



FA Equipment for Beginners (HMIs)

This is a quick overview of HMIs for beginners.



Introduction Purpose of the Course



This is an introductory course designed to provide beginners, who are new to HMIs, an opportunity to learn the basics of HMIs.

Introduction Course Structure

The contents of this course are as follows.
We recommend that you start from Chapter 1.

Chapter 1 - What are Programmable HMIs?

Learn about the basics of HMIs including roles, advantages, and typical uses.

Final Test

Passing grade: 60% or higher.

Introduction **How to Use This e-Learning Tool**

Go to the next page		Go to the next page.
Back to the previous page		Back to the previous page.
Move to the desired page		"Table of Contents" will be displayed, enabling you to navigate to the desired page.
Exit the learning		Exit the learning. Window such as "Contents" screen and the learning will be closed.



Introduction Cautions for Use



Safety precautions

When you learn by using actual products, please carefully read the safety precautions in the corresponding manuals.

Chapter 1 What are (Programmable) HMIs?

1.1 The Role of a HMI

Human Machine Interfaces (HMIs) first appeared in the marketplace around 1988 and were commonly connected to programmable logic controllers (PLC). Since then, market for HMIs has expanded to include other Factory Automation (FA) products including Inverters, CNC Systems, Robots, Safety Controllers, Servos and Motion controllers.

The Japan Electrical Manufacture's Association (JEMA) uses "programmable HMIs" as the official name for these products.

There are three major applications where HMIs are used

- (1) As a control display panel
- (2) As a production information control terminal
- (3) As a information data terminal

1.1

The Role of a HMI



Application as a control display panel

HMIs are commonly used as a replacement for hard wired switches, lamps and panel meters.

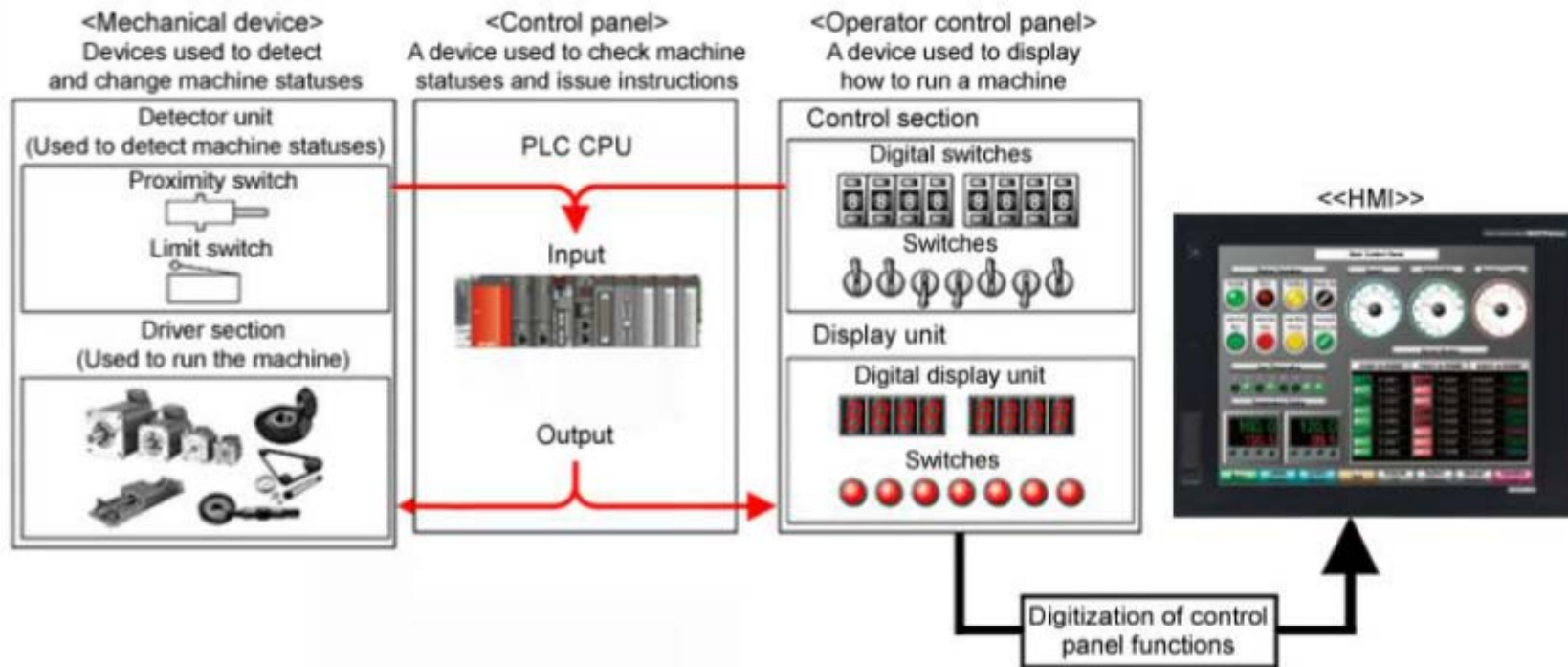
Over the years, they have been used in a variety of mechanical devices for Factory Automation systems.

