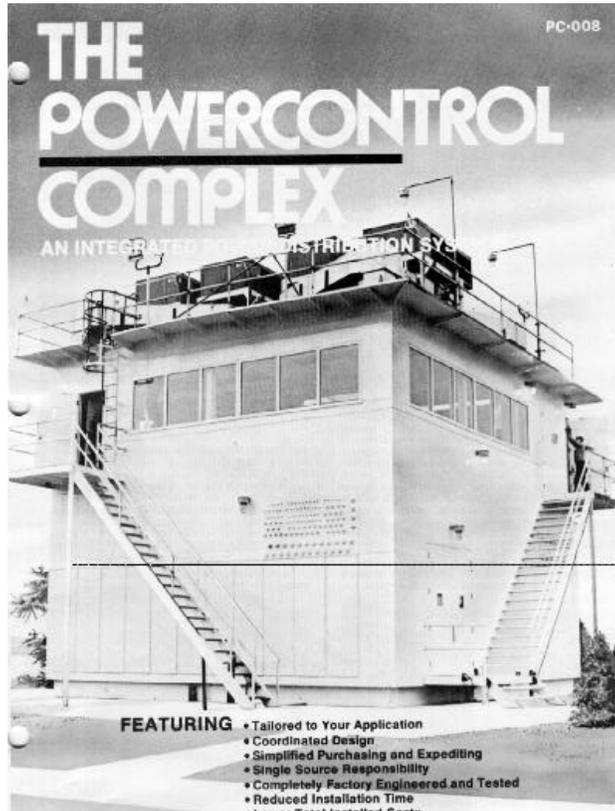


POWERCON CORPORATION



THE POWERCONTROL COMPLEX AN INTEGRATED POWER DISTRIBUTION SYSTEM

BROCHURE #PC-008

ELECTRONIC VERSION CREATED: 7/3/96

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A Fast-Growing Trend in the Economic Distribution of Electric Power

THE REQUIREMENT

Over the last century the normal and practical approach in applying distribution switchgear has been to install the switchgear in a remote section of a building outdoors or in a separate building. Using a section of a building has involved using valuable space that might have been utilized for more productive purposes. The use of a separate building has involved architectural services to design the new building, adapting to local codes and ordinances, building permits, etc. and a multitude of trades to erect the building. All of this effort requires endless coordination and involves the uncertainty of many elements such as the human element, rain, snow, heat, cold, plus unusual disasters, *all of which can cause serious delays in the completion of the power system required to get a plant in operation and production.*

The cost of the completed switchgear equipment installation can run many times more than budgeted. The delay of a completion date can delay production which will cause loss of planned profits and thereby cause serious apprehension to the management responsible for the operation of the new facility.

Company management is always asking - is there a better way of doing a function such as specifying and installing switchgear?

THE TREND

There is always a better way. Only a few years ago, a few engineers started some original thinking by planning to combine the power distribution equipment completely installed and tested in a special steel enclosure. The equipment included motor control centers, 480V low voltage drawout equipment with transformer as well as the high voltage switchgear. After the various items are

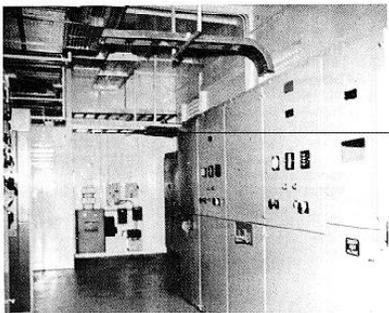
installed at the factory all primary and secondary connections are completed between the units and a sequence test made on the complete system. Thus, one manufacturer becomes totally responsible for proper line up, the coordination of all the power distribution equipment and the complete system. Thus, the complete power system is ready to put-on-line at the final destination after running only the primary and secondary wiring to the complex. Weather or disaster at the job site cannot delay the overall power system. There is a minimum of work at the job site to finish the installation. Delays due to local codes and ordinances are minimized.

This early trend led to more sophisticated planning, such as the inclusion of air conditioning, heating, pressurizing, transformers, lighting, personal facilities and many other items.

