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SECTION ONE GENERAL INFORMATION

1.1 Introduction

Thank you for using an IPC Automation Elevator Control. At IPC, we are committed to designing and manufacturing quality elevator controls to meet our customers' needs.

This manual familiarizes the user with the **Model D2130 Three Phase Hoist Motor Field/Brake Control**. It provides a general overview of the operation of the control, along with detailed descriptions of the status indicators, adjustments and connections.

Please read this manual before installation or start-up. If there are any questions concerning the application, hook-up, or adjustment of this control please call us and ask for Technical Support.

**For Technical Help
Call:
(803) 356-3100
(8 AM to 5 PM EST)
Please Ask For Technical Support**

1.2 Safety

There are certain fundamental warnings, which must be kept in mind at all times. These include:

WARNING:

THE MODEL D2130 MOTOR FIELD/BRAKE CONTROL SHOULD BE INSTALLED, ADJUSTED AND SERVICED BY QUALIFIED ELECTRICAL MAINTENANCE PERSONNEL FAMILIAR WITH THE CONSTRUCTION AND OPERATION OF ALL EQUIPMENT IN THE ELEVATOR SYSTEM; PERSONAL INJURY AND/OR EQUIPMENT DAMAGE MAY OCCUR IF INDIVIDUALS ARE NOT FAMILIAR WITH THE HAZARDS RESULTING FROM IMPROPER OPERATION.

WARNING:

THE USER IS RESPONSIBLE FOR CONFORMING TO THE NATIONAL ELECTRICAL CODE WITH RESPECT TO MOTOR, CONTROLLER AND OPERATOR DEVICE INSTALLATION, WIRING AND START-UP. THE USER IS ALSO RESPONSIBLE FOR UNDERSTANDING AND APPLYING ALL OTHER APPLICABLE LOCAL CODES, WHICH GOVERN SUCH PRACTICES AS WIRING PROTECTION, GROUNDING, DISCONNECTS AND OVER CURRENT PROTECTION.

WARNING:

DO NOT GROUND THE MOUNTING PANEL.

NOTE:

ALL ADJUSTMENT POTENTIOMETERS ARE FOUR (4) TURNS.

1.3 Warranty

Standard conditions of sale for the company include a Statement of Warranty, which covers the control equipment. This Statement of warranty covers all new equipment.




The Model D2130 Three Phase Hoist Motor Field/Brake Control has been designed as a standard product to meet the general criteria for controlling a hoist motor field in conjunction with an elevator. IPC does not warrant that the control will meet all application requirements, codes and safety standards.

1.4 Q.C. Testing

Each unit is carefully tested at the factory prior to shipment. The control must pass both Static and Dynamic performance checks as well as Final Inspection for quality of workmanship. A unit is allowed to ship only after acceptance of all aspects of Q.C. Testing and Inspection.

1.5 Storage

If it should become necessary to store the control for any length of time, the following precautions should be taken:

-  Store the control in a clean, dry (non-corrosive) location that is protected from sudden temperature changes, high levels of moisture, shock and vibration.
-  Ambient temperature should be maintained between 0° degrees C and 65° degrees C.
-  The control should be covered to protect from dust and dirt contamination.

SECTION TWO GENERAL DESCRIPTION

2.1 Introduction

The model D2130 is a 30 Amp continuous rated hoist motor field or brake control that provides a full wave rectified output for a hoist motor with field control or a brake. The output is varied by nine potentiometers that control; four independent setpoints, two ramp-up rates and two ramp-down rates. The control operates from a 208/220 VAC Three Phase input line. The third phase should be applied at all times and should not be interrupted. The D2130 can be configured to operate as either a voltage or a current regulator.

