Integration of IR temperature sensors into Siemens PLC environment

The non-contact temperature measurement devices of Optris feature advanced interface concepts which allow an easy integration within networks and automated systems. The following technical note highlights the setup of thermal imagers via an RS485 module as well as of online infrared thermometers via PLC using PROFIBUS DP.

Regarding PLC environments the PROFIBUS is generally accepted as one of the most used bus system. Concerning the production, process and building automation, the bus system represents an ideal, secure and fast communication exchange between the single bus partners and the control units.

The set up of the PROFIBUS network is almost the same every time. On the one side you can find the control unit,

e.g. a SIMATIC S7 of SIEMENS – also called master system or active station. On the other site you can find the bus partners, the so called slaves – also know as passive stations. This can either be actors or sensors.
All Optris infrared temperature sensors belong to the process or field communication – especially to the version PROFIBUS DP.

Integration of optris PI thermal imaging camera

There is now an easy solution available to integrate the thermal imager optris PI into PLC environments. The solution is based on the great advantage of the master system to support the connectivity to other networks such as RS485. This enables the system setup covering long distances (up to 3 km) between the infrared camera and the PLC (illustration 1).
Generally, the optris PI thermal imager is connected to a PC, the imager's software optris PI Connect displays
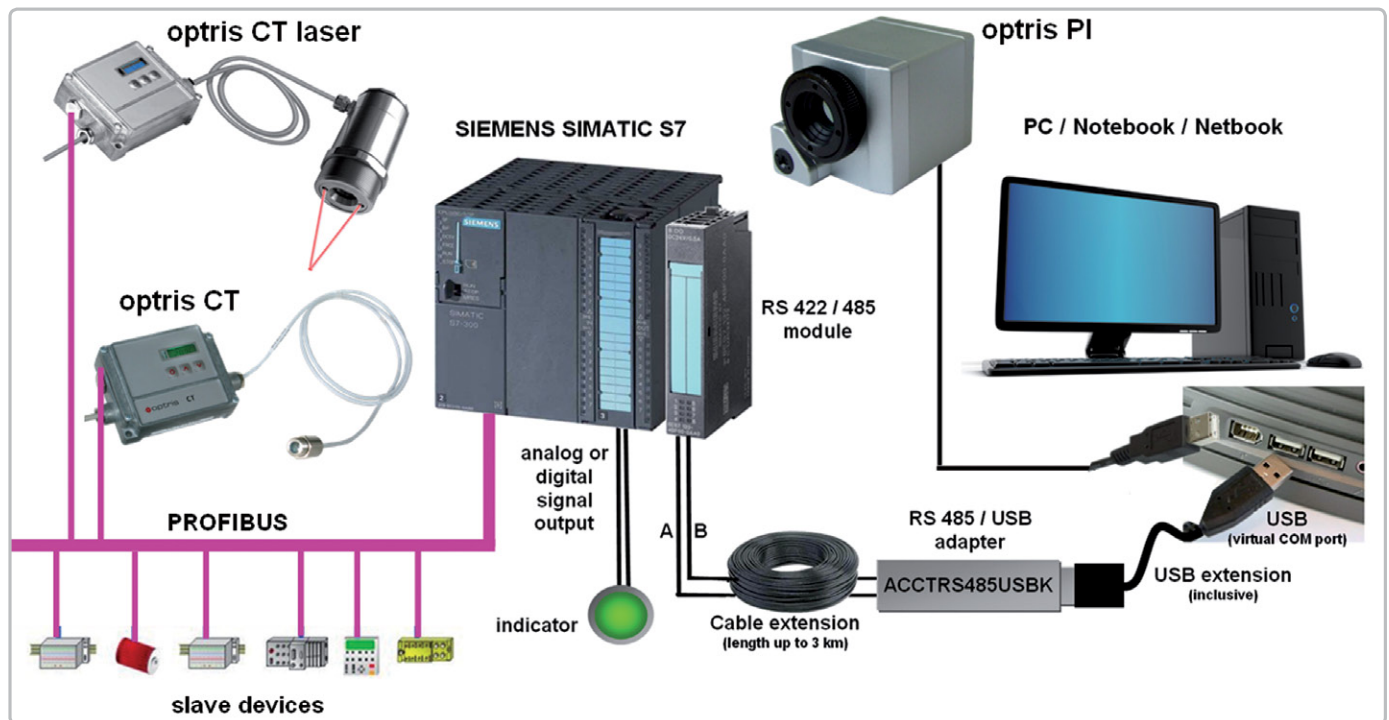