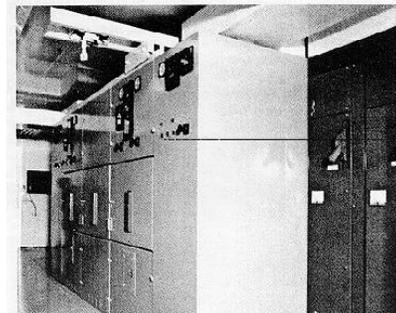
Quite naturally this involved larger sizes where considerations were focused on expanded details in design, such as methods in design to permit future additions; furthermore, arrangements were necessary to split the equipment for easier transportation - but, *still basic is the ease of installation at the job site.* Sizes of this equipment in the early stages were 50 to 60 feet. At present such mammoth sizes of 130 foot lengths and 30 foot widths are in specification stage.

Industries such as petroleum, chemical, and airplane manufacturers utilities are specifying the integrated power system approach to simplify securing their power requirements. It is natural that other industries, commercial institutions and government installations will realize these benefits as this trend continues in the future. This specialized approach to include so many varied power products and other products will be further considered, as the possibilities are realized that there are many benefits involved over the former methods of designing buildings and power systems separately.

Complex showing Metal-Clad Equipment, Bus Duct, and Battery Charger. Balance of equipment not shown.



Another Complex showing low voltage drawout equipment and motor starting equipment



When you've chosen a POWERCONTROL Complex you benefit with 1 order on 1 manufacturer of 1 pre-engineered, pre-wired, pre-tested, pre-packaged integrated power system with 1 TOTAL RESPONSIBILITY by Powercon.

There are numerous advantages and benefits to be derived from packaging multiple classes of electrical products.

The POWERCONTROL COMPLEX may be installed in many environments, deserts where the temperature may rise as high as 135 F with humidity of 90% or in cold areas where the temperature may go as low as -40 F. Recently more complex requirements have included refrigerators, work benches, water fountains, fire detection systems, spare parts storage, emergency lighting and necessary alarms in case of failures. Seismic requirements for the completely assembled units are now under consideration.

As construction costs soar for buildings, the trend to specifying POWERCONTROL COMPLEXES has increased. Industrial plants must also start to look at

the possibilities of procuring a complex - where today they install equipment in any corner of a plant, which takes up valuable space that should be used for production. Installation of a POWERCONTROL COMPLEX on a roof of a building or in a yard avoids such problems. Place a COMPLEX on the roof of a shopping center, it's a natural. Utility companies will find that COMPLEXES will conserve space and thereby reduce costs on land that is extremely expensive in city and suburban areas.

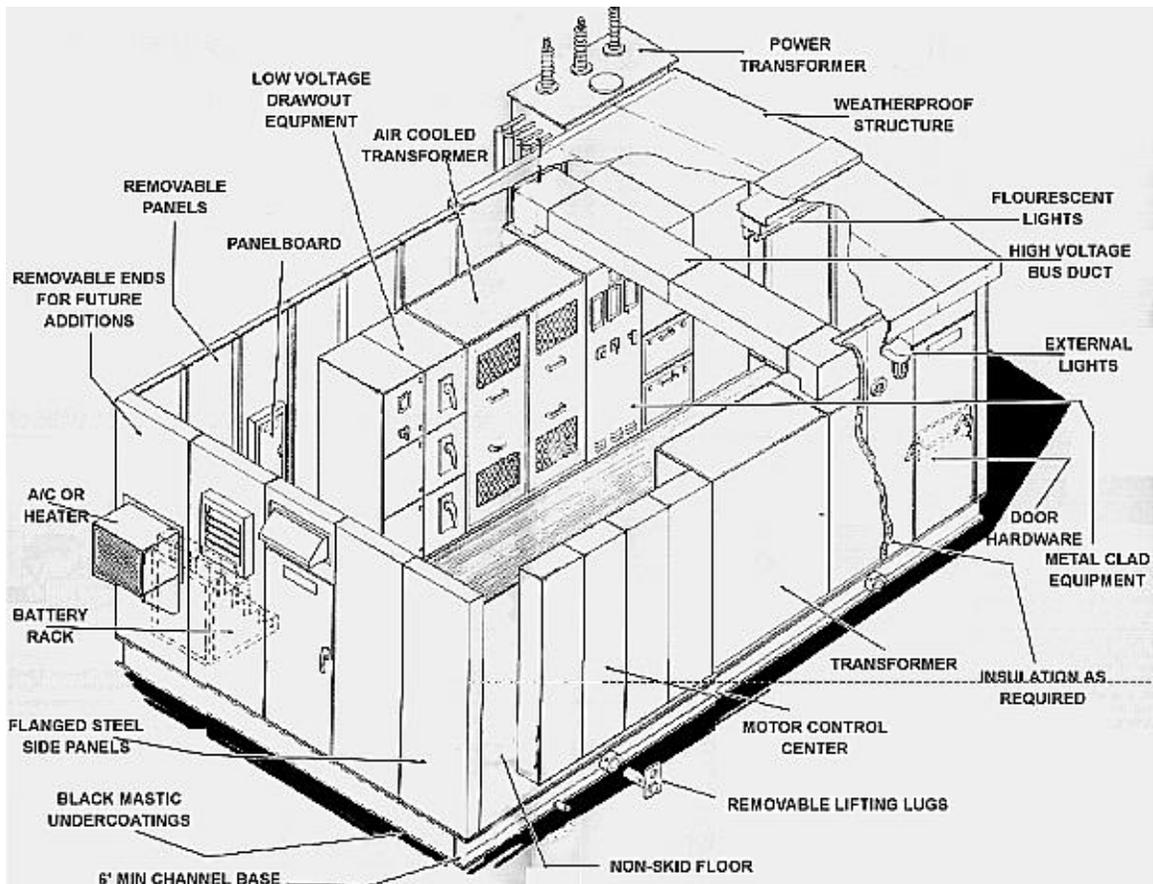
The POWERCONTROL COMPLEX arrangement avoids the many problems between various vendors as to lack of performance and it further minimizes the unpalatable practice of back-charging the equipment manufacturer or engineers for numerous questionable problems.

