Automation & Control Solutions

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# ECM

## ETHERNET CONTROL MODULE
## HIGH DENSITY I/O WITH CUSTOM CONNECTIVITY, AND cLOGIC™ CONTROL ENGINE FOR INDUSTRIAL ETHERNET HOST INTERFACE

The ECM programmable automation controller is ideal for high-density commercial and industrial applications and for remote monitoring applications with high I/O point counts. The ECM can be implemented as a complete control platform for a single location or for a complete manufacturing line. With the ability to handle detailed execution tasks through the cLogic™ engine as well as to run certified programmable safety interlocks, the unit can be used to neatly manage I/O via the custom distribution board.

Based on case studies, the compact footprint ECM can typically save users 15-40% on their automation and control costs versus other solutions. In addition to lowering cost, the flexibility of the expandable design allows users to add I/O after installation by utilizing the additional expansion slots.

## Features & Benefits

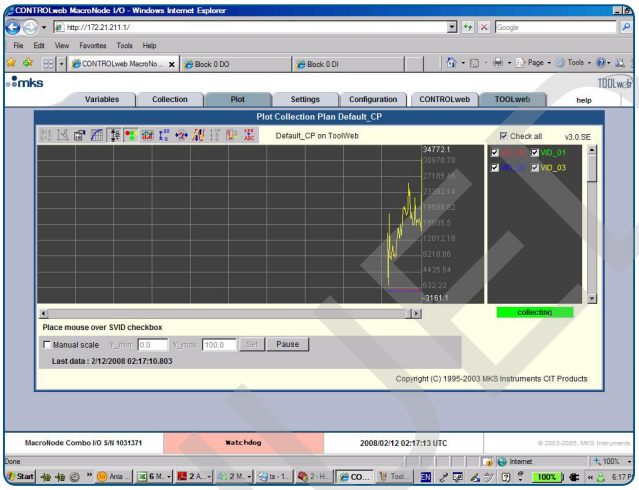
- Compact, high density design reduces the number of controllers required, saving cost and tool real estate
- Designed with analog, digital and inter-lock I/O connectivity in a single controller for flexibility and ease of use
- Adjust and reuse interlocking schemes on the fly saving engineering time and costs
- cLogic™ distributed real time logic engine allows you to control more tightly and faster than through the original control scheme
- Data monitoring & control interfaces utilize Modbus/TCP, DeviceNet, EtherCAT, or web browser for migration and flexibility
- Expanded front panel LCD display shows IP address and basic diagnostics as well as status
- TOOLweb™ Interface for data collection and analysis
- Easy, remote setup and configure via standard web browser

# Programmability

Modularize and distribute time-critical tasks closer to the device to maximize processing speed and determinism of the control. MKS cLogic allows you to overcome TCP/IP or other network bandwidth concerns by distributing logic to the I/O modules. You designate your logic using standard C code; download the code to the ECM for compiling and execution when you are ready.

A variety of embedded functions such as PID, PWM, counters and sequencers are available to simplify your programming to get you up and running with your application quickly.

The ECM unit takes advantage of built-in web servers to provide a graphical user interface for setup and diagnostics. In addition to module status, each I/O point can be manually set and read using a standard web browser. Data can also be graphed in real time for complete diagnostics.




**I/O Plotting —**

*Built in high speed data collection with historical plotting ability*

| Physical Specifications | |
|---|---|
| **Criteria** | **Specifications** |
| Dimensions | 1U(h) x 13”(w) x 10”(d) |
| Ethernet Connector | 100 BaseT auto-switched |
| RS-232 Connector | TXD, RXD; DB9 connector |
| Material Chassis | Plate/chromate |
| Material Front | Paint black |
| Clearance | Side and back only |
| Cooling | Internal Fan |
| **Environmental Specifications** | |
| **Criteria** | **Specifications** |
| Operating Temperature | 0 to +45°C |
| Storage | -40 to +85°C |
| Humidity | 5 to 95% non-condensing |
| Altitude | Up to 2000 meters |
| MTBF minimum | 5 years @ 80% confidence level(43,800 Hours @ 80% confidence level) |
| **Communication Protocol Specifications** | |
| **Protocol** | **Specifications** |
| Modbus/TCP | Modbus/TCP Server/Slave; Identical Register Set as Modbus RTU Slave; Compatible with 10/100 BT Ethernet Interface; Modbus Functions Supported: 1, 2, 3, 4, 5, 6, 15, 16, 22, 23, 43 |
| DeviceNet™ | Type II Slave Device; Support Explicit and Poll I/O Messaging of pre-defined Master/Slave Connection set; Support up to 15ms scan rate with max IO configuration |
| EtherCAT™ | EtherCAT Slave: CANopen over EtherCAT (CoE), PDO Mapping Support EtherCAT Device Description File (XML); Two Dedicated EtherCAT Ports; Support up to 1ms deterministic response time for real-time control |
| Ethernet | Configuring, Diagnostics and Monitoring (Web Browser based)10/100 BT Ethernet Interface |

| Fuse Status Detection and Power Measurements | | |
|---|---|---|
| **Fuse Detection** | 4 Fuses:<br>1. 24V_PWR_1<br>2. 24V_PWR_2<br>3. 24V_PWR_3<br>4. 24V_FUSED | Can be expended to up to 48 by different distribution board design. Fuses are reported fail / pass to the application SW. |
| Fuse Detection Thresholds | 17V for the 24V powers | 12.5V for 15V powers |
| **Powers Measurements** | 1. 24V_Main<br>2. +15V<br>3. –15V | High and low limits for each power are configurable via application SW. Power measurements are reported to the application SW and compared against the predefined limits. |
| Power Measurements Resolution | 10 bits | |