Illustration 1: Optris PI infrared camera connection to a PLC master system (SIEMENS S7) including a PROFIBUS network with slave devices like IR online thermometers

and analyses the temperature data. The software needs to be adjusted regarding the external communication. The RS485 connection can be chosen in the mode "Comport" via the software menu TOOLS – CONFIGURATION – EXTERNAL COMMUNICATION (illustration 2).
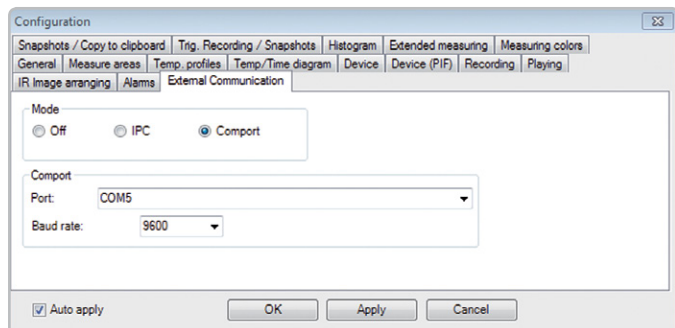

Illustration 2: Configuration of imager software optris PI Connect

The optris RS485 kit is available (product code: ACCTRS485USBK) to integrate the imager into a PLC system. A virtual Comport at the PC can be created by using separate software which is included in the RS485 kit.

The virtual Comport connects the software optris PI Connect with the RS485 module; the RS485 module finally transfers the data to the SIEMENS S7 PLC via A and B cables.

The illustration 1 also shows the hardware configuration based on a RS485 connection between the optris PI camera and the SIEMENS S7 PLC including:

- optris PI160 / optris PI200 / optris PI400
- optris RS485 kit (ACCTRS485USBK)
- SIMATIC S7-300, CPU 313C-2 DP (processor with a PROFIBUS module)
- SIMATIC S7-300, front module with digital and analog outputs
- SIMATIC S7-300, CP 340 (communication processor with RS422/485 interface)
- Software STEP 7 (to configure the SPS regarding the RS485 and the PROFIBUS module)
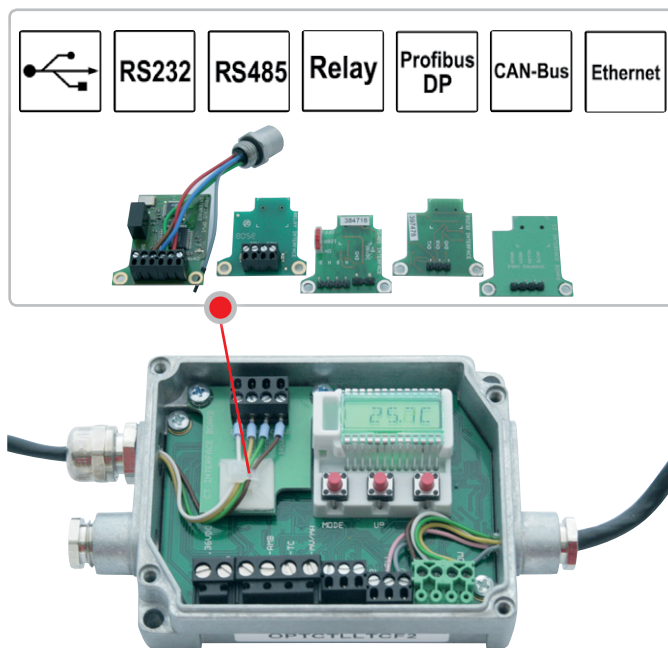

Illustration 3: Pluggable, digital interface modules for maximal flexibility; simple to install via standard modules

Integration of optris IR online thermometers

Besides the standard output signals of infrared thermometers such as voltage, power or thermocouple, Optris supplies additional digital interfaces with every two pieces device (sensor head and electronic box). A free slot, available in each box, can be used to install a suitable digital interface card (please see illustration 3).

The installation is very easy. A so called GSD file (a GENERIC STATION DESCRION FILE) belongs to each field bus partner. The file can be loaded into the PLC in order to ensure the correct communication between the master device and the slave. The GSD file for Optris' PROFIBUS interface is available on a CD supplied with the device. It contains all important information such as the communication orders to request the object temperature or to set emissivity values.

An English webcast about the setup of IR online sensors using PROFIBUS DP can be found on the website of Optris:
http://www.optris.com/profibus-interface