

PRIMAX®

i.L. series

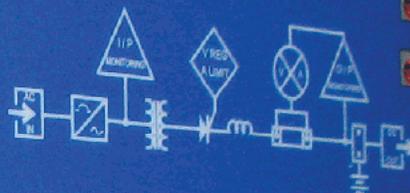
Equalize | Tools | Setting

Alarm message & buzzer reset | Relay reset

131.2 V **247 A**

Temp1 = 28.3C

Control | Alarm | Communication



AC ON

ALARM

ALARM

PRIMAX
TECHNOLOGIES

Conform to ANSIUL std 1012
Certified to CSA C22.2 107.1



Description: BATTERY CHARGER

Mod. No: P4600 -F-3-125-250

	V	A	Ph.	Hz
In/ent:	480	66	3	60
Out/ort:	125	250		

Date: 09/2012 Proj.: 4127 Ser#: 7845

Primax Technologies Inc., Montreal, Canada

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Email: info@primax-e.com Web: www.primax-e.com

Made in Canada



RISK OF ELECTRIC SHOCK
Disconnect all sources of supply prior to servicing.



ONLY authorized personnel may remove this equipment. See manual for safety information.

P4600

UTILITY AND INDUSTRIAL BATTERY CHARGERS

UL1012, CSA C22.2 107.1, ISO9001:2008



PRIMAX®

TECHNOLOGIES

ABOUT US:

Primax is a dedicated team of professionals providing high quality AC and DC backup systems for utilities, power generation, oil & gas, industrial applications and everywhere a true industrial quality backup system is required. Primax has always focused on developing engineered solutions to enhance the quality and the availability of backup power while giving the necessary tools to reduce costs and streamline operations.

Protect Automate

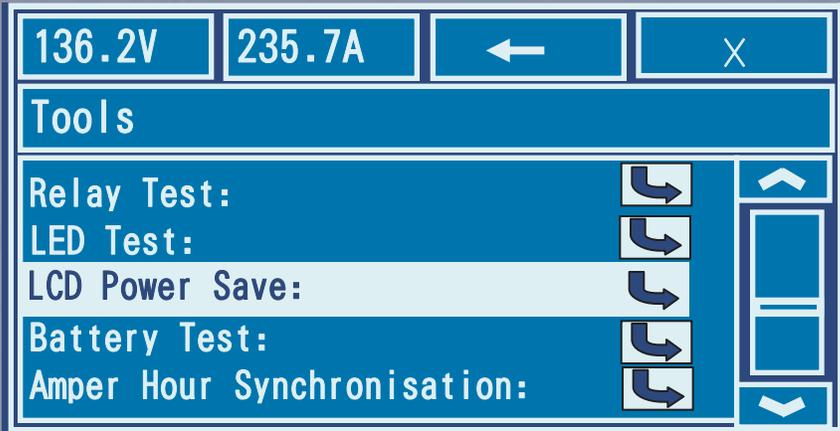
P4600 Series

Primax P4600 series is the evolution of our microprocessor controlled rectifier. Its advanced features allow communication, battery monitoring and maintenance automation at your fingertips.

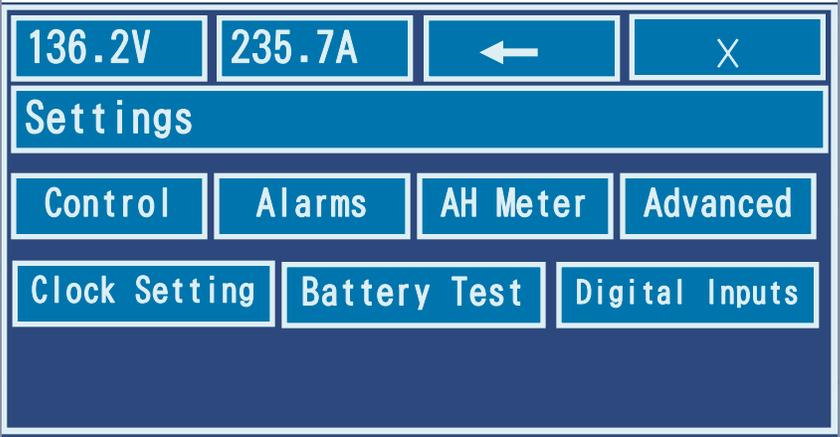
The P4600 user friendly touch-screen gives access to all functions and options on a visually interactive screen. Optional communication provides the ability to remotely and securely interact with all of the system parameters and set-up features including our unique battery monitoring and maintenance capabilities.

