IndustrialIT for Power Generation

Power Generation Portal™
Version 4.1
PGP - Functional Overview

- WEB Server
  - Client Explorer
  - Connectivity Options
  - Historian, Trending and Archiving
  - Tag Data Base Management
  - I/O Scanner
- Alarms and Security
- Data Publishing

- Product History
- Architecture
- End

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PGP - Tag Data Base Management

Online Database Configuration
- Most Changes can be done on-line
- Changes are synchronized
- Changes are immediate
- Can be done from any client

Offline Database Configuration
- Supports Excel, Dbase, XML and Text Files
- Supports incremental and total changes
PGP - Tag Data Base Management

- **Tag Types**
  - Up to 512,000 tags configurable per server
    - 256,000 Boolean
    - 256,000 Non Boolean
  - Tag Types Include:
    - Analog
    - Digital
    - Calculated
    - User Configurable
    - Bit Arrays
    - Text
    - LAB (manual entry)
PGP - Tag Data Base Management

- **User Configurable Tags**
  - Multiple I/O connection are Combined to 1 Tag
  - Link between Logic Macros, Database and Display Symbols

### Pump 1 I/O Signals
- Pump Status
- Pump Alarm
- Pump Starting
- Pump Failed to Start
- Pump Stopping
- Pump Failed to Stop

### Tagname: PUMP1
- PUMP1. STATUS
- PUMP1.ALARM
- PUMP1.STARTING
- PUMP1.STARTFAIL
- PUMP1.STOP
- PUMP1.STOPFAIL

### Display Symbol
PGP - Tag Data Base Management

- Special Tags
  - Monitor all network nodes (including switches)
  - Monitor Printers
  - Monitor any Window’s Parameter
  - Monitor remote PC’s hard drive space
PGP - Tag Data Base Management

- Aspect Links (Right Click)
  - Tags can have links to other Applications
  - Links are customizable per tags
  - Links could include:
    - P&ID drawings
    - Instruction Manuals
    - Maintenance Packages
    - Operator Notes
PGP - Tag Data Base Management

- **Input Conversions**
  - Scaling and Biasing of inputs is supported
  - Special and custom conversions are available
    - Square Root
    - RTD
PGP - I/O Scanner

- Common Infrastructure
- Available Plug-in Drivers
  - Harmony/INFI (semAPI, included)
  - Harmony/DCI (OPC)
  - Freelance 800F (OPC)
  - 800xA AC800M (OPC)
  - AC870P (OPC)
  - Procontrol P13 (OPC) – January 2008
  - OPC and ODBC Client
  - Modbus, Modbus TCP
  - SPABUS
  - IEC 870-5-101/103/104
  - DNP 3.0
  - Text
  - Siemens Teleperm (XU device)
  - General Electric GSM (Mark V/VI) (GE Standard Messages, GSM)
- Quick implementation of new drivers
PGP - Client Explorer

- Unicode-based Multilanguage Support
  - English by default
  - Other languages available through local ABB organizations (Italian, French, Spanish, Chinese, Hebrew, Russian)
- Up to 10,000 Pages supported
- Graphical pages can include:
  - Pictures (GIF or JPEG)
  - Basic graphical objects
  - Complex objects from libraries
- Object behavior and appearance linked to plant variables
- Client Explorer
  - Up to 16 Independent Windows
  - Explorer Panel Supports Display Hierarchy
- Client access to multiple servers
PGP - Client Explorer

- Pop-up Controls
  - Pop-up Faceplates to Control Process from Graphic Pages
  - Multiple Pop-up Faceplates on the Same Graphic Page for Simultaneous Control of Multiple Field Elements
  - Pop-up Pegboards
PGP - Client Explorer

- Display Builder
  - State of the art display builder
  - Templates
  - Symbol Libraries
  - ActiveX
  - Pictures (GIF and JPEG)
  - Drag and Drop support
  - Support link of object classes with instances
PGP - Data Publishing

- OPC Server
  - DA, AE, HDA
- ODBC
  - Support mirroring
- OLE-DB
  - PGP available as OLE-DB provider
- HTTP
  - Integrated Web Server for pure thin client technology
- API
  - For application development
  - Available for Visual Basic and Visual C++, also as a COM object
PGP - System Management – Alarms

