

# Отчет заочного тестирования взаимодействия микропроцессорного устройства серии БЭМП РУ и регистратора АУРА в части регистрации сообщений MMS, передаваемых Ауга

Чебоксары, Екатеринбург  
29.01.2018 - 2.02.2018

В УНИОКР РЗА АО «ЧЭАЗ» для тестирования были предоставлены:

1. Доступ по адресу 82.193.157.101 с открытым портом 102 для МЭК 61850-8-1 MMS.
2. aуга-111.iid - файл описания предварительно сконфигурированного устройства.

Было осуществлено подключение системы мониторинга «Квант-ЧЭАЗ» 2.0 [2017.09.01] по адресу 82.193.157.101 на порт 102 к стенду лаборатории ООО «СВЕЙ».

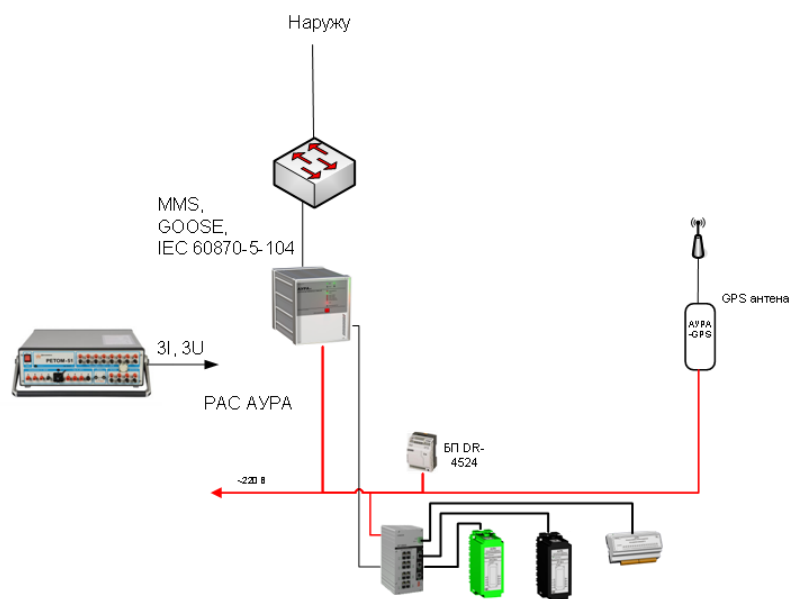


Рисунок 1 Стенд лаборатории ООО «СВЕЙ».

Подключение к стенду представлено на рисунке 2 (дата подключения 02.01.2018).

911	47	192.168.42.19	192.168.42.255	NBNS	92 Name query NB MS1400.CHEAZ.RU<0>
912	47	192.168.42.19	82.193.157.101	TCP	62 8837 → 102 [SYN] Seq=0 Win=8192 Len=0 MSS=1460 SACK_PERM=1
913	48	82.193.157.101	192.168.42.19	TCP	62 102 → 8837 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1420 SACK_PERM=1
914	48	192.168.42.19	82.193.157.101	TCP	54 8837 → 102 [ACK] Seq=1 Ack=1 Win=65320 Len=0
915	48	192.168.42.19	82.193.157.101	COTP	76 CR TPOU src-ref: 0x0001 dst-ref: 0x0000
916	48	82.193.157.101	192.168.42.19	COTP	68 CC TPOU src-ref: 0x0020 dst-ref: 0x0001
917	48	192.168.42.19	82.193.157.101	MMS	241 initiate-RequestPDU
918	48	82.193.157.101	192.168.42.19	MMS	197 initiate-ResponsePDU
919	48	192.168.42.19	82.193.157.101	MMS	128 confirmed-RequestPDU
920	48	82.193.157.101	192.168.42.19	MMS	90 confirmed-ResponsePDU
921	48	192.168.42.19	82.193.157.101	MMS	128 confirmed-RequestPDU
922	48	82.193.157.101	192.168.42.19	MMS	90 confirmed-ResponsePDU
923	48	192.168.42.19	82.193.157.101	MMS	128 confirmed-RequestPDU
924	48	192.168.42.19	192.168.42.19	TCP	62 102 → 8837 [SYN] Seq=0 Win=8192 Len=0 MSS=1460 SACK_PERM=1
925	48	82.193.157.101	192.168.42.19	MMS	90 confirmed-ResponsePDU
926	48	192.168.42.19	82.193.157.101	MMS	128 confirmed-RequestPDU
927	48	192.168.42.19	192.168.42.255	NBNS	92 Name query NB MS1400.CHEAZ.RU<0>
928	48	82.193.157.101	192.168.42.19	MMS	90 confirmed-ResponsePDU
929	48	192.168.42.19	82.193.157.101	MMS	128 confirmed-RequestPDU
930	48	82.193.157.101	192.168.42.19	MMS	90 confirmed-ResponsePDU
931	48	192.168.42.19	192.168.1.99	UDP	82 61047 → 1947 Len=40
932	48	192.168.42.19	82.193.157.101	MMS	128 confirmed-RequestPDU
933	48	82.193.157.101	192.168.42.19	MMS	90 confirmed-ResponsePDU
934	48	192.168.42.19	82.193.157.101	MMS	130 confirmed-RequestPDU

Рисунок 2 Трафик MMS

Из файла aуга-111.iid были выбраны переменные для опроса и отображения в системе мониторинга «Квант-ЧЭАЗ».

В основное окно АРМ выводятся аналоговые сигналы от стенда лаборатории ООО «СВЕЙ» (см. рис. 3).

