

CAT-TN-0001

Collaborative Access Team Technical Note

CAT-TN-0001

Document Title

MY-COM E75/80 Limit Switch Interface to PLC-based Discrete Input Modules

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CAT-TN-0001

MY-COM E75/80 Limit Switch Interface to PLC-based Discrete Input Module LAB-ANALYSIS

Introduction

The mechanical design of the F2-20 and F2-30 filters employ a bank of 8 MY-COM limit switches. These limit switches are used for confirmation of filter position. The limit switch is restricted to 2mA @ 15 VDC across their contacts. Unfortunately most PLC-based discrete input modules have an Opto-Isolated interface which requires between 5 and 10 mA to detect on/off conditions.

- For the Allen Bradley Sinking Discrete Input Module (1746-IB32) the required current is 8mA at 24 VDC.
- For the KOYO Sinking/Sourcing Discrete Input module () the required current is 5 mA at 24 VDC.

Consequently a current amplifying interface is required for the PLC inputs.

This interface was constructed using a PNP-based small signal transistor to sense the contact closure of the MY-COM limit switch. The design was based on the transistorized MY-COM limit switch, MY-COM G75P80/L (see page 4/2.05 in the Baumer Electric catalog). The transistor serves as a switch and provides the current required by the PLC-based Input modules.

Circuit Description

Figure 1 shows the desired interface. This interface was designed to supply about 1 mA across the limit switch contacts. The limit switch current was chosen to be well under the 2 mA spec but not so low as to be more susceptible to noise. The Beamline Controls Group here at the APS has designed a printed-circuit version of this interface. It is a ~2.5" X 3" DIN-rail module with 8-channel capacity. This module is available for ~\$50. Contact Kurt Goetze (goetze@aps.anl.gov) for more info.

Relevant current and voltage values were confirmed experimentally using the circuit shown in figure 2. The values are recorded in table 1 for reference.

CAT-TN-0001

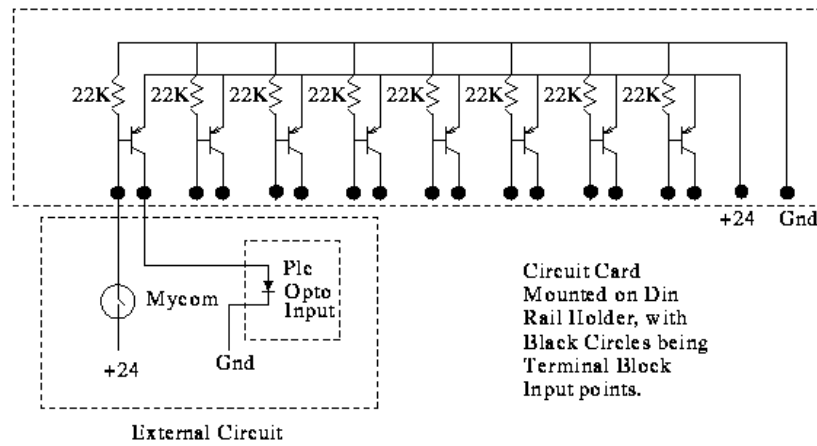


Fig. 1 Proposed MIB to be packaged as an 8-channel DIN-RAIL mountable unit with terminal screw interface.

CAT-TN-0001

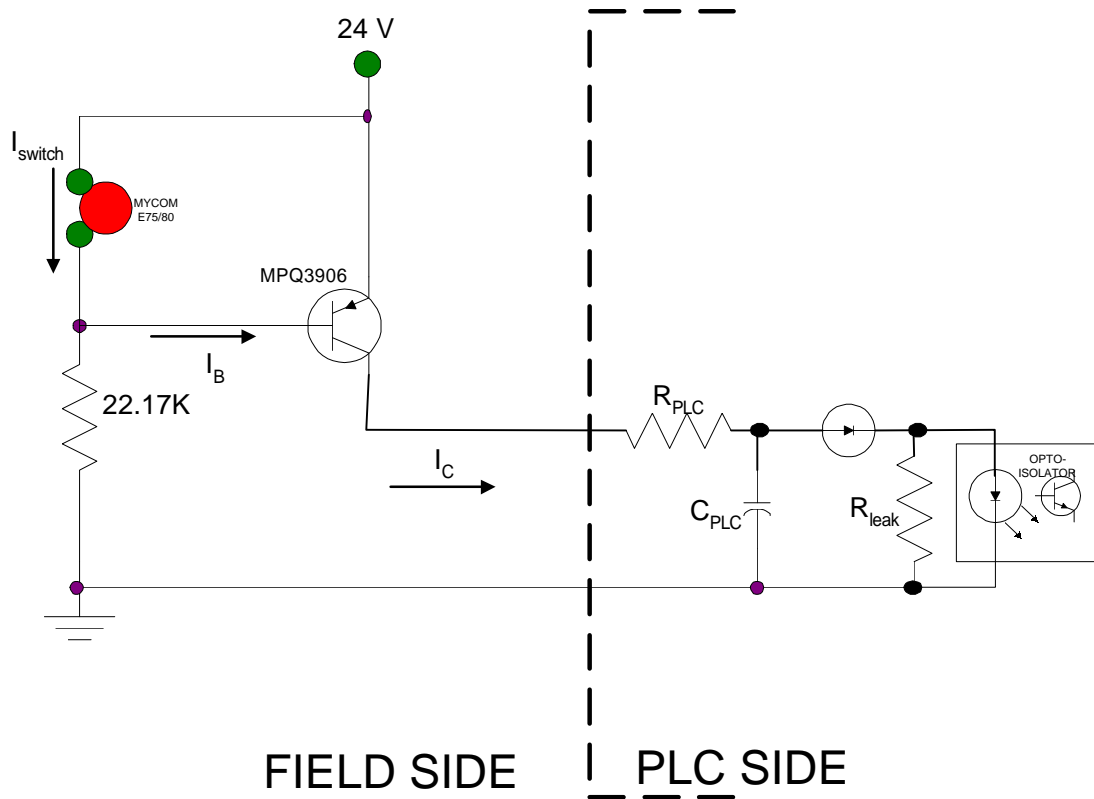


Fig. 2 Schematic used for testing the interfacing scheme between the MY-COM switch and the PLC-based Discrete Input Module.

Lab Set-up:

- Equipment --- 24 VDC power supply
- Digital multi-meter
- MYCOM switch
- 1746 Discrete Input module
- PLC ladder logic software
- cables/hook-up wire, connectors, terminal blocks.

CAT-TN-0001

TABLE 1: Lab Results

Circuit Parameters	CASE 1: Switch Closed	CASE 2: Switch Open
$R_{PLC} = 3 \text{ K}$	N/A	N/A
$C_{PLC} = 0.1 \text{ uF}$	N/A	N/A
$R_{LEAK} = 750$	N/A	N/A
Base Current (I_B)	1.086 mA	0.000 mA
Switch Current (I_{SWITCH})	1.085 mA	0.000 mA
Collector Current (I_C)	0.000 mA	5.26 mA