The P4600 series is designed to provide up to 750VDC and 3000A in single phase or 3 phase; and 6, 12 or 18 pulse configurations with or without THD filter.

The P4600 series is engineered to comply with UL-CSA-IEC-NEMA-ABS standards.



EASE OF USE
Adjust, reset and test all alarms and options through the scroll down menu



USER FRIENDLY
Access all your setting through a user friendly touch screen

Why PRIMAX:

In today's operational world the basic battery charger can no longer keep up with modern demands of communication, monitoring and maintenance automation.

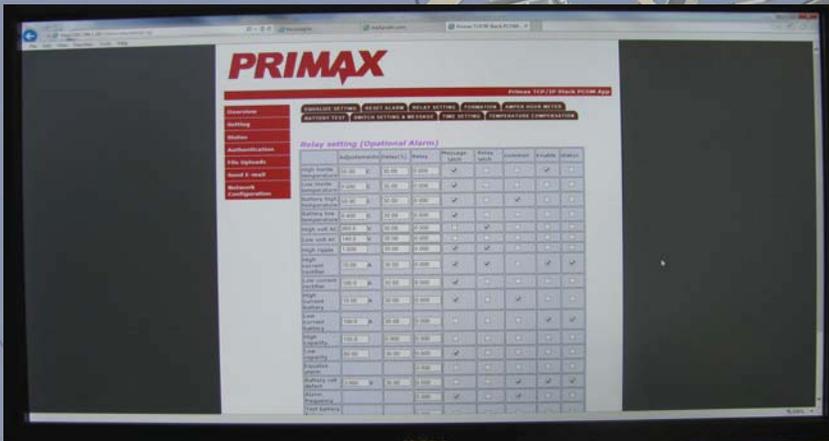
At Primax, we offer integrated solutions giving the user unparalleled flexibility, future upgrades and ease of deployment for your present and future growth.

Communicate

136.2V	235.7A	←	X
Settings			
Enter Password?			
1	2	3	
4	5	6	del
7	8	9	0
			OK

ACCESS

Your critical settings are protected by multilevel passwords



AND MUCH MORE

Diagnostic, Automation, communication and many advanced options are site installable and activated

The reliable **Primax** P4600 offers protection, communication and maintenance automation features that will ensure that your battery backup system will protect the high value assets in your substation. The P4600 battery monitoring and maintenance features will help insure backup availability and reliability of power from your battery while significantly reducing your maintenance expenditure. Opting for these tools, you can improve the net value of your system and reduce costly maintenance visits and unexpected shutdowns.

OPTIONS

Interface:

- ◇ Individual alarm form "C" contacts
- ◇ Modbus RTU via RS232/485 or TCP/IP, DNP3, IEC 61850, Canbus
- ◇ Web page via Local or dynamic IP address
- ◇ 4-20mA & 0-5V current and voltage R/W loops
- ◇ 8 customer defined digital inputs

Alarms

- ◇ Buzzer with reset
- ◇ Hardware high volt shutdown
- ◇ 2nd low volts
- ◇ AC High & Low Voltage
- ◇ Battery high & low temperature alarm and shutdown
- ◇ Charger or battery high temperature derating and shutdown

Metering & Monitoring

- ◇ Input voltage, current and frequency
- ◇ Non intrusive battery current metering
- ◇ Integrated digital AH meter
- ◇ Battery ammeter and voltmeter
- ◇ Real time charge & discharge battery Ammeter
- ◇ System Clock w/ date and time stamp on event log
- ◇ Watchdog circuit
- ◇ Individual cell monitoring
- ◇ Room temperature reading and alarm
- ◇ Lifeline Monitoring System™

Maintenance

- ◇ Temperature compensation c/w temperature probe
- ◇ Battery imbalance alarm
- ◇ Integrated online Battery Test
- ◇ Integrated online Battery continuity test
- ◇ Battery circuit breaker
- ◇ Low volt load disconnect
- ◇ Remote equalize
- ◇ Remote shutdown
- ◇ Battery liquid level monitor (individual cell)

