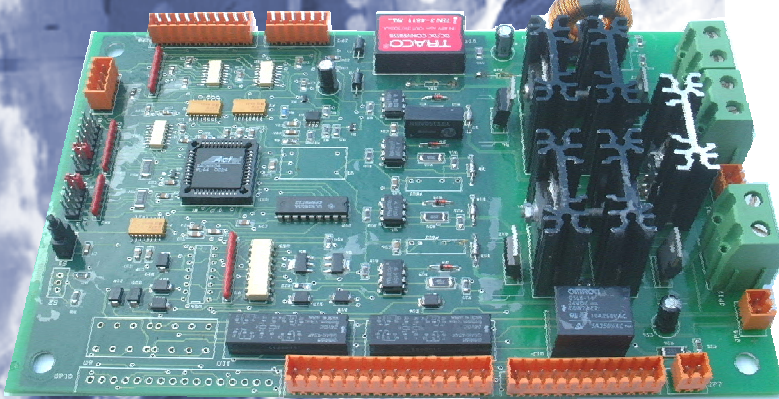


MAGACT[®] PM ACTUATOR ELECTRONIC CONTROLLERS



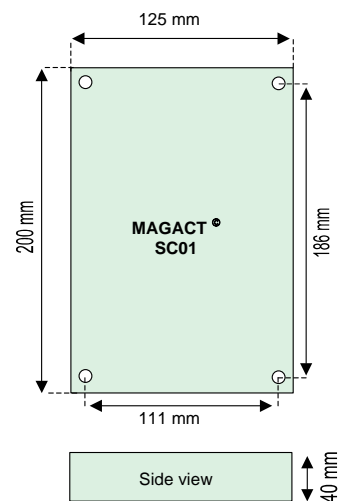
MAGACT[®] SC01 – Single Board Controller

Technology

IPEC ENGINEERING MAGACT[®] controllers utilise robust and reliable, military specification Field Programmable Gate Array (FPGA) technology with all intelligent control logic and strategy software programmed. Sophisticated multi-layer PCBs are utilised alongside complete opto-isolation for a compact system with outstanding EMC immunity. The output current pulse timing from the controller can be easily hardware programmed according to the control requirements of the VCB offering an extremely flexible solution to the customer.

Introduction

IPEC ENGINEERING holds substantial expertise and experience in the design of high quality Electronic Controllers to provide control, drive and monitoring of Permanent Magnet (PM) Actuators to drive Medium Voltage VCBs. IPEC ENGINEERING is one of only a few companies in the world who can combine actuator design, electronic drives and advanced microcontroller technology to provide 'holistic' solutions for the new generation of PM Actuator VCBs.



MAGACT[®] SC01 – Single Board

Mounting Four mounting points at each corner with 122mm and 207mm centres.

Dimensions 140mm x 226mm x 40mm

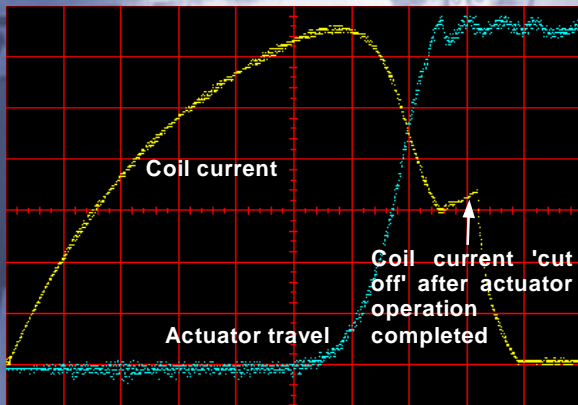


Figure 1. Close Operation of a PM Actuator using the MAGACT[®] Intelligent Electronic Controller with 'Closed Loop' Control (Note that coil current is switched off 10ms after VI Contacts closure)

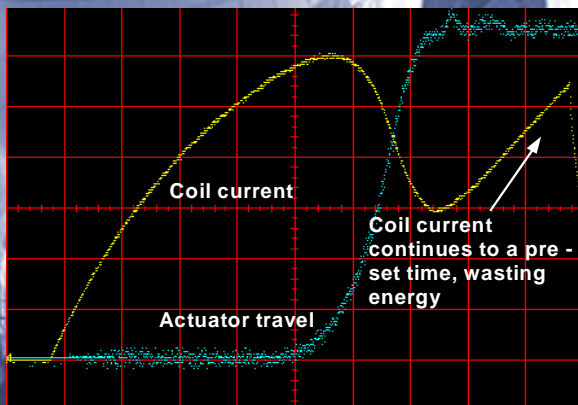


Figure 2. Close Operation of a PM Actuator **without Closed Loop Control** (Note that coil current is not switched off after VI Contacts closure with subsequent energy wastage)

Technical Discussion:

