

RDRS

Reliable Demand Response System



Intelligent Metering and Control Device

Power Quality and Reliability Analysis

Demand Controller with automated load shedding, scheduling

Internet-Enabled Communications

Reliable Demand Response System by Utilities

www.xelpower.com

RDRS

Reliable Demand Response System

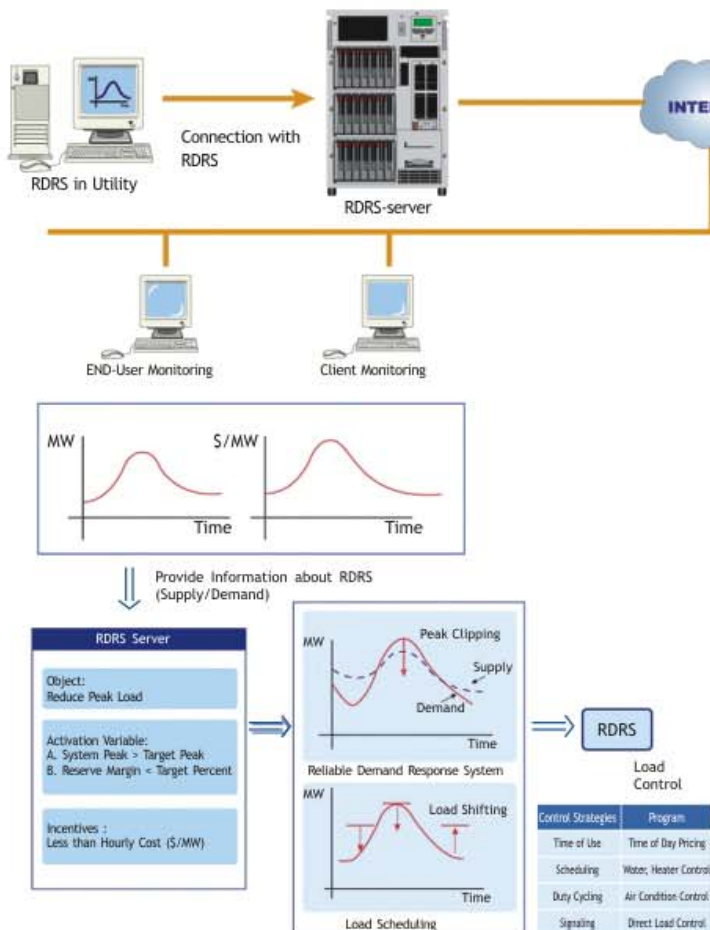


The Power grids of tomorrow will be more complex but more energy-efficient than the systems of today.

Reliable Demand Response System will be solution to benefit energy suppliers and consumers alike.

- End-users need to understand energy consumption patterns and power quality across their RDRS, and determine whether to participate in RDRS (Reliable Demand Response System)
- Utilities want to aggregate loads for RDRS, because this will cope with rapidly increasing power demand economically and quickly.
- Utilities have to address the supply/demand imbalance with RDRS