Only POWERCONTROL COMPLEX gives these and more solutions to your power system needs.....

<p style="text-align: center;">MANAGEMENT SIMPLIFICATION</p> <ul style="list-style-type: none"> • Minimized Engineering • Simplified Expediting • Minimized Permits and Inspections • Minimal Concrete Work • Minimized Material Theft • Environment Protection to Switchgear during Installation 	<p style="text-align: center;">ONE ORDER</p> <ul style="list-style-type: none"> • Multiple orders costly • Less paper work • Simplifies procedures • System ready to use • Avoids local debugging • Ready to be connected 	<p style="text-align: center;">INTEGRATED SYSTEM</p> <ul style="list-style-type: none"> • From inception to finished specifications • ANSI and NEMA standards routine at POWERCON Designed, manufactured and tested at one facility • Pre-wired and debugged BEFORE shipping • POWERCONTROL COMPLEX is ready for operation as soon as cables connected 	<p style="text-align: center;">SINGLE MANUFACTURER</p> <ul style="list-style-type: none"> • Has full responsibility for complete system • Assures highest reliability and safety • Highest quality assured • Professional control of overall system; <ul style="list-style-type: none"> • ENGINEERING • MANUFACTURING • TESTING • QUALITY CONTROL <p>Thorough test of sequencing to meet customer needs</p>
<p style="text-align: center;">DELAYS ELIMINATED</p> <p>Delivery Coordination eliminated</p> <p>All interconnecting material in place</p> <p>Storage not required</p> <p>Equipment weather protected</p> <p>retrieval from storage eliminated</p> <p>Specialist checking time greatly reduced</p> <p>Trade union disputes minimized</p>	<p style="text-align: center;">EASY HANDLING</p> <p>Single shipment of ALL components</p> <p>Direct delivery to you- No intermediate transfers</p> <p>Complete Medium Size units crane unloaded at site</p> <p>Larger units divided for shipment and bolted together on site</p>	<p style="text-align: center;">FLEXIBILITY- EXPANSION</p> <p>Single story of tow story construction</p> <p>removable wall panels allow access to rear of switchgear</p> <p>Removable ends sections allow lateral expansion</p> <p>Easily crane lifted to new location</p> <p>As you grow, your POWERCONTROL COMPLEX grows with you.</p>	<p style="text-align: center;">SAVINGS REALIZED</p> <p>Factory labor rates lower than field rates</p> <p>Savings through elimination of delays caused by bad weather</p> <p>Saves difficult assignment of coordination - workmen and equipment at right time</p> <p>Possible tax credits due to COMPLEX construction</p>

PACKAGED CONSTRUCTION:

TYPICAL POWERCONTROL COMPLEX



CONSTRUCTION.....