- General Alarming
  - 8 Alarm Priorities
  - 16 Alarm Groups
    - 16 Sub-Groups
    - 256 total Groups
  - Alarm Buttons

- Alarms at the Bottom of Screen
- Supports Remote Alarming
  - OPC AE Server & Client
Tag Alarm Options
- 8 Levels of Alarms
- Rate of Change Alarms
- Variable Alarm Limits
- Alarm Inhibit Tags
- Alarm Comments
- Variable Alarm Sounds
- Select Printer
- Print State Changes
- Alarm Deadbands
- Broadcast Alarm
- Acknowledge
- Trigger programs
PGP - System Management – Alarms

- Alarm Filtering
  - On Groups and Priorities
  - On Wild Cards
  - Historical Searches
  - Archive Searches
  - Save to Excel

- Alarms and Displays
  - Jump from an Alarm Summary to a Display
  - Show Detailed Alarm Status on a Display
  - Acknowledge Alarms from a Display
PGP - System Management – Security

- Security principles
  - Identification of users through user ID and password (may use Windows users)
  - Use of Windows can be inhibited

- Each user has a security profile, which defines:
  - Functional privileges (what the user can do)
  - Area privileges (where can he/she do it), based on Plant Units and Workplaces
  - User preferences (Menus and Toolbars, Home Page, Language)
PGP - System Management

- Diagnostics and System Management
- Fast overview by usage of symbols
- Easy navigation through a tree structure
- Output of the analysis in a log file
- User-friendly system and configuration management
PGP - Connectivity Options

- HMI add-ons extend the Power Generation Portal platform with all the tools for effective plant control

- Each add-on includes:
  - Support for DCS-specific tags and function blocks
  - Support for import of DCS configuration
  - Pop-up faceplates for common function blocks
  - System Management and Diagnostics

- Available add-ons:
  - Symphony/Harmony, INFI90, Network90
  - ControlIT AC800F, Freelance 2000, Freelance 800F
  - ControlIT AC800M
  - ControlIT AC870P
  - Procontrol P13 – January 2008
## PGP for Harmony

### Supported Function Blocks

<table>
<thead>
<tr>
<th>Analog</th>
<th>Digital</th>
<th>Intangible</th>
<th>Text</th>
<th>Externally</th>
<th>Integer</th>
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<td>N90STA</td>
<td>RCM</td>
<td>RMCB</td>
<td>RMSC</td>
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<td>TEXTSTR</td>
<td>UNDEF</td>
<td>EXTANG</td>
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<tr>
<td></td>
<td>APMSSTA</td>
<td>NODESTA</td>
<td>BITMASK</td>
<td>COMPOSITE</td>
<td>INTEGER</td>
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<tr>
<td></td>
<td>ANGRPT</td>
<td>DIGRPT</td>
<td>LABANG</td>
<td>LADBIDG</td>
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<tr>
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<td>CALCDIG</td>
<td>APMSSTA</td>
<td>NODESTA</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>BITMASK</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>COMPOSITE</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>INTEGER</td>
<td></td>
</tr>
</tbody>
</table>
PGP for Harmony

- **Faceplates**
  - DCS: Digital Control Stations
  - DD: Device Driver
  - MSDD: Multi-state Device Driver
  - PV: Analog Control Station
  - DI: Digital Input
  - RCM: Remote Control Memory
  - RMCB: Remote Motor Control Block
  - RMSC: Remote Manual Set Constant
  - TEXTSTR: Text Selector
  - DAANG: Data Acquisition - Analog
PGP for Harmony

- System Management and Diagnostics
  - Block Details
  - Tune Block
  - System Diagnostics
    - Module status and module problem reports
    - Point quality inspection
- Time synchronization
  - Time Master, synchronizes all other modules
  - Time Slave, receives time from other modules
- Configuration data import from Composer
PGP for Freelance 800F

