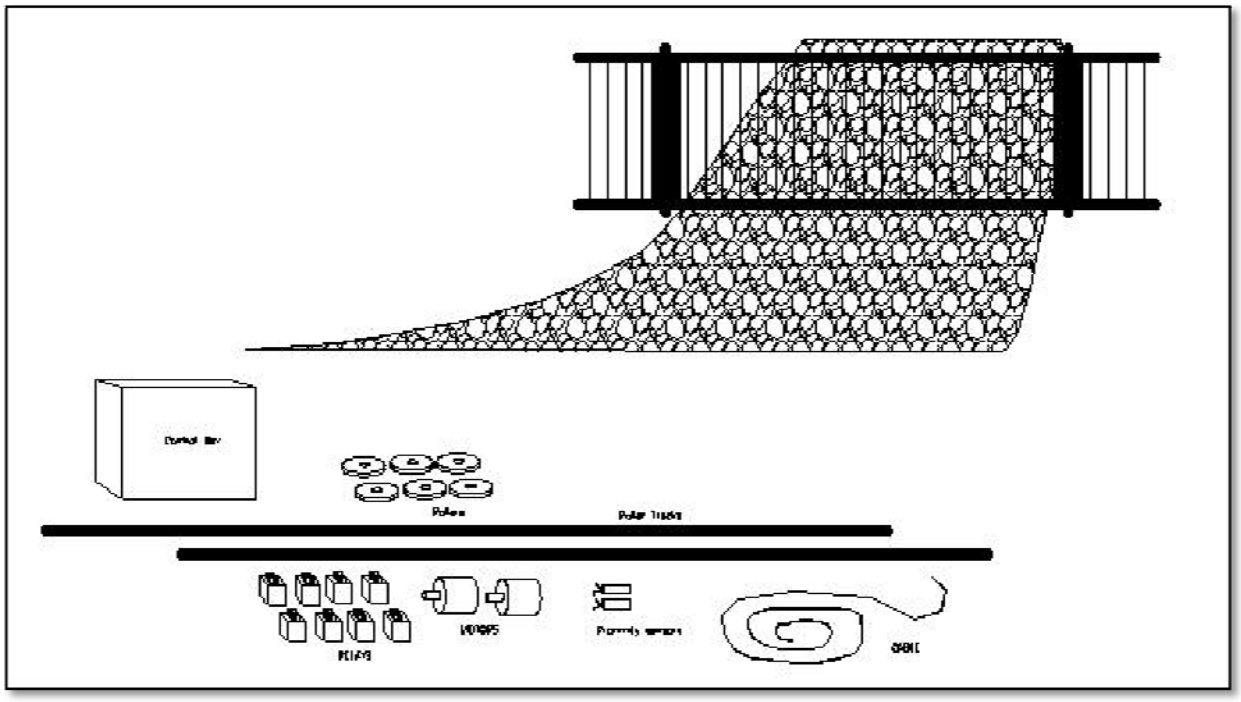
IPC Application Note: Low Maintenance AC Powered Security Gate

Mechanical Gate components:

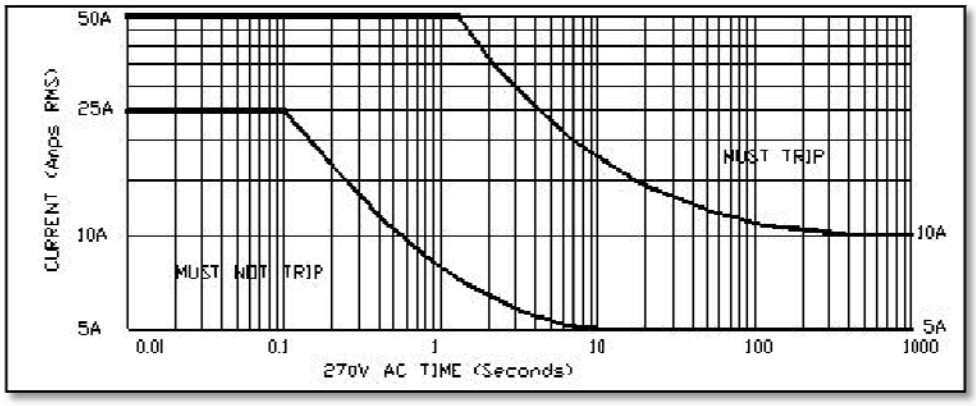
A typical Security Gate system consists of the gate, a rail or guide system, one or two motors, a cable or chain drive, a clear path detector, end stop switches, an RF or IR command remote link and a box of electronics and relays.