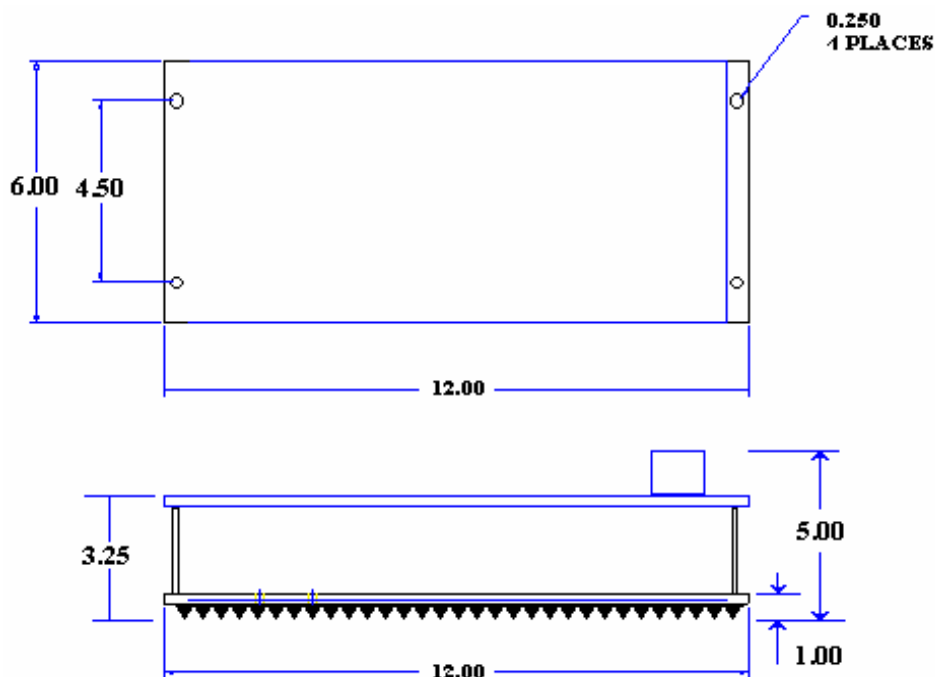
WARNING:

THIS CONTROL IS NOT RECOMMENDED FOR USE ON HOIST MOTORS OR BRAKES WITH IMPEDANCES OF LESS THAN FIVE (5) OHMS.

2.2 Mounting Dimensions

Length	12.00 inches
Width	6.00 inches
Height	5.00 inches

Use four (4) 1/4-20 bolts for mounting



Control Features (Motor Field Mode)

2.3.1 Field Weakening

Top speed of the motor is increased while the torque is decreased in a constant horsepower range. This may be accomplished by adjusting one of the four setpoints for a low output voltage.

2.3.2 Field Forcing

High torque is provided at low speed and the top motor speed is limited. This may be accomplished by adjusting one of the four setpoints for a high output voltage. Field forcing is typically used during leveling and re-leveling.

2.3.3 Input Command Fault Protection

During normal operations it is critical that hoist motor field voltage is present at all times. To ensure that there is always voltage across the field, the D2130 cannot output a voltage less than 40 VDC. The D2130 will default to setpoint one, **SP 1**, if no other setpoint is selected.

Control Features (Brake Mode)

2.3.4 Warming Voltage

Some customers may want to keep a low voltage applied to the brake coil at all times. This is said to decrease the time it takes for the brake to pick since you are not starting from zero volts. **SP 2** may be used for selecting your warming voltage by adjusting the **SP 2** potentiometer until the appropriate warming voltage is obtained.

2.3.5 Picking Voltage

The picking voltage is the voltage required to actually pick the brake. Since **SP 4** provides full output with no adjustment, this would be the setpoint to use. If the output voltage is too high you can adjust all of the setpoints down by using the **LIMIT** potentiometer (see **LIMIT**).

2.3.6 Holding Voltage

Once the brake has been picked, it will no longer require a high level of voltage to maintain its picked state. By reducing the voltage from the picking voltage to a lower holding voltage, you reduce the stress on the brake coil and prolong its life. Select **SP 3** and adjust the **SP 3** potentiometer to the desired holding voltage.

NOTE: THE SP 1 (SETPOINT 1) ADJUSTMENT POTENTIOMETER IS DISABLED WHEN THE D2130 IS CONFIGURED AS A BRAKE.

2.4 Setpoints SP 1- SP 4

There are four (4) output settings available, labeled **SP 1** through **SP 4**. Three of the setpoints are independently adjustable from 40 VDC to full output. Three of the four available setpoints are independently selectable (**SP 1** through **SP 3**). The fourth setpoint **SP 4** is set to full output. These setpoints are selected by applying 80 to 110 VAC to the appropriate input. **SP 1** is the default setpoint. This setpoint is selected when no inputs are present. When two or more inputs are present at one time, the highest input will be selected. For example, if **SP 2** and **SP 4** were selected at the same time (80 - 110 VAC), **SP 4** would be the selected setpoint.

NOTE:

ALL SETPOINT INPUTS ACCEPT 110 VAC AS A SELECTION SIGNAL WITH LED INDICATORS DENOTING THE SELECTED SETPOINT.