# Specifications

| Power Input Specifications | | |
|---|---|---|
| **General** | | |
| Main Power Supply<br>Power Consumption | 18VDC – 30VDC<br>Typical – 1.2Amp<br>Max – 10Amp | Internally limited |
| Power Supply Analog<br>Power Consumption | ±15V @ ±1%<br>Max – 6.7Amp | Internally limited |

| Programmable Interlock | | |
|---|---|---|
| **Certification** | SIL3 | Redundant PLD design, Implement 1 out of 2 programmable logic architecture |
| **Inputs** | 64 + 1 (for watchdog function) | Active high or low contact inputs, jumper selectable in groups of 12 |
| **Output Relays** | 33 dry contact type N.O. | 32 are monitored |
| **Output Current**<br>Standard Output<br>High Power | <br>2A<br>16A | Software monitored |
| **Mode of Operation** | Run / Prog | Run- normal operation mode. Prog - Load the Interlock Logic and Access special FPGA registers for debug |

| Classic Interlock | | |
|---|---|---|
| **Relays** | | Total input and output relays. Based on customer schematic.<br>High power NO relay for WD functionality |
| **Logic** | Hardwired on PCB | |

## Input/Output Specifications

| Digital Input | | |
|---|---|---|
| Number of Inputs | 210 | shared with outputs, each functions as I/O |
| **Sink**<br>Input Current<br>Input Low Voltage range(ON)<br>Input High Voltage range(OFF) | <br>Min 1.2mA at $V_{in}$=9.2V<br>Min 0V to Max 9.2V<br>Min 9.9V to Max 24V | |
| **Source**<br>Input Current<br>Input High Voltage range(ON)<br>Input Low Voltage range(OFF) | <br>Min 1.2mA at $V_{in}$=12.5V<br>Min 12.5V to Max 24V<br>Min 0V to Max 11.7V | |
| Debounce Filter | 0 msec to 999 msec | 1 msec resolution |
| **Isolation** | 2.5KVrms | |
| DI Refresh Rate | 1msec | |
| **Digital Output** | | |
| Number of Outputs | 210 | shared with inputs, each functions as I/O |
| Output Type | Open collector | Pull up value – 10K |
| Output Drive Current | 200 mA per output, maximum<br>750 mA per 6 outputs | Sinked/sourced from 24VDC |
| **Sink**<br>Output High Voltage<br>Output Low Voltage | <br>Min 23.7V @ 0.16mA<br>Max 0.3V @200mA | Pull up value -10K |
| **Source**<br>Output High Voltage<br>Output Low Voltage | <br>Min 23.7V @ 200mA<br>Max 0V @ 0µA | Pull down value -10K |
| Isolation | 2.5KVrms | |
| Max Update Rate | 1msec | |
| EMC Protections | ± 2kv (Immunity to EFT/Burst) | |
| **Over Current Protection**<br>Each Channel<br>Total | <br>~1.5A<br>~10A | Driver shuts down (Power cycle required to clear fault) |
| **Polarity** | Sink / Source , HW selectable<br>per 16 IOs for DIO 0-185,<br>per 2 IOs for DIO186-207,<br>per 1 IO for DIO208, 209. | |

# Ordering Information

## Input/Output Specifications (cont.)

| Analog Input | | |
|---|---|---|
| **Number of Inputs**<br>Single Ended<br>Differential | <br>64<br>32 | |
| **Resolution**<br>0-5V<br>±5V<br>0-10V<br>±10V | <br>16 Bit<br>16 Bit<br>16 Bit<br>16 Bit | |
| **Accuracy**<br>Single Ended<br>0-5V<br>±5V<br>0-10V<br>±10V<br>Differential<br>0-5V<br>±5V<br>0-10V<br>±10V | <br><br>0.1 % Full Scale (5V)<br>0.05 % Full Scale (10V)<br>0.1 % Full Scale (10V)<br>0.05 % Full Scale (20V)<br><br>0.1 % Full Scale (5V)<br>0.05 % Full Scale (10V)<br>0.1 % Full Scale (10V)<br>0.05 % Full Scale (20V) | <br><br>For 0.05% calibration is needed<br>For 0.05% calibration is needed<br><br>For 0.05% calibration is needed<br>For 0.05% calibration is needed |
| **Input Latency**<br>Total | <br><200µSec | <br>To hardware communication daemon |
| Input DC Resistance | 0.4MΩ (Differential)<br>0.2MΩ (Single ended) | Pull Down Res |
| -3db Filter Frequency | 0.76kHz | Calculated as f = 1/2πRC |
| **EMC Protections** | ± 2kv (Immunity to EFT/Burst) | |
| **Isolation** | No Isolation | Same net, different planes<br>for Analog and Digital part |

| Analog Output | | |
|---|---|---|
| **Number of Outputs**<br>Differential | 16 | |
| **Resolution**<br>Range ±10V | 16 Bit | |
| **Accuracy**<br>Range ±10V | 0.05 % @ Full Scale (20V) | |
| **Output Drive Current** | 10mA per output,<br>(Capacitive load max 1nF) | |
| **Output Latency Total** | <100µsec | To physical connection |
| **EMC Protection** | ± 2kv (Immunity to EFT/Burst) | |
| **Isolation** | No Isolation | |

**Ordering Code for Base Unit: AS00680-03**

Contact MKS to determine your needs for your personalized product configuration.



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