4300.00	TM	4400.00	TN	4520.00	TP	4500.00	TQ	4670.00	TX	4300.00	TY	4400.00	TZ	4500.00	7	233	105.7
190.0	65L924	TL	4800.00	TM	4700.00	TN	4820.00	TP	4800.00	TQ	4970.00	TX	4800.00	TY	4700.00	TZ	4800.00	7	236	107.1
200.0	65L925	TL	4700.00	TM	4800.00	TN	4920.00	TP	4900.00	TQ	5070.00	TX	4700.00	TY	4800.00	TZ	4900.00	7	245	11.1

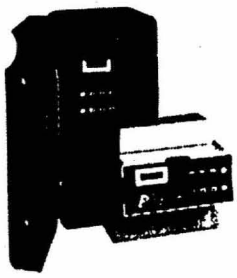
① See **Note** on page 18-9 referring to NEC Article 460-8B.

EXAMPLE: 240V, 3-phase, 25 KVAR, with 2 fuses and 2 blown fuse lights:
Cat. No. 65L815TP
Price **$642**

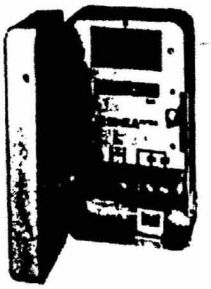
Note: To determine KVAR at 208V, multiply KVAR at 240V by .75.

Dimensions

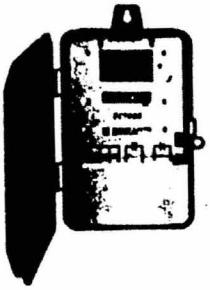
See pages 18-13 and 18-14 for outline diagrams and dimensions.



EC11 & EC11D



EC7000



EC7005

EC71 & EC71D

EC365 & HP1

Model No.	+Rating Per Pole	Type of Output	Enclosure Type	Shipping Wgt. Lb.	Shipping Wgt. Kg.	EDP No. 4988	For Add'l Info See Bull. #	Sugg. List	Sugg. Trade
Single-Channel /24-Hour With Skip-A-Day And Momentary Contact Signal Feature									
EC11/120V	15A	SPDT	NEMA 1	4	1.8	27005	2199	$270.97	$176.13
EC11D/120V	15A	SPDT	DIN	1 1/8	0.5	27007	2199	294.55	191.46
EC11D/240V	10A	SPDT	DIN	1 1/8	0.5	41055	2199	302.80	196.82
Single-Channel /7-Day									
EC7000/24V	20A	SPDT	NEMA 1	2	0.9	70024	2204	160.48	104.31
EC7000/120V	20A	SPDT	NEMA 1	2	0.9	70120	2204	156.96	102.02
EC7000/208-240V	20A	SPDT	NEMA 1	2	0.9	70208	2204	156.96	102.02
EC7000/277V	20A	SPDT	NEMA 1	2	0.9	70277	2204	160.48	104.31
Single-Channel /7-Day With Momentary Contact Signal Feature									
EC7001/24V	20A	SPDT	NEMA 1	2	0.9	70124	2204	221.75	144.14
EC7001/120V	20A	SPDT	NEMA 1	2	0.9	71120	2204	210.09	136.56
EC7001/208-240V	20A	SPDT	NEMA 1	2	0.9	71208	2204	210.09	136.56
.C7001/277V	20A	SPDT	NEMA 1	2	0.9	71277	2204	221.75	144.14
Single-Channel /7-Day, 30 Amp Contacts									
EC7004/120V	30A	SPST	NEMA 1	2	0.9	74120	2204	153.59	99.83
EC7004/208-240V	30A	SPST	NEMA 1	2	0.9	74208	2204	153.59	99.83
EC7004/277V	30A	SPST	NEMA 1	2	0.9	74277	2204	156.86	101.96
Single-Channel /7-Day, DPST Contacts, NEMA 3R Enclosure, 30 Amp Contacts									
EC7005/120V, 208-240V	30A	DPST	NEMA 3R	2	0.9	43740	2204	175.47	114.06
EC7005/277V	30A	DPST	NEMA 3R	2	0.9	43745	2204	191.82	124.68
Single-Channel /7-Day, 30 Setpoints									
EC71/30S/120V	15A	SPDT	NEMA 1	4	1.8	41002	2198	221.50	143.98
EC71D/30S/24V	15A	SPDT	DIN	1 1/8	0.5	41045	2198	225.81	146.78
EC71D/30S/120V	15A	SPDT	DIN	1 1/8	0.5	41047	2198	225.81	146.78
EC71D/30S/240V	10A	SPDT	DIN	1 1/8	0.5	41049	2198	225.81	146.78
Single-Channel /7-Day, 30 Setpoints With Momentary Contact Signal Feature									
EC71D/30SM/120V	15A	SPDT	DIN	1 1/8	0.5	41051	2198	303.48	197.26
EC71D/30SM/240V	10A	SPDT	DIN	1 1/8	0.5	41053	2198	317.94	206.66
Single-Channel /365-Day With Momentary Contact Signal Feature									
EC71/18S/120V	15A	SPDT	NEMA 1	2	0.9	40991	2192	296.74	192.88
EC71D/18S/24V	15A	SPDT	DIN	1 1/8	0.5	40992	2192	314.77	204.60
EC71D/18S/120V	15A	SPDT	DIN	1 1/8	0.5	40994	2192	314.77	204.60
EC71D/18S/240V	10A	SPDT	DIN	1 1/8	0.5	40995	2192	320.76	208.49