2.5 Field/Brake Loss Relay & Field/Brake Current Setpoint (I RELAY)

The field loss relay provides one set of normally open contacts and one set of normally closed contacts for customer use. These contacts are rated for 3 Amps. The relay is designed to pull in when the field current is equal to the field/brake current setpoint which is set with the **I RELAY** potentiometer. This potentiometer can adjust the pull-in point from 2% to 90% of the unit rating (approx 0.3A to 18A). Whenever the field/brake loss relay **CR1** is de-energized, the red **I RELAY** indicator will light.

WARNING:

DO NOT EXCEED THE FIELD/BRAKE LOSS RELAY CONTACT RATING OF 3 AMPS, OR DAMAGE TO THE CONTROL WILL OCCUR

2.6 Ramp UP/DN Settings

2.6.1 Ramp UP1/UP2

There are two ramp-up rates labeled **UP1 and UP2**. These potentiometers control the length of time for the output to go from minimum to the selected setpoint. The range of adjustment is approximately 0.5 seconds to 4 seconds. **UP1** is automatically selected and requires no selection signal.

2.6.2 Ramp DOWN1/DOWN2

There are two ramp-down rates **DOWN1 and DOWN2**. These potentiometers control the length of time for the output to go from the selected setpoint to minimum. The range of adjustment is approximately 0.5 seconds to 4 seconds. **DOWN1** is automatically selected and requires no selection signal.

2.7 Limit

The limit pot adjusts the maximum range of the **SP 1 - SP 4** settings. When the **LIMIT** potentiometer is turned full clockwise, the output voltage range of all the setpoint potentiometers will be 100% (40 to 280 VDC). Turning the **LIMIT** potentiometer counterclockwise will reduce the voltage range of all the setpoint potentiometers. For example, one turn counterclockwise will reduce the setpoint voltage range to approximately 75% (40 to 210 VDC). The **LIMIT** potentiometer can also be considered a *scaling* potentiometer.

2.8 Mode Selector Switch SW1

The D2130 has two available modes of operation.

Voltage Regulation Mode The control will operate as a voltage regulator when the **SW1** selector switch is in the **V** position. In this mode, the output voltage is regulated, but the current to the load may vary.

Current Regulation Mode The control will operate as a current regulator when the **SW1** selector switch is in the **C** position. In this mode, the output current is regulated, but the voltage to the load may vary.

Current regulation mode is recommended for applications where there are large differences in loads and temperature.

NOTE:

IN THE CURRENT REGULATING MODE, THE CURRENT WILL FOLLOW THE RAMP UP/DOWN TIME RATES. THE OUTPUT VOLTAGE COULD CHANGE RAPIDLY AND MAY OVERSHOOT THE SETPOINT FOR A SHORT PERIOD OF TIME BEFORE RETURNING TO THE SETPOINT. THIS IS NORMAL BEHAVIOR SINCE THE CONTROL IS REGULATING THE RAMP TIMES OF THE CURRENT AND NOT THE RAMP TIMES OF THE VOLTAGE.

SECTION THREE INSTALLATION AND SET-UP

3.1 Power Connections

3.1.1 Input Voltage (L1, L2, L3)

Connect a balanced three phase 208 to 220 volt AC line to the terminals marked **L1**, **L2** and **L3**. The control is not phase sensitive, so the input lines may be connected in any order.

3.1.2 Output Power (F+, F-)

Connect the hoist motor field or brake to the terminals marked **F+** and **F-**. The output voltage is adjustable from 40 to 280 volts DC and Motor Field Mode and zero (0) to 280 volts DC in Brake Mode. The output is rated for a maximum of 30 Amps DC continuous output current.

WARNING:

THIS CONTROL IS NOT RECOMMENDED FOR USE ON HOIST MOTORS OR BRAKES WITH IMPEDANCES OF LESS THAN FIVE (5) OHMS.

3.2 Input Command Selection

Input commands are selected by applying 110 VAC between **NEUT** (TB3-2,4,6,8,10) and the desired input. Input selections are available for **SP 2**, **SP 3** or **SP 4** (**SP 1** is selected with no input) **UP2** and **DOWN2**. (**UP1** and **DOWN1** are selected with no inputs).

NOTE:

ALL INPUTS ACCEPT 110 VAC AS AN INPUT WITH LED INDICATORS DENOTING SELECTION. AN INPUT VOLTAGE OF 80 TO 110 VAC IS CONSIDERED AN "ON" SELECTION. A VOLTAGE OF 0 TO 30 VAC IS CONSIDERED AN "OFF" OR DE-SELECTION.

