SIEMENS


# Central Communication Unit OCI600
# Basic Documentation

Edition 2.0
OCI600 V3.7 and higher
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# Contents

# 1 Overview

## 1.1 Fundamentals

The OCI600 central communication unit is used for operating one or several heating and / or ventilation plants via a direct connection or connection via modem.

The unit features an alarm function which is used to send fault status messages to different types of receivers (e.g. PC, mobile phone, pager, fax, etc.).

The present Basic Documentation:
- Gives an overview of the OCI600 central communication unit
- Contains all information required for engineering and commissioning the OCI600 and the connected devices
- Describes all ACS7... operating steps required in connection with the OCI600. For a complete description of ACS7... software operation, refer to Operating Instructions U5640, U5641 and U5642 (identical with Online Help of the ACS7… software package).

## 1.2 Field of use

**Typical types of buildings**

The ACS7... / OCI600 system is for use in:
- School buildings
- Municipal buildings
- Blocks of flats
- Administrative buildings

**Typical operators**

The ACS7... / OCI600 system is employed by:
- Municipal administrations
- Installation companies
- School administrations
- Real estate companies
- General contractors

## 1.3 System components

The ACS7... / OCI600 system consists of the following components:

**Devices**
- OCI600 central communication unit for the communication between a PC operator station and a heating or ventilation plant
- Heating controllers, ventilation controllers, I/O modules, pulse adapters, temperature sensors / adapters

**Software**
- ACS7... software package for the remote operation of one or several OCI600 central communication units. One component of the ACS7... is the ACS Alarm software for the reception of alarms and system reports from one or several central communication units

**Data bus**
- LPB (Local Process Bus)

## 1.4 System-compatible devices

The following LPB-compatible devices can be connected to the OCI600 central communication unit, enabling them to be integrated into the ACS7… / OCI600 system.

### 1.4.1 Controllers

| Product line, series | Type reference | Documentation [1] |
|---|---|---|
| Heating controllers RVL4... | RVL469 | N2527, P2522 |
| | RVL470 | N2522, P2522 |
| | RVL471 | N2524, P2524 |
| | RVL472 | N2526, P2526 |
| Heating controllers RVP3... | RVP300 | N2474, P2474 |
| | RVP310 | N2475, P2474 |
| | RVP320 | N2476, P2474 |
| | RVP330 | N2477, P2477 |
| | RVP331 | N2478, P2477 |
| Energy managers RVP5… | RVP5… | N2488, P2488 |
| District heating controllers RVD2... | RVD230 | N2383, P2383 |
| | RVD240 | N2384, P2384 |
| OEM heating controllers RVA... | RVA43... | P2371 |
| | RVA46... | P2372 |
| | RVA47... | P2379 |
| | RVA63... | P2373, P2374 |
| | RVA65... | P2392, P2393, P2394 |
| | RVA66... | P2378 |
| OEM district heating controllers RVD2... | RVD235 | G2385, P2383 |
| | RVD245 | G2386, P2384 |
| Ventilation controllers AEROGYR | RWI65... [2] | Z3204 |
| | with AZI65.3 [3] | N3208 |

[1] N...= Data Sheet; P...= Basic Documentation; G…= Installation Instructions; Z...= Fundamentals
[2] No longer available
[3] LPB communication module

### 1.4.2 Other devices

| Type of unit | Type reference | Documentation [1] |
|---|---|---|
| Pulse adapter with 2 inputs for consumption meters | AEW2.1 | N2831 |
| Temperature sensor / adapter with 2 inputs | QAB30.600 | N2528 |
| Input module with 4 inputs | DOE4IN [3] | – [2] |
| Relay module with 4 inputs | DOE4RE [3] | – [2] |
| Radio signal receiver | AUF77 | M5811 |
| Service unit | AZW30 | N2847, U2841 |
| Power supply unit | PNE | N8943 |

[1] N...= Data Sheet; M...= Mounting Instructions; U…= Operating Instructions
[2] For information about these modules, refer to chapter "10 Addendum"
[3] No longer available

To do the addressing, both the AEW2.1 pulse adapter and the QAB30.600 temperature sensor / adapter need an address plug. The following sets of address plugs are available:

| Set of address plugs | Type reference |
|---|---|
| For address numbers 1...16 | PTG1.16 |
| For address numbers 1...32 | PTG1.32 |
| For address numbers 33...64 | PTG1.64 |
| For address numbers 97...128 | PTG1.128 |

## 1.5 Documentation

The following pieces of additional documentation on the ACS7… / OCI600 system are available:

| Type of documentation | Ordering number [1] |
|---|---|
| Data Sheet «Plant Operating Software ACS7…» | N5640 |
| Operating Instructions «ACS Operating and ACS Service» | U5640 |
| Operating Instructions «ACS Alarm» | U5641 |
| Operating Instructions «ACS Batchjob» | U5642 |
| Data Sheet «Central Communication Unit OCI600» | N2529 |
| User Manual «Central Communication Unit OCI600» | U2529 [2] |
| Operating cards «Central Communication Unit OCI600» | B2529 [2] |
| Data Sheet «Local Process Bus LPB, Basic System Data» | N2030 |
| Data Sheet «Local Process Bus LPB, Basic Engineering Data» | N2032 |
| Basic Documentation «LPB System Engineering» | P2370 |

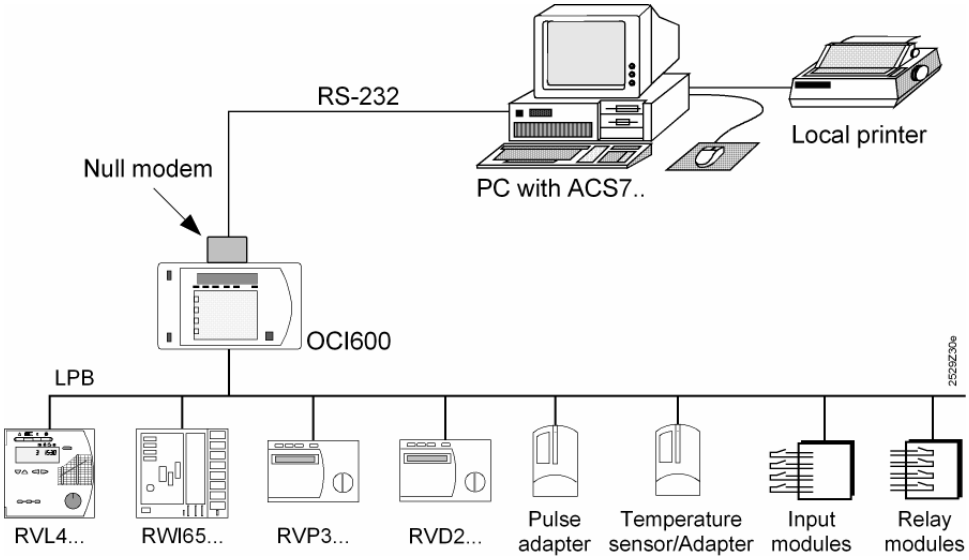
[1] N...= Data Sheet; U…= Operating Instructions; B…= Operating Instructions; P...= Basic Documentation
[2] Operating cards and User Manual are supplied in the form of sets (ordering number ARG600.EN)

# 1.6 Communication

The OCI600 central communication unit is a connecting link used to operate LPB devices and the OCI600 itself via the ACS7…software installed on a PC and to forward alarms from the LPB devices and the OCI600 to different types of receivers. For that purpose, the OCI600 offers 2 connecting choices: Direct connection via its RS-232 port or connection via modem.

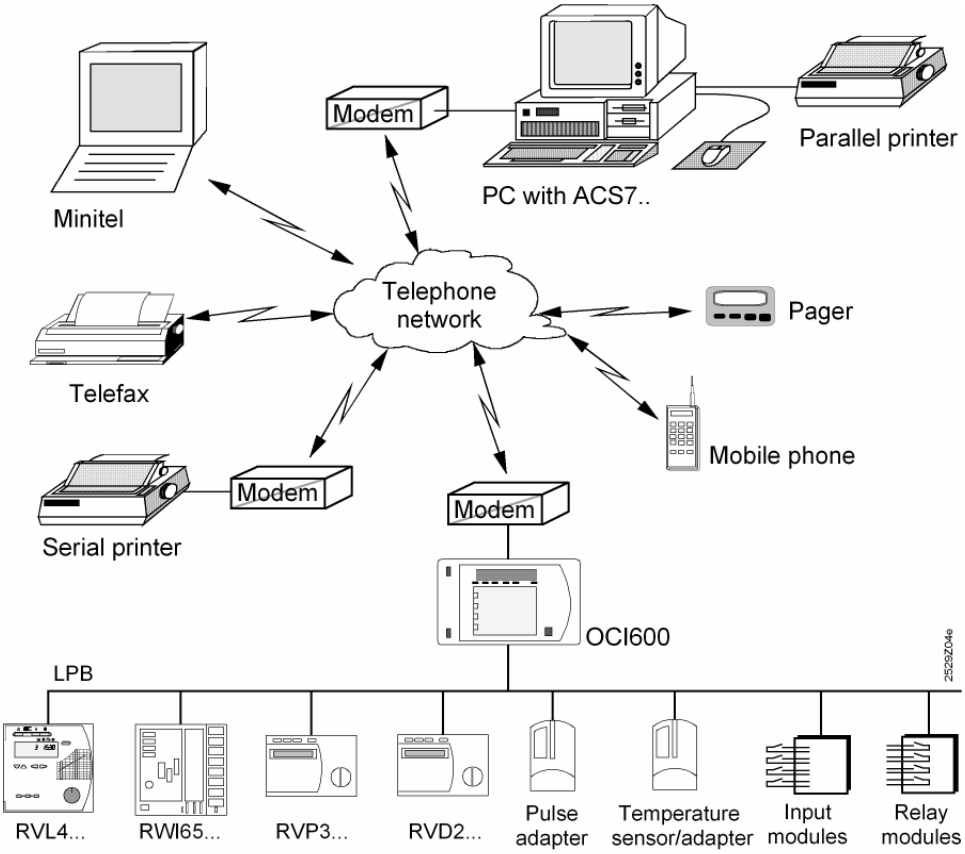
## 1.6.1 Direct communication

The connection between OCI600 and operator station (PC with ACS7... software) is established via an RS-232 cable. For that connection, a standard null modem adapter / cable or link cable is used.



### 1.6.2 Communication via modem

The connection between OCI600 and operator station (PC with ACS7…software) is made via the telephone network.




## 1.7 Important note

Where indicated, the adjacent symbol draws your attention to special safety notes and warnings. If not observed, injury to persons and / or considerable damage to property can occur.

# 2 Local commissioning

The system must be commissioned by authorized technical staff.

## 2.1 Mounting

All devices must be mounted in accordance with the relevant Data Sheets and Mounting Instructions.

## 2.2 Electrical installation

The following installation work must be performed **prior** to commissioning the system:

**Mains connections**

1. Connect the following types of devices and components to AC 230 V mains voltage:
   - Controllers (excluding the RWI65…)
   - Batibus modules
   - Modem mains unit
   - AC 24 V transformers

**Transformer connections**

2. Connect the following types of devices and components to AC 24 V:
   - Central communication unit OCI600
   - Pulse adapter AEW2.1
   - Temperature sensor / adapter QAB30.600
   - Ventilation controller RWI65...

The RWI65... ventilation controller must be connected so that it is galvanically separated from all other components. For this reason, a separate AC 24 V transformer is required.

**LPB**

3. Lay the LPB bus line between the OCI600 central communication unit and the plant's LPB devices (do not connect it yet).

**Tip**

User Manual U2529 contains the connection diagram for the OCI600.

## 2.3 Setting up the individual components

### 2.3.1 Setting up the controllers

The setting up procedure depends on the kind of bus power supply:

- Decentral bus power supply by the controllers, or
- Central bus power supply by the OCI600

**Tip**

Each time a device has been connected, the voltage across the bus is to be checked to make certain there is no false wiring. If several devices are connected before a check is made, false wiring is difficult to detect.

**Decentral bus power supply**

The LPB Basic Documentation (P2370) contains detailed commissioning instructions for the LPB with decentral bus power supply by the controllers.

**Central bus power supply**

If an OCI600 is connected to the bus, its power supply is used for the bus. The basic procedure is the following:

- ➢ Switch off bus power supply on the controllers
- ➢ Enter the addresses in the controllers
- ➢ Switch on bus power supply on the OCI600
- ➢ Enter the controller addresses in the OCI600

This means in detail:

**Procedure**

1. Ensure that all controllers have the LPB connection removed.
   - Switch off power supply of the relevant controller
   - Remove the controller from its base
   - Disconnect the LPB connection
2. Put all controllers autonomously in operation.
   - Switch on power supply of the relevant controller
   - Enter the controller's device and segment address
   - Switch off controller's bus power supply (set the controller's parameters as described in its Installation Instructions)
   - Do **not** yet establish the LPB connection
3. Set the parameters of the OCI600.
   - Activate the central bus power supply on the OCI600, operating card 3, line number 07

In large plant with central bus power supply and simultaneous bus power supply via the controllers, overcurrents on the bus can occur! For any damage resulting herefrom, Siemens will not assume responsibility.

4. Connect the controllers to the LPB, one by one.
   - Observe the polarity and check the bus voltage each time a device has been connected, thus avoiding wiring errors: The voltage must be a minimum of DC +9.5 V at any point of the network (DB+, MB–)

## 2.3.2 Setting up the AEW2.1 pulse adapter

**Service unit**

The AEW2.1 pulse adapter is to be set up with the help of the AZW30 service unit. SYNERGYR User Manual U2841 contains detailed information about the AZW30.

**Note**

To set up a pulse adapter, a PTG1… address plug set is required.

**Addressing**

| **Permissible addresses if…** | |
|---|---|
| **an OCI600 is connected to the bus** | **an OCI600 and an OZW30 are connected to the bus** |
| 1, 3, 5, 7, 9, 11 (PTG1.16) [1)] | 121...126 (PTG1.128) [2)] |

[1)] 6 pulse adapters with 2 inputs can be parameterized on the OCI600

[2)] 3 pulse adapters with 2 inputs or 6 pulse adapters with 1 input can be used with the OCI600

When using addresses 124, 125 and 126, only the inputs "Counter 1 (P1–M)" may be used with the pulse adapters.

| **Pulse adapter address plug** | **Counter number and counter connection** | **Counter number on the central unit (apartment 0)** |
|---|---|---|
| 121 | Counter 1 (P1–M) | Counter 1 |
| | Counter 2 (P2–M) | Counter 2 |
| 122 | Counter 1 (P1–M | Counter 3 |
| | Counter 2 (P2–M) | Counter 4 |
| 123 | Counter 1 (P1–M) | Counter 5 |
| | Counter 2 (P2–M) | Counter 6 |
| 124 | Counter 1 (P1–M) | Counter 2 |
| | Counter 2 (P2–M) | – |
| 125 | Counter 1 (P1–M) | Counter 4 |
| | Counter 2 (P2–M) | – |
| 126 | Counter 1 (P1–M) | Counter 6 |
| | Counter 2 (P2–M) | – |

Addresses 1...48 must not be used because they are in the area of the apartments with the OZW30.

If several OCI600 (maximum 4) are connected to the LPB, the same regulations apply when assigning addresses. Every address can be assigned only once.

**Procedure**

1. Connect the AZW30 service unit to the service interface of the pulse adapter whose parameters shall be set.
2. Check wiring with the help of the LED on the pulse adapter:

| LED flashes | LED off | LED steady on |
|---|---|---|
| Normal operation | No power (G1 and G2: AC 16...24 V) | • No address plug<br>• Wiring error, MB and DB mixed up<br>• No bus power supply<br>• Poor contact<br>• Type of pulse source (line 91) incorrectly parameterized: With Namur circuit (01) in place of without (02) when Reed contact is used<br>• Open-circuit or short-circuit at counter connection with Namur circuit (01) |

3. Ensure that on applications with the OCI600 central communication unit, the subaddress is always kept at 1.
4. If required, enter the device number (AZW30 line number 01).
5. Enter the counter parameters (AZW30 lines 86, 87, 88, 90, 91). You have 2 choices:
   - You enter the parameters one by one
   - If the parameters were previously stored in the service unit, you can copy them to the pulse adapter.
     To do this, proceed as follows:
     - Select AZW30 line number 53 (writing the standard data set)
     - Press simultaneously buttons [−] and [+] on the right for 2 seconds
     - Adjust the parameters, if required
6. Enter the current counter reading (AZW30 line number 02).
7. Store the data set of the counter just parameterized. Proceed as follows:
   - Select AZW30 line number 95
   - Press simultaneously buttons [−] and [+] on the right for 2 seconds.
     The data will be assigned to counter 3 of the apartment. In the next apartment, the data can be copied to the respective pulse adapter and then adapted
8. Repeat these steps with all counters located in the apartment.

## 2.3.3 Setting up the QAB30.600 temperature sensor

**Addressing**

To set up a QAB30.600 temperature sensor / adapter, a PTG1… address plug set is required.

| **Permissible addresses if…** | |
|---|---|
| an OCI600 is connected to the bus | an OCI600 and an OZW30 is connected to the bus |
| 13, 15 (PTG1.16) [1)] | 125, 127 (PTG1.128) [1)] |

[1)] 2 temperature sensors with 2 inputs can be parameterized

**Procedure**

1. Fit the address plugs in accordance with flow zone numbers 1 and 2. If only an OCI600 central communication unit is connected to the bus, address plugs 13 and 15 are to be used. If, in addition, an OZW30 central unit is connected, use address plugs 125 and 127.
2. Check wiring with the help of the LED on the temperature sensor / adapter:

| **LED flashes** | **LED off** | **LED steady on** |
|---|---|---|
| Normal operation | No power supply (G1 and G2: AC 16...24 V) | • No address plug<br>• Wiring error, MB and DB mixed up<br>• No bus power supply<br>• Poor contact<br>• Sensor error |

3. Connect the temperature sensor to the bus.
4. Check to ensure that the protection pocket is correctly mounted.
5. Check to ensure that the immersion sensor is correctly mounted. It must be fully immersed in the protection pocket.
6. Secure the immersion sensor using the adjusting screw on the protection pocket.

## 2.3.4 Setting up the DOE4IN input module

**Procedure**

1. Check wiring with the help of supplier's specification.
2. Select address by turning the appropriate setting knob:
   - The segment number with the knob at the top
   - The device number with the knob at the bottom
3. Connect the input module to the LPB.
4. Check the connection: The orange LED flashes in normal operation.

## 2.3.5 Setting up the DOE4RE relay module

**Procedure**

1. Check wiring with the help of supplier's specification.
2. Using a screwdriver, set all outputs to "Auto".
3. Select address by turning the appropriate setting knob:
   - The segment number with the knob at the top
   - The device number with the knob at the bottom
4. Connect the relay module to the LPB.
5. Check the connection: In normal operation, the orange LED flashes.

# 2.4 Engineering the bus with the OCI600

## 2.4.1 Key components

**Administration of several plants**

The number of OCI600 central communication units the ACS7… software can monitor and control are unlimited. However, several plants cannot be accessed at the same time.

**Reception of alarms**

The ACS Alarm software registers alarms from any number of central units like the OCI600. Using different COM ports, it is possible to simultaneously receive alarms via modem and direct communication.

**Maximum plant size**

Up to 4 OCI600 central communication units can be connected. But if, in addition, an OZW30 central unit is connected to the LPB, only 1 OCI600 can be used.

## 2.4.2 Addressing the LPB devices

**Batibus modules**

Addressing of the input modules and relay modules takes place by setting segment and device addresses. For more information about the Batibus modules, refer to section “10.1 Batibus modules”.

**Pulse adapter AEW2.1**

For the maximum number of pulse adapters and their addressing, following applies:

- If no OZW30 central unit is connected to the LPB, up to 6 AEW2.1 pulse adapters can be connected to the LPB and operated via the OCI600. In that case, addresses 1, 3, 5, 7, 9 and 11 will be used
- If, in addition to the OCI600 central communication unit, an OZW30 central unit is connected to the LPB, a maximum of 6 AEW2.1 pulse adapters can be connected to the LPB – in addition to the pulse adapters in the SYNERGYR apartments. For the assignment of the AEW2.1 pulse adapters to the OCI600, address plugs 121…126 are reserved.
  For more detailed information about the AEW2.1 pulse adapter, refer to Data Sheet N2831.

**Temperature sensor / adapter QAB30.600**

A maximum of 2 temperature sensors / adapters can be connected directly to the LPB to be read via the OCI600.

- If no OZW30 central unit is connected to the bus, addresses 13 and 15 are reserved in the OCI600
- If, in addition, an OZW30 central unit is connected to the bus, address plugs 125 and 127 are reserved for assigning the QAB30.600 temperature sensors / adapters

For more detailed information about the QAB30.600 temperature sensor / adapter, refer to Data Sheet N2528.

## 2.4.3 Maximum number of LPB devices per OCI600

The OCI600 central communication unit is designed such that with each of them, the following maximum numbers of devices can be interconnected via LPB to form a system:

| Type of device | Max. number |
|---|---|
| Siemens HVAC controllers | 16 |
| Pulse adapter AEW2.1 | 6 |
| Temperature sensor / adapter QAB30.600 | 2 |
| Input module DOE4IN | 4 |
| Relay module DOE4RE | 4 |

## 2.4.4 Powering the LPB devices

The LPB devices operate on the following voltages:

**AC 230 V**

AC 230 V mains voltage connections are to be provided for the:

- Controllers (excluding the RWI65...)
- Standard Batibus modules
- Modem mains unit
- AC 24 V transformers

**AC 24 V**

AC 24 V connections are to be provided for the:

- Central communication unit OCI600
- Pulse adapter AEW2.1
- Temperature sensor / adapter QAB30.600
- Ventilation controllers RWI65...

The RWI65... ventilation controller must be connected such that it is galvanically separated from all other components. For this reason, a separate AC 24 V transformer is required.

# 2.5 General information on bus engineering

## 2.5.1 Functional principle of LPB

**Basic principle**

The LPB is based on the Batibus protocol standard with company-specific extensions. It makes use of the CSMA / CA (Carrier Sense Multiple Access / Collision Avoidance) procedure. This procedure implies that each bus user is equal in terms of data transmission and there is no communication master (in contrast to the master / slave principle). Data are directly exchanged between bus users (peer-to-peer communication).

If several bus users want to deliver a message at the same time, special mechanisms prevent data collisions on the bus. The telegram of one sender will be correctly transmitted. The other senders stop their transmission and make another transmission attempt on completion of a certain waiting time.

The CSMA / CA procedure offers short waiting times if the available bus transmission capacity is used within permissible limits. The bus loading is dependent on the number of connected devices.
When using a central bus power supply, coexistence of LPB devices and Batibus modules is ensured.

## 2.5.2 Procedure for engineering

**Standard procedure**

| | Step | Action | Objective |
|---|---|---|---|
| Hydraulics | 1 | Understand the situation | – Overview of hydraulics |
| | 2 | Develop solutions | – Detailed plan of plant including location of buildings and arrangement of rooms |
| | 3 | Take a closer look at potential extension zones and extensions | – Design plant in a way that it can be extended later |
| Control | 4 | List potential mounting locations and applications of devices | – Entry in plant diagram<br>– List of applications |
| | 5 | Determine number and types of devices | – Table of device types<br>– Number of devices |
| Communication | 6 | Select cable routing | – Entry in plant diagram |
| | 7 | Determine cable lengths | – Entry in plant diagram |
| | 8 | Determine bus dimensions | – Cross-sectional area<br>– Bus extension |
| | 9 | Determine type of bus power supply | – Type of power supply<br>– Location of power supply |
| | 10 | Consider limitations | – Adapt bus sizing or bus power supply |
| | 11 | Draw block network plan and connection diagram | – Commissioning documentation<br>– Plant documentation |

When designing plant, it is especially the following factors that determine the plant's extension:

- Type of cable
- Number of devices
- Total cable length
- Type of bus power supply

For more detailed information, refer to subsections "2.5.7 Bus power supply" and "2.5.8 Bus sizing".