NEW!!! - TC12 Series NEW!!! - TC12 Series NEW!!! - TC12 Series

Single & Two Channel/7-Day 12 Vdc									
TC12E	10A	SPDT	NEMA 3R	1 1/2	0.7	00100	2217	144.15	93.70
:C72D/12VDC	15A	SPDT	DIN	1 1/8	0.5	41018	2188	402.64	261.72
***Single-Channel /365-Day**									
EC365/C-120V	30A	SPST	NEMA 3R	2	0.9	36525	2212	179.22	116.49
EC365/C-240V	30A	SPST	NEMA 3R	2	0.9	36530	2212	179.22	116.49
EC365/CRP-120V	30A	SPST	NEMA 1	2	0.9	36535	2212	192.70	125.26
EC365/CRP-240V	30A	SPST	NEMA 1	2	0.9	36540	2212	192.70	125.26

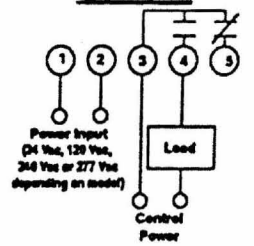
SPECIFICATIONS - PROGRAMMING CAPABILITIES

- 16 Setpoints - A setpoint defines the type of event (ON or OFF) as well as the time and day(s) on which the event will occur.
- 24-Hour or 7-Day Programming - Allows the same schedule or a different schedule for each day of the week.
- Selectable Clock Format - 12 hour (AM/PM) or 24 hour format.
- Manual Override - Reverses current output state; begins immediately when initiated and remains until overridden again or until next setpoint is reached.

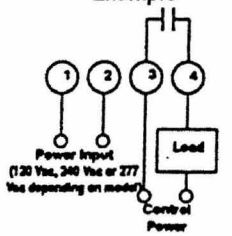
ELECTRICAL: Power Requirements

MODEL	VOLTAGE	FREQUENCY
EC7000/24	24 Vac	50/60 Hz
EC7000/120	120 Vac	50/60 Hz
EC7000/208-240	208-240 Vac	50/60 Hz
EC7000/277	277 Vac	50/60 Hz
EC7004/120	120 Vac	50/60 Hz
EC7004/208-240	208-240 Vac	50/60 Hz
EC7004/277	277 Vac	50/60 Hz
EC7005	120 or 208-240	50/60 Hz
EC7005/277	277 Vac	50/60 Hz