Input and Output

- ◇ 50Hz input frequency
- ◇ 12 or 18 pulse rectification to reduce THD & ripple with balanced current sharing and 1/2 bridge failure alarm.9 Optional derating.
- ◇ Power limited bandwidth filter
- ◇ THD and P.F. correction filter
- ◇ High capacity interrupting breakers
- ◇ Connection free forced load sharing
- ◇ Remote battery voltage sensing
- ◇ DC output circuit breaker
- ◇ Dropping diode circuit
- ◇ Battery current limit
- ◇ Integrated Distribution panel

Mechanical and hardware

- ◇ Special paint, NEMA & IP protection
- ◇ Seismic design
- ◇ Fungus and tropical proofing
- ◇ Custom enclosures to fit batteries
- ◇ Halogen free and special wiring
- ◇ Bottom or side cable entry
- ◇ Custom enclosures: Stainless steel, aluminum, fibreglass, outdoor, harsh environments, insulated, air conditioned...

01

PROTECT

Protect your system from premature failures

Battery

- . Open circuit
- . Failed cells
- . Accelerated aging
- . Ripple effect
- . High temperature
- . Unbalanced charge

Charger

- . Loss of output regulation
- . High voltage
- . Loss of one phase

02

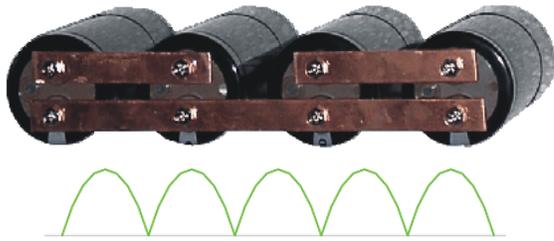
AUTOMATE

- . Data logging with date and time stamp
- . Routine battery service test
- . Automated battery Continuity test
- . Battery temperature monitoring
- . Battery water level monitoring

03

COMMUNICATE

- . Password protected
- . Read / write communication on all settings
- . operational modes, alarms and readings via most popular protocols



High ripple alarm

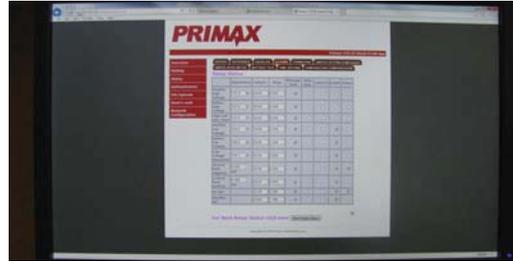
Ripple is #1 battery enemy. It micro cycles the battery and cause accelerated aging. One of 3 phase legs may fail due to protection or an SCR failure. Also capacitors age and fail over time then ripple will increase. The P4600 high ripple alarm can help into predicting events where ripple had reached as low as 1% rms.

READ-WRITE COMMUNICATION

Substation automation relies on access to each device information in both directions: read and write.

The P4600 series offers the following protocols: DNP3, MODBUS & MODBUS over Ethernet

Web server with extensive imbedded webpage IEC 61850



Temperature compensation

At every 10°C increase leads to half battery life. Compensation of float voltage is needed to optimize battery recharging and to preserve battery life. Opting for this tool will help to reduce the chances of over and under charging the battery thus preventing its premature failure. In addition to compensating float voltage, it also indicates battery temperature on the LCD. Should you wish, the charger may activate a cyclical shutdown if the temperature exceeds recommended limits.



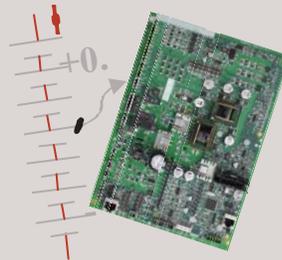
Battery imbalance alarm:

Your battery is your last line of defence.

Individual cells within a battery are not built equally, they age differently and may fail in different modes: Monitoring the battery's state of health is a must.

A simple way to predict battery failure is by using a battery imbalance monitor.

It will alarm should one cell drop in voltage lower than the others during float, equalize or even while the battery is discharging.