## 2.5.3 Addressing guidelines

**General**

To enable the different devices of the plant to work together and to exchange data via bus, they must be addressed. The bus address facilitates communication and defines the device functions within the plant.

The address consists of a segment address and a device address.
In principle, the devices are always addressed in the direction of heat flow, but considering the location of the outside sensor.

Each address in an LPB system may be assigned only one.

**Segment address**

The segment address is used for structuring a bus system. Typical structuring criteria are the following:

- Location of the plant or building (e.g. 1 segment per building)
- Flow temperature (e.g. all floor heating groups in 1 segment)
- Simultaneousness (e.g. all groups that require energy within the same period of time)

Within the system, a maximum of 15 segments (including segment 0) can be created. Controllers in the same segment must be assigned to the common flow.
Some of the addresses are reserved for certain applications. This must be taken into account when assigning addresses and when doing engineering work:

| Segment number | Function |
|---|---|
| 0 | Central segment:<br>• This segment is used for central heat generation (with boiler sequencing) which can be the heat source for all segments<br>• But it can also be used like segment 1…14<br>• The OCI600 is firmly assigned to segment 0 |
| 1...14 | Additional segment addresses:<br>• These addresses are used for subdividing a plant into segments, e.g.:<br>– Per heating group with the same flow temperature<br>– Per building<br>• Each segment can contain a heat source and take into consideration its own demand only. In that case, central heat generation is not possible! |

Consumers in segments 1…14 automatically pass on their heat demand to central segment 0.

If the LPB is used for the supervision of several functionally independent heating plants, central segment 0 must not be used for addressing a heat source.

**Device address**

The device address is used for designating the devices in a segment.
Some of the addresses are reserved for certain applications. This must be taken into account when assigning addresses and when doing engineering work:

| Device number | Function |
|---|---|
| 0 | No communication |
| 1 | Master:<br>• This device address is used for the segment master<br>• In each segment, there must be a device as a master with device address 1 |
| 2...16 | Additional device addresses:<br>• These addresses are used for structuring the devices within a segment<br>• The addresses **must** be assigned in the direction of heat flow: First heat generation, then heat distribution |
| 5...8 | Central communication unit OCI600:<br>• If an OCI600 is used in the system, the device address must always lie between 5 and 8 |

Depending on the design of the plant, the segment master provides the following function:

- In one of the consumer segments, the segment master becomes the consumer master
- In one of the heat source segments, the segment master becomes the heat generation master

The assignment of addresses must not necessarily be in consecutive order. If extensions are planned, for instance, gaps may be left. But the segment master (device address 1) must not be skipped.

Example

| Device number | | | | | |
|---|---|---|---|---|---|
| **1** | **2** | **Reserved** | **Reserved** | **5** | **6** |
|  |  | | |  |  |

Segment master

**Common measured values**

Outside sensor

The value of the outside sensor will be adopted by the controller that has an outside sensor connected which, in terms of addressing, is the next lower controller. A common sensor can be used for all controllers, or groups of controllers can use 1 sensor. In that case, addressing must take place based on the location of the outside sensor (refer to section «Addressing guidelines»).
If there is no controller with an outside sensor which – in terms of addressing – is lower (e.g. in the case of the device with the address 0/1), the value of the highest outside sensor will be used (e.g. 14/16).

When commissioning a controller with no outside sensor, the display will show error code 10 (error outside sensor) until an outside sensor value can be adopted via LPB.

Common flow sensor

With cascaded boilers, the common flow temperature sensor is used by all boiler controllers. It must be connected to the heat generation master (device address 1).

Other sensor values

Some of the LPB controllers can provide acquired sensor values (e.g. the flow temperature) via LPB to the other controllers. These values can be used by all controllers located in the same segment. In each segment, only 1 controller may

distribute the value of the same type of sensor on the bus (with the exception of the outside sensor).

**Clock time synchronization**

System time

To be in accordance with the time of day within the system, one of the devices must be defined as the clock time master. Only 1 device per LPB system can be defined as the clock time master.
The clock time master function can be provided by the OCI600 central communication unit, an AUF77 radio signal receiver, or a controller.

Basic time

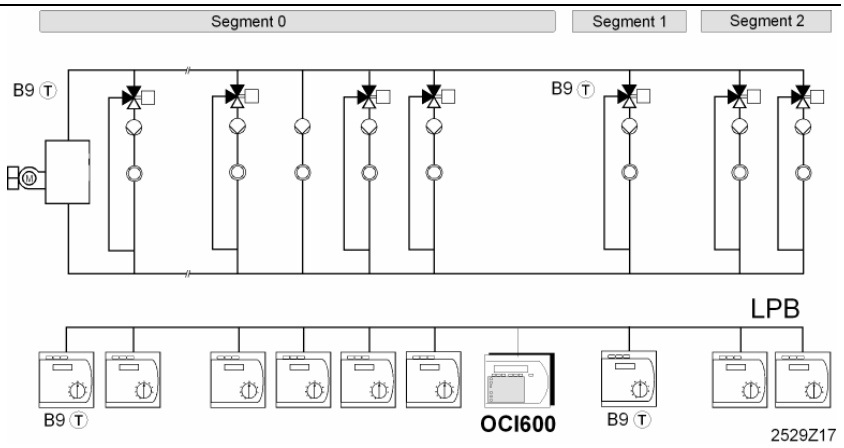
The boiler controllers are supplied with setting 3 (= system clock, master), and the consumer controllers with setting 0 (= autonomous clock). For a detailed description of the 4 different clock operating modes, refer to the Basic Documentation of the relevant device.

Radio signal receiver

The system time can be predefined by the AUF77 radio signal receiver (for detailed information, refer to Mounting Instructions CE1M5811X). This receiver can be connected to the LPB at any location. It transmits to the system the time it has received. For this reason, with all controllers and the OCI600 central communication unit, setting **1** or **2** must be selected on operating line **Clock Operation** (clock time of LPB = system time, no clock time master). In terms of the number of devices that can be connected to the LPB, the radio signal receiver is regarded as 1 device. Power is supplied via LPB. Addressing is not required.
When using the radio signal receiver, the system time always accords with the time of the atomic clock of the radio signal center in Frankfurt. The change from summer- to wintertime takes place automatically, and leap years and leap seconds are also taken into account. A switch on the AUF77 radio signal receiver permits time zone adjustments by ±1 hour.

## 2.5.4 Addressing examples

**Heat generation with several consumers**




| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Segment address | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 2 |
| Device address | 1 | 2 | 3 | 4 | 6 | 16 | 5 | 1 | 1 | 16 |
| Outside temperature adopted from | B9 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | – | B9 | 1/1 | 1/1 |

Heat generating equipment

A heat source generates the heat for the entire heating plant. Outside sensor B9 is connected to the heat source (address 0/1) and forwards its measured value via LPB to the other devices.

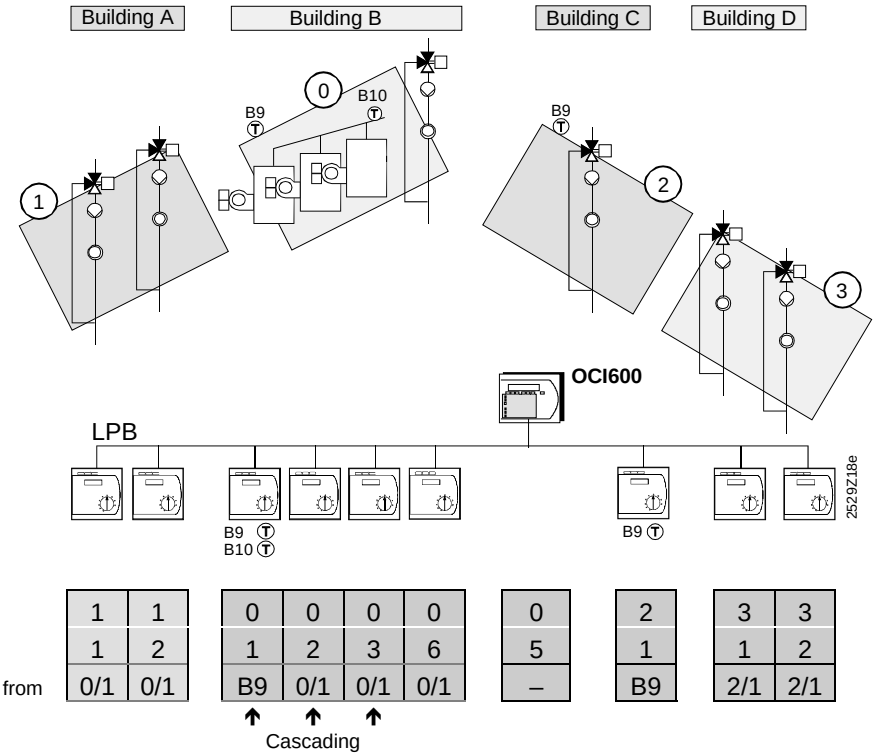
Heat consumers

The consumer controllers always use the sensor value of the controller that has the next lower address. In the above example, controllers 0/1 through 0/16 use the value of the outside sensor connected to controller 0/1 (heat source controller). Controllers 1/1 through 2/16 use the value of the outside sensor connected to controller 1/1.

Central communication unit OCI600

The OCI600 central communication unit is optional and facilitates remote supervision of the plant, among other functions. The OCI600 is capable of transmitting plant malfunctions to the ACS Alarm software.

**Cascaded heat generation with consumers in different buildings**

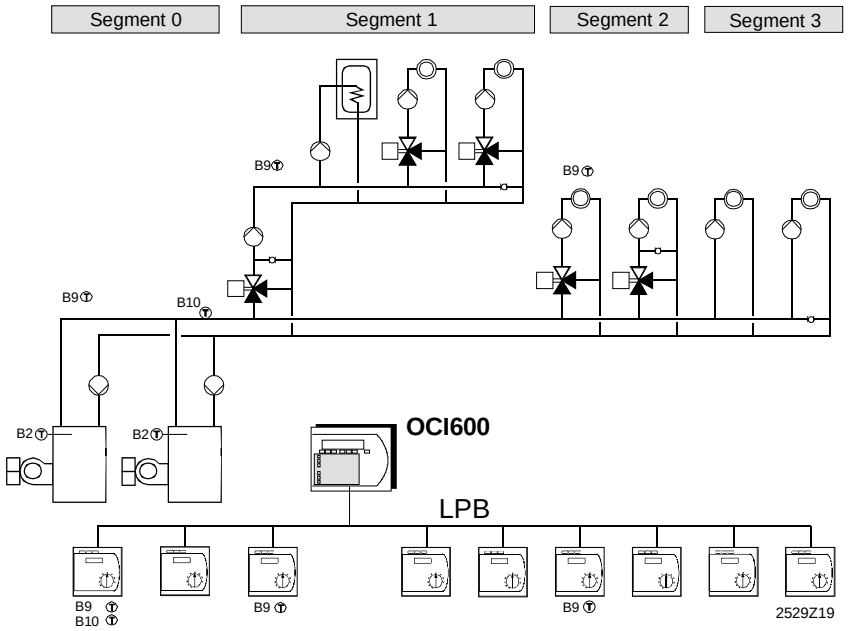



| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Segment address | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 2 | 3 | 3 |
| Device address | 1 | 2 | 1 | 2 | 3 | 6 | 5 | 1 | 1 | 2 |
| Outside temp. adopted from | 0/1 | 0/1 | B9 | 0/1 | 0/1 | 0/1 | – | B9 | 2/1 | 2/1 |

Cascading

| | |
|---|---|
| Note | Cascading is only possible with OEM controllers. |
| Heat generating equipment | The 3 heat sources are cascaded (cascading is only possible in segment 0). Outside sensor B9 and the common flow sensor (cascade sensor) B10 are connected to the heat generation master (address 0/1). |
| **Important** | The cascade sensor (B10) **must** be connected to the heat generation master. The heat generation master has segment / device address 0/1. |
| Heat consumers | The consumer controllers use the sensor value of the controller with the next lower address. Hence, the consumers in segments 0 and 1 use the value of the outside sensor connected to controller 0/1, and the consumers in segments 2 and 3 use the value of the outside sensor connected to controller 2/1. |
| Central communication unit OCI600 | The OCI600 central communication unit is optional and facilitates remote supervision of the plant, among other functions. The OCI600 is capable of transmitting plant malfunctions to the ACS Alarm software. |

**Cascaded heat generation with consumers on 2 distribution levels**




| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Segment address | 0 | 0 | 1 | 0 | 1 | 1 | 2 | 2 | 3 | 3 |
| Device address | 1 | 2 | 1 | 5 | 2 | 3 | 1 | 2 | 1 | 2 |
| Outside temp. adopted from | B9 | 0/1 | B9 | – | 1/1 | 1/1 | B9 | 2/1 | 2/1 | 2/1 |

Cascading

Note

Cascading is only possible with OEM controllers.

Heat generating equipment

The 2 heat sources are cascaded (cascading is only possible in segment 0). Outside sensor B9 and the common flow sensor (cascade sensor) B10 are connected to the heat generation master (address 0/1).

**Important**

The cascade sensor (B10) **must** be connected to the heat generation master. The heat generation master has segment / device address 0/1.

Heat consumers

The consumer controllers use the sensor value of the controller with the next lower address. Hence, the consumer controllers 1/1 through 1/16 use the value of the outside sensor connected to controller 1/1, and the consumers in segments 2 and 3 use the value of the outside sensor connected to controller 2/1.

With the following types of controllers, a second distribution level (segment 1, controller 1) can be created:

- RVA66.540
- RVL470, RVL471, or RVL472
- RVP300, RVP310, RVP320, or RVP330

Also, when using the following types of controllers on the second distribution level, control of DHW heating can be provided:

- RVA66.540
- RVL471, or RVL472
- RVP310, RVP320, or RVP330

Central communication unit OCI600

The OCI600 central communication unit is optional and facilitates remote supervision of the plant, among other functions. The OCI600 is capable of transmitting plant malfunctions to the ACS Alarm software.

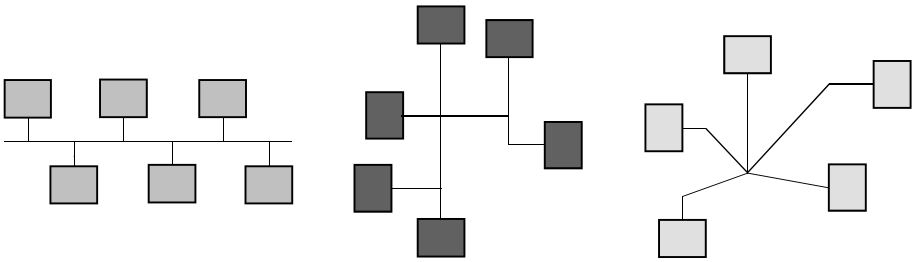
## 2.5.5 Bus topology

**General**

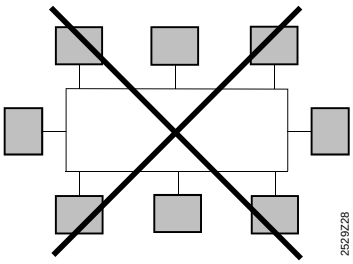
The following types of bus topology are permitted:

- Line topology
- Tree topology
- Star topology
- Combinations of these 3 topologies

For lightning protection reasons, ring topology is not permitted



Line topology Tree topology Star topology




Ring topology

If the bus is laid outside the building, special attention must be paid to lightning protection.

In most cases, a combination of line, tree and star topology is advantageous. The ideal topology is dependent on the object, however, and should therefore be decided upon on a case-to-case basis. In general, the tree topology is best suited for more extensive plant.

To facilitate fault tracing, detailed documentation of every plant should be produced, showing the bus structure, and a plan showing the location of the connection boxes. The cables used should be clearly marked where the connections are made. In the case of larger plant, it is advisable to write down the cable lengths and the measured line resistances.

## 2.5.6 Installation in compliance with EMC directives

**Introduction**

Devices must be installed according to supplier specifications and in compliance with local regulations and standards.
The following rules are of general nature and do not represent specific requirements placed on the installation of Siemens HVAC devices. The specific instructions to be observed will be found in the Installation Instructions for the relevant product, which may not necessarily accord with the information given here.

**Glossary**

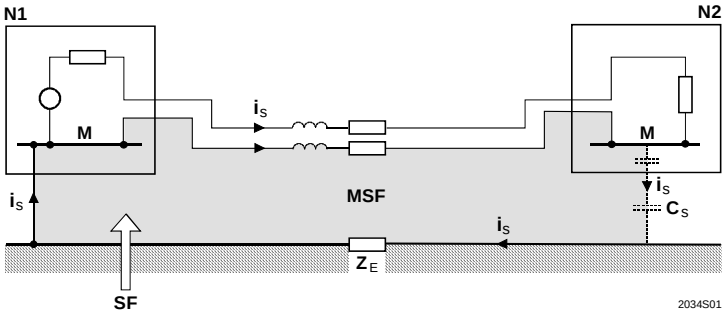
| Term | Definition | Comment |
|---|---|---|
| Grounding | Electrically conductive connection of devices with a reference ground | Grounding is the most important measure since additional measures such as shielding or filtering only work properly when grounding is effective |
| Reference ground | Grounding system that satisfies high frequency requirements, aimed at diverting interference currents to ground | Cable ducts made of metal and equipotential bonding systems are part of the reference grounding system |
| Earth | Electrical connection of one point of the operating circuit or of a metal component to the protective earth (PE) | |
| Earthing | The sum of all earthing measures | Earthing protects people. It is normally achieved by means of the protective earth (PE) wire, which is green / yellow |
| Looped area | Area created between cables and the reference ground (common mode coupling) or between 2 cables (differential mode coupling) | |

**Background**

Every mains cable can produce interference. Short-time voltage surges, so-called transients, are caused primarily when switching inductive loads. Examples of inductive loads:

- Industrial relays
- Motors
- Contactors
- Pumps
- Magnetic valves
- Fluorescent lamps

These surges have a capacitive effect on neighboring signal or bus cables and lead to interference in plant or sections of plant. In practice, the level of interference depends on the way the plant is installed. As a result, the risk of encountering EMC problems depends on a number of factors.




Principle of common mode coupling. The interference field includes interference currents on the signal transmission line.

| | | | |
|---|---|---|---|
| N1 | Controller 1 | M | Ground |
| N2 | Controller 2 | MSF | Decisive looped area for coupling from the field |
| $i_s$ | Interference current | SF | Electromagnetic interference field |
| $C_s$ | Stray capacitance | $Z_E$ | Earth resistance |

Measures to fight EMC problems:

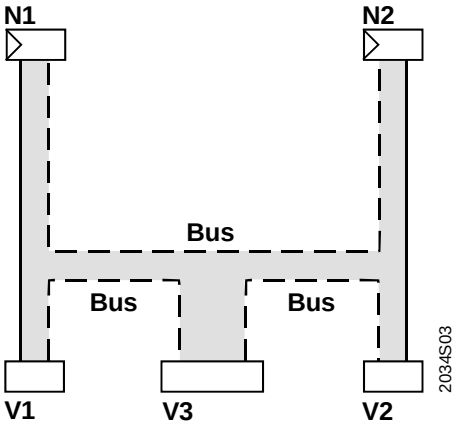
- Prevent sparks on electrical contacts by using spark quenching devices
- Reduce the looped areas between cables and between cables and reference ground by choosing appropriate cable routing (also refer to the following section «Cable routing»
- Use shielded and twisted bus and signal cables (also refer to the following section «Cable shielding»)

**Cable routing**

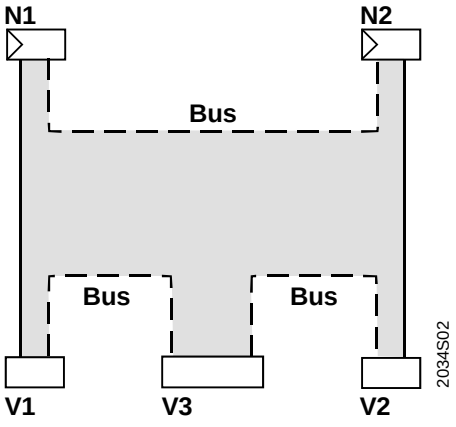
Signal and bus cables should always be routed separate from power cables, observing an adequate clearance. Too great distances create too large looped areas, however, which in turn favor couplings from the field caused by lightning currents or mobile phones, for instance.

Example

2 controllers with bus connection located in the same building. The bus cable is laid far away from the mains power cable, e.g. on the opposite side of the building. This results in a large looped area and, therefore in a considerable interference.