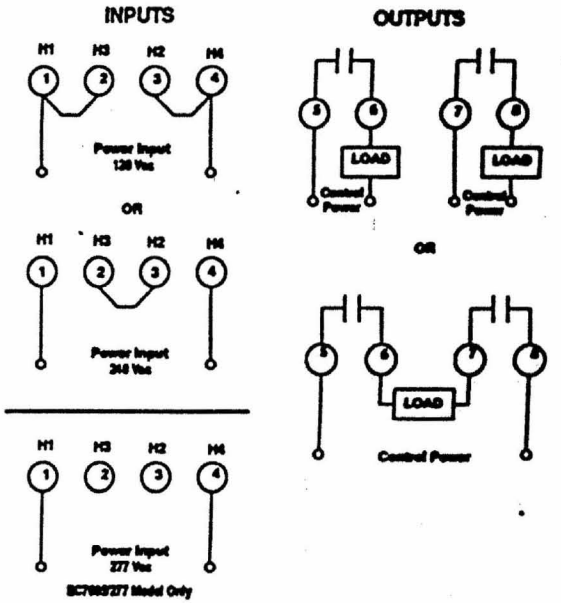
EC7000 Wiring Diagram Example



EC7004 Wiring Diagram Example



EC7005 Wiring Diagram Example



CONTACT RATINGS

Output UL Ratings

EC7000
Normally open contacts:
20 amp resistive at 24-240 Vac
1 hp at 120 Vac, 2 hp at 240 Vac
5 amp tungsten at 120-240 Vac
6 amp ballast at 120-277 Vac
Normally closed contacts:
10 amp "R" at 24-240 Vac
1/4 hp at 120 Vac, 1/2 hp at 240 Vac
3 amp tungsten at 120-240 Vac
3 amp ballast at 120-277 Vac

EC7004
Normally open contacts
30 amp resistive at 24-240 Vac
1 hp at 120 Vac, 2 hp at 240 VAc
5 amp tungsten at 120-240 Vac
6 amp ballast at 120-277 Vac

Output CSA Ratings

EC7000
Normally open contacts:
10 amp resistive at 24-240 Vac
1/2 hp at 120 Vac, 1 hp at 240 Vac
5 amp tungsten at 120-240 Vac
6 amp ballast at 277 Vac
Normally closed contacts:
10 amp resistive at 24-240 Vac
1/4 hp at 120 Vac, 1/2 hp at 240 Vac
3 amp tungsten at 120-240 Vac
3 amp ballast at 277 Vac

EC7004
Normally open contacts
30 amp resistive at 120 Vac
10 amp resistive at 240 Vac
1 hp at 120 Vac, 2 hp at 240 Vac
5 amp tungsten at 120-240 Vac
6 amp ballast at 277 Vac

EC7005
For EC7005 contact ratings please refer to inner door instructions on unit or contact factory.

NOTE: Paragon solid state controls utilize dry contacts. Input power enables the control to keep time, store programmed information and carry out instructions but input power *does not power the load.* To make circuits function, you must provide power to the contacts.

WIRING - Terminals can accommodate 10-16 AWG wire.

POWER OUTAGE CARRY-OVER - The program and time-of-day are maintained during a power outage for a minimum of 4 days. A built-in special capacitor eliminates the inconvenience of battery replacement.

ENVIRONMENTAL
EC7000 & EC7004 should be mounted indoors in an environment that is free from excessive contaminants such as oil, moisture and dirt. EC7005 is suitable for both indoor and outdoor use.

PHYSICAL

EC7000 and EC7004 Mounting -
NEMA 1 enclosure mounting
Weight - Approx. 2 lbs.(0.9 kg)
Dimensions -
Width 10.8 cm (4-1/4")
Height 20.0 cm (7-7/8")
Depth 7.6 cm (3")

EC7000 Bracket Mounting
Dimensions-
Width 10.4 cm (4-1/8")
Height 19 cm (7-1/2")
Depth 6.7 cm (2-5/8")

EC7005 Mounting -
NEMA 3 case mounting
Weight - Approx 2-1/2 lbs.(1.1 kg)
Dimensions -
Width 16.7 cm (6-9/16")
Height 23.1 cm (8-1/8")
Depth 9.8 cm (3-7/8")

YOKOGAWA ◆ Elapsed Time Meters

Back of Panel Unmounted

New Big Look Panel Mounted

Square Case

Round Case

Conduit Case

Specifications

Accuracy: Matches frequency control of power system.

Vibration Shock: Meets ANSI Specification C39 1

Materials: Case of clear LEXAN*, frame of Noryl*, brass terminal studs, Lucite* front covers.

Safety: Type 240 elapsed-time meters are recognized under the Component Program of Underwriters Laboratories (UL File #E44857)

Input Range: All Type 240 models available to operate on 120 or 208 240 volts AC, 50 or 60 Hertz; and 480 volts AC, 60 Hertz.

