# SIMATIC S7-1500 "Demo-in-a-bag"

## – Instruction Guide



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# Demo Description

The SIMATIC S7-1500 "Demo-in-a-Bag" is a simple, plug and play demo that allows a salesperson to effectively "Present / Demo" the top selling points of the SIMATIC S7-1500 – using only this demo and their laptop.

The demo does NOT include any use of the "TIA Portal Development Software". The salesperson may choose to show that as well, but it's not included in this documentation. *The basic "script" included in this guide is geared toward a user with general knowledge of the SIMATIC S7-1500 with basic skills in using the built-in CPU display, built in web server, and Industry Support App. Please see the "Appendix" at the end of this guide for further information on using the tools referenced in this document.*

**The primary advantage areas to emphasize are:**

- Design & Handling

- Integrated Diagnostics

- Monitoring and Troubleshooting

- Maintenance

**These are most enabled by the following focus tools / features**
- Built in color display / HW design advantages
- Web server & user defined web pages
- Siemens Industry Support App

# Marketing message

### <u>*The messaging to be communicated:*</u>
**the SIMATIC S7-1500 controllers are the "most advanced controllers in the world".**

While more formidable when paired with TIA, this guide is just a quick overview of some basic features – the customer should attend a relevant distributor SIPEC event or schedule a visit from an Automation Consultant as a next step for some "hands-on" demonstrations.

The SIMATIC S7-1500 controller family sets new standards in Power and Efficiency by expanding on the advantages of the existing SIMATIC S7-1200 micro-controller. The higher level PLC applications provide comprehensive and complete scalability to any of our clients.

Downtime is minimized due to powerful, built in diagnostics, and complete transparency of these diagnostics on our HMI Panels, Web Server and User defined web pages, on the programming PC – AND on the built in CPU color display for simple operator use. The S7-1500 is seamlessly integrated with HMI and drives within the TIA Portal – meaning simplified selection and parameterization, efficient global libraries, and common diagnostics all within the same application, reducing engineering and commissioning significantly.

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## How to Demonstrate

The SIMATIC S7-1500 "Demo in a Bag" is a simple, plug and play demo and the end goal is to get a prospective customer to "move down the funnel" by attending another Siemens event down the road, such as the REE (Realizing Engineering Efficiencies) hands-on workshop, etc…

### *Step #1 – Connect your laptop to the S7-1500*

*Connecting your laptop to the S7-1500 controller is necessary if you want to demonstrate features of the "Web Server"!*

- ✓ Plug the Ethernet cable provided, from your laptop, to the **"X1"** port on the S7-1500 CPU (either port on the right side of the CPU)

- ✓ The Ethernet address of the S7-1500 is set to **192.168.0.1**. The laptop's Ethernet address must be set on the same Ethernet "subnet" – **192.168.0.x** – where "x" can be any number except "1". To set this, go to "control panel" -> network settings -> change adapter settings, then right click on "Local Area Connection", then properties. Click on "Internet Protocol V4" settings, then click "properties" to set the subnet for the laptop. The screenshot example below shows 192.168.0.203, you can use 203, or any other address except "**1**".

