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# DISCLAIMER

**Take notice that operation of this equipment other than in accordance with the procedures set out in this manual may affect the safe and effective operation of the equipment, and the operator does so entirely at his or her own risk.**

**If the equipment is operated other than strictly in accordance with the procedures set out in this manual, Fisher Gauge Limited, its officers, directors, agents and servants shall not be liable to the customer nor to any other party for any liability, including without limitation strict liability, including liability for loss or damages due directly or indirectly to occurrences or consequences which arise from the operation or failure of the equipment to operate, any losses or damages, including without limitation, economic and consequential losses, or direct or indirect, incidental, exemplary and punitive damages whether in contract, tort or otherwise or any other claims or expenses in any manner resulting, including without limitation or liability, losses or damages directly or indirectly from, or connected with, the operation of the equipment, or from the discovery or elimination of any and all hazards, or from the failure to so discover or eliminate, or by reason of any action, omission, active negligence, passive negligence, including gross negligence or any error or omission in the equipment or any use of application thereof, misrepresentation, misstatement, imprudence, lack of skill or error of judgement of or by Fisher Gauge Limited or its officers, directors, agents and servants.**

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# ABOUT THIS OPERATION AND MAINTENANCE MANUAL

Whether you are a new Injected Metal Assembly process user or you are a repeat Fishertech customer, the information and guidelines contained in this manual will assist you to efficiently, safely and productively operate your IMA equipment.

Please take the time to become familiar with the information in this manual and ensure those in your organization responsible for the operation and maintenance of the equipment have access to this information.

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# FOR YOUR SAFETY

The operating and maintenance procedures described in this manual should only be performed by qualified personnel who understand the operation of the Injected Metal Assembly system.

- The system must be electrically and pneumatically isolated when performing maintenance procedures. Suitable lockout/tagout procedures must be followed when maintaining the equipment.
  - The machine should be electrically isolated by turning off the “Main Disconnect Switch” and locking the switch in the “OFF” position.
  - Although the soft start/quick dump valve in the machine will drop the air supply to the manifolds when the main power is removed, the machine should also be pneumatically isolated by turning “OFF” the ball valve supplied on the back of the machine and locking the valve in the “OFF” position.
  - The gas supply should be installed according to local gas safety codes and should include a lockable valve between the supply line and the machine.
  - Cooling water and drain lines should also be installed with suitable shut off valves to isolate the machine during maintenance procedures.
  - Always make sure the setup/run switch is in the SETUP position for maintenance operations that must be done with the power on. Never attempt any maintenance, setup, adjustment or cleaning operation with the switch in the RUN position.
- To avoid burns, particular attention should be paid to the system’s hot surfaces.
- An explosion of molten alloy could result if fluids are allowed to penetrate the surface of the molten alloy in the melting pot. Keep all fluids well away from the melting pot. Carefully check any alloy ingots or ladles, skimmers or other tools for fluids before introducing them into the molten alloy.
- The programmed operating sequence incorporates features which provide for the safe operation of the system. Under no circumstances should the program be altered or changed in any way. The program has been written to maximize efficiency of the equipment and safety of the operator. Altering the program in even the smallest manner could jeopardize the efficiency and safety of the equipment. Fisher Gauge Limited cannot accept responsibility for damage or injury resulting from changes to the programmed operating sequence. The warranty will be void if the programmed operating sequence is altered in any way by anyone other than an authorized Fishertech technical representative.
- Normal maintenance precautions should be exercised. Fisher Gauge Limited cannot accept responsibility for damage or injury due to improper safety, maintenance or operating procedures.

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Regular inspection of all guards, protective devices, point of operation safeguarding systems and mechanically loaded components is recommended.

Component devices or guarding which show signs of wear, fatigue (cracks, distortion), or damage of any type should be replaced immediately.

## SAFETY PRECAUTIONS

The IMA process uses molten alloy at temperatures up to 435°C (815°F), injected under pressure into the tooling cavity. Burns could result from improper or careless use. Proper attire, as listed below, should be worn at all times.

Safety features are designed and built into each piece of equipment. It is imperative that equipment be properly maintained, and operators be fully instructed in its proper use. Under no conditions should safety features be bypassed in any way.

Ensure that equipment is maintained with all covers and guards installed. Establish a regular schedule of checking safety features and devices to ensure they are functioning properly.

Keep all mating faces of IMA tools clean and free of build-up or damage.

Operators are to be instructed on the importance of ensuring that cable to be processed or components to be assembled are properly loaded before the system is operated.

Non-conforming components may allow the molten alloy to escape. Ensure components to be processed or assembled have the proper specifications.

If any of the above conditions are not met, we suggest the equipment not be operated until corrections are made.

### Personal protective attire and devices



**CAUTION!**

***Large volumes of molten alloy can be ejected over a great distance if the Injected Metal Assembly system is not operated properly.***

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***With proper setup, operation and maintenance, cable products and assemblies will be produced where there is no escape of molten alloy from the cavity area.***

***As a precaution, personnel who operate or are exposed to the IMA system during testing or operation should follow basic safety precautions to reduce the risk of injury in the event of an escape of zinc alloy from the tooling cavity. The following safety attire should be worn when operating the equipment.***

## Safety glasses

Approved safety glasses — those meeting requirements of CSA Standard Z94.3 M88 or ANSI NCZ87.1 — must be worn at all times when Injected Metal Assembly equipment is being tested or operated. Side shields are mandatory on safety glasses for personnel working with and around molten alloy.