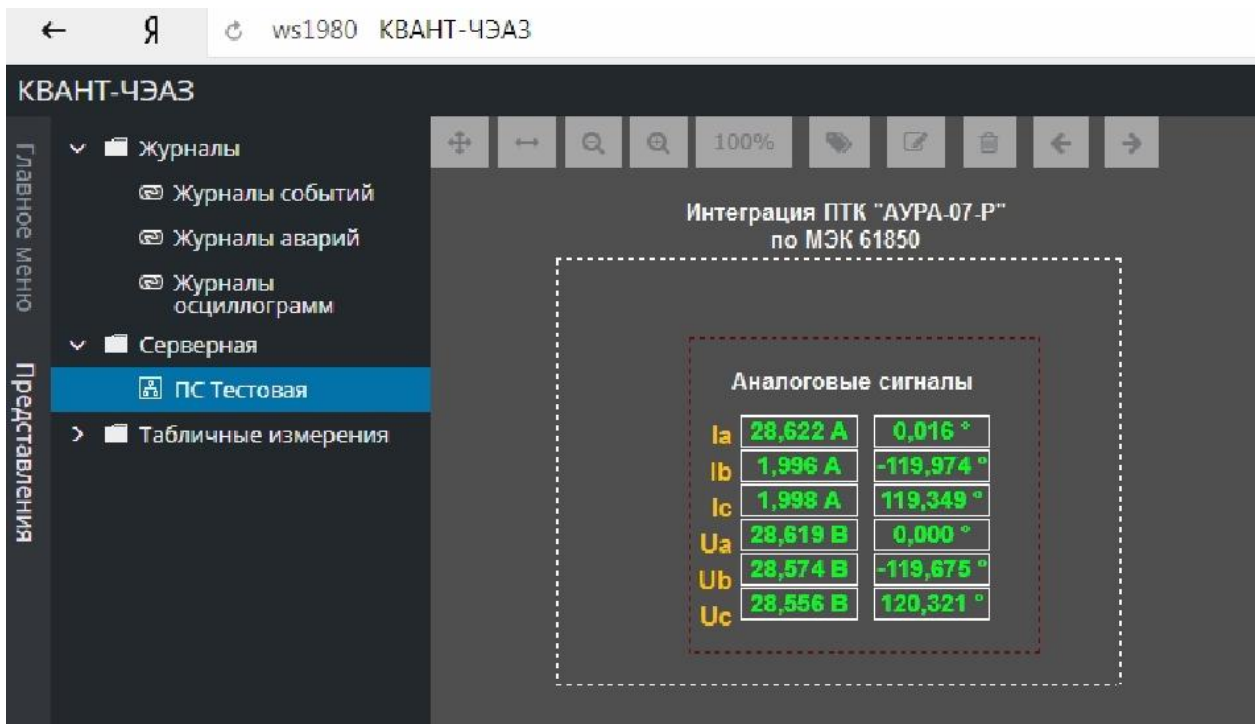


Рисунок 3 Основное окно АРМ

По результатам испытаний протокола связи МЭК 61850-8-1 MMS – устройства совместимы.

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АО «ЧЭАЗ»

Евгений Рябцев,  
ведущий программист  
ООО «СВЕЙ»

## Приложение

### 1. aura-111.iid

```

<?xml version="1.0" encoding="utf-8"?>
<SCL xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xsi:schemaLocation="http://www.iec.ch/61850/2003/SCL SCL.xsd" xmlns="http://www.iec.ch/61850/2003/SCL" version="2007"
revision="B">
  <Header id="Aura #111 disturbance recorder" toolID="AuraMMS" revision="29" />
  <Communication>
    <SubNetwork name="SubNetworkName">
      <ConnectedAP iedName="Aura" apName="AP">
        <Address>
          <P type="OSI-AP-Title">1,1,9999,1</P>
          <P type="OSI-AE-Qualifier">12</P>
          <P type="OSI-PSEL">00000001</P>
          <P type="OSI-SSEL">0001</P>
          <P type="OSI-TSEL">0001</P>
          <P type="IP">82.193.157.101</P>
        </Address>
      </ConnectedAP>
    </SubNetwork>
  </Communication>
  <IED name="Aura" type="" manufacturer="SVEY" configVersion="1.0" originalScIVersion="2007" originalScIRevision="B">
    <Services nameLength="64">
      <DynAssociation max="20" />
      <GetDirectory />
      <GetDataObjectDefinition />
      <DataObjectDirectory />
      <GetDataSetValue />
      <!-- <SetDataSetValue /> -->
    </Services>
  </IED>
</SCL>