Sealing: All non-reset Type 240 models are weather resistant. Sealed window and no-through screw holes for flange or back-of-panel mounting protect motor, counter, and gearing from rain or panel wash-down.

Presentation: 6-digit counter in hours and tenths of hours or minutes and tenths of minutes.

Insulation Level: Operating at 120, 208, 240 or 480 volts AC, will pass Hi-pot of 2000 V-rms for one minute

Burden Data: 2.5 volt-amps max.

Dimensions: See page 39.

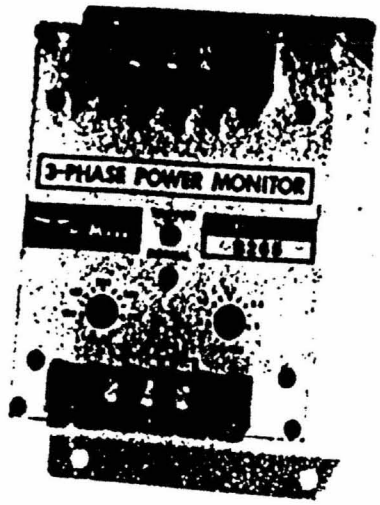
Motor: Telechron, Model S-1.

Features:
- New back-of-panel model
- 2½" and 3½" New Big Look models
- 2½" and 3½" Round and Square models
- Conduit-case models
- Complete interchangeability physically and electrically with GE Types 235 and 236 models
- Optional 3 stud mounting option is available on 3½" New Big Look style 240 meters only

Motor Volt AC	Nonreset Type		Reset Type	
	Register In Minutes	Register In Hours	Register In Minutes	Register In Hours
2½-INCH NEW BIG LOOK — 60 Hz				
120 208/240 480	240 213 AAAB 240 213 ABAB 240 213 ACAB	240 211 AAAB 240 211 ABAB 240 211 ACAB	240 214 AAAB 240 214 ABAB 240 214 ACAB	240 212 AAAB 240 212 ABAB 240 212 ACAB
3½-INCH NEW BIG LOOK — 60 Hz				
120 208/240 480	240 313 AAAB 240 313 ABAB 240 313 ACAB	240 311 AAAB 240 311 ABAB 240 311 ACAB	240 314 AAAB 240 314 ABAB 240 314 ACAB	240 312 AAAB 240 312 ABAB 240 312 ACAB
SQUARE CASE 2½-INCH — 60 Hz				
120 208/240 480	240 613 AAAD 240 613 ABAD 240 613 ACAD	240 611 AAAD 240 611 ABAD 240 611 ACAD	240 614 AAAD 240 614 ABAD 240 614 ACAD	240 612 AAAD 240 612 ABAD 240 612 ACAD
SQUARE CASE 3½-INCH — 60 Hz				
120 208/240 480	240 713 AAAD 240 713 ABAD 240 713 ACAD	240 711 AAAD 240 711 ABAD 240 711 ACAD	240 714 AAAD 240 714 ABAD 240 714 ACAD	240 712 AAAD 240 712 ABAD 240 712 ACAD
ROUND CASE 2½-INCH — 60 Hz				
120 208/240 480	240 633 AAAE 240 633 ABAE 240 633 ACAE	240 631 AAAE 240 631 ABAE 240 631 ACAE	240 634 AAAE 240 634 ABAE 240 634 ACAE	240 632 AAAE 240 632 ABAE 240 632 ACAE
ROUND CASE 3½-INCH — 60 Hz				
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Model 265

3-PHASE POWER MONITOR

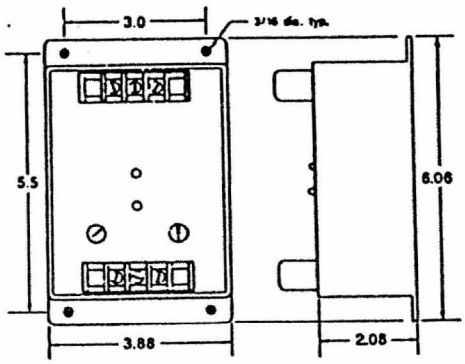


- **Adjustable restart delay**
- **Fast trip response**
- **Ideal for HVAC or air compressor applications**