Early control panels consisted of a display unit and a control unit that had pushbutton switches, lamps, and other parts.

A HMI digitizes the functions of these kinds of control panels and also comes with functions for displaying text information, displaying graphics, inputting touch key data, and so on.

The "programmable" in "programmable HMI" refers to being able to freely change screen layout and operations by changing the settings.

In general, HMIs are connected to and used with PLCs for device control or microcomputer boards.



1.1

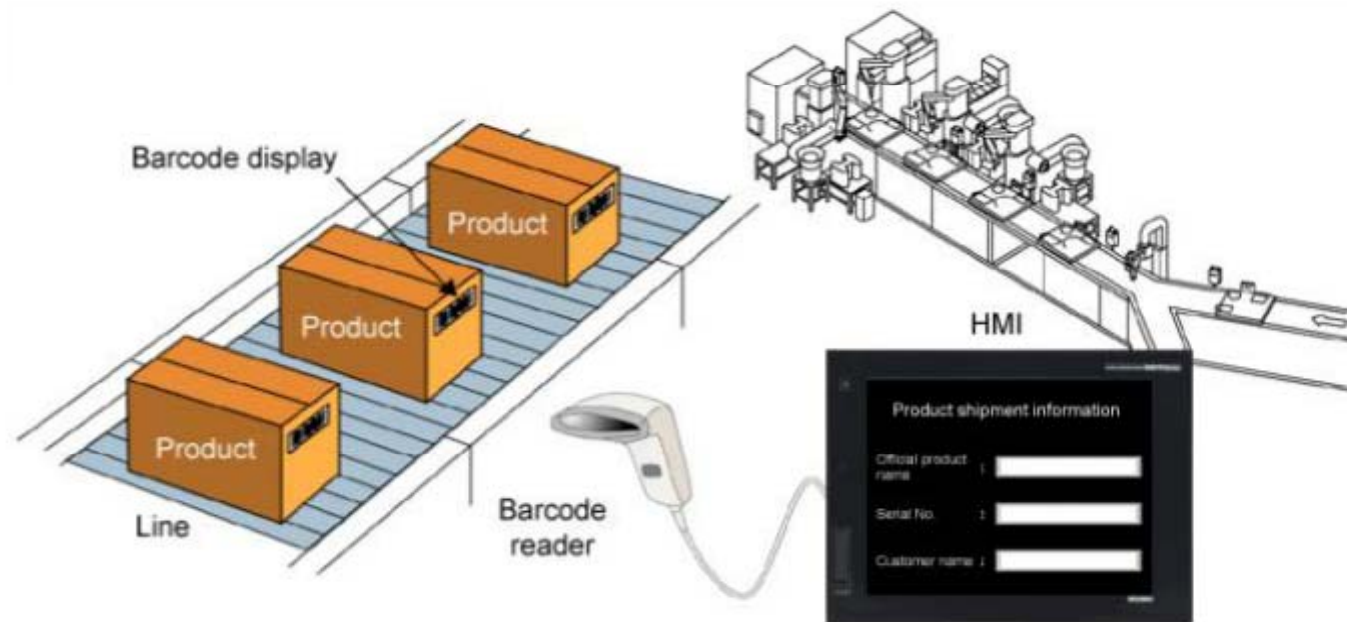
The Role of a HMI



Application as a production information control terminal

HMIs can be used to collect real-time production data and provide a direct link to production control systems. Recent usage patterns indicate that more users are integrating barcode readers and magnetic scanner into their designs to accelerate the input of production information.