- ✓ Screenshots of setup included below
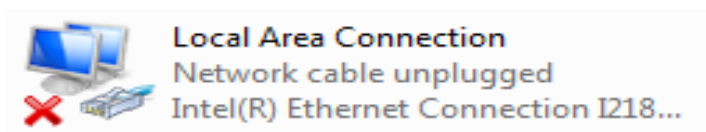


(right click, properties)
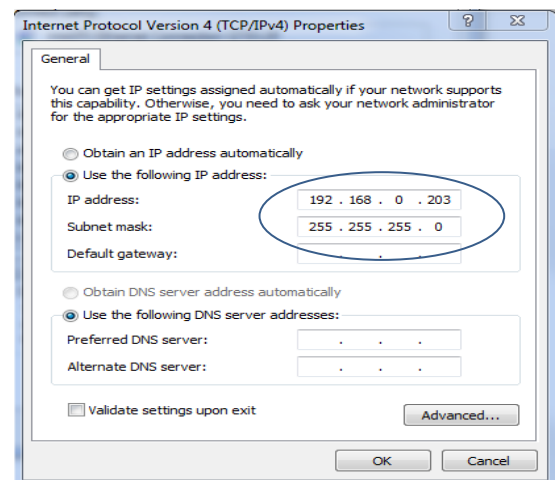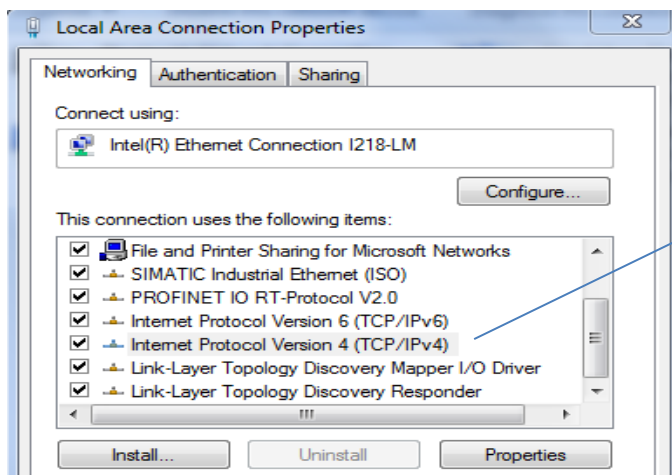


*When you're done with the demo, simply change the setting back to **"Obtain an IP address automatically"**.*

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## *Step #2 – Suggested Demonstration Script*

### *SIMATIC S7-1500 Key Feature Overview*

Before focusing on the hands on demo, give a quick 10 minute overview of the key features of the SIMATIC S7-1500.  The six key innovation areas and customer benefits are listed below.  *The "DRC" contains several PowerPoint presentations on the S7-1500 that can also be used together with this portion of the demo if desired.*

**+ Security Integrated**

✓ Block, copy, access, & manipulation protection
  + Protects intellectual property and investment
  + Protects against unauthorized project changes

**+ Design and Handling**

✓ Display, optimized components, integrated DIN rail, jumpers, etc…
  + Simple assembly saves time & costs
  + Easy to maintain due to flexible wiring

**+ Technology Integrated**

✓ Standard motion control & drives integrated
✓ TRACE function running on CPU
  + Integration saves money, time, and panel space

**+ Integrated system diagnosis**

✓ Built in, plain text diagnostics – NO programming required, local / remote / drives, even in STOP mode
  + Simplifies troubleshooting
  + Minimizes downtime

**+ Performance**

✓ 400MBaud backplane!
  + Increased productivity by shortened cycle times

**+ Engineering with TIA Portal**

✓ Integrated drives/HMI/controller, libraries, scalable HW, etc…
  + Efficient engineering & maintenance saves time and costs

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## Hardware Overview

Start the actual demo with a hardware overview – do a quick overview of the HW included.

**The S7-1500 Demo in a Bag consists of:**
- PM 1507 Power Supply 24V
- CPU 1516-3 PN/DP w/ 4 MB mem card
- DI 16x24 VDC (w/ terminal block)
- DQ 16x24 VDC, 2A (w/ TopConnect terminal block)
- Push button for "wire-break" demonstration

- Open the Siemens "Industry Online Support" App on your phone and show how **quick and easy it is to find information** on Siemens hardware. *✆ use the "scan product" function to scan the QR code on one of the cards (all cards have QR code) – show that you have quick access to lifecycle information, quick technical data, complete manuals, certificates, FW updates, FAQs, etc…*

## Design & Handling Efficiencies

Show some simple "Design and Handing" innovations to familiarize the customer with the hardware.

- Pre-wiring position – makes it **easy to make a wiring change**, due to easy access, easy to see terminals, disconnected from power. *✆ use input or output card – put in pre-wiring position*

- Standard Terminal block – show that we **minimize spare parts** by having only one terminal block – same for input/output, analog/digital. Additionally, all "Common" terminals are along the bottom of the terminal block for easier wiring compared to traditional PLC "Common" terminals locations. *✆ pull out the TopConnect card and show that this is the same as input terminal block, just wired.*

- Pre-wired connectors available, **saves wiring time**. *✆ pull out the TopConnect connector, show completed wiring, easy access to screws when full (TopConnect), labeling, etc.*

- Show the **built-in color display that allows easy access to CPU information**, changes to settings, etc…at the CPU, without any additional tools required. *✆ Quickly toggle through the five different screen selections to show the rough information available, show that the display can be removed without stopping or affecting the CPU. Show that the front display can by physically locked closed to restrict access to the memory card, run/stop switch, etc…using ring lock on display.*