Preferred cable routing due to reduction of looped areas

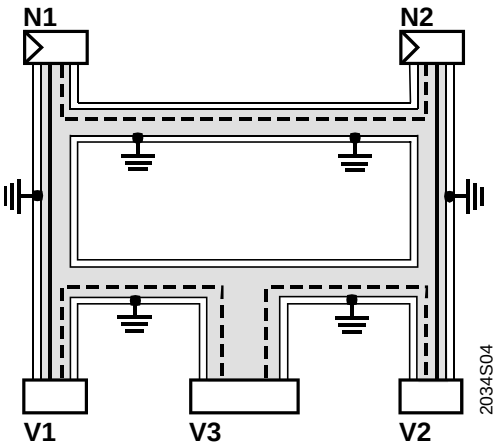



Unsuited cable routing

| | | | |
|---|---|---|---|
| N1 | Controller 1 | V3 | Control panel |
| N2 | Controller 2 | | Bus cable |
| V1 | Conduit box 1 | | Mains power cable |
| V2 | Conduit box 2 | | Looped area |

To lay the cables in compliance with EMC directives:

- Lay cables together, but always observe a distance of 15 to 20 cm!
- Do not lay signal and mains power cables in the same plastic duct
- Cables from controllers to pumps, burners, actuators, etc. are also considered as mains power cables that cause interference
- Wherever possible, lay the cables on reference ground. Suited for that purpose are metal cable ducts that are properly interconnected electrically, both between themselves and against reference ground
- Metal cable ducts reduce the looped area against ground




Reduction of looped areas, optimum cable routing in metal cable ducts

| | | | |
|---|---|---|---|
| N1 | Controller 1 | | Bus cable |
| N2 | Controller 2 | | Mains power cable |
| V1 | Conduit box 1 | | Metal cable duct |
| V2 | Conduit box 2 | | Looped area |
| V3 | Control panel | | |

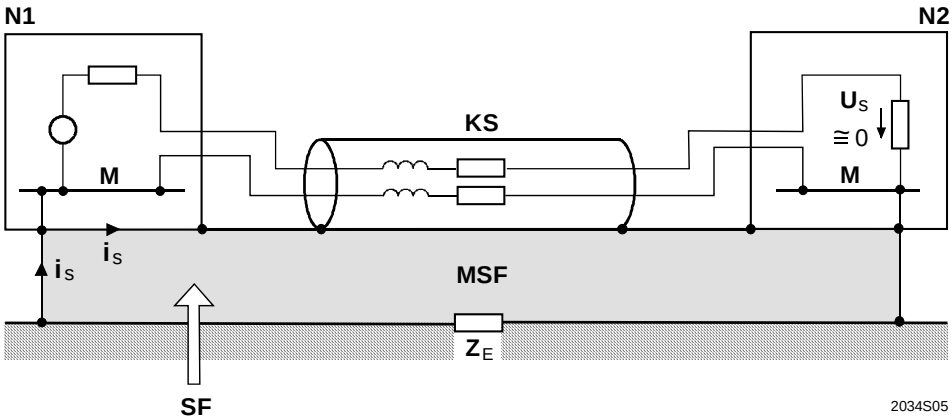
**Cable shielding**

Notes

- Shielded cables offer good protection
- Braid shielded cables with good coverage afford the best protection. Important is the proper protection of the cable shield at both ends
- Foil shielded cables should not be used
- Twisted pairs of wires reduce differential mode coupling. Common mode interference currents (interference caused by inductive loads) are not reduced however

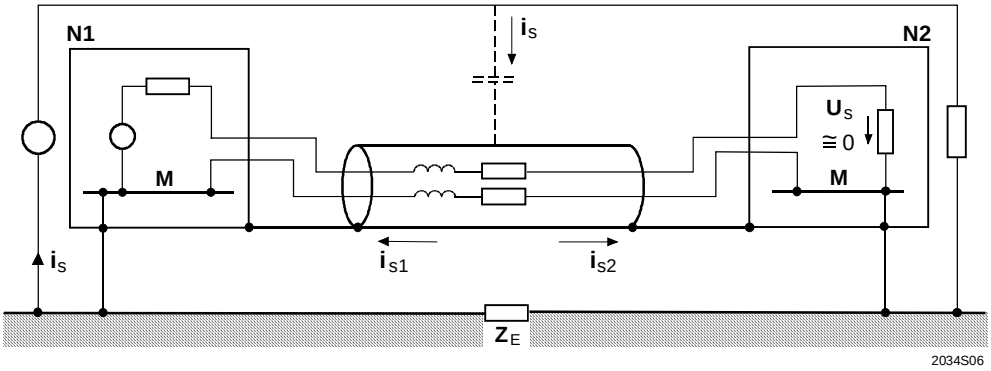
Examples

Example of suitable measures aimed at achieving immunity against radiated and inductive coupling. The cable shield is connected to ground at both ends. The cable shield keeps the interference field away from the signal cable or diverts it to ground.




| | | | |
|---|---|---|---|
| N1 | Controller 1 | MSF | Decisive looped area for coupling from the field |
| N2 | Controller 2 | KS | Cable shield impedance ≅ 0 Ω |
| $i_s$ | Interference current | SF | Electromagnetic interference field |
| $U_s$ | Interference voltage | $Z_E$ | Earth resistance |
| M | Ground | | |

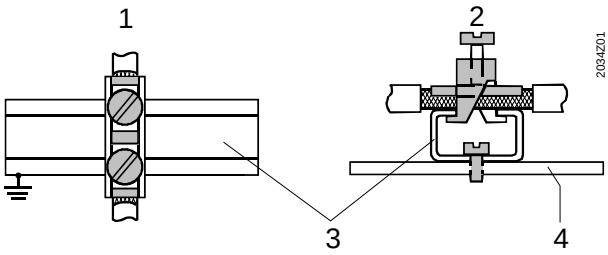
Example of suitable measures aimed at achieving immunity against capacitive coupling. The cable shield is connected to ground at both ends. The cable shield keeps capacitive coupling away from the signal cable or diverts it to ground.




| | | | |
|---|---|---|---|
| N1 | Controller 1 | $U_s$ | Interference voltage |
| N2 | Controller 2 | M | Ground |
| $i_s$ | Interference current | $Z_E$ | Earth resistance |

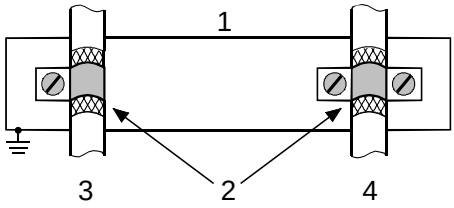
Mounting the cable shields

- The whole circumference of the cable shield must be properly connected to reference ground using a flat surface (equipotential bonding = building ground, control panel ground, etc.) at both ends
- It is recommended to connect the cable shields to the ground rail or metal mounting plat using suitable clamps



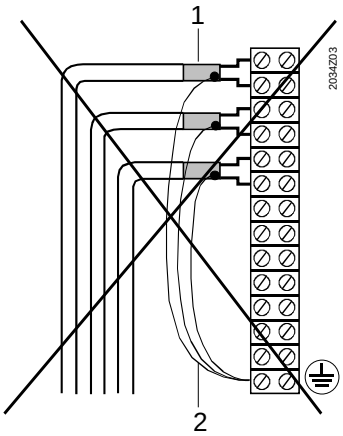

Connection of cable shield

1 Protective earth terminal
2 Cable clamp
3 Rail
4 Metal plate




Connection of cable shield

1 Ground rail
2 Cable clamp
3 Good
4 Better




Unsuited connection of cable shield by so-called pigtails

1 Shield
2 Pigtails

Shielded cables

- The clearance required between correctly shielded cables and parallel running mains power cables may even be zero. It is better, however, to observe a distance of about 15 cm
- Shielded cables to room units: in general, proper grounding at the room unit is not possible. For this reason, the cable shield is connected to the ground only at the controller

Unshielded cables

- Unshielded cables are much more susceptible to interference than shielded cables. Both wires should be twisted
- If there are parallel running mains power cables, a distance of 15 to 20 cm is mandatory
- It is recommended to rout power and signal cables in metal cable ducts
- If plastic ducts are used, signal and power cables must be laid in separate ducts observing a distance of 15 to 20 cm

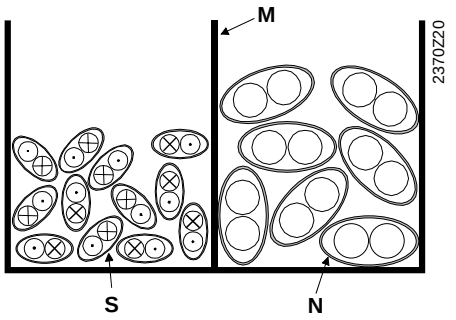
Power cables

- In situations which are difficult from the point of view of EMC, it is recommended to use shielded power cables for motors, actuators, etc.
- In the case of power cables for frequency converters, shielded cables are strongly recommended. Such cables are available as mineral insulated copper-clad cables (MICC), for instance
- The shield of such cables must be properly connected to ground at both ends

Cable ducts

- Metal cable ducts afford very good immunity against interference because the signal cables or mains power cables are laid on the reference ground. The looped area

against the ground is thus reduced, provided the individual sections are electrically properly interconnected via large surfaces
- Cable ducts must be connected to the reference ground = equipotential bonding every 20 m, but at least once on every floor
- If mains power and signal cables must be run in the same cable duct, the duct must be made of metal and be closed on three sides (see illustration). The metal partition in the middle separates the mains power cables from the signal cables

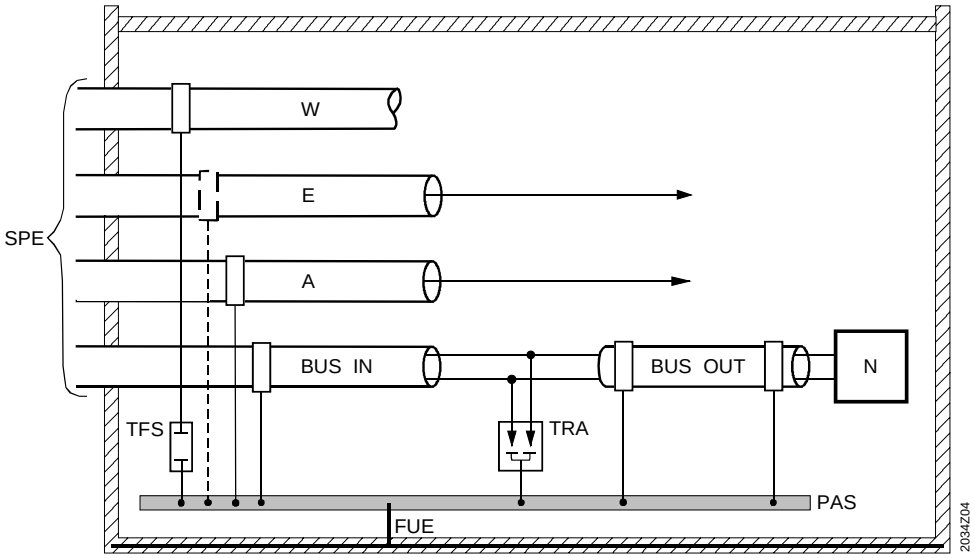



S Signal lines
N Mains power cables
M Metal duct with metal partition

**Bus connections between buildings**

- Wherever a bus cable enters or leaves a building, the proper installation of a surge protector against lightning effects is mandatory
- The proposed surge protector does not offer protection against constant overvoltages (mains voltage) and surges that affect the terminal units via the building installation (water pipes or mains connection)
- The bus cable should enter the building where the mains cable enters (single-point entry)
- Equipotential bonding system = reference ground must be fitted very close to the bus cable entry
- The surge protector must be mounted on a DIN rail that is to be connected to the equipotential bonding system using a short piece of copper (20 x 2 mm) to ensure good conductance
- Note: The surge discharge current flows via the fixing of the surge protector to the DIN rail. Without this connection, there will be no protection!
- Each building requires a surge protector, such as the protector supplied by PHOENIX, which consists of a UFBK-M 2-PE-48AC-ST plug-in unit (3-step surge protector) and a UFBK BE basic unit (decoupling). Siemens has approved this type of surge protector for use with the LPB and M-bus
- The unprotected bus cable input must be connected to terminals 1 and 2 marked «IN», the protected bus output to the controller to terminals 3 and 4 marked «OUT»)
- Planning the bus topology: the capacity of 2.3 nF per surge protector must be included in the permissible capacitive bus loading
- At the point of entry to the building, the cable shield must be connected to the equipotential bonding system while ensuring good conductivity
- In normal situations, a TN-S mains network with separate protective and neutral conductors is now used. With buildings located in the same area, equipotential bonding is provided by the earth conductor
- Armored mains supply lines must be properly connected to the equipotential bonding system where the supply lines enter the building
- In the case of long distance connections, equipotential bonding from one building to another is no longer ensured. In that case, only one side of the shield is to be earthed

**Example of equipotential bonding and surge protection at the point of entry to the building**




| | | | |
|---|---|---|---|
| N | Controller | FUE | Foundation earth |
| W | Water pipe | PAS | Equipotential bonding system |
| E | Power cable | TRA | Surge protector |
| A | Antenna cable | BUS IN | Unprotected |
| SPE | Single-point entry | BUS OUT | Protected |
| TFS | Separate spark gap | | |

## Control panels

Grounding

Metal mounting plates or the rear of control panels are the reference point for the cable shields and housings. They must be capable of decoupling interference and of short-circuiting interference voltages.

- Interior walls should not be painted
- Interior walls should be galvanized as standard (to provide protection against corrosion)
- Grates and rails must be electrically conductive and may not be painted
- Screwed connections must be made directly on bare surfaces of the control panel
- Use flat bonding conductors made of copper or flat meshes
- Establish ground connections to control panel doors via flat bonding conductors made of copper (connection in addition to the normal protective earth, if required)

Control panel conforming to EMC directives

When planning the control panel, strong emitters of interference must be separated from other devices. Particular care must be taken with the electrical connections between these 2 groups of devices.

Separation of interference emitters and interference-susceptible equipment:

- Use separate control panels for strong interference emitters and interference-susceptible equipment
- If necessary, place strong sources of interference outside the control panel without infringing the safety regulations for the relevant devices
- Use a partition inside the control panel

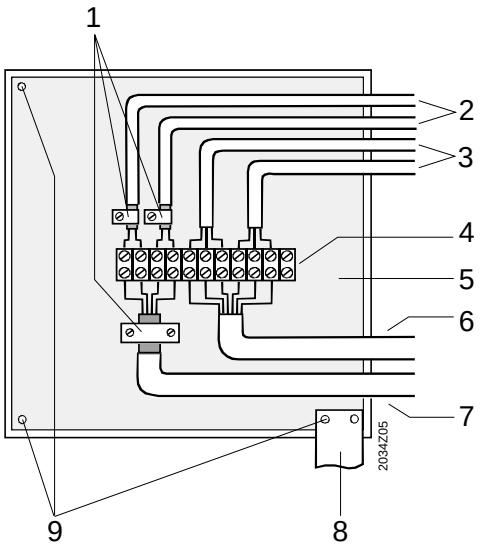
Connections conforming to EMC directives

To comply with EMC requirements, the following rules must be observed:

- Run interference-susceptible cables separately, as close as possible to the reference ground (metal mounting plate or control panel)
- Single-point entry: All connections on the same side of the control panel (mains power and control cables / inputs and outputs)
- Cable loops should be avoided
- Provide sufficient space for the connection of cable shields
- Integration of the control panel into the building's equipotential bonding system

Connecting the cable shields

Prerequisite for the proper connection of the cable shield is the availability of a reference ground. The reference ground is used to divert interference currents that flow through the cable shields.




1 Connection of cable shields with metal clamps
2 Shielded sensor cables
3 Control cable from the process
4 Terminal strip
5 Metal baseplate
unshielded primary cable
6 Shielded primary cable
7 Connection to equipotential bonding system
8 Grounding to the metal box

Correct mounting of cable shields inside conduit boxes

- The connection of cable shields must be circumferential and be made directly to the reference ground, preferably with metal clamping devices, such as cable clamps
- Pigtails for the connection of cable shields are unsuitable, even if only a few cm long
- Cable shields must always be properly connected to reference ground and, usually, at both ends (housing, control panel)

Spark quenching

- Inductive plant components such as industrial relays, contactors, magnetic valves, etc., must be fitted with adequate spark quenching using an RC unit which is to be connected in parallel to the coil causing the interference
- An alternative solution which causes practically no interference is the use of solid state relays
- Varistors (zinc oxide resistors) ensure voltage limitations, but do not provide adequate spark quenching

## 2.5.7 Bus power supply

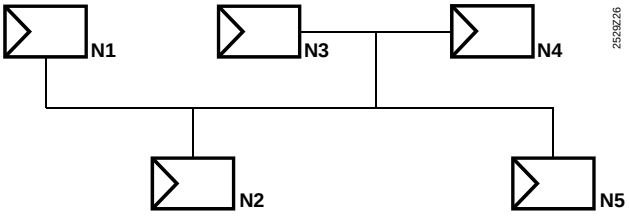
**Bus power supply via controllers**

Introduction

Plant containing a maximum of 16 devices can be operated without central bus power supply. In that case, the bus power supply of each individual controller must be switched on (when using a central bus power supply, e.g. via the OCI600, all controller bus power supplies must be switched off).

Connection

The LPB devices can be connected to the bus at any point as long as the cable lengths and the maximum network extension are observed:




N1...N5 LPB-compatible controllers

Note:

- The devices' LPB connections are not galvanically separated
- The correct polarity of the connections must be observed

**Central bus power supply:**
**Central communication unit**

Introduction

When using an OCI600 central communication unit, central bus power supply must be used. It can be provided by the OCI600 itself, the SYNERGYR OZW30 central unit or the PNE power supply unit (refer to Data Sheet N8943). Only 1 central bus power supply per system is permitted.

Note

If Batibus devices are used, central bus power supply is mandatory.

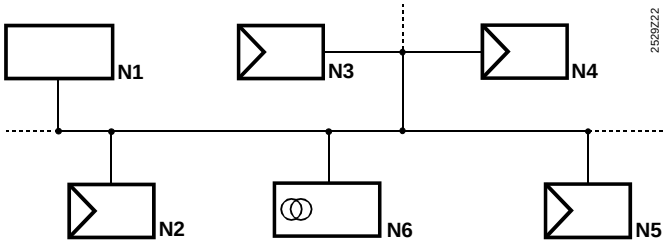
Prerequisites

Only LPB-compatible or Batibus-compatible devices may be used. Note:

- A maximum of 40 LPB-compatible devices may be connected
- The ohmic resistance of the cable between the bus power supply and a device must not exceed 12 Ω
- The bus power supply unit should be installed as close as possible to the center of the network
- When using a central bus power supply, the controller bus power supply on the devices must be switched off. If this is not observed, overcurrents on the bus can occur. Siemens will not assume responsibility for any damage resulting from such overcurrents
- If an OCI600 central communication unit or OZW30 central unit is connected to the LPB, one of them can be used to provide the function of central bus power supply. It must be ensured that only 1 central bus power supply is activated at a time (overcurrents on the LPB)

Example

All devices connected to the bus – assigned to 2 central units – are parameterized. The bus power supply on the OZW30 is switched on; all other bus power supplies (controllers and OCI600) must be switched off.




N1 Central communication unit OCI600
N2...N5 LPB-compatible controllers
N6 Central unit OZW30 with bus power supply switched on

Connection

The LPB devices can be connected to the bus at any point of the network, provided the cable lengths and the maximum network extension are observed.
The right polarity of the connections must be observed.

## 2.5.8 Bus sizing

**Number of devices**

Bus power supply via controllers

When using a bus power supply via the controllers, the number of devices is limited to **16,** the reason being capacity.

Central bus power supply

When using a central bus power supply, the number of devices is limited due to data throughput (bus loading). The precise number of devices depends on the types of controller used. For more detailed information, refer to paragraph “Bus loading” below.

**Bus loading**

The usable transmission capacity of the LPB is about 600 telegrams per minute on average. Each device connected to the LPB generates device-specific data traffic. The bus loading level corresponding to the amount of data traffic is expressed by the bus loading number E. For each device, a bus loading number E can be defined:

$$E = \frac{\text{Device telegrams / minute}}{2}$$

The total of all bus loading numbers E of the connected devices must need exceed **300**.

The following table contains the presently known bus loading numbers E of the LPB-compatible devices supplied by Siemens HVP.

| **Product line, series** | **Type reference** | **Bus loading number** |
|---|---|---|
| Heating controllers RVL4... | RVL469 | 6 |
| | RVL470 | 6 |
| | RVL471 | 7 |
| | RVL472 | 7 |
| Heating controllers RVP3... | RVP300 | 6 |
| | RVP310 | 7 |
| | RVP320 | 7 |
| | RVP330 | 10 |
| Energy managers RVP5... | RVP5... | 3 |
| District heating controllers RVD2... | RVD23... | 3 |
| | RVD24... | 4 |
| OEM heating controllers RVA... | RVA43.222 | 3 |
| | RVA43.223 | 3 |
| | RVA46.531 | 6 |
| | RVA47.320 | 3 |
| | RVA63.242 | 3 |
| | RVA63.280 | 3 |
| | RVA65... | 3 |
| | RVA66.540 | 6 |
| Ventilation controllers AEROGYR | RWI65... | 5 |
| Pulse adapter | AEW2.1 | <1 |
| Temperature sensor/adapter | QAB30.600 | <1 |
| Input module | DOE4IN | <<1 |
| Relay module | DOE4RE | <<1 |
| Central communication unit | OCI600 | 46 |

**Cable characteristics**

- The LPB is a non-exchangeable 2-wire bus
- The bus cable should be a twisted 2-core cable

If several individual wires are used, they must be twisted.

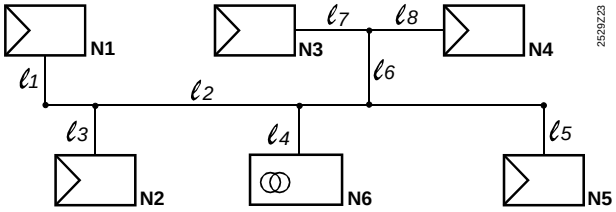
**Connection of bus cable**

The bus cable is to be connected to terminals MB– and DB+ of the LPB devices. Polarity must be strictly observed.
In the case of T-branches, it is recommended to use a conduit box.

**Types of limitations: Terms**

- Cable extension:
  Maximum cable length between the 2 remotest devices in the entire network. In the following example, this is the cable length from N1 to N5 or ($\ell_1 + \ell_2 + \ell_5$)
- Total cable length / sum of all branches:
  Sum of all interconnected cable lengths. In the following example, this is the cable length ($\ell_1 + \ell_2 + \ell_3 + \ell_4 + \ell_5 + \ell_6 + \ell_7 + \ell_8$)
- Maximum power supply distance:
  Cable between the remotest device and the central bus power supply

Example




$l_1$...$l_8$ Cable sections
N1...N5 LPB-compatible controllers
N6 Central communication unit OCI600

- Maximum total cable capacitance:
  This is the capacitance the bus cable must not exceed. It varies depending on the electrical characteristics of the bus cable:
  Total cable capacitance = total cable length x capacitance per unit length K1

**Types of limitations**

**Cross-sectional area**

The cross-sectional area required depends on the type of bus power supply.

Bus power supply via controllers

If the bus is powered by the controllers, a minimum cross-sectional area of **1.5 mm$^2$** is mandatory.

Central bus power supply

In case of a central bus power supply, it is also possible to use other cross-sectional areas which are listed below together with their related cable lengths.

**Cable lengths**

The following 2 tables contain the different permissible maximum cable lengths depending on cable resistance and cable capacitance as the physical criteria. The resulting lengths are very much dependent on whether a bus power supply via the controllers or a central bus power supply is used.  of b

Bus power supply via controllers

If the LPB is powered by the controllers, the following maximum cable lengths must be observed, based on a cross-sectional area of 1.5 $mm^2$:

| **Limitation of cable resistance R:** | |
|---|---|
| Cable extension | - 250 m for each connected device<br>- Maximum 1,000 m |
| **Limitation of cable capacitance C:** | |
| Maximum total cable capacitance | - 25 nF for each connected device<br>- Maximum 140 nF |
| Hence, at a cable capacitance of 100 pF/m, the total cable length / sum of all branches is: | - 250 m for each connected device<br>- Maximum 1,400 m |

At a cable capacitance other than 100 pF/m, the permissible total cable length must be calculated using the following formula:

$$\ell' = \frac{\ell \times 100\ \text{pF/m}}{K_1}$$

Where:

l [m] Calculated cable length at 100 pF/m
l' [m] Maximum cable length at $K_1$
$K_1$ [pf/m] Effective cable capacitance per unit length

Central bus power supply

In the case of a central bus power supply, the cross-sectional area can vary. Based on the selected type of cable, the following cable lengths are obtained:

| **Limitation cable resistance R:** | | | | | |
|---|---|---|---|---|---|
| Cross-sectional area | 0.5 $mm^2$ (0.8 mm Ø) | 0.75 $mm^2$ | 1.0 $mm^2$ | 1.5 $mm^2$ | 2.5 $mm^2$ |
| Cable extension | 320 m | 460 m | 620 m | 920 m | 1,200 m |
| Max. power supply distance | 160 m | 230 m | 310 m | 460 m | 600 m |
| **Limitation cable capacitance C:** | | | | | |
| Cross-sectional area | 0.5 $mm^2$ (0.8 mm Ø) | 0.75 $mm^2$ | 1.0 $mm^2$ | 1.5 $mm^2$ | 2.5 $mm^2$ |
| Total cable length / sum of all branches: (At a cable capacitance of 100 pF/m) | 2,500 m | 2,500 m | 2,500 m | 2,500 m | 2,500 m |

At a cable capacitance other than 100 pF/m, the permissible total cable length must be calculated using the following formula:

$$\ell' = \frac{\ell \times 100\ \text{pF/m}}{K_1}$$

Where:

l [m] Calculated cable length at 100 pF/m
l' [m] Maximum cable length at $K_1$
$K_1$ [pf/m] Effective cable capacitance per unit length

Data Sheet N2032, “Local Process Bus LPB, Basic Engineering Data”, contains detailed examples with graphs relating to the figures given in the above tables and the types of limitation.

## 2.5.9 Technical data of LPB

| | |
|---|---|
| Physical Layer to ISO / OSI | voltage level and character transmission to NF C 46 621 |
| Data Link Layer to ISO / OSI | bus access procedure, telegram makeup, transmission and data backup to NF C 46 622 |
| Application Layer to ISO / OSI | Siemens HVP-specific |
| Open-circuit bus voltage | 15.5 V ± 10 % (with no load) |
| Signal level | < 7 V = logic 1<br>> 9 V = logic 0 |
| Cable capacitance | ≤ 100 pF/m at 800 Hz [1)] |
| Bus topology | line, tree, star or combinations of them |
| Character transmission | NRZ coding, 8 data bit, odd parity, 1 stop bit |
| Baud rate | 4800 Baud |
| Telegram length | max. 32 characters |
| Transmission capacity | average of about 10 telegrams per second |
| Bus access procedure | CSMA/CA (multi-access with collision prevention) |
| Number of users | max. 16 with bus power supply via controllers<br>max. 40 with central bus power supply [2)] |

[1)] Higher values demand a proportional reduction of the permissible total cable length
[2)] Depending on the bus loading numbers E of the devices used

# 3 Commissioning with the ACS7...

## 3.1 Introduction

The ACS7... is a software package for parameterizing, monitoring and reading the data points (also refer to section 3.2) of the OCI600 central communication unit, its peripheral devices and connected controllers.
Communication between the ACS7... and the OCI600 is opened via an RS-232 port or a modem connection (also refer to chapter 4).
The ACS7… software can establish a connection to several plants via different communication interfaces (COM ports), but not simultaneously.
Operation of the ACS7... software is described in its Online Help which, when the software runs, can be accessed via **Help > Help**.