The input information can be displayed flexibly on HMI screens so that operators can easily verify the information.



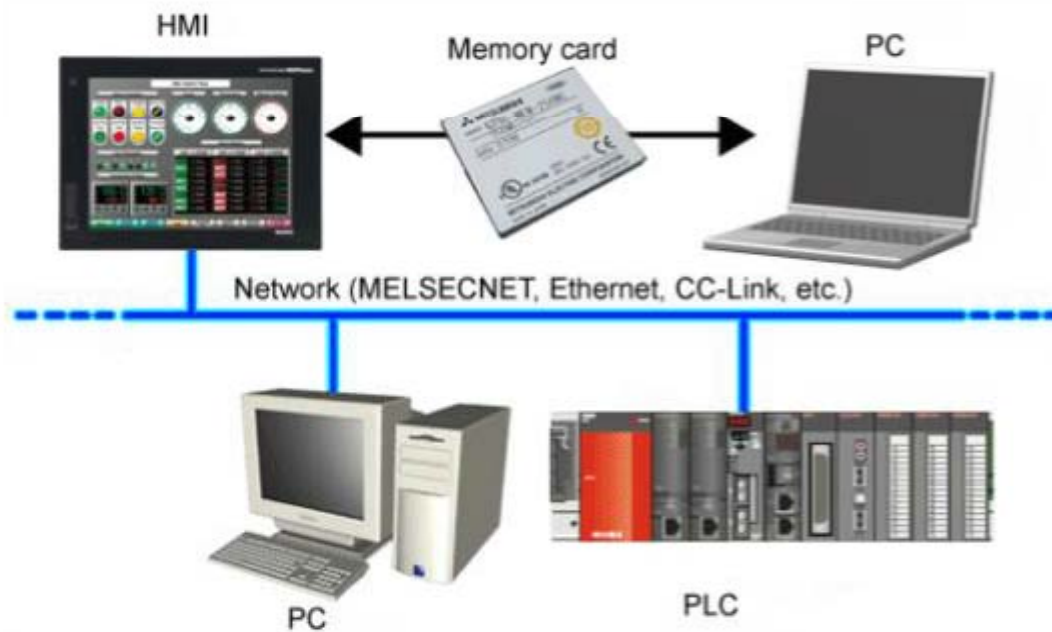
1.1

The Role of a HMI

Application as an information data terminal

HMIs may be used in the following ways.

- To display information/process data to an operator.
- To exchange and/or gather information with a PC or removable media.
- To exchange information with other PLCs and PC over a network.



1.2**Advantages of using HMIs**

Some of the advantages of using HMIs are listed below.

Reduction in control panel size	Being able to perform several functions through the software reduces the need of hardware installation, which in turn reduces equipment size.
Reduction in wiring cost	The HMI eliminates the need for complex and expensive wiring and performs the same tasks through software settings.
Standardization of control panels	HMIs enable control panels to be standardized because screen data settings can be changed using software even in the case of specification change.
Added value for the control panel	In addition to switch and lamp display, the HMI has other features such as graphics and text displays. It is capable of performing various functions that add value to the control panel.

Some of the common concerns with HMIs are listed below. We will address these concerns in the following pages.