- Supported Function Blocks (each with faceplate)
  - Analog
    - C_ANA Set Point Controller
    - CT_ANA Counter With Analog Input
  - Binary
    - M_BOUT Binary Output
    - CT_P Pulse Counter
    - CTUD Up/Down Counter
    - TOUCH Touch Button
    - MONOF Monoflop
    - TONO Timer, switch-on/switch-off delay
    - TON Timer, switch-on delay
    - TOF Timer, switch-off delay
    - TS Time Scheduler
    - CTT Timer Counter
    - CT_LT Operating Time Counter
  - Monitoring
    - M_ANA Analog Monitoring
    - M_BIN Binary Monitoring
    - M_BAV Binary Monitoring of Antivalence
    - M_GEN General Monitoring
    - EVENT Event Message
  - Controller
    - C_CU Continuous Controller, Universal
    - C_CR Continuous Controller, Ratio
    - C_CS Continuous Standard Controller
    - C_SS Standard Step Controller
    - C_SU Step Controlled Universal
    - C_SR Ratio Step Controlled
  - Open Loop Control
    - IDF_1 IDF for unidirectional units
    - IDF_2 IDF for bi-directional units
    - IDF_A IDF for actuators
  - Constant
    - CSTRE Real Constant
    - CSTBO Input of False or True
    - CSTDI Input of double integer word with sign
  - Macro^ 
    - Breakers control
    - Sequence control
    - Group Control

^Developed by ITTES
PGP for Freelance 800F

- System Management and Diagnostics
  - Support for Diagnostic Function Blocks
    - AC800FR
    - EI803FR
    - FI803FR
    - SA801FR
  - Support for Profibus Diagnostics
    - PROFI_S_DEV: Profibus Slave Object
    - PROFI_M_DEV: Profibus Master Object
PGP for Freelance 800F

- Support for DCS configuration import
  - Automatic import of controller configuration
  - Support for partial import after controller configuration changes
  - Import driven by selected OPC server
Supported Control Builder libraries

- AlarmEventLib
- BasicLib
- BatchLib
- COMLICommLib
- CommunicationLib
- ControlAdvancedLib
- ControlBasicLib
- ControlExtendedLib
- ControlFuzzyLib
- ControlSimpleLib
- ControlStandardLib
- ControlSupportLib
- FFH1CommLib
- FFHSECommLib
- FireGasLib
- GraphicTemplateLib
- GroupStartLib
- IconLib
- INSUMCommLib
- MB300CommLib
- MMSCommLib
- ModBusCommLib
- ModemCommLib
- ProcessObjBasicLib
- ProcessObjDriveLib
- ProcessObjExtLib
- ProcessObjInsumLib
- S3964CommLib
- SattBusCommLib
- SeqStartLib
- SerialCommLib
- SerialLib
- SignalAllocation
- SignalLib
- SupervisionLib
- SupportLib
- System
- VMTLib
Supported Faceplates

- PidLoop (ControlBasicLib library)
- PidLoop3P (ControlBasicLib library)
- Uni (ProcessObjExtLib library)
- Bi (ProcessObjExtLib library)
- ValveUni (ProcessObjExtLib library)
- MotorUni (ProcessObjExtLib library)
- MotorBi (ProcessObjExtLib library)
- SignalInReal (SignalLib library)
- SignalReal (SignalLib library)
- SignalInBool (SignalLib library)
- SignalBool (SignalLib library)
PGP for 800xA AC800M

- **System Management and Diagnostics**
  - Offline AC800M Management and Diagnostics through Control Builder M
  - Online AC800M Management and Diagnostics
    - Import tool provided with PGP (AC800MBuilder) generates a set of pre-configured diagnostics objects based on the hardware configuration of the project
    - These objects provide AC800M on-line diagnostic information to PGP
    - AC800M programs available for:
      - Power Failures Information
      - Memory Usage
      - Time Management
      - Restart
PGP for 800xA AC800M

- Support for DCS configuration import
  - AC800M Builder provided with PGP
- Main functions:
  - Access Control Builder M projects (full or partial)
  - Create PGP database starting from CBM projects
  - Import database
Support for Melody Automation Classes