### 3.1.1 Applications of the ACS7... software package

The ACS7... software package contains the following applications:

| Application | Brief description |
|---|---|
| Popcard… | • Visualization and parameterization (online) of all data points transmitted by the devices connected to the bus<br>• Possibility to create own Popcards |
| Parameter settings… | • Visualization and parameterization of the data points and setting parameters defined in the device description as a standard parameter data set<br>• Possibility to store the parameters of a plant offline and to reload them later |
| Offline trend… | • Offline acquisition of the dynamic behavior of selected data points of the plant.<br>The acquired data are stored on the memory card of the OCI600 central communication unit<br>• Preparation of data in a graphic window<br>• Further handling with a spreadsheet program |
| Online trend… | • Online acquisition of the dynamic behavior of selected data points of the plant<br>• Online presentation of data in a graphic window<br>• Further handling with a spreadsheet program |
| Commissioning report… | • Querying and recording data points and setting values of individual devices, device groups or of the entire plant |
| File transfer… | • Reading data from the OCI600 central communication unit and from the memory card of the OCI600 (offline trend files) |
| Plant diagram… | • Graphic presentation of plant including display of the plant values |

The user of the ACS7… can access the various applications, depending on the kind of license he has.

### 3.1.2 Device descriptions

The ACS7... software contains a device description of each supported device. The device description is thus the link between the applications of the ACS7... software and the devices connected to the LPB. The device descriptions are supplied with default and limit values of the parameters that can be set.

### 3.1.3 Detection of LPB devices

The ACS7... software makes it possible to present the entire system and to access the individual devices installed in the plant.

With the help of the ACS7…, each LPB bus user must be assigned an address in the OCI600 device directory. These addresses must accord with the addresses set on the devices.

If the device address of a bus user is changed, the device directory of the OCI600 central communication unit must be updated. Then, using function **Plant > Refresh device list,** the device with the new address must be uploaded.

**Sources of error**

If devices cannot be detected, the reason may be one of the following:

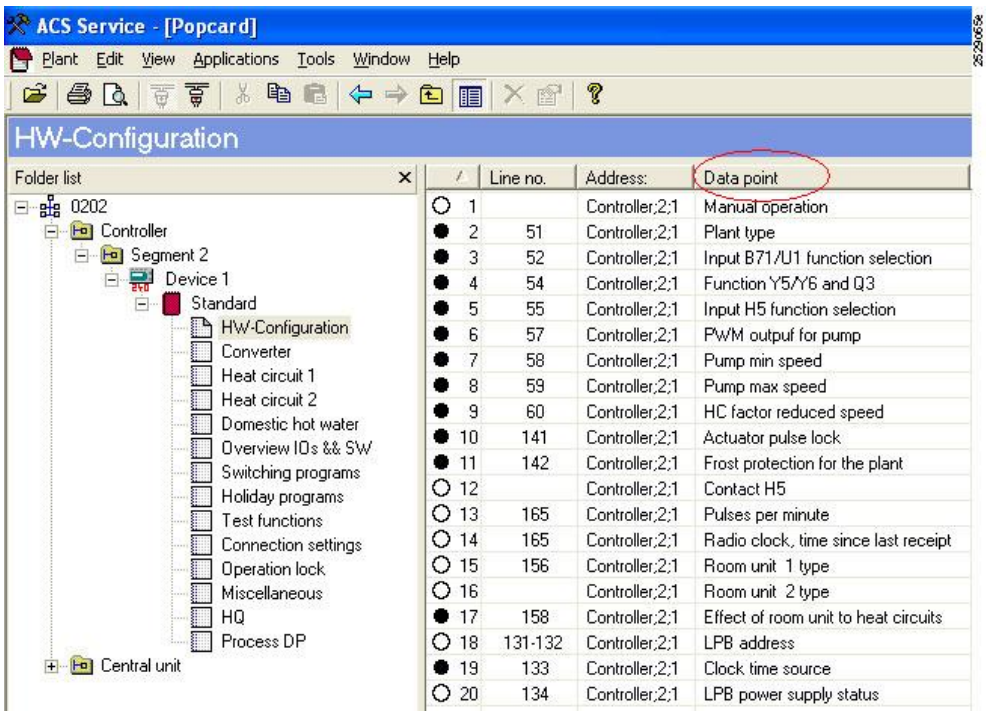
- The same address was assigned to 2 different devices, which lead to an address conflict
- The device is no longer available or is faulty. After choosing function **Plant > Refresh device list,** such a device appears in red Italics

For a detailed description of the procedure covering addressing on the software side, refer to section “3.3 Integrating the devices”.

## 3.2 Data points of a plant

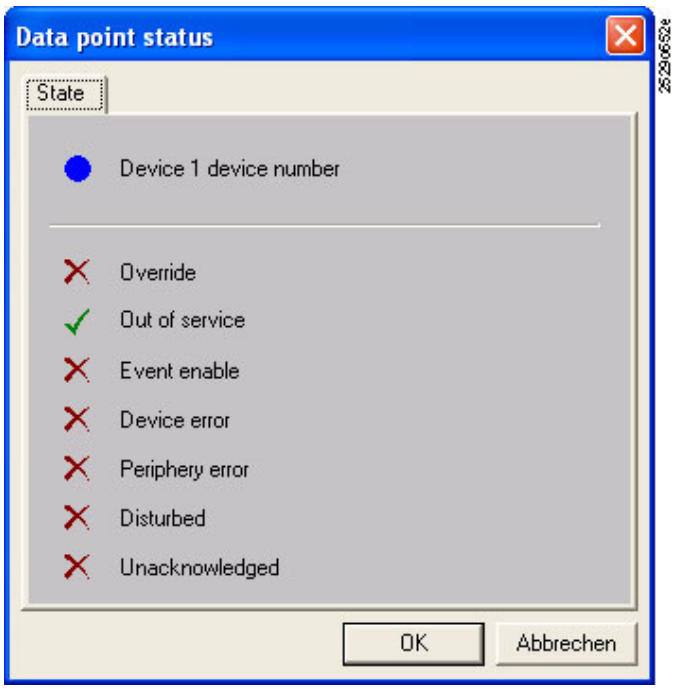
Similar to a file Explorer, the ACS7... software shows the devices and their associated Popcards in the form of a tree structure on the left. The plus symbol is used to let the sublevels appear. The sublevels of the Popcards are called operating pages.

When an operating page is selected, the configuration of this operational unit appears in the right window. The configurations always contain the “Data point” column. In the ACS7…software, a “Data point” is the variable that can be set and / or read.




**Checking the status of a data point**

The **Popcard…** and **Parameter settings…** applications provide additional information about the status of data points. When such a data point is selected, “Data point status” can be opened with the right mouse button **> Status**.



**Contents of information box “Data point status”**

| Status | Description |
|---|---|
| Override | Data point in overwrite mode. The current value is not valid. The value was preselected externally |
| Out of service | Data point not used by the device application (inactive; out of operation) |
| Event enable | Event messages for the data point are enabled |
| Device error | Device error with impact on the data point. If no differentiation can be made between peripheral error and device error, a device error will be displayed |
| Periphery error | Error of a peripheral device (external sensors, actuating devices, cables) with impact on the data point |
| Disturbed | Alarm status flag; fault has occurred |
| Unacknowledged | Alarm status flag; alarm unacknowledged |

**Changing the values of a data point**

The Popcards show data points that can be written in the form of a solid circle, data points that cannot be written in the form of an empty circle.
Then, the user level is of importance. An administrator can change a number of data points that a user cannot access.

1. Double click on the line with the data point to be changed.
   The **Data point command** window appears. The look of this window depends on the type of data point.
2. Assign the data point the required value in the “Value” tab.
3. The “Command” tab holds the following functions:

| Function / button | Description |
|---|---|
| Write | Normal write access.<br>Must not normally be performed since after a change in the “Value” tab, the value will automatically be written to the OCI600 |
| Default | Data point will be set to the standard value |
| Change “Out of service” state<br>Button raised > button recessed | Deactivates the data point.<br>This function is used to deactivate switching points in time programs, for example |
| Change “Out of service”<br>Button recessed > button raised | Activates the data point with the value set in the “Value” tab |

# 3.3 Integrating the devices

## 3.3.1 Integrating the controllers into the OCI600

**Assigning addresses**

Each controller must be assigned an individual segment and device number which must accord with those in the device directory of the OCI600 central communication unit.

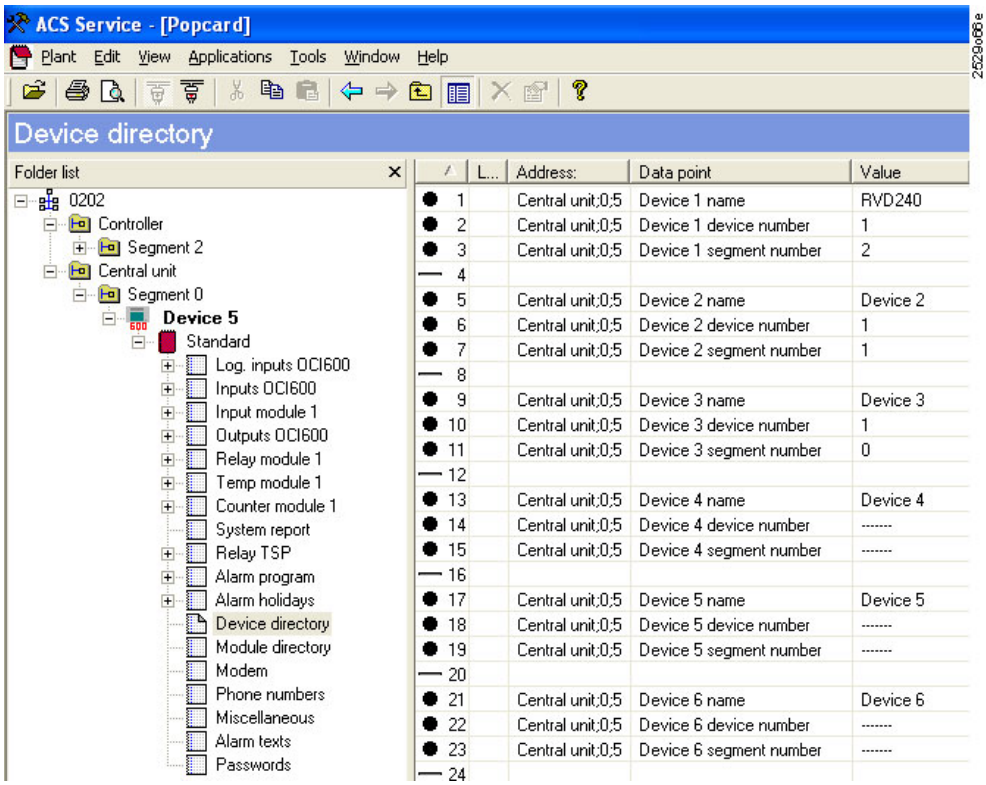
**Bus power supply**

The controllers' local bus power supply must be switched off. Power will be provided by the OCI600 central communication unit.

**Time synchronization**

It is recommended to define the OCI600 central communication unit as the clock time master and the controllers as slaves with or without remote control (refer to chapter 6).

The procedure with the ACS7... software is the following:




**Settings in the ACS7...**

1. From the **Applications > Popcard…** menu, select operating page **Device directory**. For the 16 controllers that can be connected, the right window shows you the data points "Device n name", "Device n device number", and "Device n segment number".
   Note: In this User Manual, index "n" denotes a consecutive number (here controllers 1 through 16).
2. Double-click on the relevant line to open the entry field for entering the controller's name (maximum 16 characters), the device number and the segment number. Both the device number and the segment number must accord with the settings made on the controller.
3. Repeat step 2 above with all the other controllers.

### 3.3.2 Integrating the AEW2.1 pulse adapters into the OCI600

**Brief description**

The OCI600 central communication unit supports up to 6 AEW2.1 pulse adapters. They have 2 pulse inputs and are used to convert in conformance with LPB requirements the consumption values (e.g. water, electricity, gas, etc.) acquired by the consumption meters in buildings. To commission the pulse adapters, the AZW30 service unit should be used.

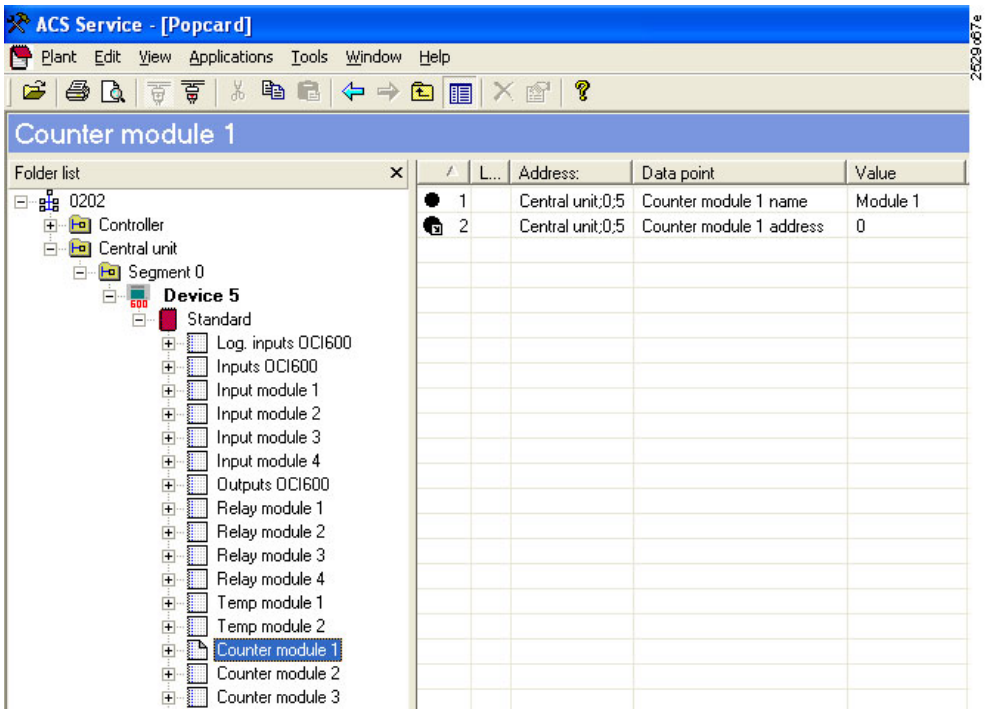
**Preparatory work**

Before integrating the pulse adapter into the OCI600, ensure that:

- Power is available
- The pulse adapter has the address plug fitted
- The LED on the pulse adapter flashes

**Settings in ACS7...**

When these preconditions are satisfied, make the settings in the ACS7... operating software:




1. On the **View** menu, deactivate **Consider dependencies** to also show devices that have not been configured.
2. From the **Applications > Popcard…** menu, select operating page “Counter module n”. Then, the right half of the screen will show data points “Counter module n name” and “Counter module n address”.
3. Double-click on the respective line to open the entry field for entering the counter module’s name (maximum 16 characters) and address. The counter module’s address must accord with that set on the AEW2.1.
4. Repeat steps 2 and 3 above with all counter modules.

### 3.3.3 Integrating the QAB30.600 temperature sensor into the OCI600

**Brief description**

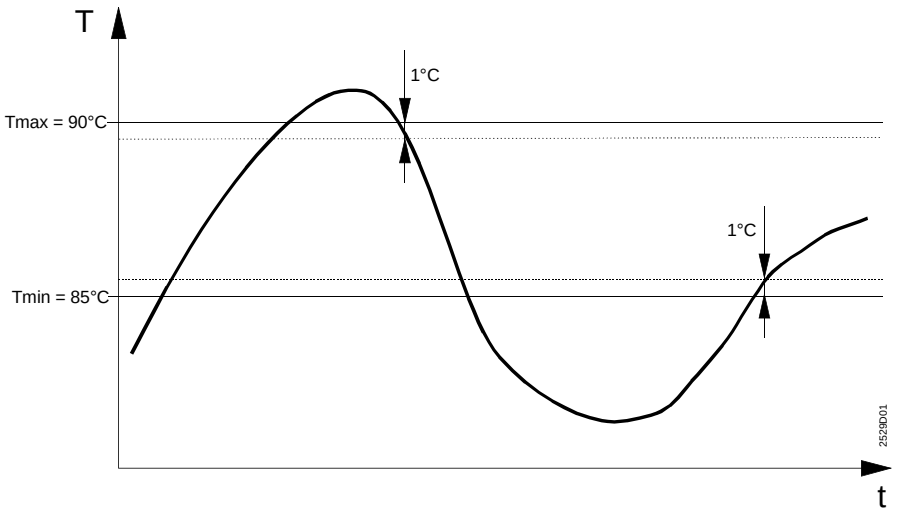
The QAB30.600 temperature sensor / adapter is used to acquire temperatures via sensors and to transmit them to the OCI600 central communication unit via LPB.

The OCI600 supports 2 QAB30.600 temperature sensors / adapters each with 2 inputs.

Example

An immersion sensor for acquiring the flow temperature, for example, is connected to one input. An outside sensor or room temperature sensor (LG-Ni 1000) can be connected to the other input.

For each input, 2 temperature limit values can be defined. An alarm can be triggered when the temperature crosses one of these limits.




| | |
|---|---|
| Tmax | Upper temperature limit value |
| Tmin | Lower temperature limit value |
| T | Temperature |
| t | Time |
| Note: | The switching differential (hysteresis) is 1°C |

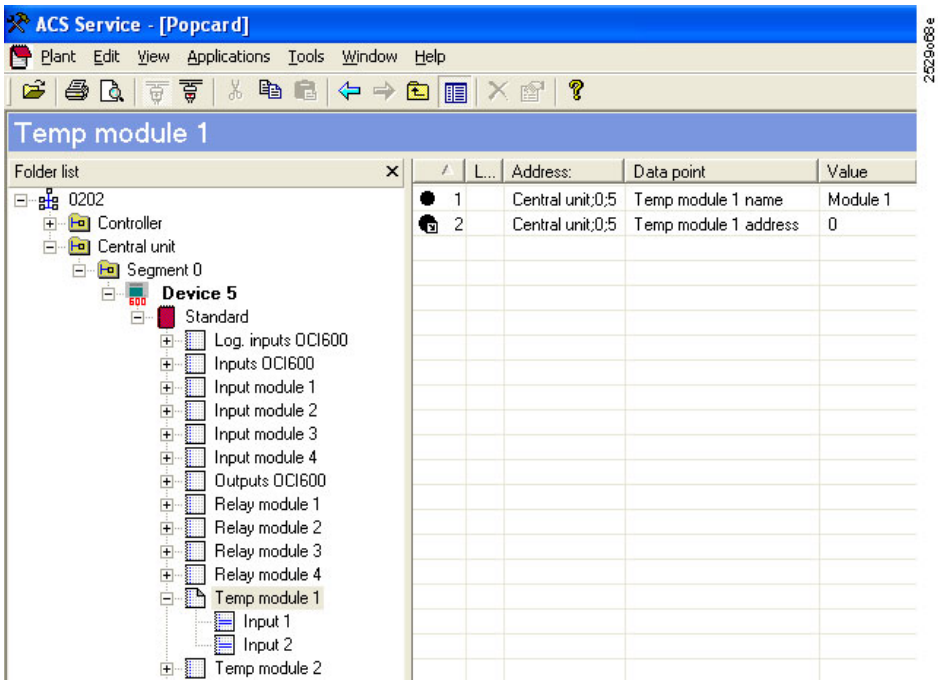
**Preparatory work**

Before starting to parameterize a temperature sensor, ensure that:

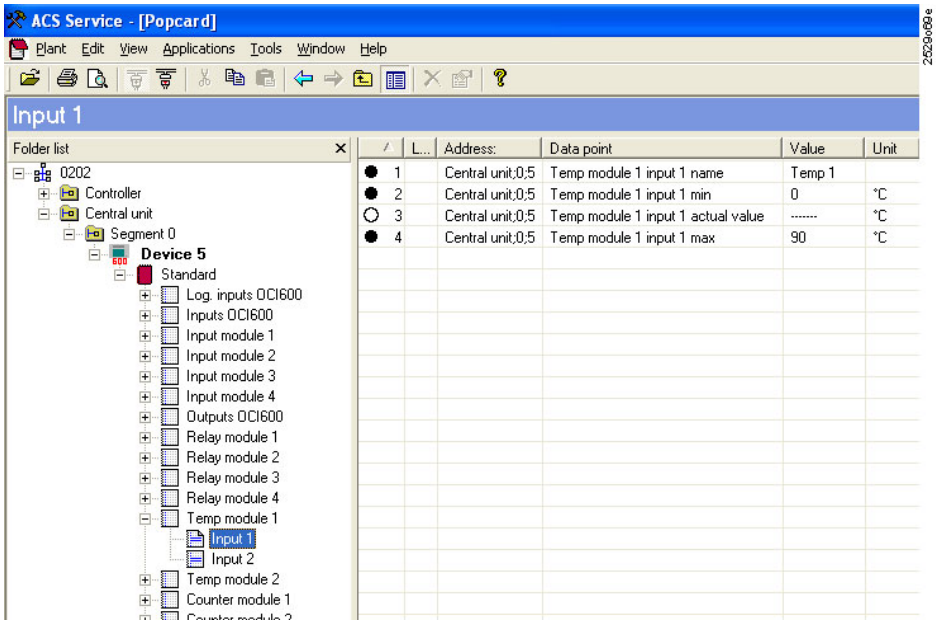
- Power is supplied to the QAB30.600 temperature sensor
- The address plug is fitted
- The LED on the device flashes

**Settings in ACS7...**

When these preconditions are satisfied, make the required settings in the ACS7... operating software:




1. On the **View** menu, deactivate **Consider dependencies**.
2. From the **Applications > Popcard…** menu, select operating page “Temp module n”. Then, the right half of the screen will show you the 2 data points “Temp module n name” and “Temp module n address” for each temperature module.
3. Double-click on the respective line to open the entry field for entering the temperature module’s name (maximum 16 characters) and address. The temperature module’s address must accord with that set on the QAB30.600.
4. Likewise, on the lower operating page “Input n”, you can enter data points “Temp module n input n name”, “Temp module n input n minimum” and “Temp module n input n maximum” for each input. The difference of the limit values must be a minimum of 3 °C.
   On line “Temp module n input n measured value”, you can read the current temperature.
5. Repeat steps 2 through 4 above for the second temperature module.



### 3.3.4 Integrating the DOE4IN input module into the OCI600

**Brief description**

The OCI600 central communication unit supports a maximum of 4 optional digital DOE4IN input modules (standard Batibus) each with 4 inputs.