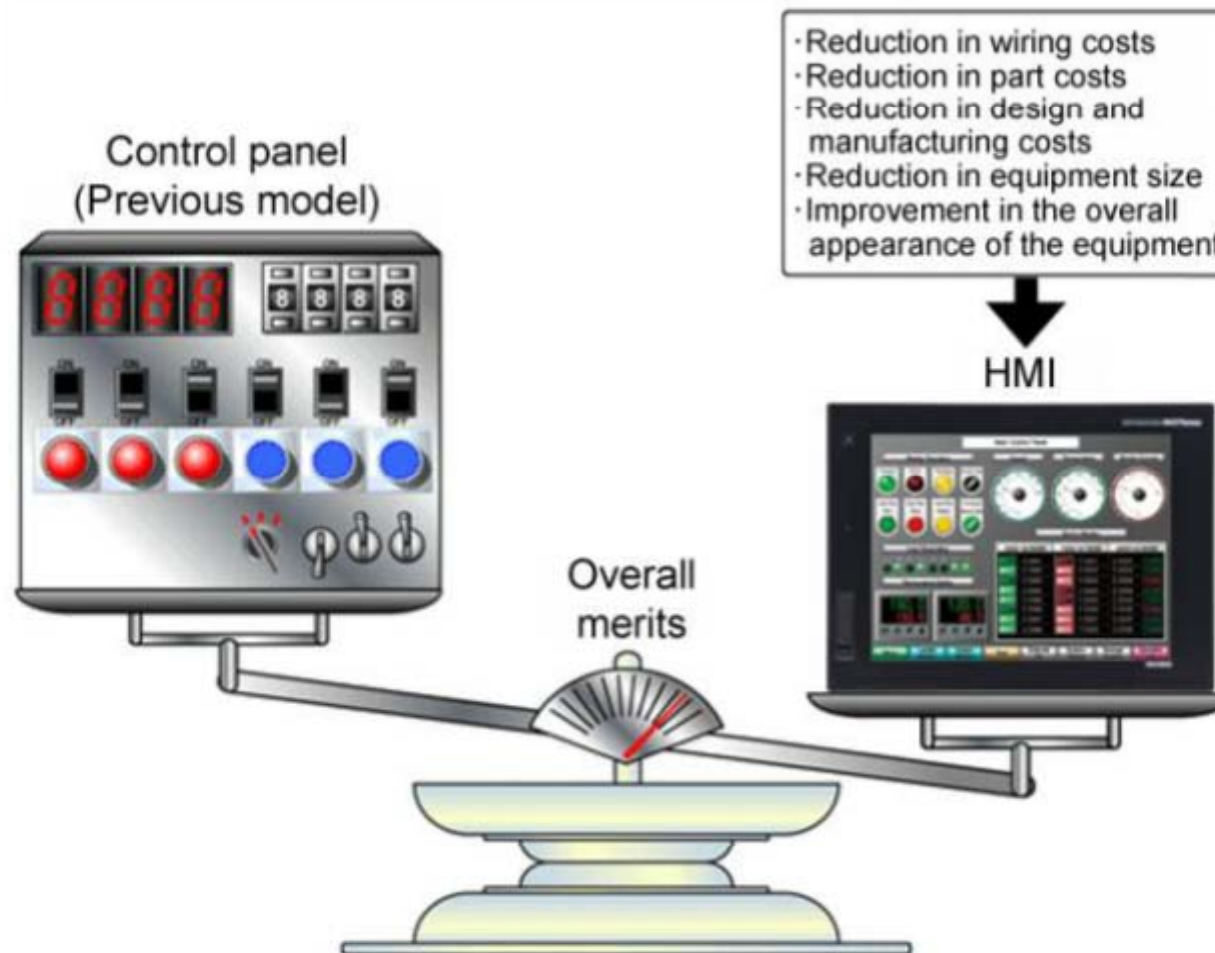
- (1) Aren't HMIs expensive?
- (2) Isn't it difficult to design HMI screens?
- (3) Don't people feel uncomfortable with touch panels because they are not widely used?
- (4) Won't my equipment become inoperable if the HMI were to break down?

1.2

Advantages of using HMIs

Aren't HMIs expensive?

The cost-performance for HMIs has increased significantly due to advancements in liquid crystal and semiconductor technology. From reductions in wiring and parts cost, as well as design and fabrication cost, to the reduction in equipment sizes, overall appearance improvement, and several other factors accelerated by the standardization of control panel design and fabrication, you can easily identify the many advantages of incorporating an HMI in your equipment.



1.2

Advantages of using HMIs



Isn't it difficult to design HMI screens?

We offer dedicated software to facilitate the design of HMI screens, even for users without prior knowledge of difficult programming languages such as Visual Basic, C, etc.

A comprehensive library consisting of switches, lamps, and other parts are integrated in the software.

Ease-of-use facilitated
by drag-and-drop operations



Comprehensive
parts library



1.2

Advantages of using HMIs

**Don't people feel uncomfortable with touch panels because they are not widely used?**

Just as touch panels gained popularity on ATMs, people have become comfortable with using touch panels in their everyday lives. Today, there probably are not too many people who feel uncomfortable with them.



Most people have gotten used to this kind of touch panel, right?