- The integrated 35mm DIN rail on the backplane – makes it **easy to add standard components** to the S7-1500 rack if necessary. *✆ remove output card, show rail*

- Blue jumpers for **quick wiring** – can quickly jumper the 24VDC and 0VDC on the terminal blocks without having to manually make jumpers. *✆ Point out the blue jumpers on the TBs*

- IO cards have "coding elements" on them so that you can't mistakenly re-insert the wrong type card after you remove one – **minimizes errors**. *✆ remove both terminal blocks and show the different configuration of the white coding elements – cannot put one in the wrong spot.*

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- Additional cable tray available – clean/flexible design – ***minimize spare parts***.  ☝ *demonstrate the 2x positions of the IO door covers using the TopConnect connector.*

## Built-in Diagnostics

- Show that we have ***built in system diagnostics*** down to the "wire break" level (no programming required, automatically generated) – user can see detailed diagnostic information on card LEDs, display, web server (HMI & programmer also if demo had one) – all same info.  ☝ *Push the "wire break" button – this creates a wire break on channel 15 of the input card.  Troubleshoot this fault on the display to show detailed diagnostic message (Diagnostics/Alarms) or (Modules/Local modules/slot 2/status/module state).*  *Note that "16x24VDC HF_1" is the specific "name" for the card at fault.  Details go down to wire break, diagnostics are "channel specific" – the text was not typed in, it is built in.

- Prove that ***diagnostics are built in, not programmed*** – demonstrate this by showing that diagnostics continue to run even with CPU in STOP mode.  ☝ *Place PLC in stop from front display (Settings/RUN/STOP,) or web server (Start Page), or switch on CPU.  Create wire break fault using the pushbutton – show fault on front display (Diagnostics/Alarms) and/or web server (Diagnostic Buffer), and explain that these detailed diagnostics are uniform across all devices (i.e. display, web server, HMIs, engineering station).  Explain that this **reduces downtime** and that competitors do not have this feature.*

- Show that the same diagnostic messages can be seen using the built in web server.  ☝ *Log in to the web server with your laptop.  When you get to the "Start" page of the web server, explain the security access levels that can be set* (including the need to use http***s*** to log in – secure server), then *log in with "engineer01 / webmax" (gives you full access).  Show the same diagnostic message using any of the following three tabs: "Diagnostic buffer", "Module information", or "Alarms".  Toggle the wire break button to show that it updates, and reinforce that the webserver can be connect over internet as well – customer would need to setup firewall, etc… for full security.*

## Built-in Monitoring & Troubleshooting Features

- ***Show that user can monitor critical data directly on the CPU display - no tools required.***  ☝ *Open the watch table on the front display (Diagnostics/Watch Tables).  Toggle output bits user display by going into specific output and "modify value".  (This will require display password "1234").  Note the clock bit flipping as well.  There are two watch tables included, and some clock bits on the watch tables to show.*

- Show that the ***built in web server can also be used to monitor program data, over "intranet or internet" – no additional tools required.***  Show that the watch tables can be viewed manipulated on the web server, same as the display.  ☝ *Open the web server (see instructions in web server section) go to "watch tables" tab – show watch table, toggle bits, etc…*

- Show that the ***web server can be used to monitor any values in the CPU***.  If you want to view or modify a tag that you don't have in a watch table – you can do that on the tag status menu.  ☝ *Open the Tag Status menu on web server and highlight how it can be used as an ad-hoc watch table.  Change an output bit and watch it light up on the output card.  Enter the location of a clock bit (ex. M0.0) and show it changing.*

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- Open the custom user-defined webpage on the web server (Customer pages) and show that the user can create custom web pages that can be used to view and manipulate data. The customer page available also features our Technology Objects within TIA, which can perform motor simulation and parametrization.  ♌ *Go to the customer web page – By turning the simulation on with the "Drive Control" switch, you can demonstrate a Speed Axis Control Technology object, and you also trigger a new trace, which can be seen on the original page of the webserver.*

- Show the TRACE functionality in the webserver.  ♌ *On the webserver intro page, go to Trace tab. The tab will display the most recent trace that was recorded by the user defined page. Discuss with the group how the data can be configured and grouped to highlight the most useful detail for any application.*