3.2.1 Potentiometers

Set all potentiometers to the full counterclockwise position. This will set all setpoints at their minimum values and the ramp times at the longest ramp time. The minimum output voltage is now set at approximately 40 Volts DC in Motor Field Mode and zero (0) volts in Brake Mode. The ramp-up and ramp-down times are set at their slowest rate, which is approximately four (4) seconds.

3.3 Operating Mode

Determine whether the control will be operated in voltage or current mode. Set the SW1 switch in the appropriate position for the mode selected.

3.4 Setpoint Configuration

3.4.1 Maximum Output Voltage/Current (Field Forcing/Brake Picking)

Connect the hoist motor field or brake wires to the **F+** and **F-** terminals of the D2130. Connect a Voltmeter set to read DC Volts across the terminals marked **F+** and **F-** with the negative meter lead on the **F+** terminal. Select the **SP 4** setpoint by applying 110 VAC between **NEUT (TB3-2, 4, 6, 8, 10)** and **SP 4 (TB3-5)**. Adjust the **LIMIT** potentiometer until the voltmeter reads the voltage/current level required for field forcing, brake picking or the maximum output voltage/current required.

3.4.2 Running Voltage/Current (Brake Holding)

Leave the voltmeter attached to the **F+** and **F-** terminals. Select the **SP 3** setpoint by applying 110 VAC between **NEUT (TB3-2, 4, 6, 8, 10)** and **SP 3 (TB3-7)**. Adjust the **SP 3** potentiometer for the normal running voltage/current or brake holding voltage/current level required.

3.4.3 Field Weakening Voltage/Current (Brake Warming)

With The voltmeter still attached to the **F+** and **F-** terminals; Select the **SP 2** setpoint by applying 110 VAC between **NEUT (TB3-2,4,6,8,10)** and **SP 2 (TB3-9)**. Adjust the **SET 2** potentiometer for the field weakening voltage/current or brake warming voltage/current required.

3.4.4 Default Voltage/Current (Motor Field Mode ONLY)

SP 1 is the setpoint that is selected when there are no inputs to TB3. **SP 1** is therefore selected by default (no input command), this makes **SP 1** ideal for use as a safety setpoint in case of input command failure. Adjust the **SP 1** potentiometer to the desired voltage or current level as in the preceding steps.

3.5 Ramp-Up and Ramp-Down Rates

Adjust the **UP1**, **UP2** and **DOWN1,DOWN2** potentiometers as desired. The adjustable range of the potentiometers is from 0.5 seconds to 4 seconds. For the fastest rate, set the potentiometer(s) to full clockwise.

3.6 Field/Brake Loss Relay

The field/brake loss relay is designed to pull-in when the field/brake current is equal to the setpoint. This setpoint is adjustable from 10% to 100% of the unit rating (3 Amps to 30 Amps). To set the field/brake loss relay pull-in point, attach a DC Ammeter in series with one leg of the Field or Brake (between **F+** and motor field or brake). Turn the **I RELAY** potentiometer fully clockwise and the **SP 2** potentiometer fully counterclockwise. Remove all input calls for setpoints except for **SP2**. Slowly turn the **SP 2** potentiometer clockwise until the Ammeter reads the desired field/brake current trip point.

Monitor either of the relay contacts at terminal block TB4 (C to NO, or C to NC) with an Ohmmeter. Slowly turn the **I RELAY** potentiometer counterclockwise until the relay pulls in and the state of the Ohmmeter changes.

IF A DC AMMETER IS UNAVAILABLE:

- 1) Measure the impedance of the hoist motor field or brake with an Ohmmeter.
- 2) Multiply the impedance measured in step #1 by the desired pull-in current point. This will give you the output voltage which corresponds to the pull-in current.

Example:

Field/Brake Impedance	=	20 Ohms
Desired Current	=	4 Amps
Output Voltage	=	20 Ohms * 4 Amps = 80 Volts

- 3) Monitor the output voltage across the **F+** and **F-** terminals. Slowly turn the **SP 2** potentiometer clockwise until the voltage across the **F+** and **F-** terminals equals the voltage calculated in step #2.
- 4) Monitor either of the relay contacts at terminal block TB4 (C to NO, or C to NC) with an Ohmmeter. Slowly turn the **I RELAY** potentiometer counterclockwise until the relay pulls in and the state of the Ohmmeter changes.