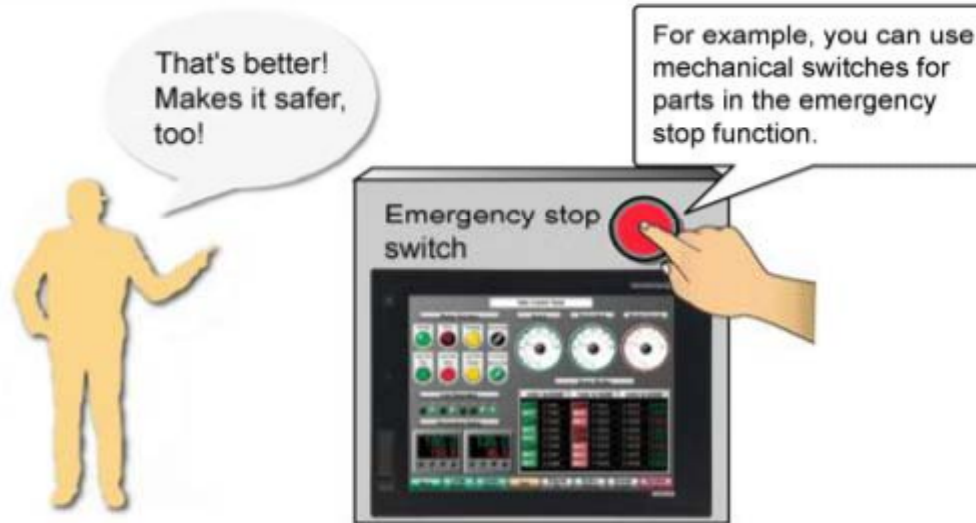


1.2

Advantages of using HMIs

**Won't my equipment become inoperable if the HMI were to break down?**

For safety reasons, a PLC is designed such that the critical parts are provided directly as hardware. Similarly, critical switches should still use mechanical switches.



1.3

Using a HMI



How can I set the HMI screen settings?

HMI screen settings are configured from a PC, using a dedicated software that is compatible with the manufacturer's HMI products.

Users create images of screen layouts and insert switches and lamps. For example, they can set up switches on the HMI to turn on an input signal in the PLC, or insert lamps that light up when the PLC output signal is turned on.



1.3 Using a HMI

How can I connect the HMI to a PLC?

There are two main system configurations, one for product development and one for actual operation.

- System configuration during product development

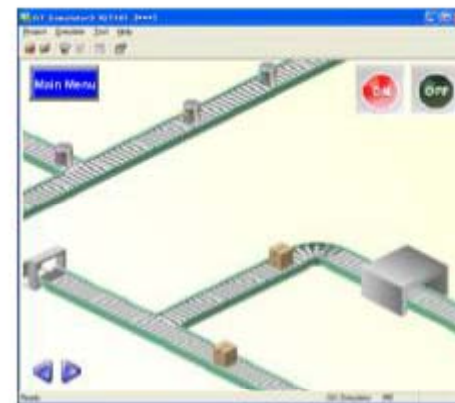


Using HMI simulators such as Mitsubishi Electric's GT Simulator3, users can use a PC to check screen operations without actually connecting to an HMI.