```

```

<DataSetDirectory />
<ConfDataSet max="5" maxAttributes="1000" modify="true" />
<ReadWrite />
<ConfReportControl max="20" bufConf="false" bufMode="unbuffered" />
<GetCBValues />
<ReportSettings cbName="Fix" datSet="Dyn" rptID="Dyn" optFields="Dyn" bufTime="Dyn" trgOps="Dyn" intgPd="Dyn"
resvTms="true" owner="false" />
<!-- <LogSettings /> -->
<GSESettings />
<FileHandling mms="true" />
<ConfLNs fixPrefix="true" fixLnInst="true" />
<ClientServices goose="true" maxGOOSE="128" supportsLdName="true" maxAttributes="1000" gsse="false" bufReport="false"
unbufReport="false" readLog="false" sv="true" maxReports="0" maxSMV="5">
  <TimeSyncProt sntp="true" c37_238="false" other="true" />
</ClientServices>
<SupSubscription maxGo="0" maxSv="0" />
</Services>
<AccessPoint name="AP">
  <Server>
    <Authentication />
    <LDevice inst="111">
      <LN0 InClass="LLN0" inst="" InType="LLN0_0">
        <DataSet name="ANALOG_8901234567890123456789012">
          <FCDA doName="PhV" fc="MX" IdInst="111" InClass="MMXU" InInst="1" />
          <FCDA doName="A" fc="MX" IdInst="111" InClass="MMXU" InInst="1" />
          <FCDA doName="Hz" fc="MX" IdInst="111" InClass="MMXU" InInst="1" />
          <FCDA doName="TotW" fc="MX" IdInst="111" InClass="MMXU" InInst="1" />
          <FCDA doName="TotVAr" fc="MX" IdInst="111" InClass="MMXU" InInst="1" />
        </DataSet>
        <DataSet name="ANALOG_A">
          <FCDA doName="A.phsA" fc="MX" IdInst="111" InClass="MMXU" InInst="1" />
          <FCDA doName="A.phsB" fc="MX" IdInst="111" InClass="MMXU" InInst="1" />
          <FCDA doName="A.phsC" fc="MX" IdInst="111" InClass="MMXU" InInst="1" />
        </DataSet>
        <DataSet name="ANALOG_AllLevel">
          <FCDA doName="PhV" fc="MX" IdInst="111" InClass="MMXU" InInst="1" />
          <FCDA doName="A.phsA" fc="MX" IdInst="111" InClass="MMXU" InInst="1" />
          <FCDA doName="A.phsB" daName="cVal" fc="MX" IdInst="111" InClass="MMXU" InInst="1" />
          <FCDA doName="A.phsC" daName="cVal.mag" fc="MX" IdInst="111" InClass="MMXU" InInst="1" />
          <FCDA doName="A.neut" daName="cVal.mag.f" fc="MX" IdInst="111" InClass="MMXU" InInst="1" />
        </DataSet>
        <DataSet name="DISCRETE_attr">
          <FCDA doName="Ind1.stVal" fc="ST" IdInst="111" InClass="GGIO" InInst="1" />
          <FCDA doName="Ind1.q" fc="ST" IdInst="111" InClass="GGIO" InInst="1" />
          <FCDA doName="Ind1.t" fc="ST" IdInst="111" InClass="GGIO" InInst="1" />
        </DataSet>
        <DataSet name="DISCRETE">
          <FCDA doName="Ind1" fc="ST" IdInst="111" InClass="GGIO" InInst="1" />
          <FCDA doName="Ind2" fc="ST" IdInst="111" InClass="GGIO" InInst="1" />
          <FCDA doName="Ind3" fc="ST" IdInst="111" InClass="GGIO" InInst="1" />
          <FCDA doName="Ind4" fc="ST" IdInst="111" InClass="GGIO" InInst="1" />
          <FCDA doName="Ind5" fc="ST" IdInst="111" InClass="GGIO" InInst="1" />
          <FCDA doName="Ind6" fc="ST" IdInst="111" InClass="GGIO" InInst="1" />
          <FCDA doName="Ind7" fc="ST" IdInst="111" InClass="GGIO" InInst="1" />
          <FCDA doName="Ind8" fc="ST" IdInst="111" InClass="GGIO" InInst="1" />
          <FCDA doName="Ind9" fc="ST" IdInst="111" InClass="GGIO" InInst="1" />
          <FCDA doName="Ind10" fc="ST" IdInst="111" InClass="GGIO" InInst="1" />
          <FCDA doName="Ind11" fc="ST" IdInst="111" InClass="GGIO" InInst="1" />
          <FCDA doName="Ind12" fc="ST" IdInst="111" InClass="GGIO" InInst="1" />
          <FCDA doName="Ind13" fc="ST" IdInst="111" InClass="GGIO" InInst="1" />
          <FCDA doName="Ind14" fc="ST" IdInst="111" InClass="GGIO" InInst="1" />
          <FCDA doName="Ind15" fc="ST" IdInst="111" InClass="GGIO" InInst="1" />
          <FCDA doName="Ind16" fc="ST" IdInst="111" InClass="GGIO" InInst="1" />
          <FCDA doName="Ind17" fc="ST" IdInst="111" InClass="GGIO" InInst="1" />
          <FCDA doName="Ind18" fc="ST" IdInst="111" InClass="GGIO" InInst="1" />
          <FCDA doName="Ind19" fc="ST" IdInst="111" InClass="GGIO" InInst="1" />
          <FCDA doName="Ind20" fc="ST" IdInst="111" InClass="GGIO" InInst="1" />
          <FCDA doName="Ind21" fc="ST" IdInst="111" InClass="GGIO" InInst="1" />
          <FCDA doName="Ind22" fc="ST" IdInst="111" InClass="GGIO" InInst="1" />
          <FCDA doName="Ind23" fc="ST" IdInst="111" InClass="GGIO" InInst="1" />
          <FCDA doName="Ind24" fc="ST" IdInst="111" InClass="GGIO" InInst="1" />
          <FCDA doName="Ind25" fc="ST" IdInst="111" InClass="GGIO" InInst="1" />
          <FCDA doName="Ind26" fc="ST" IdInst="111" InClass="GGIO" InInst="1" />
          <FCDA doName="Ind27" fc="ST" IdInst="111" InClass="GGIO" InInst="1" />
          <FCDA doName="Ind28" fc="ST" IdInst="111" InClass="GGIO" InInst="1" />
          <FCDA doName="Ind29" fc="ST" IdInst="111" InClass="GGIO" InInst="1" />
          <FCDA doName="Ind30" fc="ST" IdInst="111" InClass="GGIO" InInst="1" />
          <FCDA doName="Ind31" fc="ST" IdInst="111" InClass="GGIO" InInst="1" />
          <FCDA doName="Ind32" fc="ST" IdInst="111" InClass="GGIO" InInst="1" />
        </DataSet>
      </LN0>
    </LDevice>
  </Server>
</AccessPoint>

