



MPL

Motion Programming Language

To address the difficulty in developing complex motion control sequences, Integrated Industrial Technologies, Inc. has developed the Motion Programming Language (MPL). This language provides a convenient and intuitive way of rapidly developing and implementing a wide variety of motion applications. This on-board programming language is designed to offload confusing and difficult motion sequences from PLC ladder logic to simple, “English like” structured text control statements.

Motion programs are developed using the I²T MPL Development Environment (DE). This Windows™ application allows the automation engineer to write, compile, download, and monitor the motion sequences in the I²T motion modules. A “User Loadable Function Block” is provided to allow easy integration of the MPL programs and the PLC ladder logic.

On-board MPL Functionality:

- Native Support of motion, math, and execution flow control statements
- Exception interrupts with User Definable handler routines
- Direct manipulation and monitoring of all I²T module I/O
- Read/Write register variables for PLC interlocks and data transfer
- Auto-start feature to begin program execution on power up
- Standalone functionality, no PLC required
- Fully integrated with all standard I²T module control features including: Registration Functions, CAM Tables, Blended Moves, Interpolated Moves, Manual Feedrate Override (MFO) and Electronic Gearing

MPL Development Environment (DE):

MPL programs are developed using the I²T MPL Development Environment (DE), a Windows-based application. This software allows the user to write MPL programs that can be compiled for and downloaded to the IFC 220E module. The programmer can use the monitor mode of the DE to track and debug the program executives on the module. The Development Environment has a “real-time” cursor that moves to the program line that is being executed. DE also has a user editable grid that displays the values of any of the 500 Integer and Pseudo Floating-point registers being used by the MPL programs.

The screenshot shows the MPL Developer application window titled "Sealing_Machine_MPL.dev - MPL Developer". The interface includes a menu bar (File, Module, Program, Edit, View, Tools, Help), a toolbar, and a status bar at the bottom. The main area is divided into three sections:

- Left Panel (Tree View):** Shows a project structure with folders like "C:\My Docum" and files such as "Main_Prog", "D_JH_983736", "M_JJ_237627", "E_FP_786237", "M_JB_238283", "W_H_727293", "D_R_292929", "H_DJ_282939", "E_Return", and "Fault_Handler".
- Center Panel (Code Editor):** Displays the MPL program code. The current line being executed is highlighted in blue: "IF FROM_PLC.Br3 IS ON THEN CALL HOME_SUB". Other visible code includes "ENABLE faults", "WHEN Digital.Input5 IS ON JUMP FAULT_SUB", "WHEN Digital.Input4 IS ON JUMP P2", "WHEN FROM_PLC.Br1 IS ON JUMP FAULT_SUB", "WHEN ERROR JUMP FAULT_SUB", "ENABLE AxisAll", "WAIT 250", and "JUMP MAIN".
- Bottom Panel (Data Table):** A table showing the values of various registers. The table has columns for register names and their current values.

| | | | | | |
|-----------|--------|------------|--------|------------|---------|
| FROM_PLC | 0 | ROW_START | 0.0000 | Y_DIM | 3.0000 |
| TO_PLC | 0 | COL_START | 2.0000 | RADIUS | 0.5000 |
| HOME_SPD | 1.0000 | ROW_OFFSET | 4.0000 | MAX_COL | 11.5555 |
| RAPID_SPD | 2.0000 | COL_OFFSET | 3.0000 | MAX_ROW | 12.5555 |
| RUN_SPD | 3.0000 | X_DIM | 2.0000 | COL_START1 | 13.5555 |

MPL Development Environment (DE):

- Text editor including clipboard and searching features
- Syntax checking with Descriptive Error Messages
- Upload and Download development projects from an I²T module
- De-compile uploaded programs and Reconstruct source code
- Monitor program execution and highlight the currently executing statement
- Start, Stop, or Single-step through any program in the project
- Extensive on-line HTML help with MPL syntax and examples
- “At-a-glance” graphical project status
- Module control panels to directly manipulate a module (Axis, MFO, I/O)
- User Definable names for system elements (Registers, Axes, etc.)
- Register watch provides the User with full access (read/write) to all on-board registers
- All files stored in ASCII text and can be viewed/modified by any text editor

FN47 – Ladder Logic Interface:

- Program selection and execution control
- Program hold input
- Error reporting
- User ability to easily include any standard module command
 - Exchange Integer and Floating Point Registers
 - Axis Position, Speed, Status, etc.
 - MFO updates
 - Share System I/O Status

Module Applications:

- **Machine Tool Applications** – multi-axis requiring coordinated sets.
 - 2-Axis Profile Dressers
- **Packaging Equipment** – packing and sealing, labelers, stackers, cutting, etc...
- **Tire & Rubber** – 1st and 2nd stage tire machines, material cutting, inspection machines, etc.
- **Robotics** – PLC control of gantry robots, loaders, water/laser cutting

Typical MPL Software Architecture:

