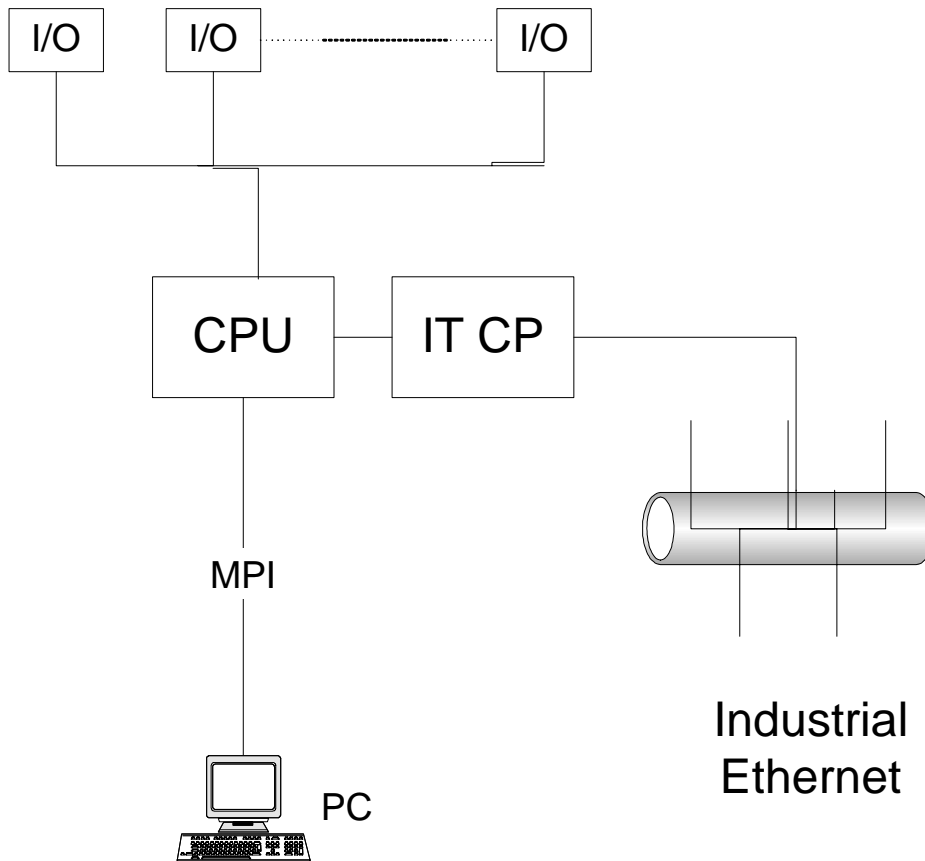


## FUNCTIONS OF THE IT-CP UNIT OF THE PLC SYSTEM

The dilution refrigerator at the NA58 Compass Project has a Siemens PLC (programmable logic control) system with an industrial Ethernet configuration. A Siemens CP 343-1 IT unit has been set up as a part of the Ethernet to improve the security of the system and extend the accessibility of process data,. The IT-CP unit makes it possible to monitor process data from dilution refrigerator via the CERN intranet or even the Internet. It also provides the feature of sending alarm messages by e-mail or to mobile telephones.



### HTML process monitoring

By means of S7 applets process data display and input of process data are incorporated into an ordinary HTML page. The applets allow read and write access to any S7 station via the IT-CP and can be straightforwardly integrated in the html-code. The web-browser in which the applet was started is responsible for the execution of the applet. This activates the applets and assigns a frame to it within the current HTML-page. When requested the IT-CP passes in the jobs to the relevant module or CPU. The code is transferred to the IT-CP by the use of File Transfer Protocol (FTP), and is saved on the

IT-CP. More extended solutions can be implemented using Java source code. However, one should keep in mind avoiding too complicated code, which will require a lot of network capacity. Depending of what kind of web-browser that is used, there is a maximum value limiting the number of applets allowed to use within one call.

On the web-site <http://na58plc588.cern.ch/> the applets are embedded in the HTML-page by use of the following type of call:

```
<APPLET CODE="de.siemens.simaticnet.itcp.applets.S7GetApplet.class"
CODEBASE="/applets/" ARCHIVE="s7applets.jar, s7api.jar" WIDTH="50"
HEIGHT="32" NAME="VHLN_Open_Signal" >
  <PARAM name="RACK" value= 0>
  <PARAM name="SLOT" value= 2>
  <PARAM name="CYCLETIME" value= 10000>
  <PARAM name="BACKGROUNDCOLOR" value=0xFFFFFF>
  <PARAM name="LANGUAGE" value="en">
  <PARAM name="DEBUGLEVEL" value=1>
  <PARAM name="EDIT" value="true">

  <PARAM name="VARTYPE" value=2>
  <PARAM name="VARCNT" value=1>
  <PARAM name="VARAREA" value=0x84>
  <PARAM name="VARSUBAREA" value=15>
  <PARAM name="VAROFFSET" value=0>
  <PARAM name="FORMAT" value="\X(2,Open,Closed)" ></APPLET>
```

Remarks:

- Set the debug level to 1 if which will display all messages, otherwise error messages are the only ones to be shown by default.
- Pay attention to what kind of values are assigned to the parameters VARAREA, VARTYPE and FORMAT, which must be compatible. For instance in the example above, VARAREA value=0x84 means that the read out is a data block in the memory area. VARTYPE value=2 means that the value is a byte, while "FORMAT" value="\X(2,Open,Closed)" checks if bit number 2 in the byte (consisting of bits numbered from 0 to 7) is 0 or 1. In the first case the string "Open" is printed, in the latter it is "Closed".

For a further description of the parameters, refer to the Siemens Simatic Net IT-CP manual ("Instructions for the CP 343-1 IT and CP 443-1 IT).

For security reasons the system is in a **read-only mode which denies any attempt of modifying parameters from the web.**

*Further development of the web pages*

An improvement of the web pages would have been to show a graphical display of the history of the different parameters. However this is imposing a task of where to store the process data history.

[Sending process alarms by e-mail](#)

The IT-CP unit is implemented to operate as an e-mail client supporting the simple mail transfer protocol (SMTP). An e-mail connection is established between the CPU315-2 DP and the IT-CP. The e-mail server is the CERN-server, and the e-mails can only be sent within the LAN (??). It is recommended to use absolute (numeric) IP-addresses in the configuration.

(List of parameters used in the set-up?)

For sending the e-mail, the predefined S7-blocks AG\_SEND (FC 5 ) is used, which allows to send e-mail with a content less than 240 bytes. Since the protocols used are connectionless, there is no guarantee that the e-mail arrived at the recipient.

The operator is recommended to try to send a test-mail to check that the e-mail function is functioning correctly at any time. This can be done via a web browser at <http://nnn.nnn.cern.ch/>. A successful sending of an e-mail indicates that the IT-CP is ready to send e-mails, that a connection that can be used by user programs is established and that the recipient specified in the request is available. However, one cannot conclude anything about the status of the user program calling the function calls AG\_SEND nor the time required from a mail being sent until it is received.