- Analog Monitoring
  - Melody Analog
  - Melody AnMon
- Analog Output
  - Melody AnOut
- Loop Control
  - Melody APID controller
- Block Flag
  - Melody BFlagB
  - Melody BFlagC
  - Melody BFlagD
  - Melody BFlagI
  - Melody BFlagL
  - Melody BflagP
  - Melody BflagR
- Single Flag
  - Melody SFlagB
  - Melody SFlagC
  - Melody SFlagD
  - Melody SFlagI
  - Melody SFlagL
  - Melody SFlagP
  - Melody SFlagR
- Binary
  - Melody Binary
  - Melody OPA
  - Melody SEL
- Calendar and Timing
  - Melody SwClock
- Controllers
  - Melody CLC
  - Melody CLCD
  - Melody CLCM
  - Melody IDF (individual control)
  - Melody DOS (dosing circuit)
  - Melody COA (change-over auto)
- Counters
  - Melody Count
  - Melody Tcount
  - Melody Total
Each Automation Class has a faceplate associated.
PGP for AC870P

- Support for DCS configuration import
  - AC870P Synchronizer provided with PGP
  - Main functions:
    - extract configuration changes
    - convert changes into XML
    - validate the changes with the OPC server
    - store changes in the PGP database
    - actualize changes on the target servers

- On line configuration changes supported
Different solutions are available, depending on

- Required level of access to plant operations
  - Only supervision
  - Supervision and Control
- Number of users
- Available bandwidth
  - Low speed, less than 64 Kbit/sec
  - Medium speed, less than 10 Mbit/sec
  - High speed, 10 Mbit and higher
- Job functions of users
  - Technical personnel
  - Engineering personnel
  - Managers
PGP for the Internet: Web Portal (PGwP)

- Technology
  - Based on a web server embedded in the PGP server
  - Web clients connect using http protocol
  - Web clients use standard Internet Explorer (thin client)

- Features
  - Web pages are automatically configured based on the PGP client frame layout
  - Same graphic pages are used in PGP standard client and Web client, no additional configuration required
  - Display of pre-defined trend groups and user-defined trend pages
  - Access to alarm and event displays and logs
  - Supervision only

- Application guidelines
  - Level of access to plant operations: Supervision
  - Required bandwidth: Suitable for all bandwidths
  - Type of users: Suitable for all users
  - Number of users: May support large number of users
PGP for the Internet: Remote Portal (PGrP)

- **Technology**
  - Based on Windows Remote Desktop
  - Remote clients connect using TCP/IP
  - Remote clients use standard Windows facilities
  - Client CPU load is on the server

- **Features**
  - Standard Windows technology
  - Provides unlimited access to PGP operating environment, limited by user security profile
  - User experience is equivalent to sitting locally in front of a PGP workplace

- **Application guidelines**
  - Level of access to plant operations: Supervision and Control
  - Required bandwidth: at least 64 kbit/sec
  - Type of users: Technical Users, familiar with PGP
  - Number of users: limited by load on server, usually 32 concurrent users
PGP – Historian, Trending and Archiving

Historian Architecture - 2 Stage

- Graphic and Trend Displays
  - Real Time Data
  - Playback Historian
  - Trend Groups
  - Archiving

Playback Historian:
- Stores all points at high resolution
- Stores selected points according to configurable policies

Trend Groups:
- INST
- AVERAGE
- TOTAL
- MIN/MAX
- COUNT
- MONITOR
- RATIO
- TRIP

Archiving:
- Stores all points at high resolution
PGP – Historian, Trending and Archiving

- Historian Overview
  - Multiple Historians can be Synchronized
  - Back Filling of Data
  - Real Time Historian
  - Alarm Log Historian
  - Sequence of Events / Trip Historian
  - Operator Actions Historian
  - Operator Notes Historian

- How to Use Historical Data
  - Trend Displays
  - Excel Reports
  - Calculation Package
  - Maintenance Counters
  - Exports to 3rd Party Databases (OPC, ODBC, OLE-DB)
PGP – Historian, Trending and Archiving

- Trend Displays – Auto-generated
  - Operating Parameters
  - Trend Groups
- Trend Displays – User Configured
  - On Operator Graphics
  - On Web Pages
- Trend Displays – Show Alarms
  - Alarms are integrated into Trends
    - line change show alarm condition
PGP – Historian, Trending and Archiving

- Excel Reports
  - User Configurable Reports
  - Pre–Canned Reports
  - Scheduled Report Printing
  - Trip Report Printing
PGP – Historian, Trending and Archiving

- Calculation Package
  - Access to Real Time and Historical Values and Qualities
  - Support for Advanced Functions
  - Also a VB and VC++ Interface

```
'Calculation Package'

'Access to Real Time and Historical Values and Qualities'

'Support for Advanced Functions'

'Also a VB and VC++ Interface'
```
PGP – Historian, Trending and Archiving

