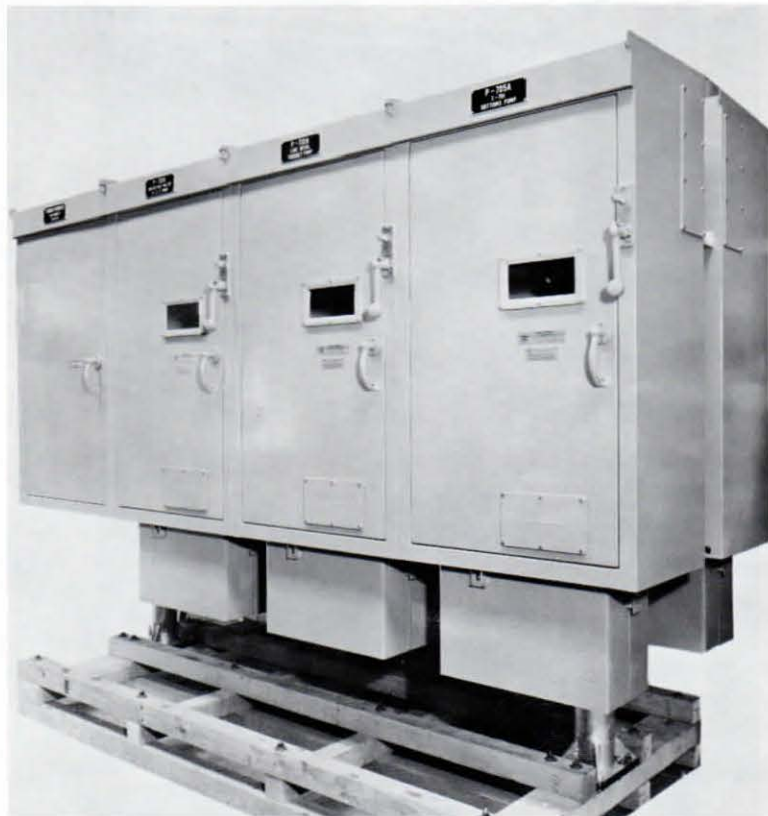


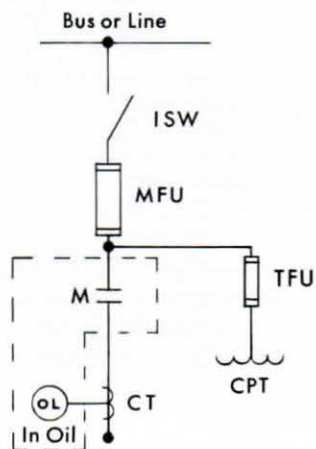


## TYPE 201 COMBINATION CONTROLLER



GROUPED CONTROLLERS ON SHIPPING PALLET

### ONE-LINE DIAGRAM



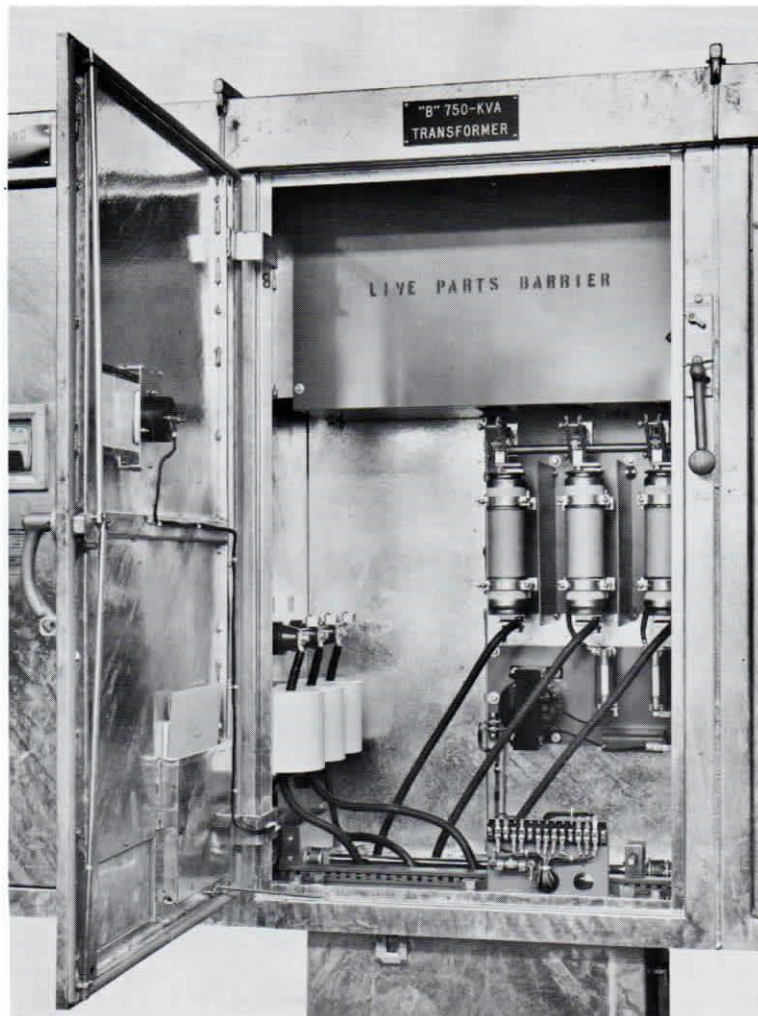
### SCOPE & SUMMARY

This bulletin outlines applications, design features, equipment arrangement, and space planning, for the type 201 controllers. These controllers are for the automatic control and protection of induction motors or transformers on 2300-4160-volt systems.

Each type 201 controller is a coordinated combination of heavy-duty oil-immersed contactor, thermal overload relays, current transformers, and current-limiting fuses, with safety-interlocked isolating switch. These controllers are particularly suitable for oil refineries, chemical plants, and pumping stations.



## TYPE 201 COMBINATION CONTROLLER



CONTROLLER WITH GALVANIZED-FINISH OPTION, CABINET DOOR OPEN

### APPLICATIONS

**GENERAL** The 201 controller provides full-voltage, non-reversing, magnetic starting and protection for induction motors. Or it may be used to switch and protect transformers. Alternate designs are available for reduced-voltage starting (type 202) and for synchronous motor control.

**SYSTEM CAPACITY** These controllers may be used on power systems capable of producing fault currents up to 60,000-amperes RMS asymmetrical. On a 3-phase basis, that corresponds to 150,000-KVA at 2300-volts and 250,000-KVA at 4160-volts, for symmetrical current calculations. This assumes 1.6 ratio between asymmetrical current and initial symmetrical current, for first-cycle fault interruption.

**LOADS** The 201 controller is made in two ratings, 200-amp and 400-amp. In general, the 200-amp rating may be used for control of induction motors up to 800-HP, 2300-V, or 1250-HP, 4000-V. The 400-amp rating may be used for up to 1500-HP, 2300-V, or 2500-HP, 4000-V. These general limits are for motors with 1.15 service factor and up to a 6.5 ratio of locked-rotor current to full-load current.