Configuration Of Reliable Demand Response System

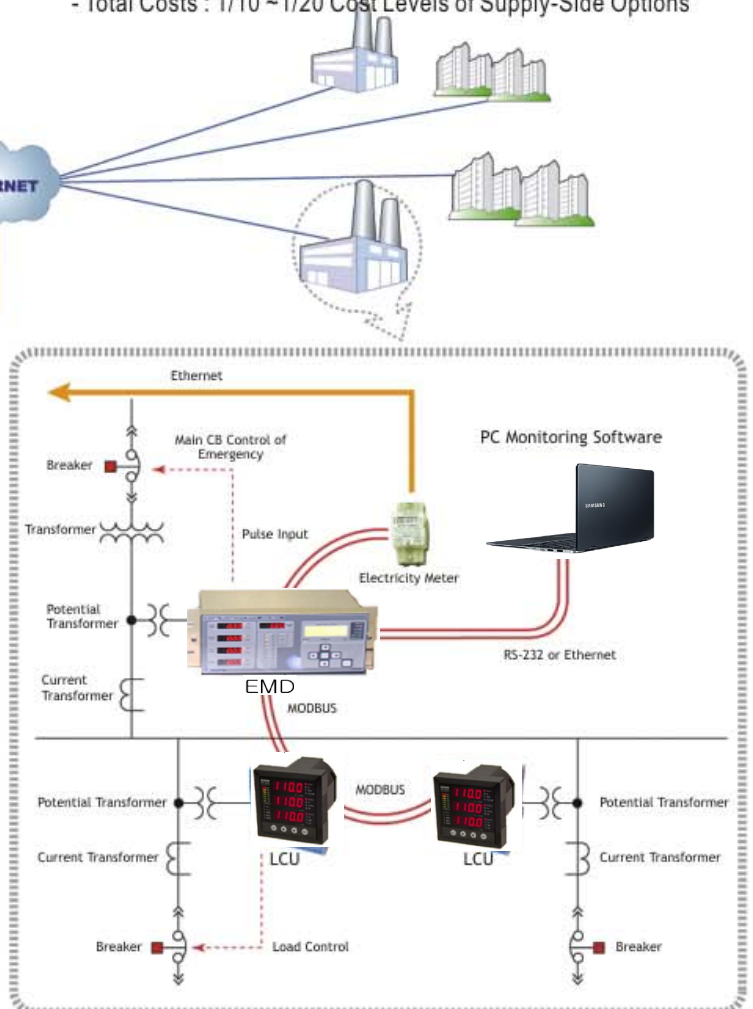


The necessity of RDRS introduction

- Power demand increases much faster than the speed of establishing new power plants
- Energy demand is increasing remarkably along with the development of heavy industry and chemical industry
- Sultry summer cause the increase of air-condition
- The rise of coal price makes generation stations be lack of starting material
- Outside of national budget, extra generation plans

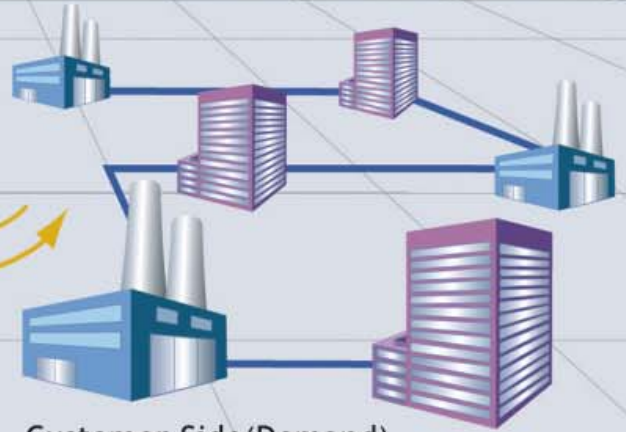
Features Summary

- **RDRS** : International Trends for Secure Supply/Demand Balance Especially in Power Shortage Countries Transmission (USA, Australia, EU, KOREA, etc)
- **National-Wide Benefit (Win-Win Strategies)**
 - Electrical Utilities Cost Saving in Generation, Transmission, Distribution
 - Industries Cost Saving (Avoiding Unexpected Power Interruptions)
 - Bill Savings & Incentive Payments to Customers
- **Edge-Cut IT-based Technologies**
 - Real-Time Monitoring & Control of Loads via Internet
 - Cooperation with RDRS
 - Side-Benefits to Customers (Power Usage Information, Power Quality Monitoring, etc)
- **Economics & Prompt Action Technologies**
 - Implementation Periods : 6 Months (Supply-Side Options : 3 ~ 10 Years)
 - Total Costs : 1/10 ~ 1/20 Cost Levels of Supply-Side Options





Utility(Supply)



Customer-Side(Demand)