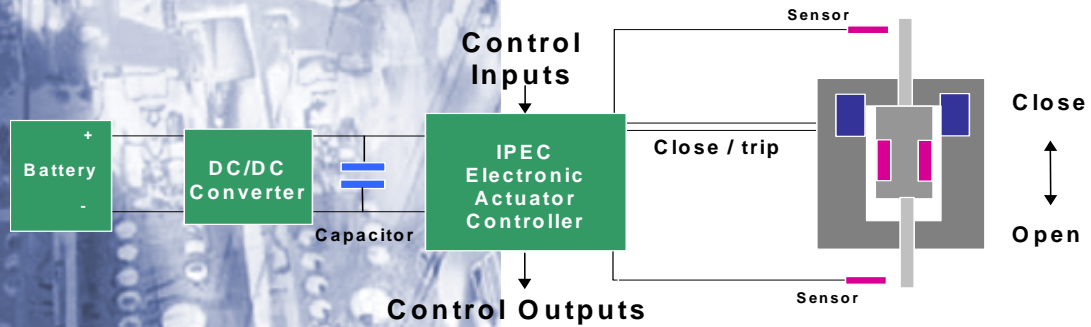
Figure 1 shows the operation of a PM actuator using IPEC ENGINEERING's Intelligent MAGACT[®] Electronic Controller with 'Closed Loop' Control. In this case the controller is programmed to emit the coil current pulse until a positive signal is received back from the microswitch position indicators (in this case the contacts 'closed' indicator). This ensures successful operation of the actuator in situations such as rapid reclose operations whilst maintaining maximum efficiency. This provides the opportunity for a smaller, more cost effective electrolytic capacitor bank.

Figure 2 shows the operation of the same PM actuator using a standard electronic controller. This shows that any current flowing after the end of actuator operation is wasted energy. If the current pulse duration is reduced with such a controller (to try to save energy) reliable sequential operation over the life of the VCB cannot be ensured. This is particularly true when contact wear in the VI and mechanical wear of the mechanical drive results in changes in the operating time of the VCB after extended

IPEC ENGINEERING MAGACT[®] PM Actuator Electronic Controller Features:

- All Controller inputs and outputs are opto-isolated to provide excellent EMC immunity and reliability.
- Military-Specification FPGA (Field Programmable Gate Array) technology is at the core of the controller which ensures reliability of operation in harsh environments and a wide frequency range.
- Universal voltage supply range from 12 to 300 Vac or dc depending on the customer's or the installation requirements.
- Variable Close Pulse, Trip Pulse and Trip Pulse Delay timing which is fully hardware programmable and suitable for all single-coil PM Actuator designs.
- Intelligent 'closed loop' control and switching of the coil current minimises energy consumption and ensures reliable O-CO operation – refer to Figures 1 and 2.
- Coil current is precisely controlled using high quality MOSFETS ensuring a controller working life of a minimum of 500,000 operations.

Typical Configuration of a MAGACT Actuator Capacitive Drive



External Connections

- Capacitor(s)
- AC / DC input
- DC / DC and / or AC / DC converter connections
- Actuator Coil
- Indicators & Counter Outputs (Open, Close, Alarm & Voltage Level LEDs)
- Auxiliary Contacts (options of 1, 3 or 5)
- Position Sensors (for contact status and 'closed loop' control)
- Remote (Protection Relay) Inputs
- Local (Manual) Operation inputs

Environmental

Temperature Operating: -40°C to 70°C

Humidity 10 to 90% RH, non-condensing at 40°C

Power Universal supply: 12 to 300 Vac or dc depending on customer requirements. Utilising AC/DC or DC/DC converters.

Applications

PM Actuator Controller for VCBs and Autoreclosers

Standards

EMC tests passed by MAGACT® Electronic Controller

EMC - Immunity Tests

EN 61000-4-2: Electrostatic discharge

EN 61000-4-3: radio frequency disturbance

EN 61000-4-4: Fast transient burst

EN 61000-4-6: electrical pulse surge

EN 50155: Variations and interruptions of voltage supply

EMC - Emissions Tests

EN 55022 Class A: Electric field radiated emissions

EN 50121-3-2:2000: Power line conducted emissions

Environmental

IEC 68-2-30-1980

IEC 529-1989

RFI and Interference Tests

ANSI / IEEE C37.60.6.12 - 1981

ANSI / IEEE C37.60.6.13 - 1981

ANSI / IEEE C37.60.6.14 - 1981

ANSI / IEEE C37.90.1 - 1989

ANSI / IEEE C37.90.2 - 1987

Impulse Tests

ANSI / IEEE C37.60.6.2 - 1981

IEC 255-5 - 1977

Vibration and Shock Tests

IEC 255-21-1-1988

IEC 255-21-2 - 1988

IEC 255-21-3 - 1988

ESD Test

IEC 255-22-2-1996

Burn - in

Twenty temperature cycles from ambient to 75°C over 48 hours

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