```

```

<FCDA doName="Ind33" fc="ST" IdInst="111" InClass="GGIO" InInst="1" />
<FCDA doName="Ind34" fc="ST" IdInst="111" InClass="GGIO" InInst="1" />
<FCDA doName="Ind35" fc="ST" IdInst="111" InClass="GGIO" InInst="1" />
<FCDA doName="Ind36" fc="ST" IdInst="111" InClass="GGIO" InInst="1" />
<FCDA doName="Ind37" fc="ST" IdInst="111" InClass="GGIO" InInst="1" />
<FCDA doName="Ind38" fc="ST" IdInst="111" InClass="GGIO" InInst="1" />
<FCDA doName="Ind39" fc="ST" IdInst="111" InClass="GGIO" InInst="1" />
<FCDA doName="Ind40" fc="ST" IdInst="111" InClass="GGIO" InInst="1" />
<FCDA doName="Ind41" fc="ST" IdInst="111" InClass="GGIO" InInst="1" />
<FCDA doName="Ind42" fc="ST" IdInst="111" InClass="GGIO" InInst="1" />
<FCDA doName="Ind43" fc="ST" IdInst="111" InClass="GGIO" InInst="1" />
<FCDA doName="Ind44" fc="ST" IdInst="111" InClass="GGIO" InInst="1" />
<FCDA doName="Ind45" fc="ST" IdInst="111" InClass="GGIO" InInst="1" />
</DataSet>
<ReportControl name="ucrbANALOG_2345678901234567890" datSet="ANALOG_8901234567890123456789012"
rptID="This is the maximum length of the Report ID used for conformance testing at DNV KEMA test lab and it has a length of 129
characts" confRev="1" buffered="false" bufTime="0">
  <TrgOps dchg="true" qchg="true" dupd="true" period="true" />
  <OptFields seqNum="true" timeStamp="false" dataSet="true" reasonCode="true" entryID="true" configRef="true" />
  <RptEnabled max="10" />
</ReportControl>
<ReportControl name="ucrbDISCRETE" datSet="DISCRETE" rptID="Aura111/LLN0$ucrbDISCRETE" confRev="1"
buffered="false" bufTime="0">
  <TrgOps dchg="true" qchg="true" dupd="true" period="true" />
  <OptFields seqNum="true" timeStamp="false" dataSet="true" reasonCode="true" entryID="true" configRef="true" />
  <RptEnabled max="10" />
</ReportControl>
<DOI name="Mod">
  <DAI name="stVal">
    <Val>on</Val>
  </DAI>
  <DAI name="ctlModel" valKind="RO">
    <Val>status-only</Val>
  </DAI>
</DOI>
<DOI name="Health">
  <DAI name="stVal">
    <Val>Alarm</Val>
  </DAI>
  <DAI name="t" />
</DOI>
<DOI name="NamPlt">
  <DAI name="vendor">
    <Val>SVEY</Val>
  </DAI>
  <DAI name="swRev">
    <Val>6.1.0.34 + 0.2.2.15</Val>
  </DAI>
  <DAI name="d">
    <Val>AURA Disturbance Recorder</Val>
  </DAI>
  <DAI name="configRev">
    <Val>1</Val>
  </DAI>
  <DAI name="IdNs">
    <Val>IEC 61850-7-4:2010</Val>
  </DAI>
</DOI>
</LN0>
<LN InClass="LPHD" inst="1" InType="LPHD_0">
</LN>
<LN InClass="RDRE" inst="1" InType="RDRE_0">
  <DOI name="RcdTrg">
    <DAI name="ctlModel">
      <Val>direct-with-normal-security</Val>
    </DAI>
    <DAI name="d">
      <Val>Start new recording (write True to trigger, False to acknowledge)</Val>
    </DAI>
  </DOI>
  <DOI name="RcdMade">
    <DAI name="d">
      <Val>Indicates presence of new records</Val>
    </DAI>
  </DOI>
</LN>
<LN InClass="MMXU" inst="1" InType="MMXU_VAX">
  <DOI name="TotW">
    <SDI name="mag">

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```

<DAI name="f" sAddr="#99v" />
</SDI>
<DAI name="q" sAddr="#99q" />
<DAI name="t" sAddr="#99t" />
<SDI name="units">
  <DAI name="SIUnit">
    <Val>W</Val>
  </DAI>
  <DAI name="multiplier">
    <Val></Val>
  </DAI>
</SDI>
<DAI name="d">
  <Val>1sk\Preobrazovatel 1\P (kanal 99)</Val>
</DAI>
</DOI>
<DOI name="TotVAr">
  <SDI name="mag">
    <DAI name="f" sAddr="#100v" />
  </SDI>
  <DAI name="q" sAddr="#100q" />
  <DAI name="t" sAddr="#100t" />
  <SDI name="units">
    <DAI name="SIUnit">
      <Val>VAr</Val>
    </DAI>
    <DAI name="multiplier">
      <Val></Val>
    </DAI>
  </SDI>
  <DAI name="d">
    <Val>1sk\Preobrazovatel 1\Q (kanal 100)</Val>
  </DAI>
</DOI>
<DOI name="Hz">
  <SDI name="mag">
    <DAI name="f" sAddr="#97v" />
  </SDI>
  <DAI name="q" sAddr="#97q" />
  <DAI name="t" sAddr="#97t" />
  <SDI name="units">
    <DAI name="SIUnit">
      <Val>Hz</Val>
    </DAI>
    <DAI name="multiplier">
      <Val></Val>
    </DAI>
  </SDI>
  <DAI name="d">
    <Val>1sk\Preobrazovatel 1\F (kanal 97)</Val>
  </DAI>
</DOI>
<DOI name="PhV">
  <SDI name="phsA">
    <SDI name="cVal">
      <SDI name="mag">
        <DAI name="f" sAddr="#1v" />
      </SDI>
      <SDI name="ang">
        <DAI name="f" sAddr="#2v" />
      </SDI>
    </SDI>
    <DAI name="q" sAddr="#1q" />
    <DAI name="t" sAddr="#1t" />
    <SDI name="units">
      <DAI name="SIUnit">
        <Val>V</Val>
      </DAI>
      <DAI name="multiplier">
        <Val></Val>
      </DAI>
    </SDI>
    <DAI name="d">
      <Val>1sk\Preobrazovatel 1\Ua (kanal 1)</Val>
    </DAI>
  </SDI>
  <SDI name="phsB">
    <SDI name="cVal">
      <SDI name="mag">

```

```

    <DAI name="f" sAddr="#3v" />
  </SDI>
  <SDI name="ang">
    <DAI name="f" sAddr="#4v" />
  </SDI>
</SDI>
<DAI name="q" sAddr="#3q" />
<DAI name="t" sAddr="#3t" />
<SDI name="units">
  <DAI name="SIUnit">
    <Val>V</Val>
  </DAI>
  <DAI name="multiplier">
    <Val></Val>
  </DAI>
</SDI>
<DAI name="d">
  <Val>1sk\Preobrazovatel 1\Ub (kanal 3)</Val>
</DAI>
</SDI>
<SDI name="phsC">
  <SDI name="cVal">
    <SDI name="mag">
      <DAI name="f" sAddr="#5v" />
    </SDI>
    <SDI name="ang">
      <DAI name="f" sAddr="#6v" />
    </SDI>
  </SDI>
  <DAI name="q" sAddr="#5q" />
  <DAI name="t" sAddr="#5t" />
  <SDI name="units">
    <DAI name="SIUnit">
      <Val>V</Val>
    </DAI>
    <DAI name="multiplier">
      <Val></Val>
    </DAI>
  </SDI>
  <DAI name="d">
    <Val>1sk\Preobrazovatel 1\Uc (kanal 5)</Val>
  </DAI>
</SDI>
<SDI name="neut">
  <SDI name="cVal">
    <SDI name="mag">
      <DAI name="f" sAddr="#7v" />
    </SDI>
    <SDI name="ang">
      <DAI name="f" sAddr="#8v" />
    </SDI>
  </SDI>
  <DAI name="q" sAddr="#7q" />
  <DAI name="t" sAddr="#7t" />
  <SDI name="units">
    <DAI name="SIUnit">
      <Val>V</Val>
    </DAI>
    <DAI name="multiplier">
      <Val></Val>
    </DAI>
  </SDI>
  <DAI name="d">
    <Val>1sk\Preobrazovatel 1\3Uo (kanal 7)</Val>
  </DAI>
</SDI>
</DOI>
<DOI name="A">
  <SDI name="phsA">
    <SDI name="cVal">
      <SDI name="mag">
        <DAI name="f" sAddr="#9v" />
      </SDI>
      <SDI name="ang">
        <DAI name="f" sAddr="#10v" />
      </SDI>
    </SDI>
    <DAI name="q" sAddr="#9q" />
    <DAI name="t" sAddr="#9t" />
  </SDI>