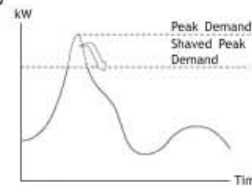
Normal Times(RDRS Server)

- The Utilities uses RDRS Server to monitor the overall Power levels of its customers.
- The Utilities can aggregate energy and power Consumption readings from devices distributed across a facility or an entire nation, with results displayed in near real time
- Increasing Stability with load curtailment

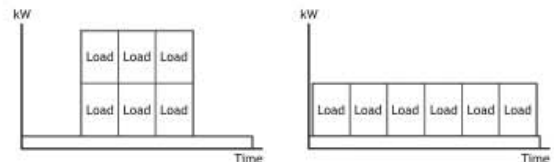


Normal Times (RDRS, Reliable Demand Response System)

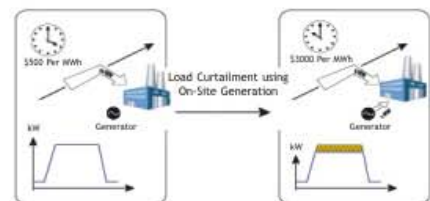
- **Intelligent Metering (SCADA)**
 - 64 samples per cycle
 - IEC 60687 class 0.5 accuracy
 - 4 Quadrant energy and demand
 - 47 real-time, true RMS electrical parameters
 - Per phase voltage, current, peak current demand, watts, VARs, kWh, and more
 - THD, frequency, Power factor, and more
- **Controlling Costs and Efficiency (Energy Saving)**
 - Avoid penalties with automated load shedding, scheduling, Peak shaving



Demand Controller of peak Shaving



Demand Controller of Load Scheduling



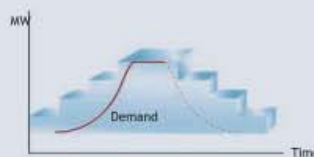
Load Curtailment using On-Site Generation

RDRS Operation (RDRS Server)

At peak times, for example, during heat waves when air conditioning system work overtime, RDRS Server with RDRS warns the utility of the increase in demand



The utility can then use RDRS Server to notify customers of the curtailment opportunity by Cell phone, PC software or RDRS Front LCD's Panel



RDRS Server shows loads returning to normal levels

- **Power Quality and Reliability Analysis (Diagnostic)**
 - Pinpoint the sources of transients, harmonics, or sags, whether external or internal to your facility, and decide on the right corrective actions



RDRS Operation (Customer-Side)

The customers respond to the messages and curtail their loads by shutting off fans and other equipment

RDRS

Reliable Demand Response System



Introduction

- RDRS has its main digital and multi-functions to display and measure all factors of 1-phase/3-phases Power, and all features of power control and monitoring such as Power analysis, Load control, Demand Controller and so on.
- It supports Remote control and monitoring by customer's demand using internet connection.

Main Features

- **Measurement Accuracy**
 - EMD (Energy Management Device) : within 0.5%
 - LCU (Load Control Unit) : within 1.0%
- **Remote monitoring and control with**
 - Internet connection
 - A. Interface between EMD and Local PC: RS-232C or Ethernet(TCP/IP)
- **Easy Maintenance**
 - Automatic firmware download
- **Reliability**
 - Passed Environmental test of Digital Protection Relay in IEC(International Standard) to prohibit its wrong operation from customers' environmental problems.
- **Various Additional Features**
 - Demand Controller functions: Measurement of customer's demand time, support monthly report
 - Power Analysis: Real-time frequency analysis, THD (Total Harmonic Distortion) analysis
 - Customers' Power waveform analysis through processing 32 sampling