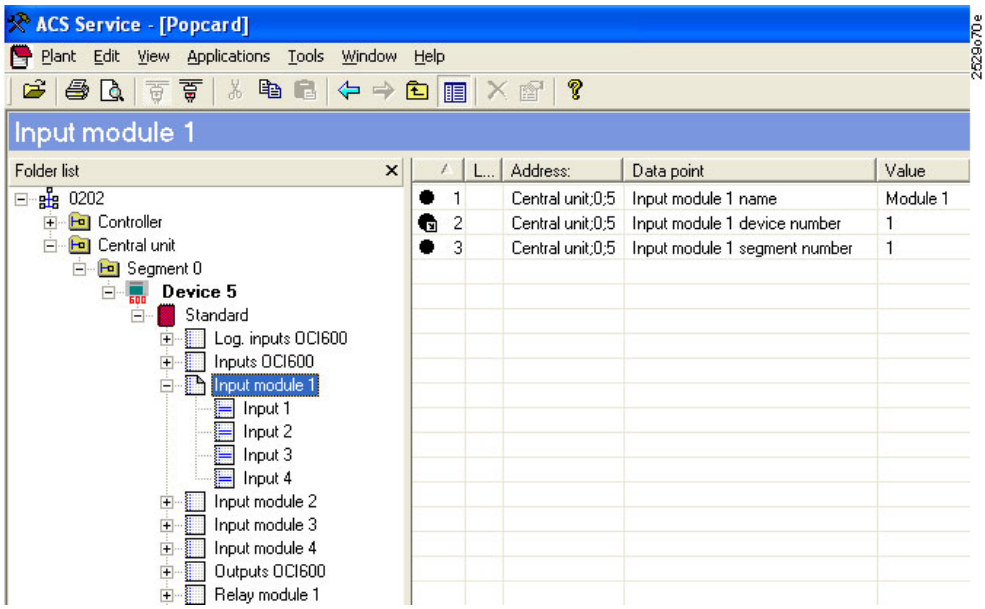
**Preparatory work**

Before integrating the DOE4IN input module into the OCI600 central communication unit, ensure that:

- Power is available
- The LED on the input module flashes

**Settings in ACS7...**

When these preconditions are satisfied, make the required settings in the ACS7... software:




1. On the **View** menu, deactivate **Consider dependencies**.
2. From the **Applications > Popcard…** menu, select operating page “Input module n”. Then, the right half of the screen will show you data points “Input module n name”, “Input module n device number” and “Input module n segment number” for each input module.
3. Double-click on the respective line to open the entry field for entering the module’s name (maximum 16 characters), the device number, and the segment number. Both the devices and the segment number must accord with the settings made on the Batibus input modules.
4. Parameterize the 4 inputs of each input module as described in subsection “3.3.6 Parameterizing the digital inputs of the OCI600”.
5. Repeat steps 2 to 4 above with all input modules.

### 3.3.5 Integrating the DOE4RE relay module into the OCI600

**Brief description**

The OCI600 central communication unit supports a maximum of 4 optional relay modules (standard Batibus) each with 4 outputs.

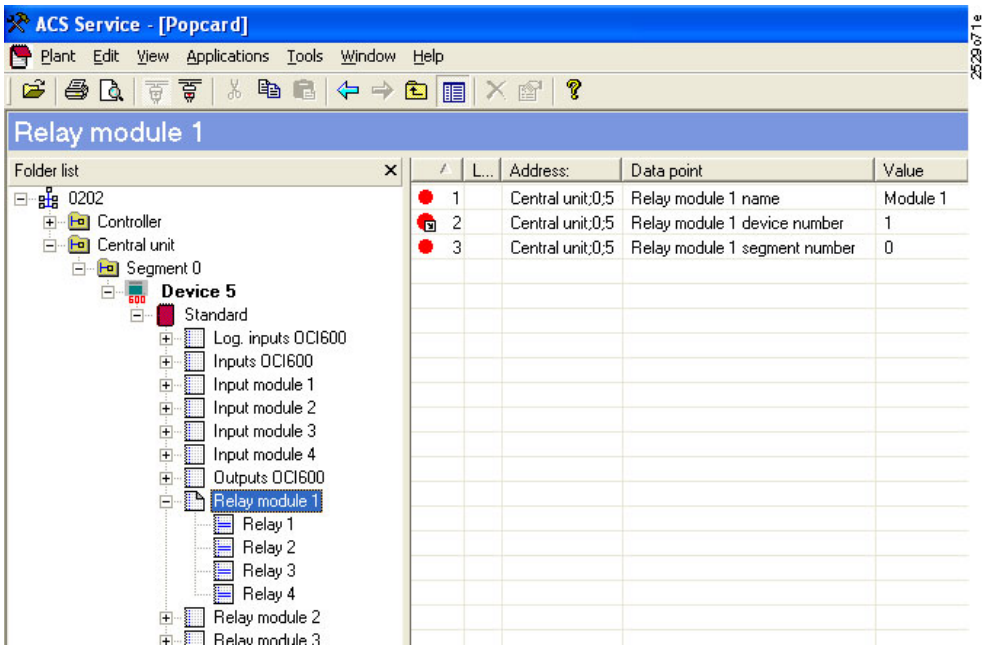
**Preparatory work**

Before integrating the DOE4RE input module into the OCI600, ensure that:

- Power is available
- The LED on the relay module flashes

**Settings in ACS7...**

When these preconditions are satisfied, make the required settings in the ACS7… software:

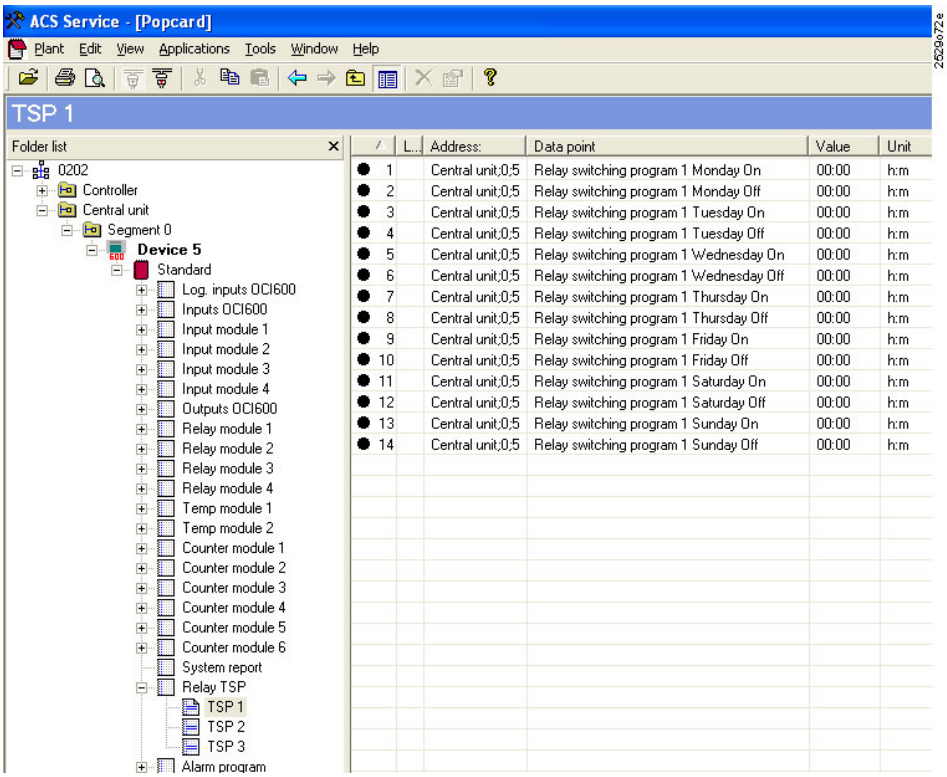



1. On the **View** menu, deactivate **Consider dependencies**.
2. From the **Applications > Popcard…** menu, select operating page “Relay module n”. Then, the right half of the screen will show you data points “Relay module n name”, “Relay module n device number” and “Relay module n segment number” for each relay module.
3. Double-click on the respective line to open the entry field for entering the module’s name (maximum 16 characters), the device number and the segment number. Both the device and the segment number must accord with the settings made on the Batibus relay modules.
4. Expand to go to the operating pages of the individual relays. For each relay, you will find data points “Relay module n relay n name”, “Relay module n relay n state” and “Relay module n relay n mode”. Edit the name.
5. You can change data point “Relay module n relay n state” only if data point “Relay module n relay n mode” (see next item) is set to “Manual”.
   Note: “On” means “Contact closed”.
6. For data point “Relay module n relay n mode”, determine how the output relay shall be controlled. The parameter values have the following meaning:

| Parameter value | Description |
|---|---|
| Manual | The state of the relay can be changed manually via the Popcard of the ACS7... operating software |
| 7-day program 1, 2 or 3 | The relay's state is controlled by one of the three 7-day programs. For every day, 1 switch-on and 1 switch-off time can be defined |

**7-day program**

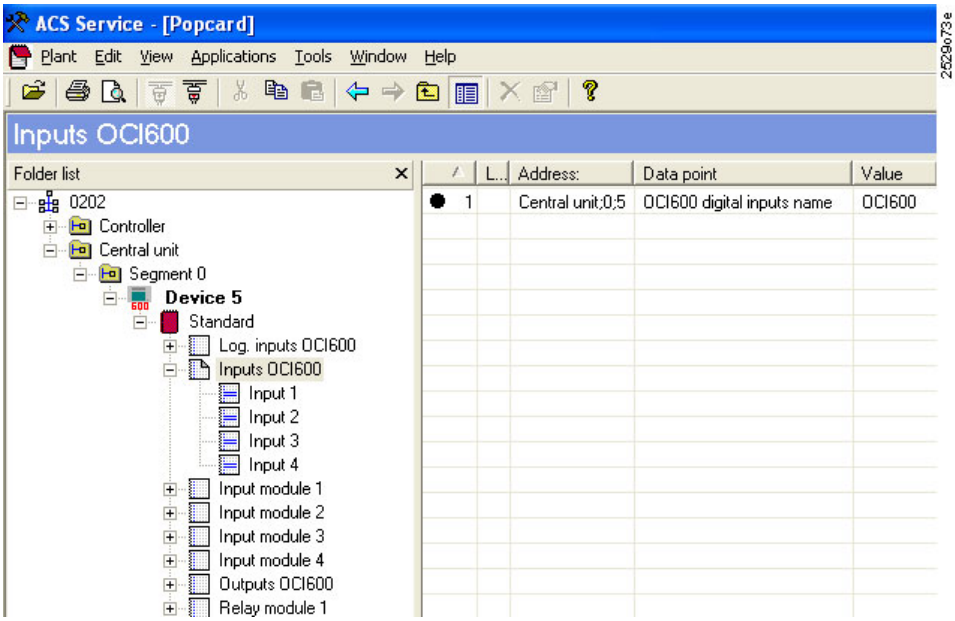
The 7-day programs can be entered on the **Applications > Popcard…** menu, operating page "Relay TSP".




## 3.3.6 Parameterizing the digital inputs of the OCI600

**Procedure**

From the **Applications > Popcard…** menu, select operating page "Inputs OCI600".



The 4 digital inputs of the OCI600 are presented as a module to which a freely selectable name with a maximum of 16 characters can be assigned.
For each of the 4 inputs, edit the relevant values of the data points listed below.

Data point:
Input n name

For each input, a freely selectable name with a maximum of 16 characters can be entered.

Data point:
Input n type

| Parameter value | Description |
|---|---|
| Signalisation | The status of the input will be displayed,<br>e.g. burner on or off |
| Operating hours | The status of the input will be displayed, and the period of time during which this status was active. This makes it possible to acquire the number of burner operating hours, for example |
| Service | For service purposes, **forwarding all alarms of the OCI600** will be suppressed if an input switch of the service type is operated |
| Alarm only coming | When activating the input, an alarm will automatically be delivered to the associated alarm receiver |
| Alarm coming and going | The input is used as an alarm input.<br>Every signal change "Active > Inactive" ,<br>or vice versa, at the input causes an alarm to be transmitted |

Data point:
Input n polarity

| Parameter value | Description |
|---|---|
| Normal | Input is inactive when contact is open (NO) |
| Inverted | Input is inactive when contact is closed (NC) |

Data point:
Input n call

Assign the phone numbers for the alarm message to the inputs that are parameterized as alarms. Alarm messages can be delivered to 4 different phone numbers in different combinations.

Data point:
Input n relay

Each digital input can be assigned to 1 of the 2 “OCI600 outputs”.

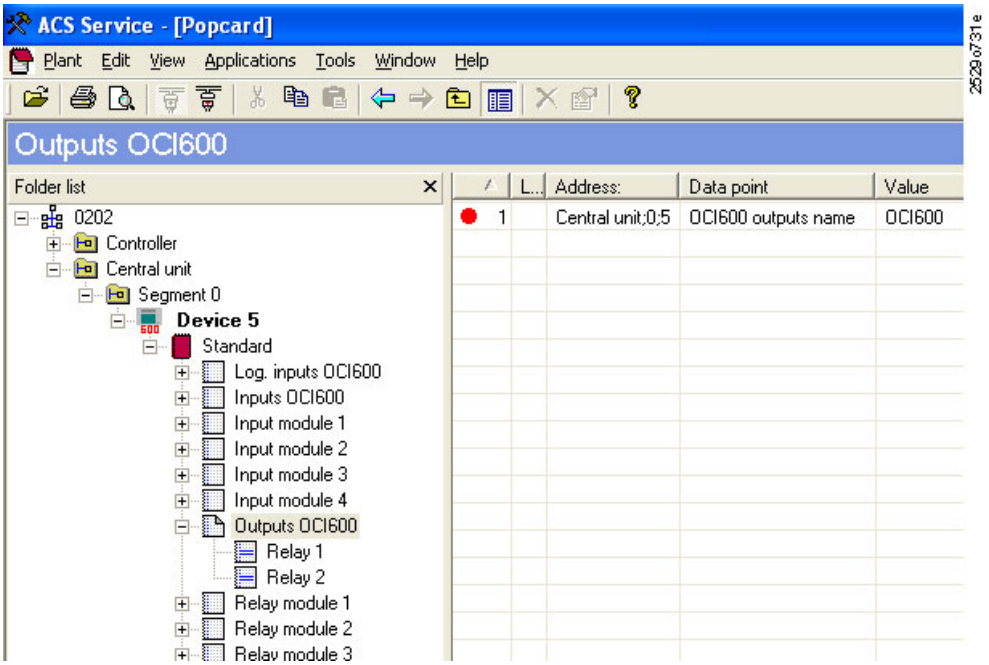
| Parameter value | Description |
|---|---|
| No action | No forwarding |
| OCI600 relay 1 | Energizing relay 1 in the OCI600 |
| OCI600 relay 2 | Energizing relay 2 in the OCI600 |

Data points “OCI600 digital input n state” and “OCI600 digit input n operating hours” are read only data points.

## 3.3.7 Parameterizing the digital outputs of the OCI600

**Procedure**

From the **Applications > Popcard...** menu, select operating page “Outputs OCI600”.




The 2 digital outputs of the OCI600 are presented as a module to which a freely selectable name with a maximum of 16 characters can be assigned.

Data point:
Relay n name

Also, 1 operating level lower, names with a maximum of 16 characters can be assigned to the 2 relays.

Data points:
Relay n state and
Relay n mode

Binary output “Relay n state” can be changed directly by the operator if data point “Relay n mode” is set to “Manual”. “Relay n mode” can also be set to “7-day program 1” through “7-day program 3”. The procedure is the same as that described in “3.3.5 Integrating the DOE4RE relay module into the OCI600”.

**Linking inputs with outputs**

The inputs of “Input module 1” through “Input module 4” of “Log. inputs OCI600” and “Inputs OCI600” (digital inputs) can be switched to the 2 “Outputs OCI600” (digital outputs).
If the states of several inputs are forwarded to the same relay, the relay will stay active until all inputs are inactive. This way, a common alarm can be implemented.

**Note**

A relay used in this way cannot simultaneously be controlled manually or by a 7-day program. Control via inputs has the highest priority.

## 3.3.8 Parameterizing the logic inputs

**Alarm function for 4 error groups**

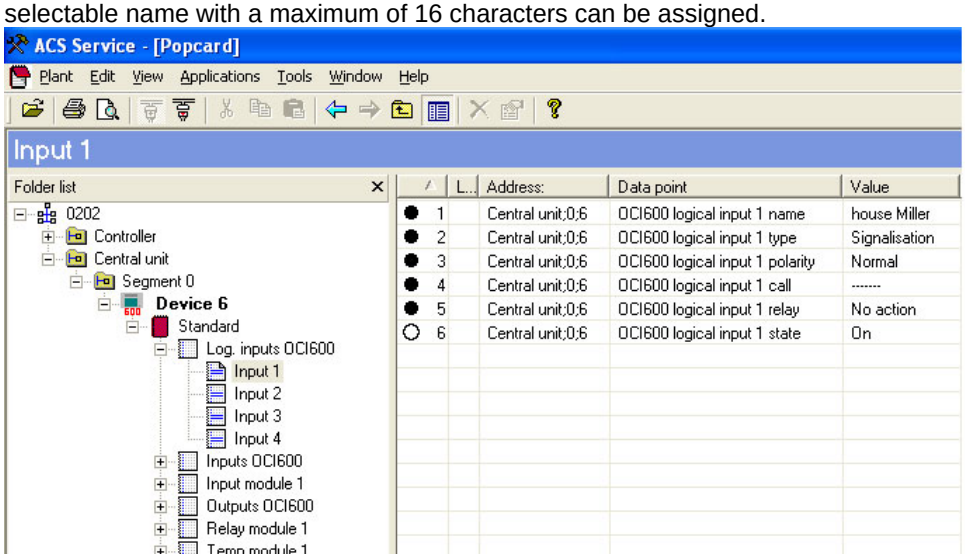
As mentioned in subsections 3.3.4 and 3.3.6, each of the Batibus inputs and the digital inputs has data point “Input n type”, which can be used to activate an alarm. In addition, the “Logic inputs OCI600” can be used to implement a common alarm for 4 error groups. The following 4 error groups are ready assigned to the 4 inputs of the “Logic inputs OCI600”:

| Input | Meaning |
|---|---|
| 1: Communication error | Internal error of OCI600 (error codes 80-99) |
| 2: LPB device error | Error messages from LPB controllers [1)] |
| 3: Sensor error | Error messages from QAB30.600 temperature sensors |
| 4: SYNERGYR error | Error messages from an OZW30 central unit connected to the bus |

[1)] The controller delivers an alarm message via bus only if the priority of the error is high enough

**Procedure**

From the **Applications > Popcard…** menu, select operating page “Log. inputs OCI600”.
The 4 logic inputs at the OCI600 will be presented as a module to which a freely selectable name with a maximum of 16 characters can be assigned.




For each of the 4 logic inputs, edit the relevant values of the data points mentioned below.

Data point:
Logic input n name

For each input, a freely selectable name with a maximum of 16 characters can be entered.

Data point:
Logic input n type

| Parameter value | Description |
|---|---|
| Signalisation | The status of the logic input will be displayed, e.g. input 1: Communication error present or not present |
| Operating hours | No function |
| Service | No function |
| Alarm only coming | An alarm will be delivered when an error from the error group of the logic input occurs |
| Alarm coming and going | An alarm will be delivered when an error from the error group of the logic input occurs and disappears |

Data point:
Input n polarity

Recommendation: Always set the polarity to “Normal” (the delivery of alarms when no alarms occur, or vice versa, makes no sense).

Data point:
Input n call

For the logic inputs parameterized as alarms, select the phone number to which the alarm message shall be sent. Alarm messages can be sent to 4 different numbers in different combinations.

Data point:
Input n relay

Each logic input can be assigned to 1 of the 2 “Outputs OCI600”.

## 3.4 Notes on storing and loading a configuration

Special loading of the edited settings is **not** required on the Popcards. Once connected, the changed values will be directly written to the OCI600 where they are stored.

**Making a backup**

Using **Applications > Parameter settings…** in ACS Operating and ACS Service, the configurations of the OCI600 (and of all other devices that can be reached via LPB) can be uploaded, stored in the ACS7…, and from there downloaded to the devices.
Application examples:

- In case the OCI600 requires a reset to the factory-set default values (e.g. communication password forgotten), a backup is required
- The current parameter settings shall be used for some other plant, similar or identical plant
- Some other parameter settings shall be tested without having to overwrite the former settings

A detailed description of the **Applications > Parameter settings…** function is given in the Online Help of the ACS7… software.

# 4 Communication

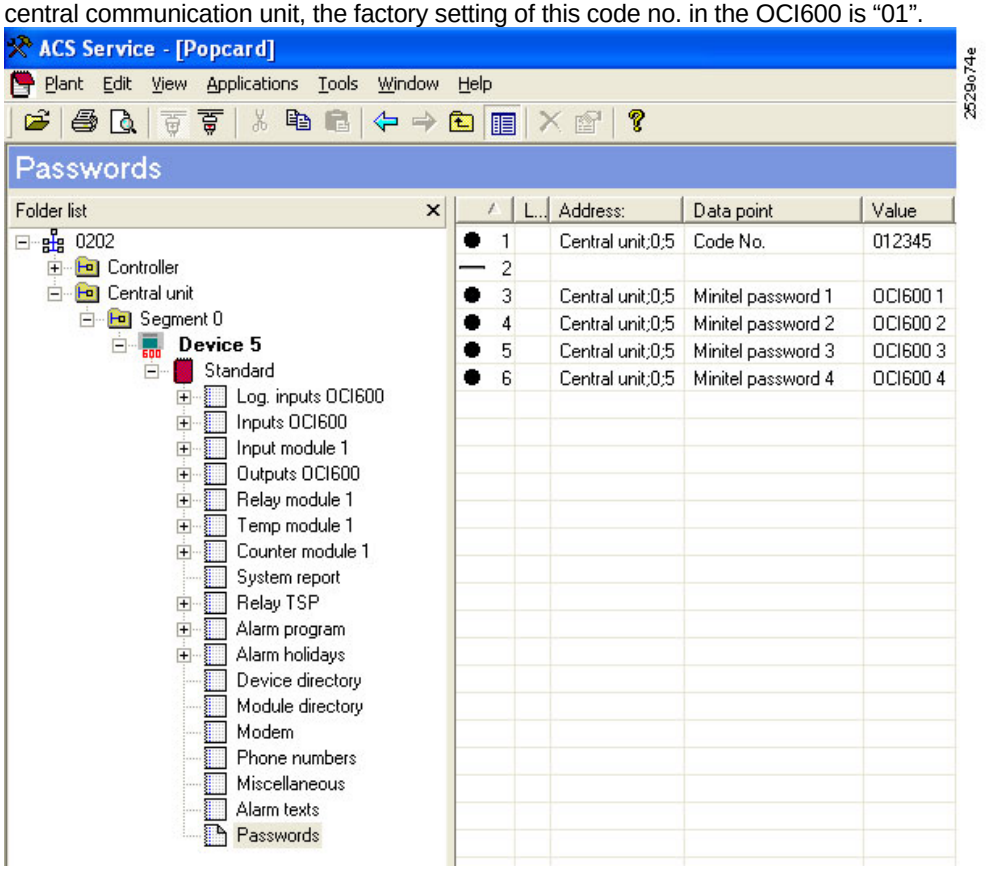
## 4.1 Authorization of access

**Connection password-protected**

Each connection that is opened, be it directly via the RS-232 port or via modem and the public telephone network, is protected by a password.
A connection can only be opened if the password in the ACS7... operator station and that in the OCI600 agree.
The password (code no.) in the OCI600 central communication unit is set in the ACS7... using the **Popcard** application on operating page “Passwords”, data point “Code no.”.

**State as supplied**

To make possible the first connection between the ACS7... software and the OCI600 central communication unit, the factory setting of this code no. in the OCI600 is “01”.




**Procedure for changing the password**

To change the code no. that serves as a password, proceed as follows:

1. In ACS Service – [Popcard], select operating page **Passwords**.
   Note: In that case, you need to have an online connection to the OCI600.
2. Enter the new numeric password of the OCI600 under “Code no.” (maximum 7 numeric characters starting with 0, e.g. 07845).
3. Select **Plant > Plant properties…**
4. Choose **Continue** to go to dialog box **Communication.**
5. Enter the new numeric password of the ACS operator station under **Code number** (same as point 2 above) and close with **Finish**.
6. The numeric password is changed and active next time a connection is opened.

**Password forgotten**

If the password of the software under **Plant properties …** is different from the password active in the OCI600 and you do not know the latter, there is only one thing you can do, namely to reinitialize the central unit (reset). This is made by simultaneously pressing buttons [−] and [+] on the left and button [+] on the right both before and when the OCI600 power supply is switched on. When doing this, all data will be reset to their factory-set default values. This means that setting values that

have already been parameterized will be lost and the password will be set to “01”. Hence, the system must be set up again.