```

```
<SDI name="units">
  <DAI name="SIUnit">
    <Val>A</Val>
  </DAI>
  <DAI name="multiplier">
    <Val></Val>
  </DAI>
</SDI>
<DAI name="d">
  <Val>1sk\Preobrazovatel 1\la (kanal 9)</Val>
</DAI>
</SDI>
<SDI name="phsB">
  <SDI name="cVal">
    <SDI name="mag">
      <DAI name="f" sAddr="#11v" />
    </SDI>
    <SDI name="ang">
      <DAI name="f" sAddr="#12v" />
    </SDI>
  </SDI>
  <DAI name="q" sAddr="#11q" />
  <DAI name="t" sAddr="#11t" />
<SDI name="units">
  <DAI name="SIUnit">
    <Val>A</Val>
  </DAI>
  <DAI name="multiplier">
    <Val></Val>
  </DAI>
</SDI>
<DAI name="d">
  <Val>1sk\Preobrazovatel 1\lb (kanal 11)</Val>
</DAI>
</SDI>
<SDI name="phsC">
  <SDI name="cVal">
    <SDI name="mag">
      <DAI name="f" sAddr="#13v" />
    </SDI>
    <SDI name="ang">
      <DAI name="f" sAddr="#14v" />
    </SDI>
  </SDI>
  <DAI name="q" sAddr="#13q" />
  <DAI name="t" sAddr="#13t" />
<SDI name="units">
  <DAI name="SIUnit">
    <Val>A</Val>
  </DAI>
  <DAI name="multiplier">
    <Val></Val>
  </DAI>
</SDI>
<DAI name="d">
  <Val>1sk\Preobrazovatel 1\lc (kanal 13)</Val>
</DAI>
</SDI>
<SDI name="neut">
  <SDI name="cVal">
    <SDI name="mag">
      <DAI name="f" sAddr="#15v" />
    </SDI>
    <SDI name="ang">
      <DAI name="f" sAddr="#16v" />
    </SDI>
  </SDI>
  <DAI name="q" sAddr="#15q" />
  <DAI name="t" sAddr="#15t" />
<SDI name="units">
  <DAI name="SIUnit">
    <Val>A</Val>
  </DAI>
  <DAI name="multiplier">
    <Val></Val>
  </DAI>
</SDI>
<DAI name="d">
  <Val>1sk\Preobrazovatel 1\lo (kanal 15)</Val>
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</DAI>
</SDI>
</DOI>
</LN>
<LN InClass="GGIO" inst="1" InType="GGIO_0">
  <DOI name="Ind1">
    <DAI name="stVal" sAddr="#33v" />
    <DAI name="q" sAddr="#33q" />
    <DAI name="t" sAddr="#33t" />
    <DAI name="d">
      <Val>2sk\DS01\TS1 (channel 33)</Val>
    </DAI>
  </DOI>
  <DOI name="Ind2">
    <DAI name="stVal" sAddr="#34v" />
    <DAI name="q" sAddr="#34q" />
    <DAI name="t" sAddr="#34t" />
    <DAI name="d">
      <Val>2sk\DS01\TS2 (channel 34)</Val>
    </DAI>
  </DOI>
  <DOI name="Ind3">
    <DAI name="stVal" sAddr="#35v" />
    <DAI name="q" sAddr="#35q" />
    <DAI name="t" sAddr="#35t" />
    <DAI name="d">
      <Val>2sk\DS01\TS3 (channel 35)</Val>
    </DAI>
  </DOI>
  <DOI name="Ind4">
    <DAI name="stVal" sAddr="#36v" />
    <DAI name="q" sAddr="#36q" />
    <DAI name="t" sAddr="#36t" />
    <DAI name="d">
      <Val>2sk\DS01\TS4 (channel 36)</Val>
    </DAI>
  </DOI>
  <DOI name="Ind5">
    <DAI name="stVal" sAddr="#37v" />
    <DAI name="q" sAddr="#37q" />
    <DAI name="t" sAddr="#37t" />
    <DAI name="d">
      <Val>2sk\DS01\TS5 (channel 37)</Val>
    </DAI>
  </DOI>
  <DOI name="Ind6">
    <DAI name="stVal" sAddr="#38v" />
    <DAI name="q" sAddr="#38q" />
    <DAI name="t" sAddr="#38t" />
    <DAI name="d">
      <Val>2sk\DS01\TS6 (channel 38)</Val>
    </DAI>
  </DOI>
  <DOI name="Ind7">
    <DAI name="stVal" sAddr="#39v" />
    <DAI name="q" sAddr="#39q" />
    <DAI name="t" sAddr="#39t" />
    <DAI name="d">
      <Val>2sk\DS01\TS7 (channel 39)</Val>
    </DAI>
  </DOI>
  <DOI name="Ind8">
    <DAI name="stVal" sAddr="#40v" />
    <DAI name="q" sAddr="#40q" />
    <DAI name="t" sAddr="#40t" />
    <DAI name="d">
      <Val>2sk\DS01\TS8 (channel 40)</Val>
    </DAI>
  </DOI>
  <DOI name="Ind9">
    <DAI name="stVal" sAddr="#41v" />
    <DAI name="q" sAddr="#41q" />
    <DAI name="t" sAddr="#41t" />
    <DAI name="d">
      <Val>2sk\DS01\TS9 (channel 41)</Val>
    </DAI>
  </DOI>
  <DOI name="Ind10">
    <DAI name="stVal" sAddr="#42v" />
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<DAI name="q" sAddr="#42q" />
<DAI name="t" sAddr="#42t" />
<DAI name="d">
  <Val>2sk\DS01\TS10 (channel 42)</Val>
</DAI>
</DOI>
<DOI name="Ind11">
  <DAI name="stVal" sAddr="#43v" />
  <DAI name="q" sAddr="#43q" />
  <DAI name="t" sAddr="#43t" />
  <DAI name="d">
    <Val>2sk\DS01\TS11 (channel 43)</Val>
  </DAI>
</DOI>
<DOI name="Ind12">
  <DAI name="stVal" sAddr="#44v" />
  <DAI name="q" sAddr="#44q" />
  <DAI name="t" sAddr="#44t" />
  <DAI name="d">
    <Val>2sk\DS01\TS12 (channel 44)</Val>
  </DAI>
</DOI>
<DOI name="Ind13">
  <DAI name="stVal" sAddr="#45v" />
  <DAI name="q" sAddr="#45q" />
  <DAI name="t" sAddr="#45t" />