**LOCATION** This controller is particularly suited to outdoor installation and to other installations where protection from dust or corrosive conditions is desirable. When specified, the controller will also conform to our interpretation of requirements for Class I, Group D, Division 2 hazardous-locations.





## TYPE 201 COMBINATION CONTROLLER

### DESIGN FEATURES

**GENERAL** Each 201 controller is a coordinated combination of a heavy-duty oil-immersed contactor, thermal overload relays, current transformers, and current-limiting fuses, with safety-interlocked isolating switch. These major elements, with the accessory parts, are metal-enclosed, factory assembled, and interconnected. The controller is front-connected with all parts readily accessible.

**OPERATION** A solenoid-operated, oil-immersed contactor, is the power-switching element. It is controlled by the customer's 115-VAC pushbutton or other master element, with control power from a self-contained transformer. The contactor stays closed on momentary voltage dips but opens on prolonged loss-of-voltage.

**PROTECTION** Three main-line fuses, and two transformer-primary fuses, provide high-speed fault protection with current-limiting effect. Three induction-thermal overload relays provide running overcurrent protection. The fuses are coordinated with the overload relays, so that the contactor interrupts any overcurrents up to locked-rotor current and the fuses interrupt only fault currents.

**SAFETY** The isolating switch is manually operated to isolate the controller and the circuit from the power supply. The isolating switch may be padlocked open or closed. The enclosure may be padlocked closed. Windows permit checking the isolating switch position and the oil level. Mechanical interlocks prevent opening the door before opening the isolating switch or closing the isolating switch with the door open. An ammeter shows load current.