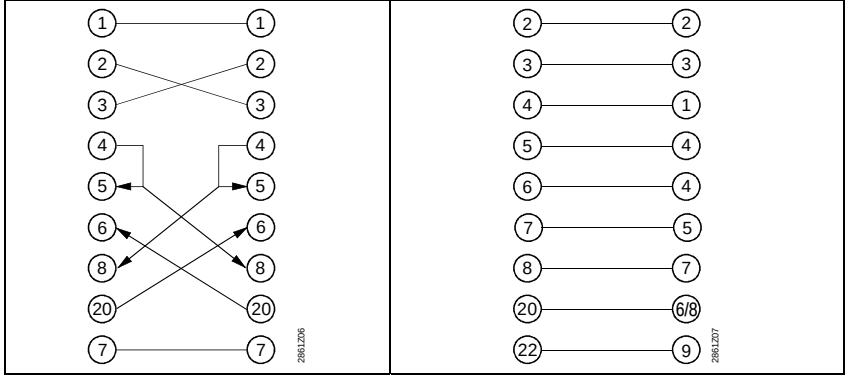
## 4.2 Direct connection via RS-232 port

### 4.2.1 Hardware

For a direct connection from the PC to the OCI600 central communication unit, use a commercially available standard null modem or link cable. The illustration below shows the wiring inside the standard null modem cable and link cable.

**Pin assignment**

| Standard null modem cable | | Link cable | |
|---|---|---|---|
| 25-pole | 25-pole | 25-pole | 9-pole |
| | | Female | Female |




### 4.2.2 Opening the direct connection

**Opening the direct communication**

1. Use the buttons of the OCI600, operating page 3, line number 11, to select **3** (PC local with alarm).
2. Use operating page 3, line number 08, to select **4** (9600 Baud).
3. In the ACS7… software, choose menu item **Plant > Connection on**.
   Status window “Connection information” appears, showing the current state of opening the communication. When the connection is open, menu item **Plant > Connection on** is not highlighted and **Plant > Connection off** and the “Disconnect” symbol can be selected. Also, the window heading reads **[State - Connected]**.

# 4.3 Modem connection

## 4.3.1 Introduction

The use of modem technology makes it possible to implement remote monitoring and remote alerting.
Receiver and transmitter of remote monitoring and receiver of alarms can be the ACS7… software running on a PC with a modem connection facility. In that case, 2 modems are used: 1 at the central unit and 1 at the PC.
The receiver of alarms can also be a mobile phone, pager, fax, serial printer or Minitel station (France only). In that case, only 1 modem at the central unit is required.

Compared to a standard **analog modem,** an **ISDN modem** does not offer higher speeds since the rate of transmission of the central unit is the limiting element. The use of a **GSM modem** looks promising if it is not possible to run a telephone line.
Contact the telephone provider to obtain information about the available protocols and phone nos. / calling nos. to be set for the required functionalities.

**More information in the User Manual**

User Manual U2529 gives the calling nos. for individual countries to be set on operating page “Phone numbers”. Please note that these numbers can change and new choices may be available when new providers appear on the market.

Subsection “4.3.2 Installing a PC modem” provides information about the installation of modems. An overview of the choices available when selecting a certain modem technology and protocols is given in subsection “4.3.3 Selecting the modem and the provider”. Subsection “4.3.4 Configuring the modem connection” describes the required modem settings, and chapter “5 Alarms” gives a description of the settings steps on the software side for all alarm choices.

## 4.3.2 Installing a PC modem

The procedure to be followed when integrating a PC modem depends on the type of modem and the type of operating system. All Windows versions offer support in their Online Help. For that purpose, select **Start > Help** or click on the Desktop and press function key F1. Then, in Windows Online Help, search for “Install modem” and follow the instructions given.

### 4.3.3 Selecting the modem and the provider

**Remote maintenance with ACS7...**

If the plant shall be maintained from a remote location via modem and if alarms shall be delivered via the telephone network, 2 modems are needed: 1 at the central unit and 1 at the PC on which the ACS7... software is installed. It is to be noted here that an ISDN modem cannot be combined with an analog or GSM modem; it can only communicate with an ISDN partner modem.

**Tip**

We also recommend testing the compatibility of the 2 modems prior to installing them. Even when based on the HAYES AT command set, compatibility cannot necessarily be guaranteed.

**Use of mobile phone, pager or fax**

To reach a mobile phone, pager or fax, a modem at the OCI600 is required. The following protocols are used:

| Application | Analog and GSM modem | ISDN modem |
|---|---|---|
| Alarm to mobile phone | • UCP<br>• TAP for SMS | • UCP<br>• TAP for SMS |
| Alarm to pager | • TAP | • TAP |
| Alarm to fax | • Modem must support “Group 2 fax protocol”<br>• Fax terminal must be downward-compatible and support the “Group **3** fax protocol” | Not commercially available |

**Explanations to the table**

For SMS in the case of an analog modem, the Universal Computer Protocol (UCP) or the Telocator Alphanumeric Input Protocol (TAP) for SMS can be used. For pager messages, TAP is used.

The OCI600 supports neither the original AT+ Protocol of GSM modems for sending SMS nor pager messages.
For SMS in the case of a GSM modem, the UCP of an **analog connection** or the TAP for SMS of an **analog connection** can be used. For pager messages, the TAP number of an **analog connection** is used.

For SMS with an ISDN modem, the UCP or the TAP for SMS is used. For pager messages, TAP is used.

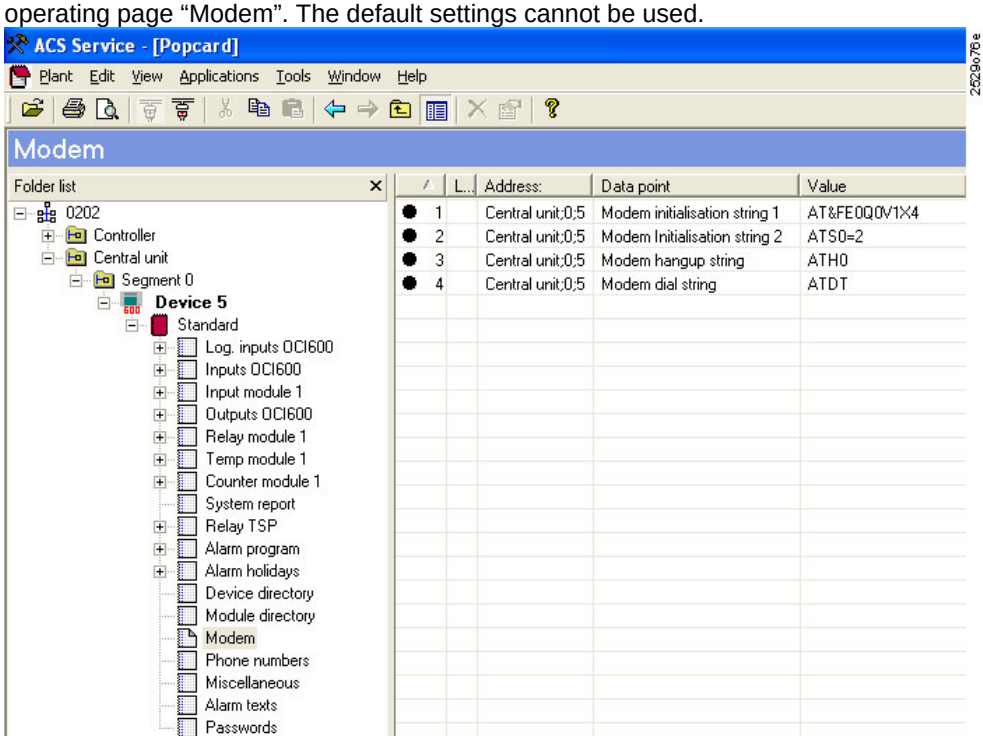
**Questions for the provider**

- Does the **fixed network** provider support the transmission of SMS via UCP or TAP and / or the transmission of pager information via TAP?
- What are the phone nos. / calling nos. (service center nos.) to make use of these services?
- Are these phone nos. for analog modems or ISDN modems?
- Does the **GSM** provider support the transmission of SMS or pager information via UCP/TAP (not AT+)?
- What are the phone nos. / calling nos. (service center nos.) to make use of these services?

## 4.3.4 Configuring the modem connection

**Procedure**

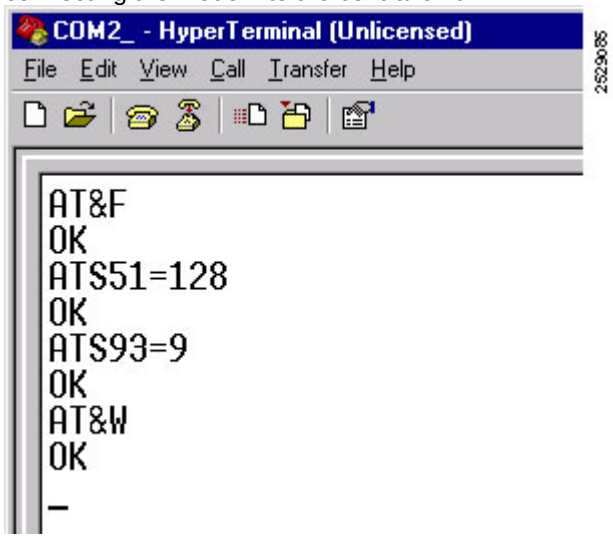
Before connecting a modem to the OCI600, a number of settings must be made on operating page “Modem”. The default settings cannot be used.




Make the following data point entries:

| Data point | Analog / GSM | ISDN (recommendation) |
|---|---|---|
| Modem initialisation string 1 | AT&FE0Q0V1X4 | ATE0Q0V1X4 |
| Modem initialisation string 2 | ATS0=2 | ATS0=2 |
| Modem hangup string | ATH0 | ATH |
| Modem dial string | ATDT | ATD |

In addition, the ISDN adapter requires the following presettings (recommendation), which must be made with a terminal program (e.g. Windows Hyper Terminal) before connecting the modem to the central unit:



## 4.3.5 Notes on communication choices

**Selecting the type of communication**

The type of communication of the OCI600 can be selected with its buttons, using operating page 3, line number 11:

| Type of communication | Description, notes on alarm behavior |
|---|---|
| 0 = Minitel local | (As supplied); can only be used in France |
| 1 = Modem | • The OCI600 is operated from a PC with ACS7... via the telephone network<br>• The alarm message is sent to the selected alarm receiver (refer to chapter “5 Alarms”)<br>• Note: Once a PC with ACS Operating has opened a connection to the OCI600, the latter cannot send any alarms during that time, because the connection is busy (general system characteristic of a telephone connection) |
| 2 = PC local without alarms | Alarm messages are not delivered during the time a connection is opened |
| 3 = PC local with alarms | Alarm messages are also delivered during the time a connection is opened |

**General information about Baud rate**

Especially in the case of communication via modem (fax, pager, mobile phone), the provider may send the message at a low Baud rate (e.g. 1200 Baud). The only rule to be observed by the user of the OCI600 is to ensure that the Baud rate set on the OCI600 **is not lower** than that set on the telephone network. For that reason, the maximum Baud rate is to be set to 9600 Baud.

The Baud rate of the OCI600 central communication unit is to be set with its buttons on operating page 3, line number 8. For both the direct connection and communication via modem, the setting to be used is **4** = 9600 Baud.

## 4.3.6 Opening the connection via modem

**Procedure**

1. Cut the direct connection between PC and OCI600, if such a connection exists.
2. Connect the modem to the OCI600 and check power supply and the cables to the OCI600 and those to the telephone network.
3. On the OCI600, line number 11 of operating page 3, set the parameter: 1 = modem.
4. Connect the second modem to the PC and check power supply and the cables to the communication network and those to the COM port.

**Note on ACS operation**

5. Start ACS Operating.
   Note: Communication via modem can only be opened with ACS Operating.
6. Choose menu **Plant > Plant properties…**
7. Choose **Continue >** to go to the “Communication” dialog.
8. At “Connection:”, select your modem on the PC side.
9. In field “Phone no. plant:”, enter the phone no. of the modem on the OCI600 side.
10. Close the dialog by selecting “Finish”.
11. Choose menu item **Plant > Connection on**.
12. Status window “Connection information” appears showing the current state of the communication opening process. Once the connection is established, menu item **Plant > Connection on** is not highlighted, and **Plant > Connection off** and the “Disconnect” symbol can be selected. In addition, the window heading reads **[State - Connected]**.

# 5 Alarms

## 5.1 Alarms and errors with the OCI600

**Terms:**
**Alarms and errors**

**Alarms** are triggered by the alarm-capable inputs of the OCI600, which are:

- The Batibus inputs DOE4IN
- The digital inputs of the OCI600
- The logic inputs of the OCI600

**Errors** are internal malfunctions of the OCI600, communication errors and malfunctions of LPB users forwarded via the LPB. For more information about errors and the entire list of errors, refer to chapter “7 Error handling”.

The 4 logic inputs make it possible to further handle part of the potential errors as alarms. For more detailed information, also refer to subsection “3.3.8 Parameterizing the logic inputs”.

**Alarm handling**

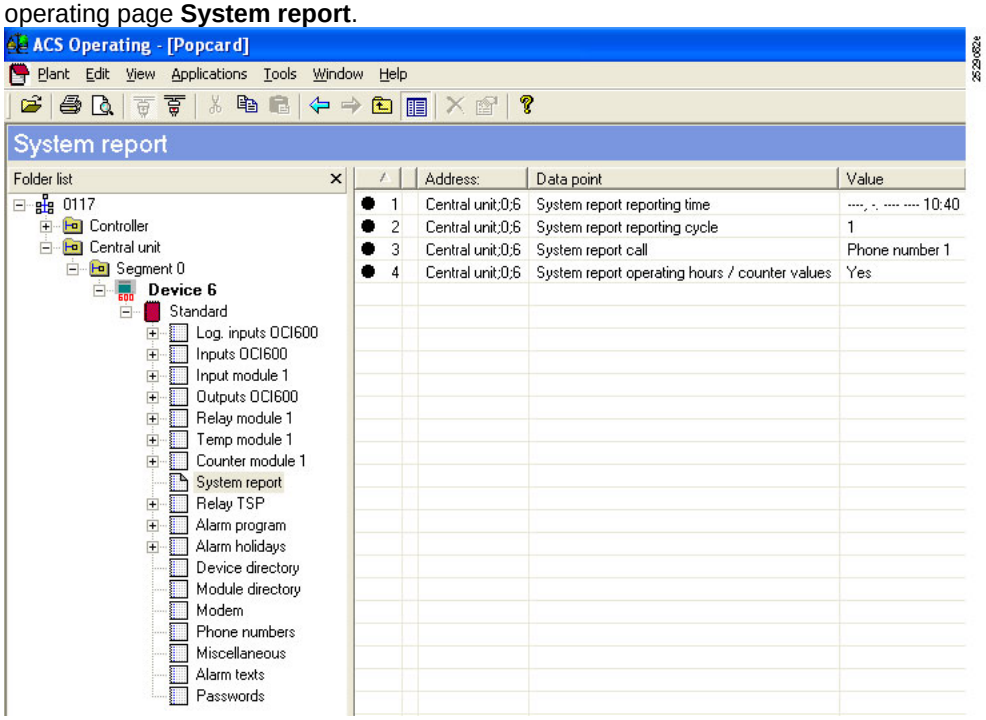
When the ACS7… software is installed on a PC, ACS Alarm can be employed for convenient alarm handling. In the event of an alarm, the OCI600 calls the PC modem or contacts the directly connected PC, where ACS Alarm visualizes the event. The OCI600 can send an SMS, pager message or fax to the mobile service engineer. In France, the OCI600 can also call a Minitel station.

## 5.2 System report

The system report can be used to transmit regular reports about the plant’s state, enabling the plant or plant section to be checked at regular intervals. The system report shows primarily pending – not yet acknowledged – plant alarms, but also counter values and the number of operating hours. The digital inputs and counters must be appropriately parameterized.
The reporting cycle can be set to 1...99 days.

**Parameter settings**

The parameters of the system report are to be set in the **Popcard…** application on operating page **System report**.



| Parameter value | Description |
|---|---|
| System report reporting time | This is the time of day the system report is sent to the assigned phone no. |
| System report reporting cycle | 1...99 days |
| System report call | The receivers of the system report can be entered:<br>• In the case of direct communication, a system report is sent to the PC with ACS Alarm for each phone no. set<br>• In the case of communication via the telephone network, the system report can be transmitted to a PC, fax or, in France, Minitel station. The relevant settings are to be made on operating page “Phone numbers.” (refer to the next subsections) |
| System report operating hours / counter values | If “Yes” has been entered, the system report also includes counter values and the number of operating hours |

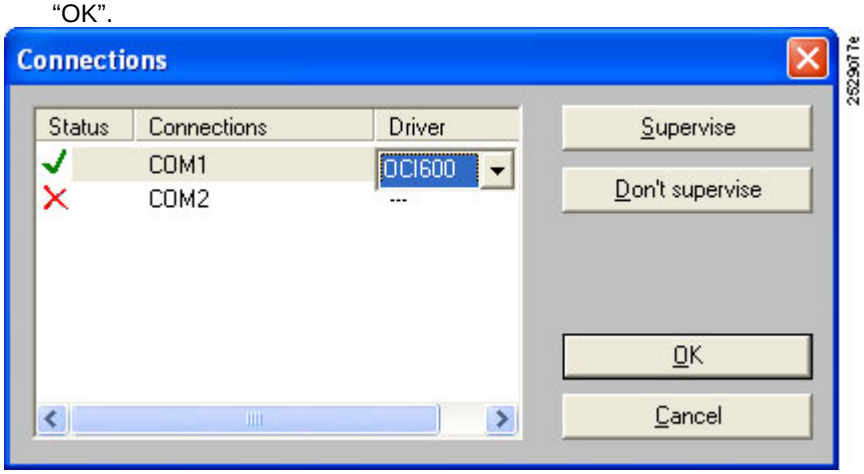
**System report: Mobile phone and pager**

When a system report is sent to a pager, or via SMS to a mobile phone, only the sender and the plant’s name appear on the display, but no data. These restrictions are to be observed since the system report is too large for the transmission to mobile phones and pagers.

## 5.3 Sending alarms to the directly connected ACS7... software

**Procedure**

1. On the OCI600, on line number 11 of operating page 3, select:
   3 = PC local with alarms.
2. On line number 08 of operating page 3, select:
   4 = 9600 Baud.
3. Establish the cable connection between PC and central unit.
4. Start **ACS Alarm** via the **ACS Alarm** icon on your Desktop or via **Start > Programs > ACS > ACS Alarm**.
5. Open the **Extras > Connections…** menu.
6. Select the line with the PC port to which the cable is connected (e.g. COM1) and double-click on the respective line in the “Driver” column.
7. Select the type of central unit “OCI600” and close by choosing “Supervise” and “OK”.




### 5.3.1 Testing the alarms

**Triggering a system report**

It is recommended to test the alarms as long as there is a local connection to the plant. If communication takes place via modem, it is more difficult to rectify parameter setting errors. The easiest way to make an alarm test is to trigger a system report.

**Note**

The only obstacle is that system reports can only be received once a day. For this reason – in the procedure described below – the system time is put forward one day.

You are still using the **ACS Alarm** software.

**Procedure**

1. Choose **Window > New system report window**.
2. Start **ACS Service** and open **Applications > Popcard…**
3. On operating page **Miscellaneous,** set data point “Time of day” to the date of the previous day and wait about 1 minute.
4. On operating page **System report,** keep data point “System report reporting time” and edit the following data points:
   “System report reporting cycle”: 1
   “System report call”: E.g. phone number 1+2+3+4
   “System report operating hours / counter values”: Yes
5. On operating line **Miscellaneous,** set the time of day back to the correct date.

Within 3 minutes, **ACS Alarm** should produce 4 system reports for the 4 phone numbers.

**General note: Phone numbers / direct mode**

In contrast to the alarm functions via the telephone network, which are covered by the following subsections, operating page “Phone numbers.” for direct mode need not be configured.

However, to ensure that an alarm or system report can be delivered, at least one phone no. must be selected at data point “Input n call” (for alarms) and at data point “System report call” (for system reports). If more than 1 phone number is selected, an alarm message or system report will be transmitted to ACS Alarm for each number (also refer to the example given in the last subsection).

## 5.4 Alarms by ACS7… connected via modem

**Procedure**

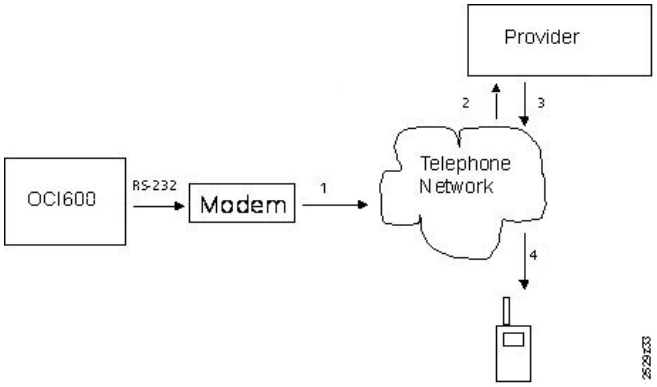
1. On the OCI600, line number 11 of operating page 3, select: 1 = modem
2. On line number 8 of operating page 3, select: 4 = 9600 Baud.
3. Establish the hardware connection according to subsection “4.3.6 Opening the connection”.
4. Start **ACS Alarm** via the **ACS Alarm** icon on your Desktop or via **Start > Programs > ACS > ACS Alarm**.
5. Open menu **Tools > Connections…**
6. Select the line with your modem entry.
7. Select the type of central unit “OCI600” and close with “Supervise” and then with “OK”.

In ACS Operating – [Popcard], make the following entries on operating page “Phone numbers”:

| Data point | Setting |
|---|---|
| Phone number OCI600 | (Entry optional)<br>Plant phone no. OCI600 is transmitted along with the alarm text |
| Phone number n | Phone no. of modem on the PC side |
| Additional number for mobile phone or pager n | No entry |
| Type of alarm receiver under phone number n | PC alarm receiver |
| Modem partner initialisation string n | No entry permitted |

You can also test the alarms now, as described in subsection “5.3.1 Testing the alarms”. However, in contrast to direct mode, please note that in this case, you need to enable the line again (refer to subsection “4.3.5 Notes on communication choices”).