  <DAI name="d">
    <Val>2sk\DS01\TS13 (channel 45)</Val>
  </DAI>
</DOI>
<DOI name="Ind14">
  <DAI name="stVal" sAddr="#46v" />
  <DAI name="q" sAddr="#46q" />
  <DAI name="t" sAddr="#46t" />
  <DAI name="d">
    <Val>2sk\DS01\TS14 (channel 46)</Val>
  </DAI>
</DOI>
<DOI name="Ind15">
  <DAI name="stVal" sAddr="#47v" />
  <DAI name="q" sAddr="#47q" />
  <DAI name="t" sAddr="#47t" />
  <DAI name="d">
    <Val>2sk\DS01\TS15 (channel 47)</Val>
  </DAI>
</DOI>
<DOI name="Ind16">
  <DAI name="stVal" sAddr="#48v" />
  <DAI name="q" sAddr="#48q" />
  <DAI name="t" sAddr="#48t" />
  <DAI name="d">
    <Val>2sk\DS01\TS16 (channel 48)</Val>
  </DAI>
</DOI>
<DOI name="Ind17">
  <DAI name="stVal" sAddr="#49v" />
  <DAI name="q" sAddr="#49q" />
  <DAI name="t" sAddr="#49t" />
  <DAI name="d">
    <Val>2sk\DS02\TS1 (channel 49)</Val>
  </DAI>
</DOI>
<DOI name="Ind18">
  <DAI name="stVal" sAddr="#50v" />
  <DAI name="q" sAddr="#50q" />
  <DAI name="t" sAddr="#50t" />
  <DAI name="d">
    <Val>2sk\DS02\TS2 (channel 50)</Val>
  </DAI>
</DOI>
<DOI name="Ind19">
  <DAI name="stVal" sAddr="#51v" />
  <DAI name="q" sAddr="#51q" />
  <DAI name="t" sAddr="#51t" />
  <DAI name="d">
    <Val>2sk\DS02\TS3 (channel 51)</Val>
  </DAI>
</DOI>
<DOI name="Ind20">
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<DAI name="stVal" sAddr="#52v" />  
<DAI name="q" sAddr="#52q" />  
<DAI name="t" sAddr="#52t" />  
<DAI name="d">  
<Val>2sk\DS02\TS4 (channel 52)</Val>  
</DAI>  
</DOI>  
<DOI name="Ind21">  
<DAI name="stVal" sAddr="#53v" />  
<DAI name="q" sAddr="#53q" />  
<DAI name="t" sAddr="#53t" />  
<DAI name="d">  
<Val>2sk\DS02\TS5 (channel 53)</Val>  
</DAI>  
</DOI>  
<DOI name="Ind22">  
<DAI name="stVal" sAddr="#54v" />  
<DAI name="q" sAddr="#54q" />  
<DAI name="t" sAddr="#54t" />  
<DAI name="d">  
<Val>2sk\DS02\TS6 (channel 54)</Val>  
</DAI>  
</DOI>  
<DOI name="Ind23">  
<DAI name="stVal" sAddr="#55v" />  
<DAI name="q" sAddr="#55q" />  
<DAI name="t" sAddr="#55t" />  
<DAI name="d">  
<Val>2sk\DS02\TS7 (channel 55)</Val>  
</DAI>  
</DOI>  
<DOI name="Ind24">  
<DAI name="stVal" sAddr="#56v" />  
<DAI name="q" sAddr="#56q" />  
<DAI name="t" sAddr="#56t" />  
<DAI name="d">  
<Val>2sk\DS02\TS8 (channel 56)</Val>  
</DAI>  
</DOI>  
<DOI name="Ind25">  
<DAI name="stVal" sAddr="#57v" />  
<DAI name="q" sAddr="#57q" />  
<DAI name="t" sAddr="#57t" />  
<DAI name="d">  
<Val>2sk\DS02\TS9 (channel 57)</Val>  
</DAI>  
</DOI>  
<DOI name="Ind26">  
<DAI name="stVal" sAddr="#58v" />  
<DAI name="q" sAddr="#58q" />  
<DAI name="t" sAddr="#58t" />  
<DAI name="d">  
<Val>2sk\DS02\TS10 (channel 58)</Val>  
</DAI>  
</DOI>  
<DOI name="Ind27">  
<DAI name="stVal" sAddr="#59v" />  
<DAI name="q" sAddr="#59q" />  
<DAI name="t" sAddr="#59t" />  
<DAI name="d">  
<Val>2sk\DS02\TS11 (channel 59)</Val>  
</DAI>  
</DOI>  
<DOI name="Ind28">  
<DAI name="stVal" sAddr="#60v" />  
<DAI name="q" sAddr="#60q" />  
<DAI name="t" sAddr="#60t" />  
<DAI name="d">  
<Val>2sk\DS02\TS12 (channel 60)</Val>  
</DAI>  
</DOI>  
<DOI name="Ind29">  
<DAI name="stVal" sAddr="#61v" />  
<DAI name="q" sAddr="#61q" />  
<DAI name="t" sAddr="#61t" />  
<DAI name="d">  
<Val>2sk\DS02\TS13 (channel 61)</Val>  
</DAI>  
</DOI>

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<DOI name="Ind30">
  <DAI name="stVal" sAddr="#62v" />
  <DAI name="q" sAddr="#62q" />
  <DAI name="t" sAddr="#62t" />
  <DAI name="d">
    <Val>2sk\DS02\TS14 (channel 62)</Val>
  </DAI>
</DOI>
<DOI name="Ind31">
  <DAI name="stVal" sAddr="#63v" />
  <DAI name="q" sAddr="#63q" />
  <DAI name="t" sAddr="#63t" />
  <DAI name="d">
    <Val>2sk\DS02\TS15 (channel 63)</Val>
  </DAI>
</DOI>
<DOI name="Ind32">
  <DAI name="stVal" sAddr="#64v" />
  <DAI name="q" sAddr="#64q" />
  <DAI name="t" sAddr="#64t" />
  <DAI name="d">
    <Val>2sk\DS02\TS16 (channel 64)</Val>
  </DAI>
</DOI>
<DOI name="Ind33">
  <DAI name="stVal" sAddr="#101v" />
  <DAI name="q" sAddr="#101q" />
  <DAI name="t" sAddr="#101t" />
  <DAI name="d">
    <Val>AURA #111\Indikator\Push (channel 101)</Val>
  </DAI>
</DOI>
<DOI name="Ind34">
  <DAI name="stVal" sAddr="#102v" />
  <DAI name="q" sAddr="#102q" />
  <DAI name="t" sAddr="#102t" />
  <DAI name="d">
    <Val>AURA #111\Indikator\Neispravnost (channel 102)</Val>
  </DAI>
</DOI>