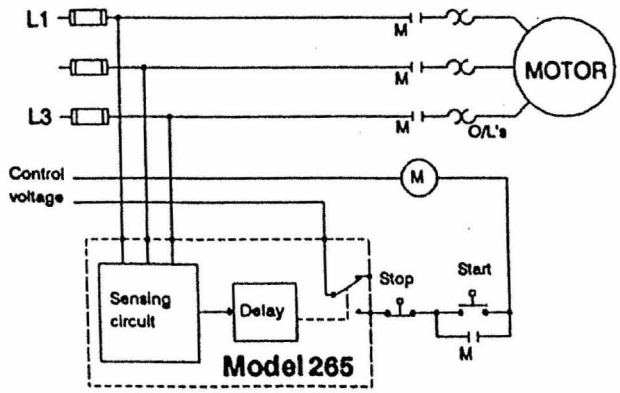
DESCRIPTION

The Model 265 continuously monitors 3-phase Wye or Delta systems for phase loss, low voltage, phase reversal and phase unbalance. It will detect a phase loss even when regenerative feedback is present. The solid-state sensing circuit drives an internal relay in a fail-safe configuration (relay energized when correct voltage and phasing are applied). Operating power is drawn from the 3-phase lines being monitored. An adjustable timer delays restarting of the load, allowing up to 5 minutes for compressor head pressures to bleed off in the event of short- term power failures. The Model 265 is not sensitive to line current and can be used with any motor size.

DIMENSIONS



TYPICAL APPLICATION



SPECIFICATIONS

Model No.	A265	B265	C265	D265	EX265
Nominal AC Voltage (phase-to-phase)	120VAC	208/240VAC	480VAC	575VAC	380VAC
Adjustment Range	85-120V	160-240V	380-480V	450-575V	300-380V
Frequency	60 Hz	60 Hz	60 Hz	60 Hz	50 Hz
Power Consumption (per phase)	.25W	.5W	1.5W	2.5W	1.5W
Transient Protection	2500VRMS for 10ms				
Repeat Accuracy (fixed conditions)	0.1% of set point				
Response Time	50 milliseconds				
Reset Time	20 to 300 seconds ± 10%				
Reset Type	Automatic				
Dead Band	2%				
Output Contacts	SPDT				
Contact Ratings	Resistive: 15A at 150VAC 10A at 240VAC 15A at 28VDC Inductive: 4A at 120VAC 2A at 240VAC Tungsten lamp operation: 600W on N.O. contacts 240W on N.C. contacts Pilot duty: 480va at 240VAC				
Expected Relay Life	Mechanical: 50,000,000 operations Electrical: 100,000 operations at rated load				
Operating Temp.	-40° to +55° C				
Humidity Tolerance	0-97% w/o condensation				
Case Material	ABS plastic				
Mounting	Surface				
Weight	10 oz.				
Agency Approval	UL Recognized				

TIME MARK® CORPORATION
11440 East Pine Street
Tulsa, Oklahoma 74116
Tel:(918)438-1220
FAX (918)437-7584

TITLE 3-PHASE POWER MONITOR, MODEL 265

Dimensions are in inches unless otherwise specified. Drawings show no power applied.

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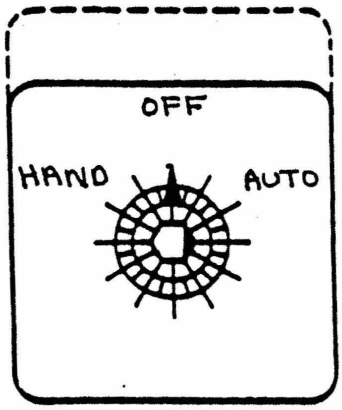
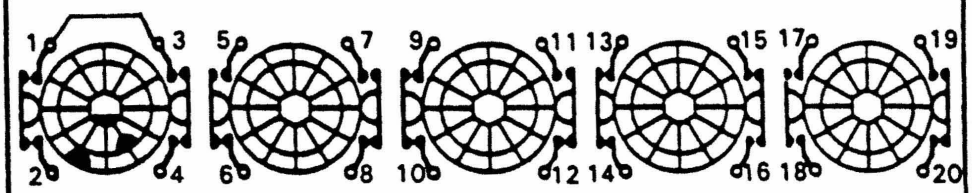
FORM 87A128 12/89