### CONSTRUCTION

**ENCLOSURE & MOUNTING** The controller enclosure consists of a control cabinet with integrally-mounted oil-filled tank. The enclosure is gasketed, weather-resistant, and ventilated dusttight, with space heater. The controller is mounted on a support-column. Grouped controllers are mounted on a common support-structure.

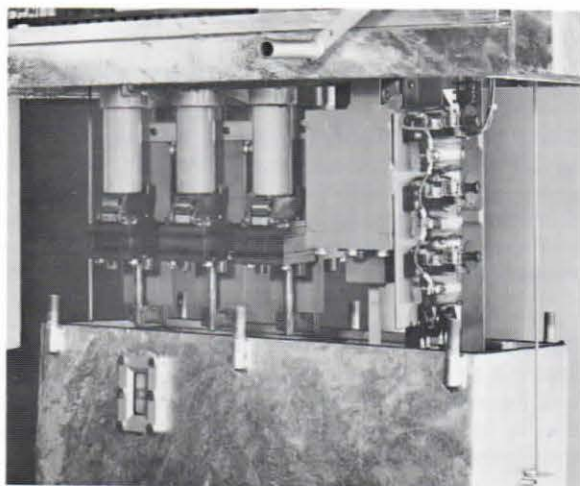
**LIVE PARTS BARRIER** When the isolating switch is open and the door may be opened, the line contacts of the isolating switch and the incoming-line terminals or bus, are the only parts still energized. These parts are at the top of the cabinet. Accidental contact with these energized parts is prevented by a vertical "Live Parts Barrier" and by a horizontal barrier.

**SWITCH & FUSES** The safety-interlocked isolating switch is 3-pole, gang-operated, with external operating handle. Contact travel is vertical, and the air-gap is easily seen when the switch is open. To prevent accidental operation under load, the switch is mechanically interlocked with a control-power switch which is externally operated. The high-voltage fuses are fixed-position, silver element. The fuses are non-vented and completely sealed.

**CONTACTOR** The oil-immersed contactor is solenoid-operated, and the solenoid is energized through a rectifier at 115-volts. The contactor has a unique contact arrangement and operating mechanism designed for high momentary current-carrying and fast current-interrupting. All high voltage insulation is vertically arranged. The contactor includes a gear-driven tanklifter with stainless-steel lifter cables that may be detached from the tank.

**OVERLOAD RELAYS** The thermal-overload relays are oil-immersed, induction-thermal type. Tamper-proof, simple, mechanical construction and low operating temperature, assure accurately maintained tripping characteristics. The current coils are energized from window-type current transformers. The relays automatically reset about five minutes after operating. Optionally, they may be equipped with electric-reset solenoids.

**FINISH** The enclosure and tank are either painted with at least one prime and two finish coats of corrosion-resistant paint or (optionally) hot-dip galvanized after fabrication. The support column or support-rack is hot-dip galvanized. External hardware, shafts, pins, and springs, are stainless. Current-carrying contacts and connections are oil-immersed or hermetically-sealed or specially plated.