<DOI name="Ind35">
  <DAI name="stVal" sAddr="#103v" />
  <DAI name="q" sAddr="#103q" />
  <DAI name="t" sAddr="#103t" />
  <DAI name="d">
    <Val>AURA #111\Indikator\MAKS (channel 103)</Val>
  </DAI>
</DOI>
<DOI name="Ind36">
  <DAI name="stVal" sAddr="#104v" />
  <DAI name="q" sAddr="#104q" />
  <DAI name="t" sAddr="#104t" />
  <DAI name="d">
    <Val>AURA #111\Indikator\MIN (channel 104)</Val>
  </DAI>
</DOI>
<DOI name="Ind37">
  <DAI name="stVal" sAddr="#105v" />
  <DAI name="q" sAddr="#105q" />
  <DAI name="t" sAddr="#105t" />
  <DAI name="d">
    <Val>AURA #111\Indikator\U2 (channel 105)</Val>
  </DAI>
</DOI>
<DOI name="Ind38">
  <DAI name="stVal" sAddr="#106v" />
  <DAI name="q" sAddr="#106q" />
  <DAI name="t" sAddr="#106t" />
  <DAI name="d">
    <Val>AURA #111\Indikator\KONT (channel 106)</Val>
  </DAI>
</DOI>
<DOI name="Ind39">
  <DAI name="stVal" sAddr="#107v" />
  <DAI name="q" sAddr="#107q" />
  <DAI name="t" sAddr="#107t" />
  <DAI name="d">
    <Val>AURA #111\Server NTP\Sinhronizaciya (channel 107)</Val>
  </DAI>
</DOI>
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</DOI>
<DOI name="Ind40">
  <DAI name="stVal" sAddr="$9v" />
  <DAI name="q" sAddr="$9q" />
  <DAI name="t" sAddr="$9t" />
  <DAI name="d">
    <Val>KEMA SIM Ind1</Val>
  </DAI>
</DOI>
<DOI name="Ind41">
  <DAI name="stVal" sAddr="$10v" />
  <DAI name="q" sAddr="$10q" />
  <DAI name="t" sAddr="$10t" />
  <DAI name="d">
    <Val>KEMA SIM Ind2</Val>
  </DAI>
</DOI>
<DOI name="Ind42">
  <DAI name="stVal" sAddr="$11v" />
  <DAI name="q" sAddr="$11q" />
  <DAI name="t" sAddr="$11t" />
  <DAI name="d">
    <Val>KEMA SIM Ind3</Val>
  </DAI>
</DOI>
<DOI name="Ind43">
  <DAI name="stVal" sAddr="$12v" />
  <DAI name="q" sAddr="$12q" />
  <DAI name="t" sAddr="$12t" />
  <DAI name="d">
    <Val>KEMA SIM Ind4</Val>
  </DAI>
</DOI>
<DOI name="Ind44">
  <DAI name="stVal" sAddr="$13v" />
  <DAI name="q" sAddr="$13q" />
  <DAI name="t" sAddr="$13t" />
  <DAI name="d">
    <Val>KEMA SIM Ind5</Val>
  </DAI>
</DOI>
<DOI name="Ind45">
  <DAI name="stVal" sAddr="$14v" />
  <DAI name="q" sAddr="$14q" />
  <DAI name="t" sAddr="$14t" />
  <DAI name="d">
    <Val>KEMA SIM Ind6</Val>
  </DAI>
</DOI>
</LN>
</LDevice>
</Server>
</AccessPoint>
</IED>
<DataTypeTemplates>
  <LNNodeType id="LLN0_0" InClass="LLN0">
    <DO name="Mod" type="ENC_MOD" />
    <DO name="Beh" type="ENS_BEH" />
    <DO name="Health" type="ENS_HEALTH" />
    <DO name="NamPlt" type="LPL_NAMPLT" />
  </LNNodeType>
  <LNNodeType id="LPHD_0" InClass="LPHD">
    <DO name="PhyNam" type="myDPL" />
    <DO name="PhyHealth" type="myINS" />
    <DO name="Proxy" type="mySPS" />
  </LNNodeType>
  <DOType id="myDPL" cdc="DPL">
    <DA name="vendor" fc="DC" bType="VisString255">
      <Val>SVEY</Val>
    </DA>
    <DA name="hwRev" fc="DC" bType="VisString255">
      <Val>Rev 2.0</Val>
    </DA>
  </DOType>
  <DOType id="myINS" cdc="INS">
    <DA name="stVal" fc="ST" dchg="true" bType="INT32" />
    <DA name="q" fc="ST" qchg="true" bType="Quality" />
    <DA name="t" fc="ST" bType="Timestamp" />
  </DOType>

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<DOType id="mySPS" cdc="SPS">
  <DA name="stVal" fc="ST" dchg="true" bType="BOOLEAN" />
  <DA name="q" fc="ST" qchg="true" bType="Quality" />
  <DA name="t" fc="ST" bType="Timestamp" />
</DOType>
<LNodeType id="RDRE_0" InClass="RDRE">
  <DO name="Beh" type="ENS_BEH" />
  <DO name="FltNum" type="INS" />
  <DO name="RcdTrg" type="SPC_D" />
  <DO name="RcdMade" type="SPS_D" />
</LNodeType>
<LNodeType id="MMXU_V" InClass="MMXU">
  <DO name="Beh" type="ENS_BEH" />
  <DO name="PhV" type="WYE_Ph4" />
</LNodeType>
<LNodeType id="MMXU_VX" InClass="MMXU">
  <DO name="Beh" type="ENS_BEH" />
  <DO name="Hz" type="MV_FLOAT" />
  <DO name="PhV" type="WYE_Ph4" />
</LNodeType>
<LNodeType id="MMXU_VDX" InClass="MMXU">
  <DO name="Beh" type="ENS_BEH" />
  <DO name="Hz" type="MV_FLOAT" />
  <DO name="PhV" type="WYE_Ph4" />
  <DO name="PPV" type="DEL_Ph3" />
</LNodeType>
<LNodeType id="MMXU_A" InClass="MMXU">
  <DO name="Beh" type="ENS_BEH" />
  <DO name="A" type="WYE_Ph4" />
</LNodeType>
<LNodeType id="MMXU_AX" InClass="MMXU">
  <DO name="Beh" type="ENS_BEH" />
  <DO name="TotW" type="MV_FLOAT" />
  <DO name="TotVAr" type="MV_FLOAT" />
  <DO name="A" type="WYE_Ph4" />