## 5.5 Alarms to mobile phone



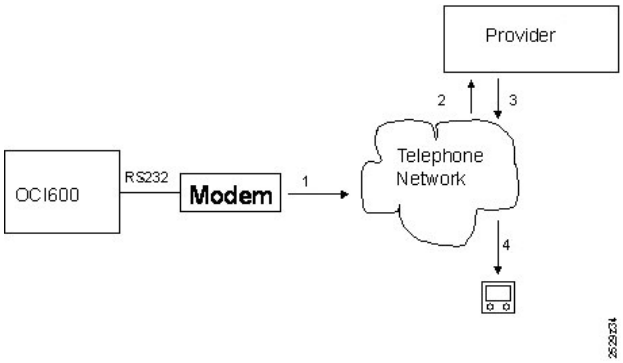

**Procedure**

In **ACS Service – [Popcard],** make the following entries on operating page “Phone numbers”:

| Data point | Setting |
|---|---|
| Phone number OCI600 | (Entry optional)<br>Plant phone no. OCI600;<br>displayed together with the SMS [1)] |
| Phone number n | Phone no. of SMS provider [2)] |
| Additional number for mobile phone or pager n | No. of SMS receiver (mobile phone) that shall receive the message [2)] |
| Type of alarm receiver under phone number n | • Mobile phone SMS (UCP)<br>• Pager alphanumeric 40 characters (8N1) (TAP for SMS)[3)]<br>• Pager alphanumeric 40 characters (7E1) (TAP for SMS) [3)]<br>• Pager alphanumeric 80 characters (8N1) (TAP for SMS) [3)]<br>• Pager alphanumeric 80 characters (7E1) (TAP for SMS) [3)] |
| Modem partner initialisation string n | No entry permitted |

[1)] Permitted characters are **a-z A-Z 0-9 blanks ! „ # $ % & , ( ) * + ` - . / : ; < = > ?** @.
[2)] Only numerals permitted, no “+” characters
[3)] TAP for SMS: The setting must be made in accordance with the technical outfit of the SMS receiver and the extra specification on the phone nos. of the selected TAP for SMS delivered by the provider. The OCI600 limits the maximum number of characters to 80 however. Hence, in the case of an SMS receiver providing 160 characters and the provider specification “00491712092522, 8N1, 160”, the setting to be made is “Pager alphanumeric 80 characters (8N1)”

# 5.6 Alarms to pager




**Procedure**

In **ACS Service – [Popcard],** make the following entries on operating page “Phone numbers”:

| Data point | Setting |
|---|---|
| Phone number OCI600 | (Entry optional)<br>Plant phone no. OCI600; displayed on alphanumeric and numeric pagers [1)] |
| Phone number n | Phone no. of pager provider (TAP) for analog / GSM and ISDN modem [2)] |
| Additional number for mobile phone or pager n | Number of pager receiver that shall receive the message [2)] |
| Type of alarm receiver under phone number n | • Pager numeric (8N1) [3)]<br>• Pager numeric (7E1) [3)]<br>• Pager alphanumeric 40 characters (8N1) [3)]<br>• Pager alphanumeric 40 characters (7E1) [3)]<br>• Pager alphanumeric 80 characters (8N1) [3)]<br>• Pager alphanumeric 80 characters (7E1) [3)] |
| Modem partner initialisation string n | No entry permitted |

1)

- Numeric pager: Only numerals permitted
- Alphanumeric pager: Permitted characters are: **a-z A-Z 0-9 blanks ! „ # $ % & , ( ) * + ` - . / : ; < = > ?** @.

2) Only numerals permitted; no “+” characters

3) The setting must be made in accordance with the technical outfit of the pager and the extra specification on the phone nos. of the selected TAP pager delivered by the provider. The OCI600 limits the maximum number of characters to 80 however. Hence, in the case of a pager providing 160 characters and the provider specification “00491712092522, 8N1, 160”, the setting to be made is “Pager alphanumeric 80 characters (8N1)”

## 5.7 Alarms to fax machine

**Procedure**

In **ACS Service – [Popcard],** make the following entries on operating page “Phone numbers”:

| Parameter | Setting |
|---|---|
| Phone number OCI600 | (Entry optional)<br>Plant phone no. OCI600; appears on fax |
| Phone number n | Phone no. of fax machine [1)] |
| Additional number for mobile phone or pager n | No entry |
| Type of alarm receiver under phone number n | Fax |
| Modem partner initialisation string n | No entry permitted |

[1)] Entry must consist of numerals only; no “+” characters permitted

## 5.8 Waiting times in connection with alarms

**Repetition of alarms**

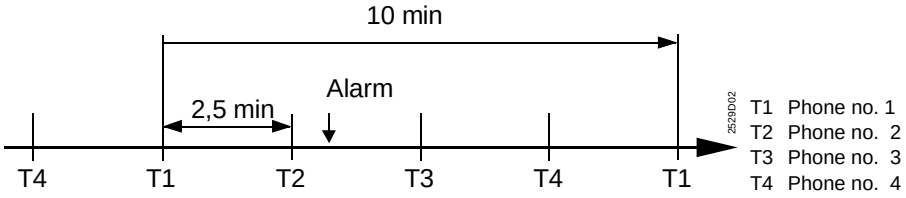
In the event of an alarm, the OCI600 central communication unit tries to open a connection to the alarm receiver and to deliver an alarm message. If this proves impossible at this point in time, the OCI600 will try 2 more times to open the connection after a certain waiting time has elapsed. This waiting time depends on the type of communication. The time frame within which an alarm is delivered to the respective phone no. is predefined and independent of the point in time the alarm-triggering event occurred.

- In the case of a **direct connection**, the waiting time is 30 seconds. This means that it may take 30 seconds for an alarm to be delivered
- In the case of **communication via modem**, the waiting time is 10 minutes per phone no. An alarm is forwarded to the next phone no. after 2.5 minutes. Hence, since 4 phone nos. are available, an attempt is made every 10 minutes to deliver an alarm to the same phone no.

**Order of delivering alarms**

A call priority cannot be assigned to phone nos. 1 through 4. For this reason, it is not possible to define the phone no. to which the alarm is delivered first.

**Example of modem communication**




An alarm shall be delivered to phone no. T1. An alarm can occur at any time. In our example, the alarm is delivered to phone no. T1 after about 7 minutes. This means that 10 minutes is the maximum time from the moment the alarm occurs to the moment it is sent to the alarm receiver.

# 5.9 Alarm text

## 5.9.1 Text with ACS Alarm

**ACS Alarm**

In ACS Alarm, the texts of system reports and alarm messages are made up of readily available modules of a text database available in the software and the names of the reporting input modules as defined by the user, and their inputs. The fixed text modules are available in several languages and filed in the database. They appear in the language selected when starting up ACS Alarm.

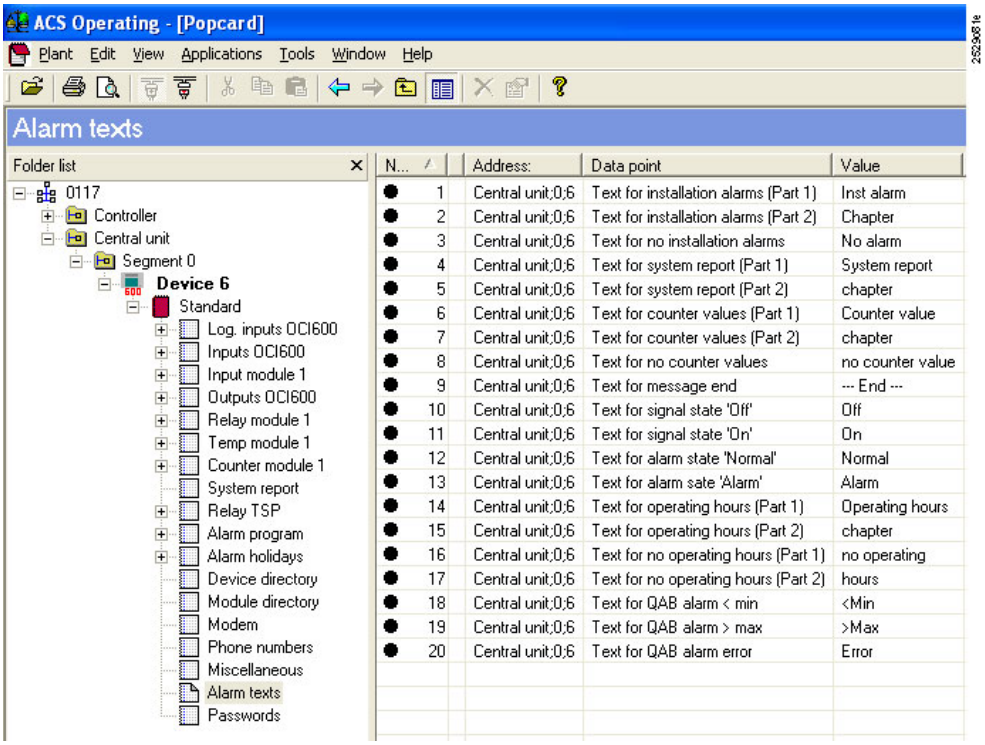
## 5.9.2 Text with fax, Minitel and serial pinter

**Fax, Minitel and serial printer**

When output on a fax, Minitel or serial printer, the texts of system reports and alarm messages consist of the alarm texts as defined by the user and the names of the reporting input modules and their inputs.

**Entering alarm text**

The alarm texts are to be parameterized in the **Popcard** application on operating page **Alarm texts**.



The following example shows a system report as output by a fax machine. In this example, the OCI600 has an input whose operating hours are acquired and a counter input that is monitored.

**Example of a system report**

```
01-03-2005   09:33
Demo plant   0041 777 5555
Plant operating state   System report
No alarms
Operating hours   Section
01-03   09:33   General alarms
Burner 2   On   115  H
Counter values   Section
01-03   09:33   Module 1
Line 1   86   m3x100
--- End ---
```

The following layout shows the general makeup of a system report as a fax. When a text module begins with “Text for…”, the output shows the text that the user previously entered on operating page “Alarm texts”.
When the line numbers (Z.) are identical, the lines show alternatives. If an alternative requires several lines, the numbering is a, b, c, etc.

**Layout: System report**

| L. | Text modules |
|---|---|
| 1 | **[**Date**]** + **[**Time of day**]** |
| 2 | **[**Name of plant**]** + **[**Phone no. of plant**]** |
| 3 | **[**Text for system report (Part 1)**]** + **[**Text for system report (Part 2)**]** |
| 4 | **[**Text for installation alarms (Part 1)**]** + **[**Text for installation alarms (Part 2)**]** |
| 4 | **[**Text for no installation alarms**]** |
| 5 | **[**Text for operating hours (Part 1)**]** + **[**Text for operating hours (Part 2)**]** |
| 6 | **[**Text for no operating hours (Part 1)**]** + **[**Text for no operating hours (Part 2)**]** |
| 6a | **[**Date**]** + **[**Time of day**]** + **[**Module name of inputs**]** |
| 6b | **[**Name of input**]** + **[**Text for signal state 'On'**]**[1)] + **[**Number**]** + **[**Hours**]** |
| 7 | **[**Text for counter values (Part 1)**]** + **[**Text for counter values (Part 1)**]** |
| 8 | **[**Text for no counter values**]** |
| 8a | **[**Date**]** + **[**Time of day**]** + **[**Module name of inputs**]** |
| 8b | **[**Name of input**]** + **[**Number**]** + **[**Unit with factor**]** |
| 9 | **[**Text for end of message**]** |

[1)] Gives the signal state at the time the report is delivered

The following example shows the presentation of an alarm message delivered by a digital input as a fax.

**Example of alarm message: Digital input**

```
01-03-2005   09:33
Demo plant   0041 777 5555
Plant alarms   Section
01-03   09:33   General alarms
Dig. input 1   A3   Alarm!   D5   T1
--- End ---
```

The following 2 layouts show the makeup of an alarm message of a reporting input and of an alarm message of a reporting temperature input as a fax. When a text module begins with “Text for…”, the output shows the text that the user previously entered on operating page “Alarm texts”.
When the line numbers (Z.) are identical, the lines show alternatives.

**Layout alarm message: Input**

| L. | Text modules |
|---|---|
| 1 | **[**Date**]** + **[**Time of day**]** |
| 2 | **[**Name of plant**]** + **[**Phone no. of plant**]** |
| 3 | **[**Text for installation alarms (Part 1)**]** + **[**Text for installation alarms (Part 2)**]** |
| 4 | **[**Date**]** + **[**Time of day**]** + **[**Module name of inputs**]** |
| 5 | **[**Name report. input**]** + **[**Ax**]** + **[**Text for alarm state 'Alarm'**]** + **[**Dx**]** + **[**Tx**]** |
| 5 | **[**Name report. input**]** + **[**Ax**]** + **[**Text for alarm state 'Normal'**]** + **[**Dx**]** + **[**Tx**]** |
| 6 | **[**Text for end of message**]** |

**Layout alarm message: Input temperature module**

| L. | Text modules |
|---|---|
| 1 | **[**Date**]** + **[**Time of day**]** |
| 2 | **[**Name of plant**]** + **[**Phone no. of plant**]** |
| 3 | **[**Text for installation alarms (Part 1)**]** + **[**Text for installation alarms (Part 2)**]** |
| 4 | **[**Date**]** + **[**Time of day**]** + **[**Temperature module name**]** |
| 5 | **[**Name report. temperature input**]** + **[**Ax**]** + **[**Text for QAB alarm < min**]** + **[**Dx**]** **[**Tx**]** |
| 5 | **[**Name report. temperature input**]** + **[**Ax**]** + **[**Text for alarm state 'Normal'**]** + **[**Dx**]** **[**Tx**]** |
| 5 | **[**Name report. temperature input**]** + **[**Ax**]** + **[**Text for QAB alarm > max**]** + **[**Dx**]** **[**Tx**]** |
| 6 | **[**Text for end of message**]** |

In addition, the alarm messages use an alphanumeric code consisting of 2 characters, which have the following meaning:

**Ax**

Parameter settings of alarm type:

A3 Alarm only coming
A4 Alarm coming and going

**Dx**

Parameter settings of alarm calls:

D1 Phone no. 1
D2 Phone no. 2
D3 Phone no. 3
D4 Phone no. 4
D5 Phone nos. 1+2
D6 Phone nos. 1+2+3
D7 Phone nos. 1+2+3+4
D8 Phone nos. 3+4

**Tx**

Identification of phone no. to which the message was just delivered:

T1 Phone no. 1
T2 Phone no. 2
T3 Phone no. 3
T4 Phone no. 4

### 5.9.3 Text with mobile phone and pager

**Numeric pager**

In the case of a numeric pager and a parameterized alarm input 15, numeric characters are sent. This is the phone no. of the OCI600. If this number comprises more than 15 numerals, the last 15 will be sent. The number must not contain “+” or “/” characters.

**Alphanumeric pager and mobile phone**

In the case of an alphanumeric pager and SMS and a parameterized alarm input, the date, time of day, name of the OCI600, phone no. of the OCI600, name of the reporting module and name of the reporting input with a suffix for alarm (AL) or normal (NO) will be sent.

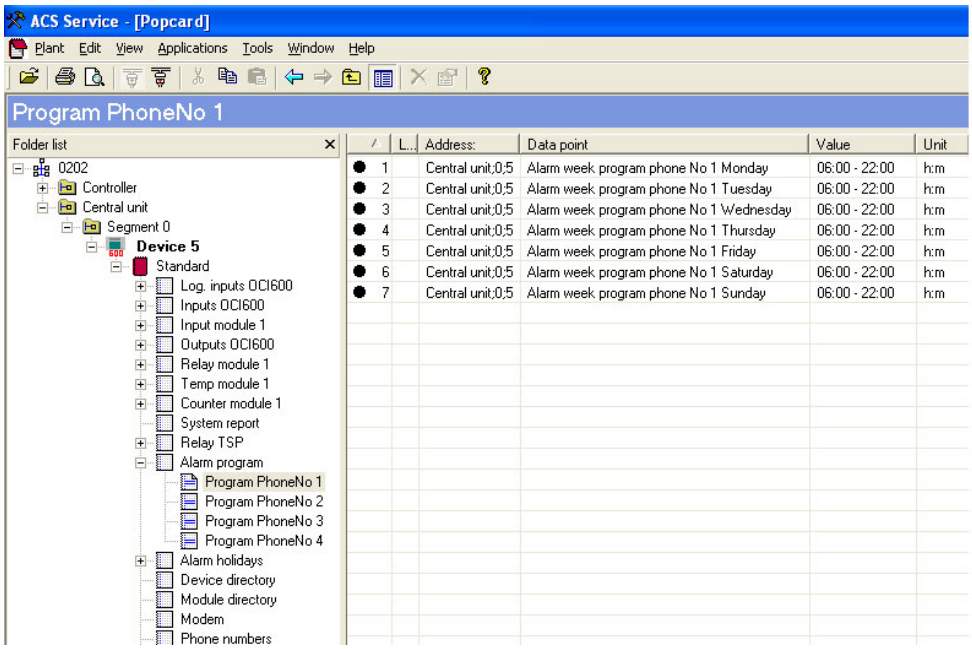
It was mentioned in sections “5.5 Alarms to mobile phone” and “5.6 Alarms to pager” that the “Phone no. OCI600” may only contain characters because it is sent along with SMS or the alphanumeric pager text. Same must be observed in connection with the name of the OCI600, name of the reporting module and name of the reporting input, because they are or can be part of the message sent. Here too, the characters permitted are: **a-z A-Z 0-9 blanks ! „ # $ % & , ( ) * + ` - . / : ; < = > ?** @.

## 5.10 Alarm programs

### 5.10.1 7-day program

Operating page: Alarm program

The alarm 7-day program is used to activate or deactivate the individual phone nos. in a weekly cycle. The program can be specified on the **Applications > Popcard…** menu, operating page “Alarm program”.




For each phone no., enter the period of time per day during which the number shall be activated.

**Example**

Configuration with 4 alarm receivers:

| Phone number | Alarm receiver | 7-day programming |
|---|---|---|
| 1 | Service engineer 1: Mobile phone | Always switched on, except on Saturdays and Sundays |
| 2 | Service engineer 2: Mobile phone | Always switched on, except on Mondays and Tuesdays |
| 3 | Control station: Mobile phone | Always switched on |
| 4 | PC alarm receiver in the central control station | Always switched on |

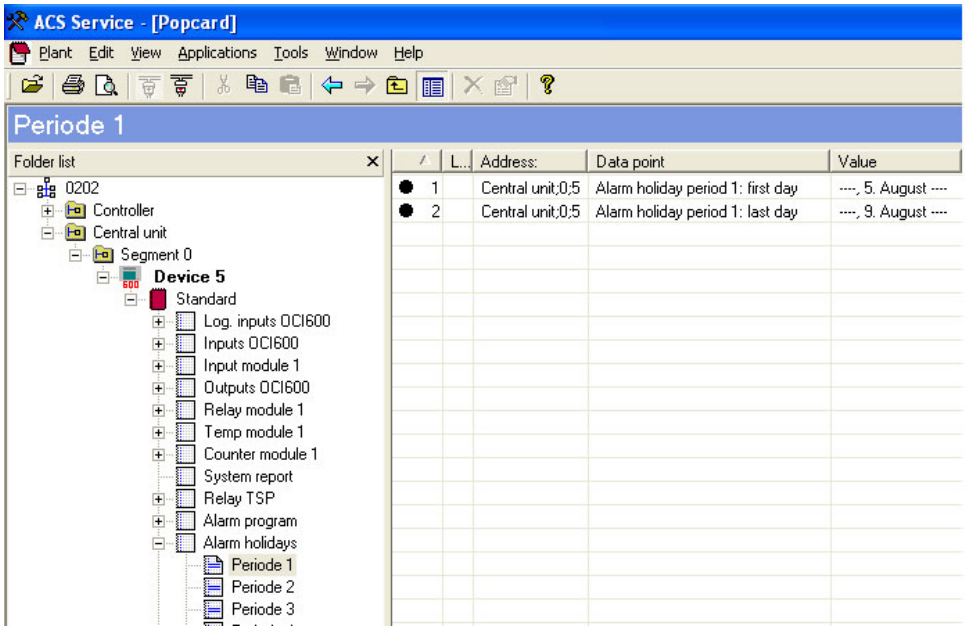
**As supplied**

The unit is supplied with all phone nos. activated during the whole week.

## 5.10.2 Holiday program

Operating page: Alarm holiday period

The “Alarm holiday period” function is used to enter holiday periods. During a holiday period, forwarding alarms to the individual phone nos. can be suppressed. The program can be defined on the **Applications > Popcard …** menu, operating page “Alarm holiday period”.




You find data points for up to 8 programmable holiday periods and a data point “Activation”. Using the latter, you can enable **all** programmed periods for 1 of the 4 receiver addresses.

**Application example**

One application would be to acquire all holiday periods at the beginning of the year and accommodate them in the 8 periods. When starting the holidays, the relevant receiver would have to be activated.

# 6 Clock time function

## 6.1 Synchronization of time of day

The purpose of clock time synchronization is to ensure efficient administration of the clock times of LPB devices. Furthermore, it is made certain that incoming alarm messages will carry a consistent time stamp.

To ensure that, within a system of LPB devices, the clock times are identical, one of the devices must be defined as the clock time master.
Clock time master can be a central communication unit (e.g. the OCI600), a controller or an AUF77 radio clock receiver.

Only one of the devices in an LPB system can be the clock time master, or else, an error message will be delivered. It is recommended to define the OCI600 central communication unit as the clock time master. This can be entered via data point “Clock time source” which, with the OCI600, can be found on operating page “Miscellaneous” and, with controllers, on operating page “HW Configuration” (RVD240), for example.

## 6.2 Setting choices with data point “Clock time source”

With each LPB device providing the clock time function, there are 4 choices for the value of data point “Clock time source”:

| **Value of data point “Clock time source”** | **Result: Date / time of day of this device…** |
|---|---|
| Autonomous clock | ...cannot be influenced by the time-of-day of other devices on the LPB. |
| From bus: slave without remote setting | …is delivered by the clock time master via LPB. |
| From bus: slave with remote setting | …is delivered by the clock time master. If data / time-of-day of this device is directly changed, the clock time master will adopt the adjustment and distribute it to all slaves. |
| Clock time master | …is the master time. |

## 6.3 Clock time master

**Radio clock receiver**

If the system uses an AUF77 clock time receiver, it automatically becomes the clock time master. In that case, the OCI600 central communication unit and the other devices used by the system are to be parameterized as slaves with or without remote setting.

**Without radio clock receiver**

Each device with clock time master function connected to the bus can be parameterized as the clock time master. In that case, the other devices used by the system are to be parameterized as slaves with or without remote setting.

# 7 Error handling

## 7.1 Error messages

- The OCI600 is integrated in the error signaling system of the LPB system
- Its display only shows 1 error at a time
- First, own errors in the order of priority are displayed
- When own errors are no longer present, the system error with the highest priority will be displayed

**Components of an error message**

An error message consists of a defined error code with a predefined specific error priority.

**Error priority**

The error priorities control the orderly forwarding of errors, but are not visible and cannot be changed.
To keep bus loading low, only the error message with the highest priority per segment is delivered (that is a maximum of 15 errors in the entire system). If a segment contains several controllers, they withhold their error messages with lower priorities until the error with the higher priority is rectified.

**Example of a displayed error**

Line number 50 of operating page 1 of the OCI600 shows the following display:
**141----1----05**
This reads as follows:
Device **05** in segment **1** shows its faulty behavior with error code **141**.

**About error messages**

Error messages cannot be reset. They are deleted when the relevant error has been rectified or temporarily recede into the background if a new error with a higher priority occurs. Power failures have no impact on the display of errors. An error that existed before the power failure occurred is reported again when power returns.