A m p e r e - h o u r m e t e r

Predicting residual battery capacity in order to estimate backup time at any moment is an essential tool to manage crisis situations.

The integrated AH meter will display the actual battery capacity during charging and during discharging modes. The operator will then be capable to safely manage his emergency plan with more confidence.

AH Meter

Enable: (OFF)

Vcharge: 136V

Icharge: 5%

Tcharge: 30mn

Peukert: 125%

Battery Continuity Tester & cell open alarm

Having your battery fail open could have serious consequences. Our automatic tester will periodically test for continuity and report any change that could lead to an open failure. Also, this test will ensure that all your connections are as per specification.

2nd low volts alarm

As a backup we include 2 levels of Low volt DC alarm. The 1st alarm can be set at the battery's open circuit voltage to give the first notice while the 2nd alarm can be set at the battery's final voltage to send the most critical level notice.

Basic design features

UL/ANSI 1012 Listed, CSA C22.2 107.1. Certified to applicable IEC standards¹, ABS², ISO 9001 Quality control SCR (Thyristor) based rectifier c/w double wound isolation transformer, electronic control, current limiting and voltage regulation modular construction using the latest power and microelectronic devices, numbered PVC copper stranded wire, 30 year design.

MTBF	300 000 hours typical
MTRR	less than 1 hour
Available voltages	110, 120, 208, 220, 240, 277, 380, 400, 460, 480, 550, 575, and 600 VAC
Phases	1 and 3 phase 60Hz (50Hz optional)
Power factor	0.75 (1 phase), 0.85 (3 phase) at nominal load when tested on battery and resistive load
Efficiency	Typical 90% at full load

Output:
Standard voltages 12, 24, 36, 48, 72, 110, 130, 250, 380, 480, 600, 750 VDC (nominal)

Power From 60 W to 1000+ kW

AC ripple voltage (RMS)		12-24-48VDC	125VDC	250VDC	>250VDC
	Unfiltered ³	1%	2%	2%	2%
Static regulation	Filtered ³	30mV, 32dBrc	100mV	200mV	1%
	Battery eliminator ³	30mV, 32dBrc	100mV	200mV	0.8%
Dynamic regulation	≤ 0.5% in float for simultaneous variations of +10/-12% input voltage, +/- 5% frequency and 0-100% load				
Load sharing	+/-6% from 10%-90% and 90%-10% load variation (t< 300msec)				
Emc⁴	Random: Similar chargers can be operated in random parallel EN 61000-6-4: Emission standard for industrial equipment EN61000-6-5: Immunity standard for power/substation equipment EN 61558-1: Safety standard for power supplies and similar devices				

Protection: Soft start, Automatic current limiting adjustable from 20% to 100% of nominal rating, higher current limits optional
Input thermal-magnetic circuit breaker and DC output fuse standard
Surge suppression on input and output.
Reverse polarity.

Standard Features

Metering & logging, :

- Simultaneous DC voltage and current metering 0.5 % Accuracy ± 1 digit
- Line frequency monitoring
- Rectifier ambient temperature
- Remaining and elapsed equalize time
- Event log (Up to 250 events)

Control modes:

- Constant Voltage regulation. Limited current
- Forced load sharing without common wire connection
- DC current de-rating based on charger temperature

Local indications:

- AC On green LED
- Urgent Red LED
- Non-Urgent Amber LED
- Common alarm with flashing LED
- LCD sleep mode

Charging modes:

- Automatic or manual float / equalize
- Adjustable Float and equalize
- Equalize period 0-88 months (in h)
- Automatic equalize mode activation
- based on: time, low volts, charger start, AC fail, current limit: time adjustable 1-100hrs
- Automatic equalize termination based on voltage, time, or current
- Antidepressant equalize mode
- Constant current mode (formation)

Remote indications:

Common relay with dry form "C" contacts
Others
Restore default

Alarms:

- Alarm acknowledgement and reset
- LED & relay test and reset

Default alarms:

- Rectifier failure
- AC fail
- Battery high volt
- Battery low volt
- Segregated positive & negative ground fault in mA or kΩ

Factory⁴ or customer activated alarms:

- End of discharge (2nd low volt level)
- High volts shutdown
- Equalization on
- High ripple
- High/low frequency shutdown
- High/low temperature shutdown
- Rectifier high/low current
- Rectifier high/low volt

Each can be enabled or disabled, has its own level and time delay, its message and relay latched or unlatched, its relay failsafe on or off.