- **Maintenance Counters**
  - Continuous counting of switching cycle, operation hours and quantity values
  - Storage of temporary values in case of power failure
  - Automatic or manual reset
  - Manual correction of the counter value (preset)
### Retrieved Alarms list

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Tag</th>
<th>Description</th>
<th>Value</th>
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<tbody>
<tr>
<td>13-May-05</td>
<td>14:18:34 PM</td>
<td>492 FV-TAG-30</td>
<td>ANALOG TAG 30</td>
<td>6</td>
</tr>
<tr>
<td>13-May-05</td>
<td>14:18:34 PM</td>
<td>492 FV-TAG-31</td>
<td>ANALOG TAG 31</td>
<td>3</td>
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<td>492 DI-TAG-01</td>
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</table>

2000 alarm messages found
PGP – Historian, Trending and Archiving

Archiving

- Custom archives can be created
- Any Window’s devices is supported (DVD, optical etc.)
- Full system saves are also supported
PGP - System Architecture Concepts

- Multi-master Redundancy
- Database Distribution
  - Segregated architecture
  - Composite architecture
  - Hierarchical architecture
- Linux-based server
PGP - Multi-master Redundancy

- Clients have a Server Access List: if communication with a server is lost, the client re-connect to the next server.
- Each server can acquire data in parallel, or, if parallel paths not available, from other servers.
- One server is the designated master for actions on the field.
- Backfill of data and configuration changes.
- Only available if Client/Server network is at least 10 Mbit/sec.
PGP - Segregated architecture

Client Layer

Server Layer

Unit 1

Unit 2

Unit 3
PGP - Segregated architecture

- Solutions when independent servers are required for plant areas (e.g. separate groups)
- Each server only acquires and maintains data from the related plant area
- Clients are logically connected to one server, but graphical pages can include tags from other servers
  - Client 1 is logically connected to Server Unit 1
  - If tags are addressed by name only (e.g. TIC401), its value will be the one available in the connected server (Server Unit 1)
  - If tags are addressed by a fully qualified name (e.g. Server Unit 2\TIC401), its value will be fetched on Server 2 by Server 1 and made available to the client
PGP - Composite architecture
PGP - Composite architecture

- Solutions when servers are required to maintain a complete database
- Each server acquires data from the related plant area through the connected controllers. Tags from other plant areas are acquired through the network
- Clients are logically connected to one server, and from that server they can see tags for all plant areas
- Only available if Client/Server network is at least 10 Mbit/sec. For large number of tags (> 5000) 100 Mbit/sec recommended
PGP - Hierarchical Architecture
PGP - Hierarchical Architecture

- Solutions when plant areas need dedicated servers and/or workstations, and there is a central control room with access to whole plant.

- Each area server acquires data from the related plant area through the connected controllers. Central plant server acquires tags from area servers through proprietary InterServer protocol.

- Area clients are logically connected to the corresponding area server.

- Plant clients are logically connected to the plant server, and have access to tags from the whole plant.
PGP Linux

- PGP Linux for DCS systems
  - PGP Linux for DCS is structured in a 3-tier architecture
    - PGP Clients based on Windows to provide a common look and feel to users regardless of the server platform
    - The complete set of server functions is based on Linux
    - Data access is embedded in DCS-specific communication modules, based on industrial hardware, operating in the background and requiring no human interaction

- PGP Linux for SCADA systems
  - PGP Linux for SCADA is structured in a 2-tier architecture
    - PGP Clients based on Windows to provide a common look and feel to users regardless of the server platform
    - The complete set of server and data access functions is based on Linux for the following protocols:
      - Modbus, Modbus TCP
      - SPABUS
      - IEC 870-5-101/103/104
      - Text
      - Siemens Teleperm (XU device)
      - General Electric GSM (Mark V/VI) (GE Standard Messages, GSM)
Product History – Installed Base – 1998-2004

- 1179 servers, 1434 clients
- 534 systems

- 1798 servers, 3248 clients
- 838 systems

Total Installed Base
- Server: 2977
- Clients: 4682
- Licenses: 7659
- Systems: 1372