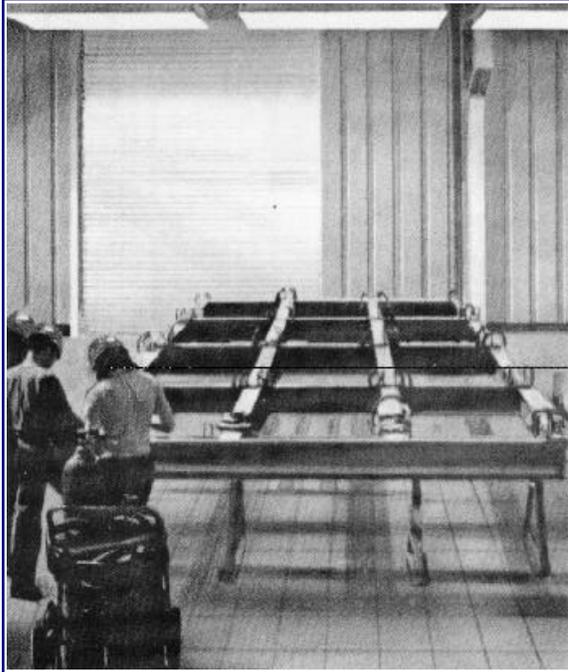
The steel structure is designed to meet many conditions. The floor holding the heavy switchgear equipment and other electrical apparatus is strongly reinforced. The normally single floor structure is manufactured with thick steel plate reinforced underneath by structural steel beams. Depending on the installation location the walls may vary from a single steel panel of 11 gauge formed into a strong pan-structure for normal temperatures; to a sandwich type of structure made of formed steel panels insulated for extreme temperature conditions. The roof of the steel structure is a weather-proof arrangement.

← **Finishing the base floor preparatory to erecting the sides and ends.**

The steel enclosure may include all the switchgear and other items required for full operation. When all apparatus is included for shipment, doors are supplied that are extra wide, and gasketed for various weather conditions. Bolted-on end steel panels permit access for adding additional equipment. Windows can be added if natural light is desired. Otherwise, incandescent or fluorescent lighting is provided.

As acceptance of this arrangement has spread among various types of customers, many other items have been added, thus adding to the size of the structure and reducing the installation effort. Such additional items include air-conditioning or pressurization to keep out dust, dirt, and fumes. Computers have been installed, intercom systems have been added, fire extinguisher systems, and a complement of furniture included; making a full complement for operation.

Welding a base of 10" steel I beams, bottom of base is undercoated with bituminous asphalt. →

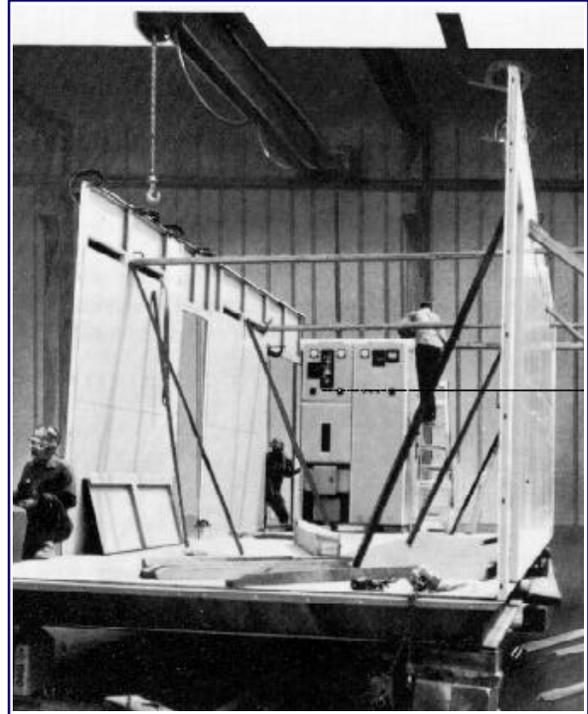


Tailored to Fit Your Needs.

With such additions the structure increases in size, but this does not present a problem. If the structure is of such a size that can not be transported easily or can not be handled by the customer as a complete unit it is designed in modules to permit ease in handling and ease in shipping. These modules are bolted together again upon arrival at the destination.

One of the important features of this equipment is that less space is required to mount the switchgear equipment over installation in a normal building. The switchgear in the steel structure may be mounted against the wall of the structure as any maintenance

Finalizing construction of sides, some panels arranged for removal for access to rear of switchgear. Low voltage drawout switchgear partially installed.



required in the rear of the equipment can be performed by removing that steel panel behind the equipment and thereby access is gained to the equipment. In a conventional building an aisle must be left behind the switchgear for maintenance access.