1- CE marked units only,

2- Marine applications only

3- Values are typical, measured at connected battery terminals with capacity 4 times the charger output current as per IEEE 946 & NEMA PE5. Other values are also available on request.

4- Must be specified at order time

Mechanical dimensions, weight and heat loss

Standard mechanical specifications

Enclosure NEMA1 (IP20), steel c/w hinged front access door Standard ANSI 61, light gray
 Natural convection cooling up to 100A output current
 Forced air cooling assistance for units with over 100A output current
N.B. Floor mounted models are provided with 3 in. (75mm) clearance at bottom to facilitate handling by lift truck, pallet truck or slings

Environmental:

Audible noise 45 to 65 dBA at 3ft (1 meter) rating dependant
 Temperature range Operating 32°F to +122°F (0°C to 50°C)/Storage -40°F to 185°F (-40°C to 85°C)
 Temperature de-rating 0.83% / °F from 122°F to 140°F (1.5% / °C from 50°C to 60°C)
 Operating humidity Up to 95% (non condensing)
 Altitude 0% for 1st 3300 ft (1000m), de-rating 7% per 3300 ft (1000m) over 3300 ft (1000m)

1ph chargers	AMPS									
24VDC	5	10	15	20	25	30	40	50	75	100
Enclosure	ARM 300	ARM 300	ARM 300	ARM 300	ARM 400	ARM 400	ARM 500	ARM 500	ARM 500	ARM 650
weight lb	80	85	115	121	136	141	226	267	333	388
weight kg	36	39	52	55	62	64	103	121	151	176
KW	0.04	0.06	0.08	0.1	0.12	0.15	0.2	0.25	0.38	0.5
BTU/hr	119	196	273	350	427	503	699	853	1280	1706
48VDC	5	10	15	20	25	30	40	50	75	100
Enclosure	ARM 300	ARM 300	ARM 400	ARM 400	ARM 400	ARM 500	ARM 500	ARM 500	ARM 650	ARM 650
weight lb	85	96	141	161	177	262	308	338	389	443
weight kg	39	44	64	73	80	119	140	154	177	201
KW	0.05	0.08	0.12	0.16	0.2	0.24	0.32	0.39	0.57	0.78
BTU/hr	162	282	401	563	682	802	1083	1322	1962	2644
125-130VDC	5	10	15	20	25	30	40	50	75	100
Enclosure	ARM 300	ARM 400	ARM 400	ARM 400	ARM 500	ARM 500	ARM 500	ARM 500	ARM 650	ARM 650
weight lb	104	172	243	248	322	339	368	405	531	556
weight kg	47	78	110	113	146	154	167	184	241	253
KW	0.08	0.16	0.24	0.32	0.4	0.47	0.63	0.8	1.2	1.6
BTU/hr	290	537	827	1075	1365	1612	2150	2730	4095	5459
240-250VDC	5	10	15	20	25	30	40	50	75	100
Enclosure	ARM 400	ARM 400	ARM 500	ARM 500	ARM 500	ARM 650	ARM 650	ARM 650	ARM 700	ARM 700
weight lb	172	223	339	368	380	506	506	531	644	828
weight kg	78	101	154	167	173	230	230	241	293	376
KW	0.15	0.3	0.44	0.59	0.75	0.88	1.18	1.5	2.25	2.95
BTU/hr	503	1007	1510	2013	2559	3020	4026	5118	7677	10066

(INCHES)

Enclosure	H	W	D
ARM 300	20"	17"	13"
ARM 400	30"	21"	15"
ARM 500	39"	24"	20"
ARM 650	51"	24"	20"
ARM 700	60"	36"	25"

(mm)

Enclosure	H	W	D
ARM 300	508	432	331
ARM 400	762	533	381
ARM 500	991	610	508
ARM 650	1295	610	406
ARM 700	1524	914	635