EMD Main Specifications

- **Power Measurement and Display**
 - Measurement all factor such as 3-phase voltage/current, N-phase current, active power, reactive power, apparent power, power factor, frequency of customer's MOF panel
 - Measurement cycle : within 1 second
- **15 minutes Demand Power Measurement and Demand Control Function**
 - Demand control of load through measuring 15 minute demand power of electronic power meter
- **Frequency Analysis**
 - Separate frequency Analysis (support analysis by 16 harmonic)
- **Communication with LCU**
 - Communication with customer's LCU via RS-485 type
 - Customer's load control
- **Protocol Application : MODBUS**
- **Communication with Customer's Local PC**
 - Standard RS-232C
 - Ethernet(TCP/IP) using Modem
- **Daily, Monthly, Yearly Report**

LCU Main Specifications

- **Load Power Measurement and Display**
 - 3-phase voltage/current, active power, reactive power, apparent power, power factor, frequency measurement
 - Front panel FND display
- **Load Control**
 - Max. 2 Loads control
 - Unit control, group control, maintain control
- **Communication with EMD**
 - Interface: RS-485
 - Protocol: MODBUS

Technical Specifications

EMD

Input power :
DC : 120V-370V
AC : 85V-265V, 60Hz
Power consumption :
15W

- **Output contact**
 - Channel No. : 10 channel
(A contact: 2EA, C contact: 8EA)
 - Closing capacity :
AC 250V, 10A, 0.3 SEC
DC 125V, 30A, 0.3 SEC
- **Input contact**
 - Channel No. : 4 channel
(2 channel : power meter connection)
 - Hot contact : 2 channel
 - Dry contact :
EOI, pulse of power meter (+24dc)

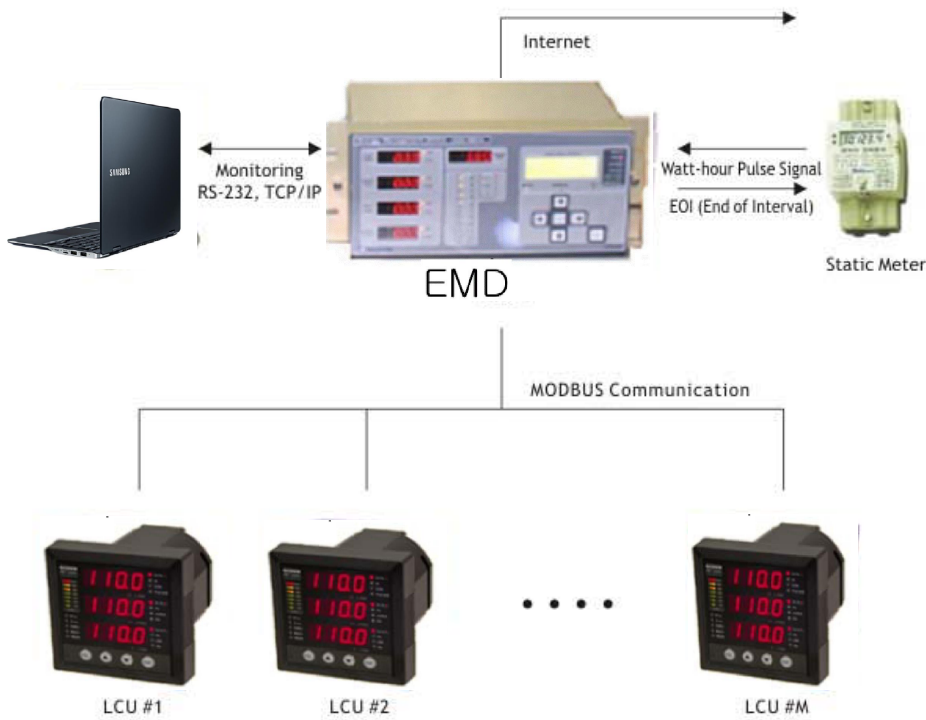
LCU

Input power :
AC : 110V-220V,
50/60Hz
Power consumption :
10VA

- **Output contact**
 - Channel No. : 2 channel (C contact)
 - Closer capacity :
AC 250V, 10A, 0.3 SEC
DC 125V, 30A, 0.3 SEC
- **Input contact**
 - Channel No. : 1 channel (Hot contact)