CONTACTOR & OVERLOAD RELAYS  
WITH TANK LOWERED



## TYPE 201 COMBINATION CONTROLLER

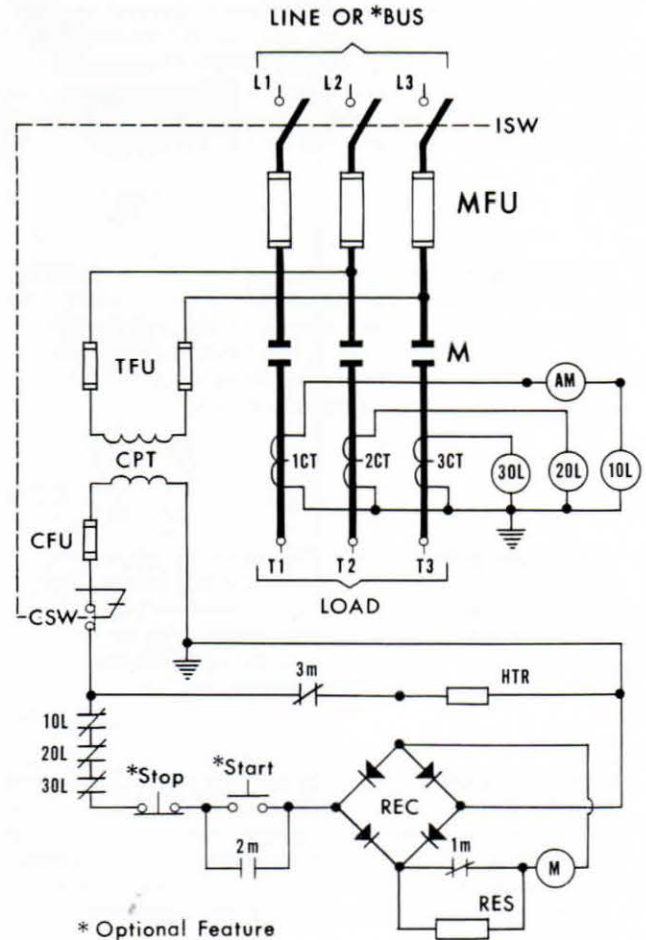
### EQUIPMENT ARRANGEMENT

Mounted in the Control Cabinet—  
 L1/3 Incoming Line Connectors or  
 Connecting Bars to Main Bus  
 ISW Isolating Switch with Interlocks  
 MFU Main Line Fuse  
 TFU Transformer Primary Fuse  
 CPT Control Power Transformer  
 CT Current Transformer  
 T1/3 Load Terminal Connector  
 CSW Stop-On Control-Power Switch  
 CFU Control Fuse  
 TB Control Terminal Block  
 REC Rectifier for Contactor Coil  
 RES Resistor for Contactor Coil  
 HTR Space Heater in Control Cabinet  
 AM Ammeter

Mounted in the Oil-filled Tank—  
 M Solenoid-operated Contactor  
 OL Overload Relay  
 m Auxiliary Contact on Contactor

Optional Features Include—  
 Main Power Bus  
 Application Nameplate 3" x 8"  
 Foreign Voltage Switch  
 Electric-Reset of Overload Relays  
 Overload-Relay Reset Switch  
 Extra Auxiliary Contacts  
 Time-Delay Reclosing Relay  
 Start-Stop Control Switch  
 Hand-Off-Auto Selector Switch  
 A C Ammeter Transfer Switch  
 A C Voltmeter  
 Extra Potential Transformer & Fuses  
 A C Voltmeter Transfer Switch  
 Watthour Meter  
 Indicating Lights  
 Ground Fault Relay

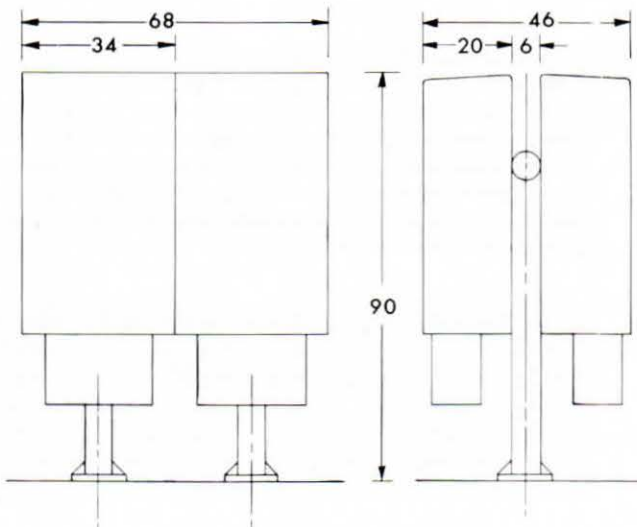
### SCHEMATIC DIAGRAM



### SPACE PLANNING

**SPACE REQUIRED** Each controller is 34" wide by 90" high by 20" deep and mounts on column 6" deep. When grouped, the controllers are mounted back-to-back with connecting bus section. Suggested minimum working clearance in front of each controller is 4-ft (or 5-ft if the voltage to ground exceeds 2500-volts).

**CONDUIT ENTRANCES** Conduit entrances for the incoming-line, will be provided at the top or side or in an attached box for overhead or underground conduit. Conduit entrances for load and control, are standard in the bottom and (optionally) available in the top.



OUTLINE DIMENSIONS FOR FOUR CONTROLLERS