CSII CONTROL SWITCHES INTERNATIONAL INCORPORATED

5213-61025-11

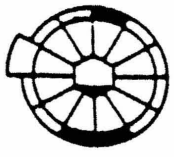




POSITIONS		1	2	3	4	5	6	7	8	9	10
HAND	1	X									
	2										
	3										
	4										
OFF	5										
	6										
	7										
	8										
AUTO	9		X								
	10										
	11										
	12										
	13										
	14										
	15										
	16										
	17										
	18										
	19										
	20										
	21										
	22										
	23										
	24										

B13 MOUNTING

PISTOL GRIP HANDLE



DATE 4/6/93 NAME JF

COMPANY

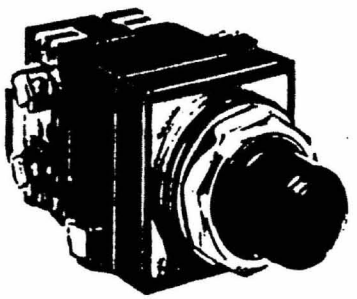
2405 MIRA MAR AVENUE • LONG BEACH, CA 90815 • P.O. BOX 92349 • LONG BEACH, CA 90809
(310) 498-7331 • (310) 498-3559 • (800) 521-1677 • FAX (310) 498-5894

CR104P Heavy-Duty Indicating Lights

600 Volts Maximum AC/DC
10 Amperes Continuous
Suitable for Use in NEMA Type 1, 3, 3R, 4, 4X, 12 and 13 Applications①

Units are supplied factory assembled when ordered with lenses.

Standard Indicating light



Push-to-Test Indicating light

~~Standard~~ and Push-to-Test Indicating Light Units, Transformer Type

Transformer Type with 6-Volt Secondary, No. 755 Lamp

Operating Voltage	Color of Lens	Standard Unit Catalog Number② CR104	List Price, GO-10P1	Push-to-Test Unit Catalog Number② CR104	List Price, GO-10P1
120 Volts (60/50 Hz)	Red	PLG32R	$64.20	PLT32R	$82.20
	Green	PLG32G	64.20	PLT32G	82.20
	Amber	PLG32M	64.20	PLT32M	82.20
	Blue	PLG32L	64.20	PLT32L	82.20
	White	PLG32W	64.20	PLT32W	82.20
	Yellow	PLG32E	64.20	PLT32E	82.20
	Clear	PLG32C	64.20	PLT32C	82.20
	Less Lens③	PLG32	60.00	PLT32	78.00
240 Volts (60/50 Hz)	Red	PLG33R	64.20	PLT33R	82.20
	Green	PLG33G	64.20	PLT33G	82.20
	Amber	PLG33M	64.20	PLT33M	82.20
	Blue	PLG33L	64.20	PLT33L	82.20
	White	PLG33W	64.20	PLT33W	82.20
	Yellow	PLG33E	64.20	PLT33E	82.20
	Clear	PLG33C	64.20	PLT33C	82.20
	Less Lens③	PLG33	60.00	PLT33	78.00
480 Volts (60/50 Hz)	Red	PLG34R	64.20	PLT34R	82.20
	Green	PLG34G	64.20	PLT34G	82.20
	Amber	PLG34M	64.20	PLT34M	82.20
	Blue	PLG34L	64.20	PLT34L	82.20
	White	PLG34W	64.20	PLT34W	82.20
	Yellow	PLG34E	64.20	PLT34E	82.20
	Clear	PLG34C	64.20	PLT34C	82.20
	Less Lens③	PLG34	60.00	PLT34	78.00
600 Volts (60/50 Hz)	Red	PLG35R	64.20	PLT35R	82.20
	Green	PLG35G	64.20	PLT35G	82.20
	Amber	PLG35M	64.20	PLT35M	82.20
	Blue	PLG35L	64.20	PLT35L	82.20
	White	PLG35W	64.20	PLT35W	82.20
	Yellow	PLG35E	64.20	PLT35E	82.20
	Clear	PLG35C	64.20	PLT35C	82.20
	Less Lens③	PLG35	60.00	PLT35	78.00

Notes: Catalog Number and price do not include nameplate. All nameplates must be ordered as a separate item from pages 7-26 and 7-27.
Resistor forms of standard and push-to-test indicating lights are available. Contact nearest GE Electrical Distribution & Control sales office for proper selection and pricing.

