

# Starter Kit Plus

## Seamlessly Connected, Fully Secured and Distributed IIoT-Application Demonstrator



A real end-to-end secured distributed IIoT application based on networking sensors and Single Pair Ethernet(SPE) is provided with Perinet's *Starter Kit Plus*. The *Starter Kit Plus* implements a simplified demonstrator that switches an actuator (i.e. contactor) based on the value of a distance provided with a smart sensor adaptor. The included modular computing device, the periMICA, provides – next to the computing example of the application itself – a password free security (PKI2Go) and a dashboard user interface (based on Grafana) for demonstration purposes. The provided example application is supported with a variety of documentation available online.

### Targeted Applications

- Industrial control
- Industrial sensors
- IoT / IIoT
- Turn passive sensor and contactor into active network participants
- Automatically switch the contactor based on distance sensor
- Configure and read data in a web browser
- Access Control using SSL certificates
- Application secured setup evaluation

### Security

- NIST compliant TLS implementation
- Role Based Access Control (RBAC)
- Certificate based client authentication
- AES encryption algorithm
- X.509 certificates and PKIX path validation
- Elliptic Curve Cryptography (ECC)

### Key Features

- hybrid SPE for sensor connection
- distributed network application
- zero configuration network
- patent-protected
- periNODE smart adapter 0-10V
- periNODE smart adapter GPIO
- periMICA modular edge computer
- periSTART media converter
- periSWITCH 3-port hybrid SPE switch
- periLINE hybrid SPE cable

### Operational Parameters

- Operating voltage: 24 VDC

## Demo Application

The Starter Kit Plus presents a distributed example application, where virtual (periMICA container) and physical (periNODEs) entities communicate via Single Pair Ethernet (SPE).

Distance metrics are gathered continuously with the **periNODE distance**, where an ultrasonic sensor (0-10V) is attached. A distance smaller than 100mm enables the contactor via the **periNODE GPIO**. The example python application, presented with the periMICA container *DistanceControl* decides whether the contactor is switched on or off.



## Security

Only authorized clients are allowed to access the data if the proper client certificate is presented. Therefore, unauthorized access will be blocked. Users of the Starter Kit Plus will be shown how to access all entities without proprietary software.

The *PKI2go* container thereby provides an easy interface to manage the certificate authority (CA), which creates and delivers the keys and the certificates to the hosts and clients.

## Built-in containers

**GettingStarted** provides, as starting point of the Starter Kit Plus, both the certificates needed for access and the documentation.

**Dashboard** provides a Grafana based web interface to graphically display the sensor/actuator metrics.

**PKI2go** is a user-friendly public key infrastructure (PKI) to easily create and manage keys and certificates.

**MQTT** includes a MQTT Broker (*mosquitto*) to distribute sensor/actuator metrics.

**DistanceControl** implements the example distributed application, which interacts with the contactor based on distance metrics.

**Debian** is the general purpose application container, which allows rapid prototyping for enhanced functionality.

## Ordering Information

Ordering Code	Product Name	Description
PRN.000.063	Starter Kit Plus	secured and distributed IIoT-demonstrator
PRN.000.002	periNODE 0-10V	smart adapter for 0 to 10V signal type
PRN.000.003	periSTART standard	hybrid SPE media converter with M8 connector
PRN.000.010	periNODE GPIO	smart adapter for GPIO signal type
PRN.000.008	periSWITCH 3-port	3-port hybrid SPE switch
PRN.000.017	periLINE 0.2m	hybrid SPE cable with M8 connectors
PRN.000.025	periMICA	modular edge computer