## *Maintenance Features*

- *Show how front display can be removed in RUN and replaced if necessary.  It has a service life of 50,000 operating hours.  ♌ Push in two tabs on top of display and remove it – showing that the CPU continues to run, and that it re-starts immediately upon putting it back in.*

- *Show that the display itself has a separate password and can be locked at the display (from user changes) to prevent unauthorized access and security threats via the display.  ♌ On display, go to: (Settings/Lock Display) show how to unlock and lock (screen password is "1234")*

- *Show how **IP address can be changed from the display**, and explain that this can be used in a multi-use system setup to automatically assign IP addresses of all connected slaves without any programming software on-site.  ♌ Go to (Settings/Addresses/X1/IP Address) – change this to 192.168.0.**2**, (apply), show that IP address changed.  Change address back when finished.*

- *Firmware update.  ♌ Show that firmware can be updated from the web server (Module Information/Firmware), front display (Settings/FW Update)*

- *Memory Card benefits.  ♌ Show where the memory card is located and explain how program or firmware can be transferred to the card using a standard PC card reader.  Explain how data is not lost when power is lost.  Explain how when a faulty CPU is replaced, SD card can be swapped in for reduced downtime*

- *Show how the file browser on the CPU **(memory card) can be used for documentation storage.**  ♌ Open the file browser on the web server (located under File browser) and download the preloaded files (instruction guide, CAD drawing, etc.).  Open them on the laptop to show that the 1500 acts as a standard file server.  Explain applications, such as uploading/downloading recipes and data logs.*

- *Explain front display customization in Portal (e.g. Siemens logo on demo) and how **multiple languages are supported** (Display/Language).  ♌ Show a customized logo on display by pushing the (Esc) key when at the main screen of the display.  Show how to change a language (Display/Language for display) – toggle to Deutsch to show this.*

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## Appendix

### *Passwords*

- Password for display: "1234"
- User Name / passwords for web server (different levels)
    - Maximum Access: "engineer01 / webmax"
        - All menus on left, read/write to all
    - Read Access: "engineer02 / webmid"
        - Can only read tags and flash LEDs
    - Minimum access: "engineer03 / webmin"
        - Can only see start page, and change operating mode
- Access protection for programming unit / HMI: "access01"

### *Manuals:*

Link to primary manual.

### *Web Server* – *built into ALL the S7-1500 CPUs*

- The built in CPU web server is a very nice feature to show with this demo – the general idea is that the sales person simply connects their laptop to the S7-1500 with the Ethernet cable included and demonstrates from their standard laptop – no special SW/HW required to do this demo.
    - ✓ To connect to the web server – you need to use a secure connection, type https://192.168.0.1 into the browser to connect, then use the appropriate password to enter the web server on the CPU (see password list attached for web server).
- Show the features of the web server using the demo instructions listed below. *Note that there are many more things to demonstrate with the web server than are listed in this quick guide.* For detailed information on the webserver, please refer to the S7-1500 web server manual on the Service and Support site for detailed information. For detailed information on the "customer" web pages included on the demo – this entry on the Industry Support Site contains the project and all information about it.

### *CPU Display* – *built into ALL the S7-1500 CPUs*

- The demo notes in this document point out some of the more important features to demonstrate regarding the display. *Note that there are many, many more things to demonstrate on the CPU color display than are listed in this quick guide*. For detailed information on the CPU display, please refer to chapter #12 in the S7-1500 / ET 200MP Automation system manual on the Service and Support site for detailed information. To toggle between custom screen logo that has been added and start screen, push and hold "ESC" key.

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*Siemens "Industry Support" App* – *FREE App downloadable on the App store*

- In order to demo this App, you will need to download it (free) on the App store. You can search for it "Siemens Industry Online Support". The icon looks like:



- Once this App is on your phone/iPad, to demonstrate the app, simply start the App – you can easily search for information on Siemens parts by either typing in the part number, or choosing **"Scan product"** (recommended). When you choose "Scan product" – you can easily scan the QR codes on the cards and it will quickly bring you to all information on that product. Information you can show includes: lifecycle information (is the product current, what is the latest version, etc…), quick technical data, complete manuals, certificates, FW updates, FAQs, etc… Of course, QR codes are on all S7-1500 components on this demo, so you can pick and choose which to show.