Standard and Push-to-Test Indicating Light Units, Full Voltage

Resistor Type

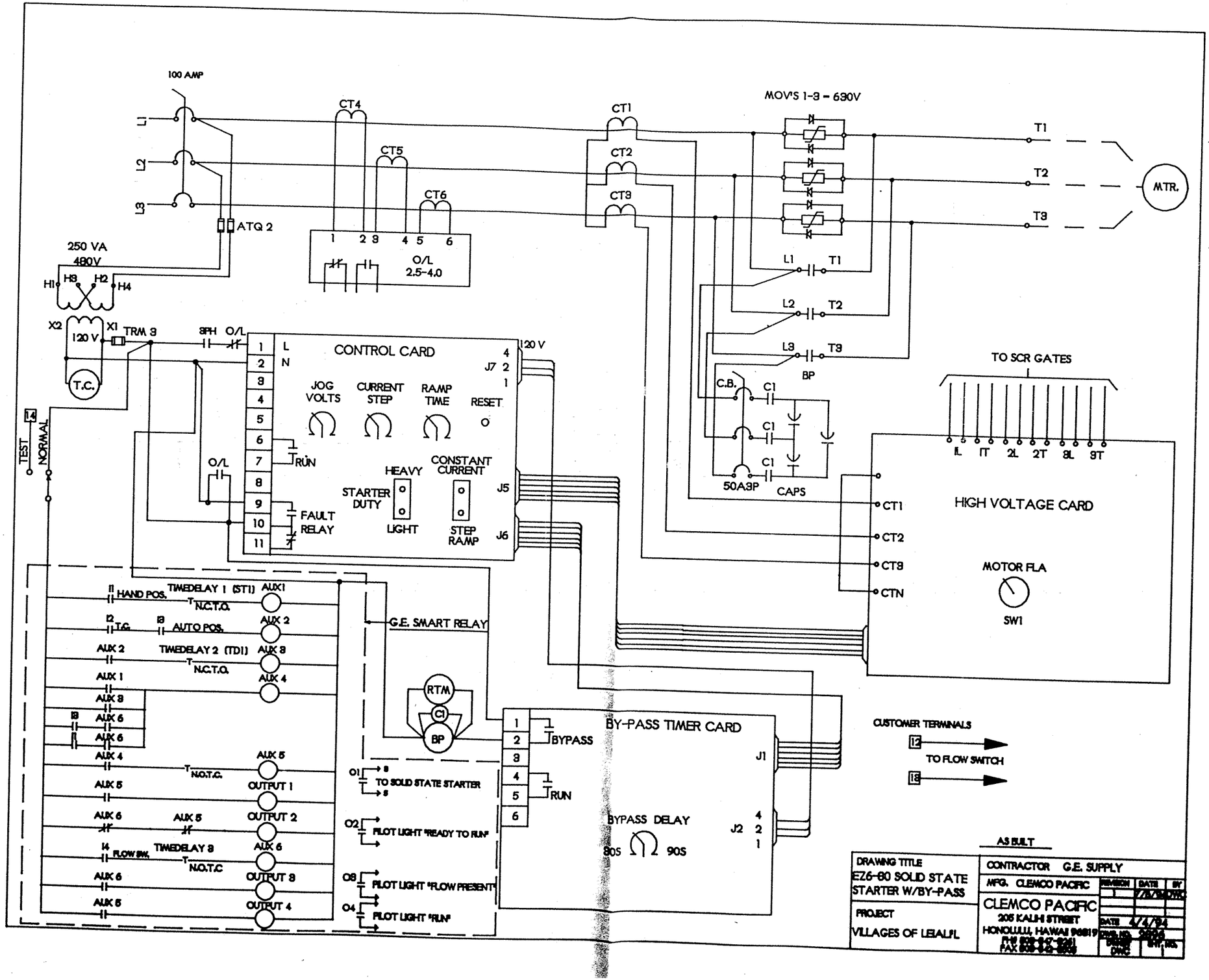
Operating Voltage	Color of Lens	Standard Unit Catalog Number② CR104P	List Price, GO-10P1	Push-to-Test Unit Catalog Number② CR104P	List Price, GO-10P1
120 Volts (# 1835 Lamp)	Red	LG42R	$52.20	LT42R	$70.20
	Green	LG42G	52.20	LT42G	70.20
	Amber	LG42M	52.20	LT42M	70.20
	Blue	LG42L	52.20	LT42L	70.20
	White	LG42W	52.20	LT42W	70.20
	Yellow	LG42E	52.20	LT42E	70.20
	Clear	LG42C	52.20	LT42C	70.20
	Less Lens③	LG42	48.00	LT42	66.00
240 Volts (# 120PSB Lamp)	Red	LG43R	52.20	LT43R	70.20
	Green	LG43G	52.20	LT43G	70.20
	Amber	LG43M	52.20	LT43M	70.20
	Blue	LG43L	52.20	LT43L	70.20
	White	LG43W	52.20	LT43W	70.20
	Yellow	LG43E	52.20	LT43E	70.20
	Clear	LG43C	52.20	LT43C	70.20
	Less Lens③	LG43	48.00	LT43	66.00