Reliability can be problematic. Cables and chains stretch requires limit switch adjustments and relays wear out or stick. The limit switches and their wires are outside the control box exposed to the elements. And nuisance or real fault circuit breaker trips require attention and resetting.

A simpler and all electrical approach is possible.

The I^2t current trip curve of the Industrial Power Controller (IPC) emulates a circuit breaker and is ideally suited for this application. The motor selection can be matched to the IPC current trip curve.



1) The loaded start current of the motor is available within the first 1 to 2 seconds of the I^2t curve.

2) Motor run current is available at the IPC current rating.

3) Motor stall current will trip the IPC at a time of that current.

The I^2t circuits and electronic switching of the IPC has no wear-out mechanism allowing this feature to be used as a normal operating design mode. The I^2t characteristic of the IPC protects the source, itself, and loads within its control. Over current and fault currents are within the IPC's NORMAL operating conditions.

With a matched motor and IPC, the gate can be driven into a mechanical stop at full open or closed with no end of travel detection. The motor stalls, the current increases and the IPC turns off the motor. Obstructions to gate travel are acted upon in the same manner.

No end-of-travel sensors or switches are required eliminating their associated adjustment and maintenance. The addition of a spring loaded tension in the cable / chain circuit will further reduce stretch and wear maintenance and provide a less abrupt buildup of end stop forces to the mechanical system.

Logic control and the Status signal of the IPC allows for electronic control and monitoring of the gate condition. Normal end of travel trips and actual fault conditions are within the electronics capability. A single input from clear path detector is all that is required for gate and path condition when the detector is place so that the closed gate is in the detection path, OPEN or CLOSED / Obstructed gate information is available.

A dual motor or two motors driven by separate IPCs can further reduce maintenance by eliminating a mechanical means of changing direction.

With an optical detector for clear gate path and a RF or IR command link, and the Output Status of the IPC, sufficient information is available for a microprocessor to automate the full gate normal and abnormal operating conditions

Example: Using the, 280V, 5A AC IPC.

- Start current = 25A minimum, 50A maximum for 100msec and 10A minimum for 600msec
- Travel current = 5A minimum
- End-of-travel stall currents are:
  1) 10A maximum for 20 seconds
  2) 15A maximum for 4 seconds.
  3) 50A maximum for up to 4 seconds.

An induction motor with a start / Locked rotor current of 4 times that of rated output, the IPC will remain on for 1 second typically and 0.15 to 8 seconds minimum / maximum before the a trip occurs. The microprocessor has the ability of it programming to terminate a gate closure if a new open request is received before a closure is complete.

Results:

- The gate will always be fully open, closed or in travel. No more built in gaps.
- There are no end-of-travel sensors to adjust and subjected to the weather.
- Nuisance and fault trips can be self resetting.
- There are no mechanical contacts, relays or contactors.
- The motors operate from the AC input – no big power supplies.

Table 1 - Micropac IPC Product Line

	Micropac Part Number	Description	Rating
	IPC01-75VDC10A-ST	75VDC applications; MIL-STD-704E and MIL-STD-1760E compliant I^2T and instant trip overload protection; Output enable; Output status; -40°C to +80°C	V_{I-O} 1,500VDC V_O 75VDC; I_O 10 A DC
	IPC01-400VDC5A-ST	400VDC applications; MIL-STD-704E and MIL-STD-1760E compliant I^2T and instant trip overload protection; Output enable; Output status; -40°C to +80°C	V_{I-O} 1,500VDC V_O 400VDC; I_O 5 A DC
	IPC01-40VAC10A-ST	40VAC applications; MIL-STD-704E and MIL-STD-1760E compliant I^2T and instant trip overload protection; Output enable; Output status; -40°C to +80°C	V_{I-O} 1,500VDC V_O 40V RMS; I_O 10 A AC
	IPC01-280VAC5A-ST	280VAC applications; MIL-STD-704E and MIL-STD-1760E compliant I^2T and instant trip overload protection; Output enable; Output status; -40°C to +80°C	V_{I-O} 1,500VDC V_O 280V RMS; I_O 5 A AC

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