Network Configuration



■ Type Tests

- Operation Environment
 - Temperature : -10 °C ~ 55 °C
 - Humidity : ~90 %
- Insulation Test Voltage : IEC-60255-5, above 10MΩ
- Impulse Voltage Withstand : IEC-60255-5, 5kV, 3kV (1.2X50us)
- Dielectric Test : IEC-60255-5, AC2,000V, for 1 minute
- Radiated Electromagnetic Field Disturbance Test : IEC-60255-22-3 Class III
- 1MHz Burst Disturbance : IEC-60255-22-1
- Surge Immunity : IEC-60255-22-5
- Electrostatic Discharge : IEC-60255-22-2, (Air)8kV, (Con.)6kV
- Fast Transient : IEC-60255-22-4 Class IV, 4kV
- Vibration : IEC-60255-21-1 Class I
- Shock and Bump : IEC-60255-21-2 Class I

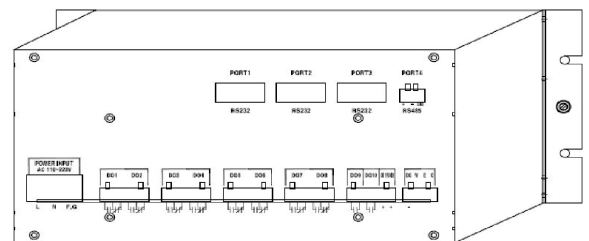
Monitoring Program

- Customer's Power Display
- Real-time Data Display
- Harmonic Analysis
- Recording Report
- Customer's Load Control
- Demand Control Status Display and Remote Manual Control

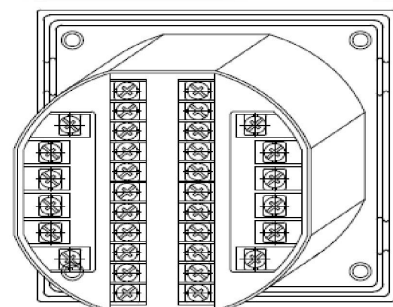


<Main Display>

■ Terminal Block Arrangement



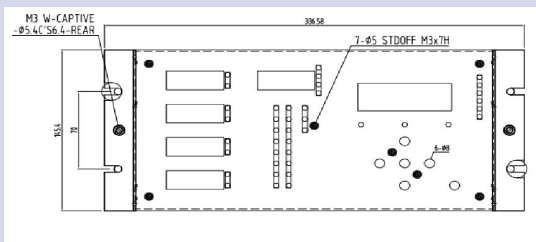
<Rear of EMD>



<Rear of LCU>

■ EMD Dimensions

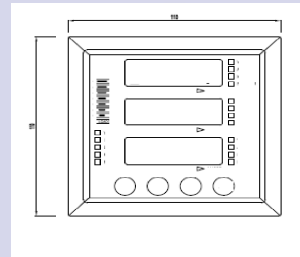
336(W) X 145(H) X 163(D)



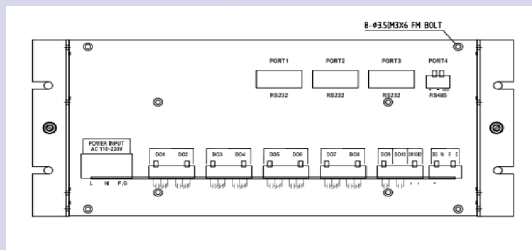
Front

■ LCU Dimensions

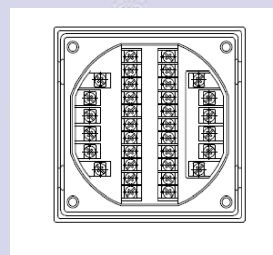
110(W) X 110(H) X 114(D)



Front



Rear



Rear