

## KEMA Smart Meter DLMS Test Facility

### Introduction

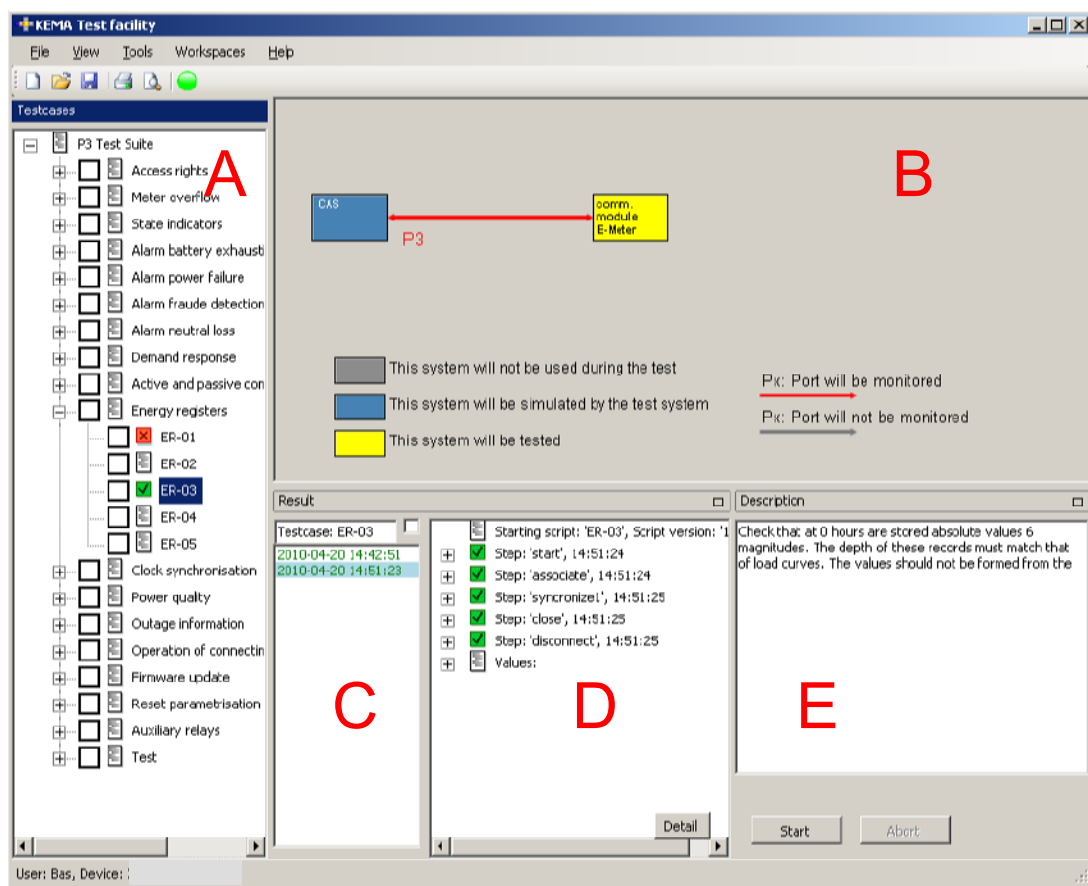
The KEMA Smart Meter DLMS Test Facility is an advanced and highly automated test tool, that is designed for testing the details of a DLMS implementation. The Test Facility allows you to be well prepared for e.g. DLMS Companion Specification tests at a laboratory, which will reduce the need for re-tests and gives you better control over the time lines of the test process.

### Features of the KEMA Smart Meter DLMS Test Facility

The KEMA Smart Meter DLMS Test Facility is a test application designed for automated execution of test scripts. The following sections provide more details on the features of this sophisticated tool:

#### The graphical user interface (GUI)

The picture below shows the GUI of the Test Facility, in which several parts are indicated:



Part A lists the test cases that are available for execution and their status (Passed/Failed/Not yet tested). From this pane, adding, starting or editing a test case is just one mouse-click away.

In part B of the GUI, a schematic overview of the test setup for the selected test case is depicted. In the example, a Central Access System (CAS) is simulated by the test system and the DUT is an electricity meter.

A description of the selected test case is given in part E. Clicking the 'Start' button, executes the selected test case.

In part C, all historical test runs for the selected test case are shown. Details for the selected test run are shown in part D. For each step in the test case, the results are separately presented in the GUI, which makes it easy to find the reason for failure if the test case does not completely pass. By expanding the step result, further details on the step result are available.

With the Graphical User Interface, you have a 'one screen' overview of your test setup, the available tests and the details of the test case results!