</LNodeType>
<LNodeType id="MMXU_VAX" InClass="MMXU">
  <DO name="Beh" type="ENS_BEH" />
  <DO name="TotW" type="MV_FLOAT" />
  <DO name="TotVAr" type="MV_FLOAT" />
  <DO name="Hz" type="MV_FLOAT" />
  <DO name="PhV" type="WYE_Ph4" />
  <DO name="A" type="WYE_Ph4" />
</LNodeType>
<LNodeType id="MMXU_D" InClass="MMXU">
  <DO name="Beh" type="ENS_BEH" />
  <DO name="PPV" type="DEL_Ph3" />
</LNodeType>
<LNodeType id="MMXU_DX" InClass="MMXU">
  <DO name="Beh" type="ENS_BEH" />
  <DO name="Hz" type="MV_FLOAT" />
  <DO name="PPV" type="DEL_Ph3" />
</LNodeType>
<LNodeType id="MMXU_DAX" InClass="MMXU">
  <DO name="Beh" type="ENS_BEH" />
  <DO name="TotW" type="MV_FLOAT" />
  <DO name="TotVAr" type="MV_FLOAT" />
  <DO name="Hz" type="MV_FLOAT" />
  <DO name="PPV" type="DEL_Ph3" />
  <DO name="A" type="WYE_Ph4" />
</LNodeType>
<LNodeType id="MMXU_VDAX" InClass="MMXU">
  <DO name="Beh" type="ENS_BEH" />
  <DO name="TotW" type="MV_FLOAT" />
  <DO name="TotVAr" type="MV_FLOAT" />
  <DO name="Hz" type="MV_FLOAT" />
  <DO name="PhV" type="WYE_Ph4" />
  <DO name="PPV" type="DEL_Ph3" />
  <DO name="A" type="WYE_Ph4" />
</LNodeType>
<LNodeType id="GGIO_0" InClass="GGIO">
  <DO name="Beh" type="ENS_BEH" />
  <DO name="Ind1" type="SPS_D" />
  <DO name="Ind2" type="SPS_D" />
  <DO name="Ind3" type="SPS_D" />
  <DO name="Ind4" type="SPS_D" />
  <DO name="Ind5" type="SPS_D" />
  <DO name="Ind6" type="SPS_D" />
  <DO name="Ind7" type="SPS_D" />

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<DO name="Ind8" type="SPS_D" />
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<DO name="Ind10" type="SPS_D" />
<DO name="Ind11" type="SPS_D" />
<DO name="Ind12" type="SPS_D" />
<DO name="Ind13" type="SPS_D" />
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<DO name="Ind17" type="SPS_D" />
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<DO name="Ind19" type="SPS_D" />
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<DO name="Ind21" type="SPS_D" />
<DO name="Ind22" type="SPS_D" />
<DO name="Ind23" type="SPS_D" />
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<DO name="Ind27" type="SPS_D" />
<DO name="Ind28" type="SPS_D" />
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<DO name="Ind32" type="SPS_D" />
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<DO name="Ind37" type="SPS_D" />
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<DO name="Ind41" type="SPS_D" />
<DO name="Ind42" type="SPS_D" />
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<DO name="Ind44" type="SPS_D" />
<DO name="Ind45" type="SPS_D" />
</LNodeType>
<DOType id="LPL_NAMPLT" cdc="LPL">
  <DA name="vendor" bType="VisString255" fc="DC" />
  <DA name="swRev" bType="VisString255" fc="DC" />
  <DA name="d" bType="VisString255" fc="DC" />
  <DA name="configRev" bType="VisString255" fc="DC" />
  <DA name="IdNs" bType="VisString255" fc="EX" />
</DOType>
<DOType id="ENC_MOD" cdc="ENC">
  <DA name="stVal" bType="Enum" type="Mod" dchg="true" fc="ST" />
  <DA name="q" bType="Quality" qchg="true" fc="ST" />
  <DA name="t" bType="Timestamp" fc="ST" />
  <DA name="ctlModel" bType="Enum" type="ctlModelStatus" fc="CF" valKind="RO" />
</DOType>
<DOType id="INS" cdc="INS">
  <DA name="stVal" bType="INT32" fc="ST" dchg="true" dupd="true" />
  <DA name="q" bType="Quality" fc="ST" qchg="true" />
  <DA name="t" bType="Timestamp" fc="ST" />
</DOType>
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  <DA name="stVal" bType="Enum" type="Mod" dchg="true" fc="ST" />
  <DA name="q" bType="Quality" qchg="true" fc="ST" />
  <DA name="t" bType="Timestamp" fc="ST" />
</DOType>
<DOType id="ENS_HEALTH" cdc="ENS">
  <DA name="stVal" bType="Enum" type="Health" dchg="true" fc="ST" />
  <DA name="q" bType="Quality" qchg="true" fc="ST" />
  <DA name="t" bType="Timestamp" fc="ST" />
</DOType>
<DOType id="WYE_Ph4" cdc="WYE">
  <SDO name="phsA" type="CMV_FLOAT" />
  <SDO name="phsB" type="CMV_FLOAT" />
  <SDO name="phsC" type="CMV_FLOAT" />
  <SDO name="neut" type="CMV_FLOAT" />
</DOType>
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  <EnumVal ord="4">test/blocked</EnumVal>
  <EnumVal ord="5">off</EnumVal>
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  <EnumVal ord="5">automatic-station</EnumVal>
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