Screen design software

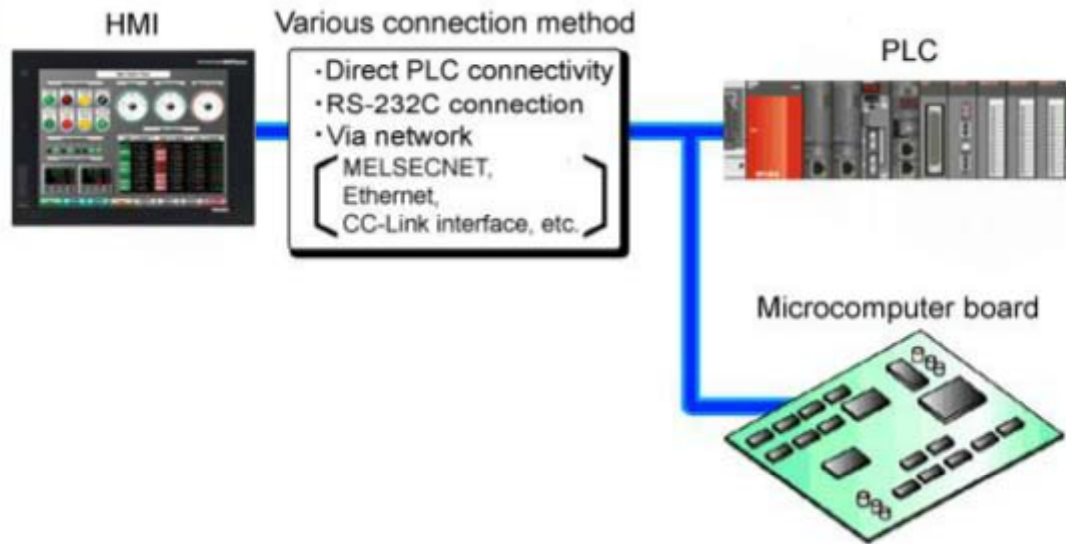


Simulation software



1.3 Using a HMI

■ System configuration during actual operation



Now that you have completed all of the lessons of the FA Equipment for Beginners (HMIs) Course, you are ready to take the final test. If you are unclear on any of the topics covered, please take this opportunity to review those topics.

There are a total of 7 questions (24 items) in this Final Test.

You can take the final test as many times as you like.

How to score the test

After selecting the answer, make sure to click the **Score** button. Failure to do so will not score the test. (Regarded as unanswered questions.)

Score results

The number of correct answers, the number of questions, the percentage of correct answers, and the pass/fail result will appear on the score page.

Correct answers : 3

Total questions : 10

Percentage : 30%

To pass the test, 60% of correct answers is required.

Proceed

Review

Retry

- Click the **Proceed** button to exit the test.
- Click the **Review** button to review the test. (Correct answer check)
- Click the **Retry** button to retry the test multiple times.

Features of programmable HMIs

Fill in the blanks in the explanation of HMI features with the appropriate terms.

A HMI realizes of control panel functions and also includes functions for displaying text information, displaying , inputting data, and so on.

The word "programmable" in "programmable HMI" is a meaning which can change and operations, by in software-tools.

What are Programmable HMIs?

Select the HMI application that corresponds to the explanation listed below.

HMIs are being used in control panels to operate machinery.

HMIs are being used to input information from barcode readers, magnetic cards, and other terminals.

HMIs are being used to transfer data to PLCs and PCs through network connections.

Advantages to using HMIs

Fill in the blanks regarding the advantages of using HMI features with the appropriate terms.

The use of HMIs leads to a in the need of installing panel parts and reduces the size and the of equipment.

They can be used to promote the of control panel designs and manufacturing, because changes in desired specifications can be handled by simply modifying settings using the software tool.

They can be used to improve the overall of the equipment through improvements in efficiency by the use of the HMI.

Screen design software for HMIs.

Select the correct statements relating to the explanation about screen software for HMIs.

(More than one may be correct.)

- Screen data are created using Visual Basic, C, and other computer programming languages.
- Users can create screen data easily using the dedicated screen design software.
- Screen design software comes with the parts library with switches, lamps, and other parts available for use.

Score

Back

How to create screen images for HMIs

Fill in the blanks regarding design methods for HMI screen layouts with the appropriate terms.

HMI screen settings are made from a using specialized screen design software.

Users the operating screen layouts and parts corresponding to switches and lamps into those layouts.

For example, users can set up switches on the HMI that when turn the relevant input signal of the PLC , insert lamp parts that when the PLC is turned on, and so on.

Using a touch panel

Select the correct statements about touch panels in HMIs listed below.

- In FA worksites, generally operation panels are operated by using hardware buttons so that many people feel uncomfortable using touch panels.
- Touch panels have become more common, and more people feel comfortable using them.

Score

Back

What to do if the touch display or other equipment breaks down

Fill in the blanks in the sentences below with the appropriate terms from the explanation on what to do if the touch display or other equipment breaks down.

For safety reasons, critical switches are constructed using switches.

The reason for this is the same as with PLCs--for safety reasons, PLCs are designed such that parts

are provided directly as on the unit instead of as software.

Test**Test Score**

You have completed the Final Test. Your results are as follows.
To end the Final Test, proceed to the next page.

Correct answers : 0

Total questions : 7

Percentage : 0%

[Proceed](#)[Review](#)[Retry](#)

You failed the test.

You have completed the **FA Equipment for Beginners (HMIs)** Course.

Thank you for taking this course.

We hope you enjoyed the lessons and the information you acquired in this course is useful for configuring systems in the future.

You can review the course as many times as you want.

Review

Close