Full Voltage Type

Operating Voltage	Color of Lens	Standard Unit Catalog Number② CR104	List Price, GO-10P1	Push-to-Test Unit Catalog Number② CR104	List Price, GO-10P1
6 Volt④ (# 755 Lamp)	Red	PLG16R	$52.20	PLT16R	$70.20
	Green	PLG16G	52.20	PLT16G	70.20
	Amber	PLG16M	52.20	PLT16M	70.20
	Blue	PLG16L	52.20	PLT16L	70.20
	White	PLG16W	52.20	PLT16W	70.20
	Yellow	PLG16E	52.20	PLT16E	70.20
	Clear	PLG16C	52.20	PLT16C	70.20
	Less Lens③	PLG16	48.00	PLT16	66.00
12 Volts④ (# 756 Lamp)	Red	PLG17R	52.20	PLT17R	70.20
	Green	PLG17G	52.20	PLT17G	70.20
	Amber	PLG17M	52.20	PLT17M	70.20
	Blue	PLG17L	52.20	PLT17L	70.20
	White	PLG17W	52.20	PLT17W	70.20
	Yellow	PLG17E	52.20	PLT17E	70.20
	Clear	PLG17C	52.20	PLT17C	70.20
	Less Lens③	PLG17	48.00	PLT17	66.00
24 Volts④ (# 1819 Lamp)	Red	PLG18R	52.20	PLT18R	70.20
	Green	PLG18G	52.20	PLT18G	70.20
	Amber	PLG18M	52.20	PLT18M	70.20
	Blue	PLG18L	52.20	PLT18L	70.20
	White	PLG18W	52.20	PLT18W	70.20
	Yellow	PLG18E	52.20	PLT18E	70.20
	Clear	PLG18C	52.20	PLT18C	70.20
	Less Lens③	PLG18	48.00	PLT18	66.00
120 Volts④ (# 120PSB Lamp)	Red	PLG22R	52.20	PLT22R	70.20
	Green	PLG22G	52.20	PLT22G	70.20
	Amber	PLG22M	52.20	PLT22M	70.20
	Blue	PLG22L	52.20	PLT22L	70.20
	White	PLG22W	52.20	PLT22W	70.20
	Yellow	PLG22E	52.20	PLT22E	70.20
	Clear	PLG22C	52.20	PLT22C	70.20
	Less Lens③	PLG22	48.00	PLT22	66.00

① When mounted in enclosures rated for those same applications. For some NEMA Type 4X applications, protective caps will improve corrosion resistance.
② "CR104PXG . . ." Catalog Number on light unit *label* identifies only the "power source" component of each complete unit listed above.
③ Select required lens from page 7-23 and order as a separate item.
④ 6-, 12-, and 24-Volt units have same lamp socket; lamps are therefore interchangeable for voltage change.

Nameplate Selection ..... **pages 7-26, 7-27**
Drilling Plan and Dimensions ..... **page 7-28**
Lamp Ordering Information ..... **page 7-24**



INPUTS
I_1 - HAND
I_2 - AUTO
I_3 - BACK SPIN
I_4 - FLO SW
OUTPUTS
O_1 - SS STARTER
O_2 - READY LIGHT
O_3 - FLOW PRESENT
O_4 - RUN LIGHT