3ph chargers	AMPS												
24VDC	30	40	50	75	100	125	150	200	250	300	400	500	600
Enclosure	ARM 400	ARM 500	ARM 500	ARM 500	ARM 650	ARM 700	ARM700+TXF	ARM700+TXF	ARM700+TXF				
weight lb	150	242	287	373	430	441	463	551	617	642	782	807	807
weight kg	68	110	130	170	195	200	210	250	280	292	355	367	367
KW	0.18	0.24	0.29	0.43	0.57	0.7	0.84	1.14	1.41	1.68	2.27	2.82	3.37
BTU/hr	623	810	998	1467	1936	2406	2875	3873	4811	5749	7746	9622	11499
48VDC	30	40	50	75	100	125	150	200	250	300	400	500	600
Enclosure	ARM 500	ARM 500	ARM 500	ARM 650	ARM 650	ARM 700	ARM700+TXF	ARM700+TXF	ARM700+TXF				
weight lb	288	348	380	438	501	517	517	697	747	772	865	1097	1097
weight kg	131	158	173	199	228	235	235	317	340	351	393	499	499
KW	0.27	0.34	0.43	0.64	0.86	1.09	1.28	1.73	2.18	2.56	3.46	4.29	5.12
BTU/hr	921	1169	1476	2184	2952	3719	4368	5903	7438	8735	11806	14638	17470
125-130VDC	30	40	50	75	100	125	150	200	250	300	400	500	600
Enclosure	ARM 500	ARM 500	ARM 500	ARM 650	ARM 650	ARM 700	ARM 700	ARM 700	RM700+T	ARM700+TXF	ARM700+TXF	ARM700+TXF	ARM700+TXF
weight lb	388	426	467	622	647	730	780	1037	1037	1415	1425	1703	2010
weight kg	176	194	212	283	294	332	355	471	471	643	648	774	914
KW	0.53	0.71	0.87	1.3	1.74	2.21	2.61	3.48	4.35	5.22	6.96	8.7	10.65
BTU/hr	1817	2423	2969	4453	5937	7541	8906	11874	14843	17811	23749	29686	36339
240-250VDC	30	40	50	75	100	125	150	200	250	300	400	500	600
Enclosure	ARM 650	ARM 650	ARM 650	ARM 700	ARM 700	ARM 700	ARM 700	RM700+T	RM700+T	ARM700+TXF	ARM700+TXF	ARM700+TXF	ARM700+TXF
weight lb	597	597	622	755	987	987	1340	1400	1653	1985	1985	2410	2743
weight kg	271	271	283	343	449	449	609	636	751	902	902	1095	1247
KW	0.97	1.27	1.64	2.39	3.21	3.96	4.78	6.35	8.2	9.7	12.7	16.05	19.05
BTU/hr	3310	4333	5596	8155	10953	13512	16310	21667	27980	33098	43334	54765	65001

Other sizes are available upon request

Reduce your maintenance expenditure- Maximize battery life
Increase your system's reliability - Reduce your long term cost of ownership

LIFELINE™

What are the various battery failure modes?

What can go wrong with chargers?

How can chargers prevent some of these failures from occurring?

If these events or failures are unavoidable... How can a charger monitor and test certain parameters in order to predict and annunciate the failures before they actually occur?

The answers we have found for these questions allow us to claim the following:

Any charger out there can fail, and when it fails, there are 3 ways it can react:

It can fail in over voltage, under voltage or under current.

As part of the **Lifeline** Monitoring system you get 4 alarms that will help you with these 3 events:

- Second level of low volt dc alarm
- Battery discharging alarm
- High voltage shutdown.
- Low current alarm.

Following this, we proceed to further protect your battery investment by adding the following features:

- Battery temperature compensation
- Battery high temperature alarm
- Battery high temperature shutdown
- AC high ripple alarm
- Battery imbalance monitor
- Digital Ampere/hour meter
- Automatic Online Partial Battery Capacity Tester
- Automatic Continuity Tester & Battery open alarm
- Watchdog circuitry

Recording and Reporting:

In order to record and communicate all of this information the **Lifeline** Monitoring system will also include:

- A data logger (black box)
- A true read/write communication module that can come in any of the following formats:
DNP3, MODBUS & MODBUS over Ethernet, Web server (charger generates its own webpage), IEC 61850 (optional)

Charger with integrated DC distribution panel and battery compartment



12 pulse large charger designed to reduce THDi & ripple



Redundant chargers with common battery compartment



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