### **Reference table with OBIS Codes**

In order to be able to verify the correctness of the COSEM objects that are read from the DUT, the Test Facility must be provided with a reference table with OBIS codes. This reference table lists the OBIS codes that are allowed in the tested implementation and the format of the object attributes.

A reference table can for example be a country specific Companion Specification to which the DUT should comply.

### **Automated execution of Test cases**

Test cases are programmed in XML, which is the most widely used language to represent structured data as readable text.

Dedicated test scripts that are written to test e.g. a specific OBIS code, can be added to the test facility. A XSD scheme is included which enables you to validate your custom test cases.

The Test Facility comes some example test scripts, that can be used as a starting point for creating a specific test set for your DUT.

```
<!-- Synchronize meter -->
<action id="init_synchronize">
  <module>CAS_simulator</module>
  <function>WriteRequest</function>
  <ParamsXml>
    <WriteRequest>
      <Purpose>sync time on meter</Purpose>
      <WriteObject>
        <OBISCode>0.0.1.0.0.255</OBISCode>
        <ClassId>8</ClassId>
        <AttributeId>2</AttributeId>
      </WriteObject>
      <values>
        <datetime>0</datetime>
      </values>
    </WriteRequest>
  </ParamsXml>
  <result>
    <ok ret="ok"></ok>
    <default ret="nok"></default>
  </result>
</action>
```

### **Database storage**

Historical results for all test cases are stored in an SQL database. This enables you to access the test results on any workstation with access to the database and to analyze them when the Test Facility is shut down.

For easy handling of multiple DUTs, configuration data like communication profile and logical device address, are also stored in the database.

### **External Power source**

To combine functional testing of your meter with testing the DLMS implementation, the Test Facility can be extended with a third party controllable power source. For example, testing the correct registration of power sags and swells can be done by programming voltages in the power



source and reading the appropriate Power Quality event loggings from the meter. Contact KEMA for more information about this important extension of the Test Facility.

**Logging and interpretation of communication**

The Test Facility provides detailed logging down to byte level, which enables you to quickly isolate implementation issues.

```

2-5-2010 17:41:44:609: Connected.
2-5-2010 17:41:44:609: Connected.
2-5-2010 17:41:44:672: AARQ sent.
2-5-2010 17:41:47:718: AARE received, associated = False
2-5-2010 17:41:47:812: Send GetRequest, OBISCode 0.0.42.0.0.255, classID 1, attributeID 1

2-5-2010 17:41:47:984: CosemPdu (1)
  GetRequest (1)
    GetRequest_Normal (3)
      InvokeIdAndPriority (8)
        InvokeIdAndPriority_Zero: True (Boolean)
        InvokeIdAndPriority_One: False (Boolean)
        InvokeIdAndPriority_Two: False (Boolean)
        InvokeIdAndPriority_Three: False (Boolean)
        InvokeIdAndPriority_Reserved_Four: False (Boolean)
        InvokeIdAndPriority_Reserved_Five: False (Boolean)
        InvokeIdAndPriority_ServiceClass: True (Boolean)
        InvokeIdAndPriority_Priority: True (Boolean)
      CosemAttributeDescriptor (3)
        CosemClassId: 0001 (Unsigned16)
        CosemObjectInstanceId (6): 00 00 2A 00 00 FF (OctetString)
        CosemObjectAttributeId: 01 (Integer8)
      SelectiveAccessDescriptor: null
2-5-2010 17:41:47:984: Rcv (3) at 2-5-2010 17:41:47.890: 00 01 00 01 00 01 00 04 0E 01 03 02
2-5-2010 17:42:05:653: Snd (4) at 2-5-2010 17:42:05.466: 00 01 00 01 00 01 00 0D C0 01 C1 00 01
00 00 60 01 00 FF 01 00

+ AARE (4)
- GetRequest (1)
  - GetRequest_Normal (3)
    + InvokeIdAndPriority (8)
    - CosemAttributeDescriptor (3)
      ... CosemClassId: 0001 (Unsigned16)
      ... CosemObjectInstanceId: 00 00 2A 00 00 FF (OctetString)
      ... CosemObjectAttributeId: 01 (Integer8)
      ... SelectiveAccessDescriptor
  - GetRequest (1)

```

**Supported communication profiles**

The KEMA Smart Meter DLMS Test Facility supports the following communication profiles:

- DLMS over HDLC. This profile is mostly used in combination with an optical head.
- DLMS over TCP/IP.

If the DLMS over TCP/IP profile is used to connect to a PLC node, DLMS over PLC profiles can be tested as well.

**Contact**  
 KEMA Nederland B.V.  
 P.O. box 9035, 6800 ET  
 Arnhem, The Netherlands  
 Tel: +31 26 356 2025  
 Fax: +31 26 351 3683  
 Email : sales@kema.com  
 Website : www.kema.com/pctc