Some structures have been designed in a two-story arrangement in order to conserve horizontal space. In this case access to the second floor is by steps on the inside or the outside of the structure.

All equipment is shipped bolted in place in the steel enclosure.

Assembling the sides, consisting of flashing and outside covers, with insulation between.

Considerations to Guide Specifications

General

This specification outlines the requirements for the control and switchgear complex as shown on attached drawing. When required, each shipping section shall be designed to interlock structurally with the adjacent section in order to provide a uniform structure. The equipment to be included, but not be limited to the equipment indicated on the drawing, plus essential environmental equipment and sub-systems.

CODES AND STANDARDS

The units and all related equipment and facilities shall be manufactured, assembled, installed and tested in accordance with the latest edition of the applicable standards indicated below:

- IEEE
- ANSI
- NEMA
- National Electric Code
- American Society of Heating Air-Conditioning and Refrigeration Engineers

MECHANICAL CONSIDERATIONS

The units involved will be subject to the following environmental conditions:

Environmental Conditions

Temperature Range _____ °C to _____ °C

Humidity from _____ % to _____ %

Dust or Sand _____

Type of Atmosphere _____ Salt Spray

_____ Grain Dust

_____ Oil-Gas Fumes

_____ Other

Climate Control

Air Conditioning Units _____

Heating Units _____ Space Heaters

_____ Wall Heaters

Dehumidifiers _____

Structure

Size _____ H _____ W _____ D

Expandable _____ ends

_____ sides

Paint Finish

Color _____ Exterior Type of Paint

_____ Interior Type of Paint

Floor Finish

Type _____

Insulation

Ceiling _____

Wall _____

Floor _____

Conductor Entrance

Cable _____

Bus Duct _____

Other _____

Other Items

Lighting _____ Inside

_____ Outside

_____ Emergency

Security Locks _____

Cable Entrance _____ Size

Facilities _____ Size

_____ Size

ELECTRICAL CONSIDERATIONS

The complex shall include the following:

Medium Voltage Switchgear (5 KV) Rating
(15 KV) Rating

Line Up Shown on Dwg. _____

Details in Spec-Pages _____

Low Voltage Switchgear (480V) Rating
(240V) Rating

_____ Other

Considerations to Guide Specifications, cont'd

Motor Starter Equipment

Line Up Shown on

Dwg. _____

Details in Spec-

Pages _____

Power Transformers

Voltage Rating _____ Primary/ _____ Secondary

Details in Spec-Pages

Control Power Transformers

Phases _____

Voltage Rating _____

Bus Duct

(5 KV-15 KV) 3 Phase, _____ A _____ V

(48OV) 3 Phase, _____ A _____ V

or

Cable Tray

(48OV) 3 Phase, 4 Wire _____ A

OPTIONS FOR CONSIDERATION

Removable Floor Plates	_____
Special Size Doors	_____
Filtered Ventilation	_____
Emergency Lighting	_____
Wall Receptacles	_____
Fire Extinguisher System	_____
Sanitary Facilities	_____
Furniture	_____
Door Closures	_____
Base Undercoatings	_____
Two Story Design	_____
Three Way Light Switches	_____
Spare Parts	_____
External Pull Boxes	_____
Vacuum Cleaner	_____
Intercom System	_____
Pressure Equipment	_____
Equal to -# of Water	_____
Loss of Pressure Alarm	_____

SWITCHGEAR BY POWERCON.....

Custom engineered switchgear equipment to meet individual needs has elevated Powercon to wide recognition in the electric power and distribution equipment industry.

Powercon has chosen to be a leader in value. This assumes a responsibility for scientific research, for innovation in development, for selecting manufacturing processes that maximize the probability of fault free production and to provide fast service. The significance of this background is to provide quality equipment that will minimize problems in the field.

High quality equipment represents the best long term value to customers and provides the most protection to electrical systems.

Powercon welcomes the opportunity to create special products for applications that will meet customers' needs. Whether it is a minor request or a complicated design, each product receives equal professional engineering attention in every detail.

Reference Bulletins can be found on the World Wide Web at <http://www.powerconcorp.com>:

Low Voltage Drawout Equipment
Metal Clad Equipment
Bus Duct PC-002
Load Break Interrupter Switches PC-003
General Bulletin PC-001
Drawout Load Break Interrupter Switches PC-007