## Safety footwear

System operators, setup personnel and workers handling molten alloy, and personnel who work the majority of the time in the vicinity of operating IMA system are required to wear safety boots acceptable for light foundry use, (meeting or exceeding the requirements of CSA Standard Z-195, Grade 2 designation (which is similar to ANSI NCZ41, Class 1) in place of safety shoes. These boots must be a minimum of six inches high to cover the ankle and be either designated as a slip-on foundry boot or a lace-up work boot with a solid tongue attached to the boot completely down the sides. The boots must be worn laced up correctly, with the portion of the lace on the outer part of the boot forming horizontal bars.

Sandals, canvas running shoes, or shoes with open toes are not allowed.

## Trousers

All personnel working in manufacturing areas must wear long trousers or coveralls. For personnel working with and around molten alloy, the trouser legs must overlap the top of the safety boots to provide adequate ankle protection.

## Smocks

Personnel operating or testing IMA equipment are required to wear coveralls or a properly buttoned smock long enough to cover the knee, and with sleeves long enough to cover the wrist.

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## Gloves

Personnel must wear work gloves when handling both solid ingot and molten alloy. Heat resistant gloves are to be worn by personnel handling components of the system which may become very hot, such as goosenecks, nozzles and melt pots.



**CAUTION!**

### *System setup - first alloy shots*

*Additional precautions must be taken when injecting the first shots after a new setup, as this presents a higher than usual risk for molten alloy burn accidents. To the extent of what is reasonable in the circumstances, setup personnel and others should use personal protective attire as described below, plus other equipment such as face shields, safety screens and barriers to reduce the chance of an accident to themselves or others in the surrounding area.*

#### *Protective attire will consist of:*

- *face shield*
- *safety glasses with side shields*
- *gloves*
- *safety boots*
- *trousers*
- *smock or coveralls which cover the throat, wrists and top of the safety boots.*
- *portable safety screens should also be considered to shield setup personnel, as well as others in the area.*

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# YOUR OPERATING AND MAINTENANCE MANUAL

## SECTION A: INTRODUCTION

An overview of the Injected Metal Assembly (IMA) process, an introduction to the CPM-1 Injected Metal Assembly system, plus important information on safety precautions, your equipment warranty, equipment return procedure, and terminology pertaining to the Injected Metal Assembly process and equipment.

## SECTION B: SYSTEM OPERATING COMPONENTS

This section introduces you to the various components of the Injected Metal Assembly system: IMA machine, Cable Processor Module and tooling.

## SECTION C: THEORY OF OPERATION

Through a series of drawings, this section shows the basic elements of the Injected Metal Assembly process and how they work together to terminate wire and cable products or produce an assembly using the process.

## SECTION D: SYSTEM INSTALLATION

This section provides the specifications of the equipment, service requirements, and the procedure for installing the IMA machine, the Cable Processor Module and the tooling.

## SECTION E: SYSTEM SETUP

This section provides the procedures for preparing the system for production of wire and cable terminations or assemblies.

## SECTION F: SYSTEM START UP AND OPERATION

This section provides instructions for operating the Injected Metal Assembly system.

## SECTION G: SYSTEM MAINTENANCE

This section outlines procedures for maintaining the IMA system, including a Preventative Maintenance Schedule and a Troubleshooting Section.

## SECTION H: FISHERTECH RENEWAL PARTS SALES AND SERVICE

Fishertech maintains an extensive inventory of genuine IMA Renewal Parts, designed and built exclusively for your system.

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**SECTION I: INDEX**

**SECTION J: VENDOR SUPPLIED SPECIFICATIONS AND MAINTENANCE BULLETINS**

Instruction and maintenance bulletins from the vendors of valves, regulators, pyrometers, and other components to assist in their use and to facilitate ordering of replacement units or renewal parts. When ordering renewal parts, please provide the machine serial number.

**SECTION K: MACHINE REFERENCE DRAWINGS**

Parts lists and assembly drawings for the machine are enclosed as well as electrical schematics, pneumatic schematics, connection diagrams, etc. When ordering renewal parts, please provide the machine serial number. Note: The more common machine renewal parts are detailed in Section H.

**SECTION L: CABLE PROCESSOR MODULE REFERENCE DRAWINGS**

The Cable Processor Module parts list and assembly drawing are enclosed for use in operation and maintenance. When ordering renewal parts, please provide the Cable Processor Module serial number. The serial number is stamped on the Cable Processor Module frame or on a plate attached to the frame.

**SECTION M: TOOLING REFERENCE DRAWINGS**

The assembly tool parts list and assembly drawing are enclosed for use in operation and maintenance. When ordering renewal parts, please provide the assembly tool parts list number. Tooling parts lists can be found at the beginning of Section M.