## 7.2 Error codes

The following list shows the meaning of the error codes.
Error codes 1...149 are identical for all controllers reporting in the LPB system. From error code 150, the code may differ from one controller to another.

| Display | Meaning |
|---|---|
| **10-79** | **Sensor errors** |
| **10-19** | **Outdoor sensors** |
| 10 | Outside temperature, sensor error |
| 11 | Solar sensor, error |
| 12 | Wind sensor, error |
| **20-29** | **Boiler sensors and sensors located close to the boiler** |
| 20 | Boiler temperature 1, sensor error |
| 22 | Boiler temperature 2, sensor error |
| 25 | Boiler temperature, wood, sensor error |
| 26 | Common flow temperature, sensor error |
| 28 | Flue gas temperature, sensor error |
| **30-39** | **Flow sensors and other sensors** |
| 30 | Flow temperature 1, sensor error |
| 32 | Flow temperature 2, sensor error |
| 33 | Flow temperature, heat pump, sensor error |
| 34 | Condenser sensor, heat pump, error |
| 35 | Source inlet temperature, sensor error |
| 36 | Hot-gas temperature compressor 1, sensor error |
| 37 | Hot-gas temperature compressor 2, sensor error |
| **40-49** | **Return sensors and other sensors** |
| 40 | Return temperature 1, sensor error |
| 42 | Return temperature 2, sensor error |
| 43 | Return temperature, wood, sensor error |
| 44 | Return temperature, heat pump, sensor error |
| 45 | Source outlet temperature, sensor error |
| 46 | Cascade return temperature, sensor error |
| 47 | Common return temperature, sensor error |
| 48 | Refrigerant temperature, liquid, sensor error |
| **50-59** | **DHW sensors** |
| 50 | DHW temperature / thermostat 1, error |
| 52 | DHW temperature / thermostat 2, error |
| 54 | DHW flow temperature, sensor error |
| 55 | Storage tank 2, DHW temperature / thermostat 1, error |
| 56 | Storage tank 2, DHW temperature / thermostat 2, error |
| 57 | DHW circulation sensor, error |
| 58 | DHW thermostat, error |
| **60-69** | **Room sensors, room unit** |
| 60 | Room temperature 1, sensor error |
| 61 | Room unit 1, error |
| 62 | Wrong room unit 1 / wrong radio clock module |
| 64 | Room unit 1 (PPS), open-circuit |
| 65 | Room temperature 2, sensor error |
| 66 | Room unit 2, error |
| 67 | Room unit 2, wrong type |
| 68 | Room temperature 3, sensor error |
| 69 | Room unit 2 (PPS), open-circuit |
| **70-79** | **Various special sensors** |
| 70 | Storage tank temperature 1 (top), sensor error |
| 71 | Storage tank temperature 2 (bottom), sensor error |
| 72 | Storage tank temperature 3 (middle), sensor error |
| 73 | Collector temperature 1, sensor error |
| 74 | Collector temperature 2, sensor error |

| Display | Meaning |
|---|---|
| 75 | Bypass temperature, sensor error |
| 76 | Special sensor 1, error |
| 77 | Air pressure, sensor error |
| 78 | Water pressure, sensor error |
| 79 | Brine temperature, sensor error |
| **80-89** | **Communication errors** |
| 80 | LPB, no communication |
| 81 | LPB short-circuit or no bus power supply |
| 82 | LPB, address collision |
| 83 | BSB wire, short-circuit |
| 84 | BSB wire, address collision |
| 85 | BSB radio communication error |
| 86 | PPS, short-circuit |
| 87 | PPS 2, short-circuit |
| 88 | PPS, no communication |
| 89 | Modem, no communication |
| **90-99** | **Device errors** |
| 90 | Data loss in RAM |
| 91 | Data loss in EEPROM |
| 92 | Electronics error in device |
| 93 | Change battery |
| 94 | Change battery of memory card |
| 95 | Time of day invalid |
| 98 | Extension module 1, error |
| 99 | Extension module 2, error |
| **100-105** | **System errors / miscellaneous** |
| 100 | 2 clock time masters |
| 101 | Clock time source, wrong setting |
| 102 | Clock time master without power reserve |
| 105 | Maintenance alarm |
| **106-139** | **Process errors** |
| 106 | Source temperature too low |
| 107 | Error hot-gas compressor 1 |
| 108 | Error hot-gas compressor 2 |
| 109 | Boiler temperature supervision, error |
| 110 | Safety limit thermostat (SLT), lockout |
| 111 | Thermal reset limit thermostat, safety shutdown |
| 112 | Flue gas SLT, lockout |
| 113 | Flue gas supervision, safety shutdown |
| 114 | Flue gas thermostat has cut out |
| 115 | Flue gas sensor has responded |
| 116 | Flue gas sensor has shut down |
| 117 | Water pressure too high |
| 118 | Water pressure too low |
| 119 | Water pressure switch has cut out |
| 120 | Flow temperature precontrol not reached |
| 121 | Flow temperature heating circuit 1 not reached |
| 122 | Flow temperature heating circuit 2 not reached |
| 123 | Flow temperature DHW not reached |
| 124 | Boiler temperature not reached |
| 125 | Maximum boiler temperature exceeded |
| 126 | DHW charging temperature not reached |

| Display | Meaning |
|---|---|
| 127 | Legionella temperature not reached |
| 128 | Loss of flame in operation |
| 129 | Wrong air supply |
| 130 | Flue gas temperature limit exceeded |
| 131 | Burner error |
| 132 | Gas pressure switch safety shutdown |
| 133 | Safety time for establishment of flame exceeded |
| 134 | Common error heat pump |
| 135 | Brine circuit, error |
| 136 | Refrigeration circuit heat pump pressure, error |
| 137 | Operation checkback signal heat pump missing |
| 138 | Control sensor heat pump missing |
| **140-149** | **Configuration errors** |
| 140 | LPB, address invalid |
| 141 | LPB, configuration not consistent |
| 142 | Partner unit on LPB missing |
| 145 | PPS device, wrong type |
| 146 | Sensor / actuator configuration error |
| 147 | No BMU connected |
| 148 | Incompatibility LPB interface / basic unit |
| 149 | Freely programmable function, configuration error |
| **150-199** | **Various device-specific errors** |
| 150 | General BMU error |
| 151 | Internal BMU error |
| 152 | Parameter setting error |
| 153 | Device has locked out |
| 154 | Plausibility criterion violated |
| 155 | Remote reset locked |
| **160-179** | **External components** |
| 160 | Fan speed threshold not reached |
| 161 | Maximum fan speed exceeded |
| 162 | Refer to User Manual of the device causing the error |
| 163 | Modulation valve, error |
| 164 | Flow / pressure switch heating circuit, error |
| 165 | Priority changeover does not work |
| 166 | Air pressure switch does not open |
| 167 | Heating output limits violated |
| 168 | Communication timeout with control of burner |
| 171 | Alarm contact 1 active |
| 172 | Alarm contact 2 active |
| 173 | Alarm contact 3 active |
| 174 | Alarm contact 4 active |
| 175 | Error output freely programmable function active |
| 176 | Water pressure 2 too high |
| 177 | Water pressure 2 too low |
| **180-199** | **Special functions are active, various errors** |
| 180 | Refer to User Manual of the device causing the error |
| 181 | Refer to User Manual of the device causing the error |
| 182 | Refer to User Manual of the device causing the error |
| 183 | Refer to User Manual of the device causing the error |
| 184 | Refer to User Manual of the device causing the error |
| 185 | Refer to User Manual of the device causing the error |

| Display | Meaning |
|---|---|
| 190 | Refer to User Manual of the device causing the error |
| 191 | Refer to User Manual of the device causing the error |
| 192 | Refer to User Manual of the device causing the error |
| **200-221** | **Error messages "Non-ALBATROS devices"** |
| 200 | Fire / smoke alarm |
| 201 | Frost alarm |
| 202 | Supply air temperature, sensor error |
| 203 | Flow error |
| 204 | Fan error (overload) |
| 205 | Pump / electrical error (overload) |
| 206 | Chiller error (overload) |
| 210 | SYNERGYR, error message |
| 211 | Wood-fired boiler, error |
| 220 | Alarm AUX1 |
| 221 | Alarm AUX2 |
| 222 | High-pressure with heat pump operation |
| 223 | High-pressure when starting heating circuit |
| 224 | High-pressure when starting DHW charging |
| 225 | Low-pressure |
| 226 | Winding protection compressor 1 |
| 227 | Winding protection compressor 2 |
| 228 | Flow switch heat source |
| 229 | Pressure switch heat source |
| 230 | Thermal relay source pump |
| **231-239** | **Sensor errors of “sensors without special functions”** |
| 231 | B101 sensor error |
| 232 | B102 sensor error |
| 233 | B103 sensor error |
| 234 | B104 sensor error |
| 235 | B105 sensor error |
| 236 | B106 sensor error |
| 237 | B107 sensor error |
| 238 | B108 sensor error |
| 239 | B109 sensor error |
| 241 | Flow sensor for yield measurement, error |
| 242 | Return sensor for yield measurement, error |
| 243 | Swimming pool sensor, error |

## 7.3 Fault tracing on LPB

### 7.3.1 General remarks

Careful planning of LPB engineering, which takes into account a number of parameters, such as cross-sectional area, total cable length, distance to the next power source, distance between 2 LPB partners, as described in detail in sections 2.4 and 2.5, is the best approach to ensure that bus problems will be avoided. Nevertheless, should problems occur, the following list provides information on rectification based on experience.

### 7.3.2 Selected phenomena and proposals for remedy

**No bus voltage**

After a bus settling time of 3 seconds, there is no power on the bus.

**Possible causes:**

- There is no central bus power supply, or it is incorrectly connected
- The central bus power supply is defective
- There is a short-circuit on the bus line between bus power supply and measuring point
- The bus line is interrupted

**Remedy:**

Test the bus line for continuity and check the connection.

**Voltage too low throughout the network**

The bus voltage (bus level) throughout the network is below 9.5 V (make measurement when there is no communication on the bus).

**Possible causes:**

- The bus power supply is not sufficient
- There is a short-circuit (in that case, the current is about 300 mA)

**Remedy:**

Check or remove:

- Cable faults
- Defective devices
- Sizing of bus power supply

**Certain devices are not read in**

The devices do not communicate.

**Possible causes:**

1. The cable's cross-sectional area is too small or the device's connecting cable too long.
2. The devices have no bus address.
3. The devices are not connected or are defective.

**Remedy:**

1. Check the Ohmic resistance of the devices' connecting cables or check bus sizing.
2. Assign a valid bus address.
3. Check the devices' connections.

**Error code "141"**

The OCI600 displays error code "141" (LPB configuration not consistent).

**Possible causes:**

- It may take up to 12 minutes for the OCI600 to include the devices in the device directory
- The address of at least 1 connected device is not correctly set
- The device directory does not, or not fully, show the existing plant

**Remedy:**

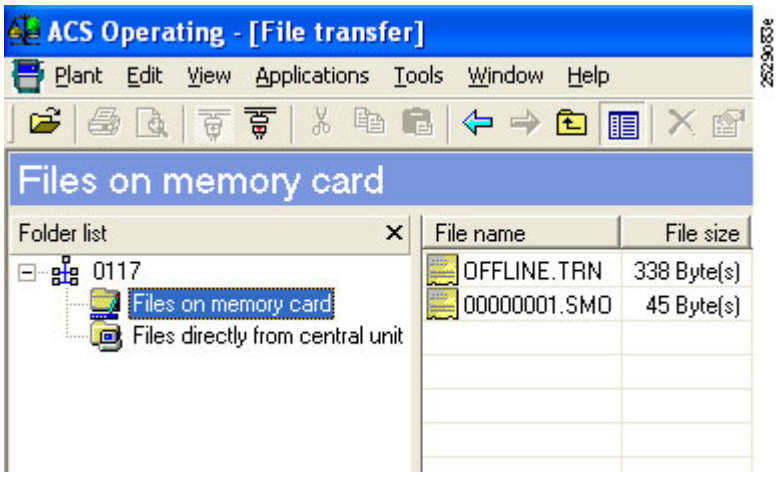
Consult the respective sections in this User Manual plus the Instructions supplied with the device that causes the problem.

# 8 Files on the OCI600

**Applications > File transfer…** takes you to the data administration of the OCI600. There are “Files on memory card” (for the “Offline trend” application) and “Files directly from central unit” for logging alarm events and user interventions.

**Note on licenses**

The **File transfer…** and **Offline trend…** applications are not available with all types of license packages.




## 8.1 Files on the memory card: Offline trend files

On the memory card, the 2 files OFFLINE.TRN and 00000001.SMO will be saved. These 2 files are for exclusive evaluation with the **Offline trend** application.

**Offline trend**

Using the ACS7... software, it is possible to define a number of data points in the OCI600 central communication unit whose values are periodically logged. The recorded data will be saved on the memory card and can then be opened and presented via the **Offline trend** application of the ACS7... software. Logging can take place offline, which means that there is no need for having a connection to the OCI600.

For more detailed information about the **Offline trend** application, please refer to Online Help of the ACS7... under “Introduction to the Offline Trend application”.

**Logging time**

Due to the storage capacity of the memory card, the logging time is limited:

$$T = 0.16 \cdot \frac{m}{d} \cdot s$$

*d* = number of selected data points
*m* = capacity of memory card in Bytes
*s* = sampling interval in minutes
*T* = logging time in minutes

**Example**

*d* = 10
*m* = 128 KB
*s* = 15 min

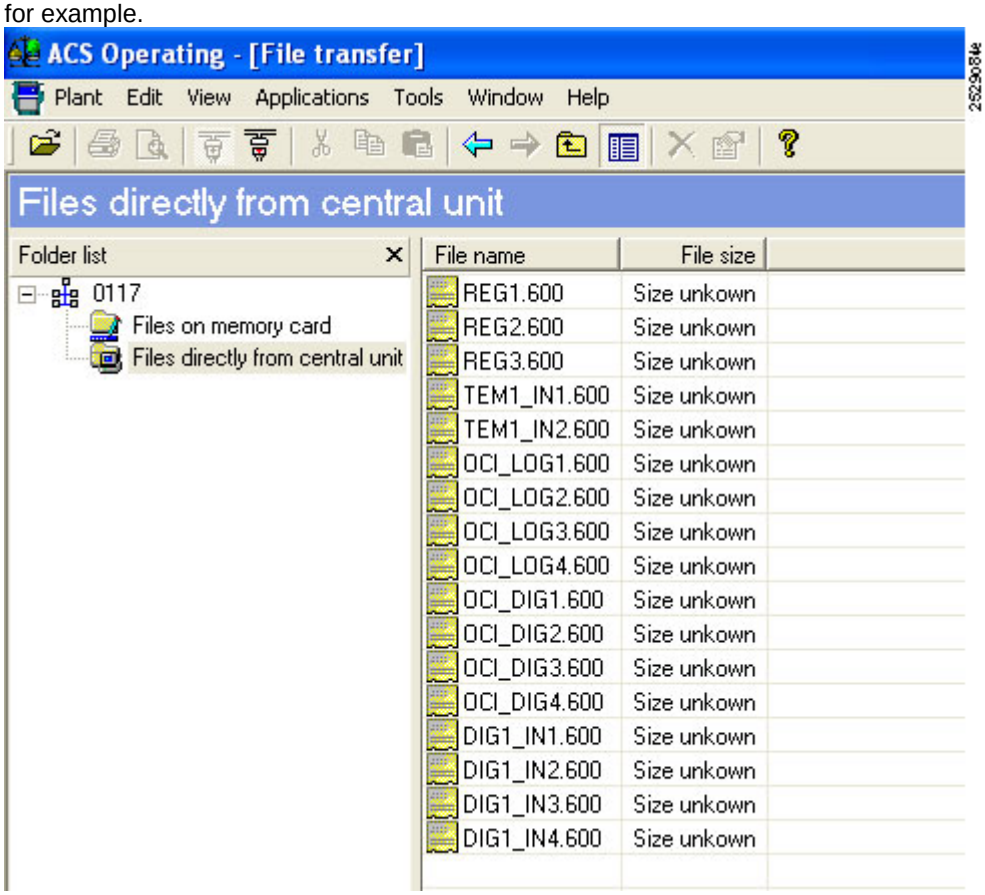
$$T = 0.16 \cdot \frac{m}{d} \cdot s = 0.16 \cdot \frac{128000}{10} \cdot 15 = 30720\ min \cong 21 days$$

## 8.2 Files directly from the central unit: Event files

Events of parameterized inputs of the OCI600 (temperature, logic, digital and Batibus inputs) and the last 20 events of integrated controllers are also recorded in the event files and can later be evaluated by the user.

**Procedure**

Highlight the event file. Using the right mouse button, you can copy the file to the hard disk and open it. Menu item **Extras > Options… > Tab: File transfer** allows you to select a program that opens the file as standard. If you wish to do this, use MS Excel, for example.



Depending on the type of event files, different information is stored. Date and time of day of an event are always stored.

| Contents of information | Recorded in file types [1)] |
|---|---|
| If the inputs are of the signalization type, the changes from the active to the inactive state, or vice versa, are recorded as an event with date and time of day | OCI_LOGx.600<br>OCI_DIGx.600<br>DIGx_INx.600 |
| If the inputs are parameterized as alarm inputs, an entry with date and time of day is recorded for every attempt made to signal the alarm event. The entry designates the relevant phone nos. | OCI_LOGx.600<br>OCI_DIGx.600<br>DIGx_INx.600 |
| If the inputs are parameterized as hours run counters, the time of day and date of input activation, as well as the time cumulated up to this point in time are recorded | OCI_DIGx.600<br>DIGx_INx.600 |
| The last 20 events per controller 1…16 that were defined in the device directory of the OCI600 are recorded | REGx.600 |
| Crossing the temperature limit values at the inputs of the temperature sensors / adapters is recorded as an event. The current temperature and the information which of the temperature limit values has been crossed are stored | TEMx_INx.600 |

**1) :**

REGx.600: Protocol files of the planned controllers (maximum 16)

TEMx_INx.600: Protocol files of the inputs of the 2 temperature modules

OCI_LOGx.600: Protocol files of the 4 logic inputs

OCI_DIGx.600: Protocol files of the 4 digital inputs

DIGx_INx.600: Protocol files of the 16 inputs of the Batibus input modules

## 8.3 Up-to-dateness of files

**Note on up-to-dateness of OCI600 files**

Regarding the up-to-dateness of the “Files on memory card” and the “Files directly from central unit”, following applies:

- The directory is automatically uploaded when starting the **File transfer** application if, at this point in time, there is a connection to the central unit
- The directory is automatically uploaded if the **File transfer** application has already been started and a connection to the central unit is then established
- You can upload the directory at any time by clicking with the right mouse button on “Files on memory card”/ “Files directly from central unit” and choosing “Upload directory”

You also find this information on up-to-dateness in ACS7... Online Help.

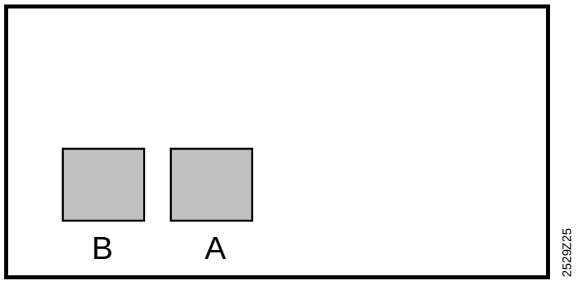
# 9 Exchange of OCI600 device software

**Backup of parameter settings**

Prior to exchanging the EPROMs, menu item **Applications > Parameter settings …** of the ACS7… software can be used to make a backup of the parameter settings. In that case, the parameter set is transferred to the PC and, after the exchange of the EPROMs, downloaded again to the OCI600. For more information about the **Parameter settings** application, refer to ACS7... Online Help.

**Exchange of EPROMs**

The OCI600 central communication unit has 2 EPROM plug-in spaces at the rear of the OCI600 operator unit. It must be made certain that the EPROMs, marked A and B, are plugged into the correct bases.




A, B Plug-in spaces

**Procedure**

When the software is updated by exchanging the EPROMs, the unit must be reinitialized.
Reinitialization is triggered by pressing buttons [−] and [+] on the left and button [+] on the right before and at the instant power is switched on.
In that case, all data are reset to their default values, which means that setting values that have already been parameterized will be lost.

# 10 Addendum

## 10.1 Batibus modules

Since there is no documentation on the Batibus modules available, the following sections contain the key features regarding engineering, setting and commissioning.

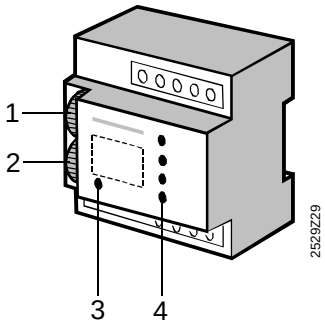
## 10.2 Input module DOE4IN

**Function**

The input module is used for acquiring the switching states of ancillary units and controllers not compatible with the LPB. Up to 4 input modules, each with 4 potential-free contact inputs, can be connected to the LPB and queried via the OCI600 central communication unit.
The function of the input module corresponds to that of the digital input modules of the OCI600 (status or alarm inputs).

**Mechanical design**

The input module mounts on DIN rails.
The 2 setting knobs can be accessed after removing the transparent cover.




1 Setting knob «famil.» for segment number
2 Setting knob «n°» for device number
3 LED «trans.» for status indication
4 LEDs for operating state of inputs

**Batibus address**

If the DOE4IN input module is operated together with other Batibus devices, Batibus address collisions can occur. For this reason, a Batibus address calculation is made prior to making the settings.

Based on the 2 settings, the address of the connected device or of the assigned apartment is calculated as follows:

Address = ( f – 1 ) * 16 + ( n – 1 ) + ( Ex – 1 )

where:

f = segment number «famil.»
n = device number «n°»
Ex = input number (E1 = 1, E2 = 2, E3 = 3, E4 = 4)

*Example*

f = 4 (segment 4)
n = 1 (device 1)
Ex = 1 (input 1)

Batibus address =
( f – 1 ) * 16 + ( n – 1 ) + ( Ex – 1 ) = ( 4 – 1 ) * 16 + ( 1 – 1 ) + ( 1 – 1 ) = **48**

**Settings**

On the input module, the following settings must be made:

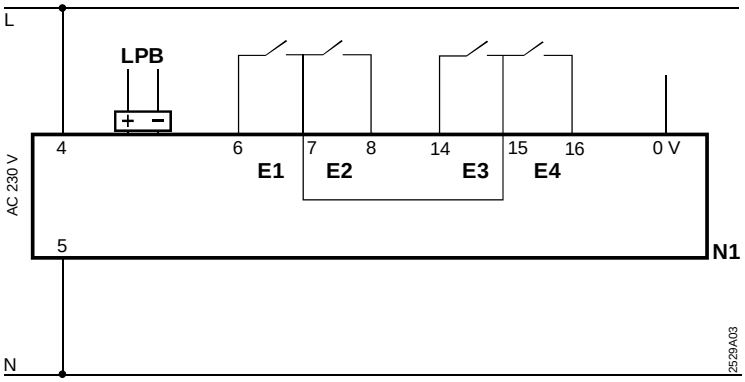
- Setting knob «famil.» is used for setting the segment address (recommended: 4).

- Setting knob «n°» is used for setting the device number, which can be 1, 5, 9 or 13. This setting automatically assigns a number to each input.
  If, for example, setting «n°» = 5, the following numbers will be assigned:
  Input E1 is given number 5
  Input E2 is given number 6
  Input E3 is given number 7
  Input E4 is given number 8

**Notes on operation**

To check the connection, the orange LED «trans.» flashes when in operation.
The operating state of the 4 inputs is indicated by a green LED (LED lit = input active).

**Connection diagram**




E1...E4 Inputs 1...4
LPB Data bus
N1 Input module DOE4IN

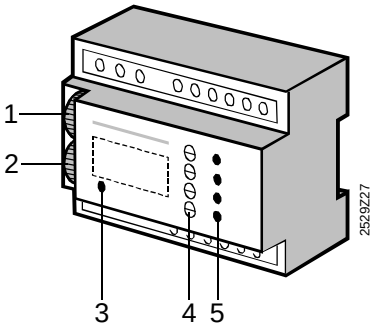
# 10.3 Relay module DOE4RE

**Function**

The relay module is used for triggering a function, either manually or automatically, by closing a contact. Up to 4 relay modules, each with 4 potential-free contact inputs, can be connected to the LPB and operated via the OCI600 central communication unit.
The function of the relay module corresponds to that of the OCI600 outputs.

**Mechanical design**

The relay module mounts on DIN rails.
The 2 setting knobs can be accessed after removing the transparent cover. The relay selectors on the module front can be operated with a screwdriver.




1 Setting knob «famil.» for segment number
2 Setting knob «n°» for device number
3 LED «trans.» for status indication
4 Relay selector
5 LEDs for operating state of relay

If the DOE4RE relay module is operated together with other Batibus devices, Batibus address collisions can occur. For this reason, a Batibus address calculation is made prior to making the settings.

**Batibus address**

Based on the 2 settings, the address of the connected device or of the assigned apartment is calculated as follows:

Address = ( f – 1 ) * 16 + ( n – 1 ) + ( Sx – 1 )

where:

f = segment number «famil.»
n = device number «n°»
Sx = relay number (S1 = 1, S2 = 2, S3 = 3, S4 = 4)

*Example*

f = 5 (segment 5)
n = 1 (device 1)
Sx = 1 (relay 1)

Batibus address =
( f – 1 ) * 16 + ( n – 1 ) + ( Sx – 1 ) = ( 5 – 1 ) * 16 + ( 1 – 1 ) + ( 1 – 1 ) = **64**

**Settings**

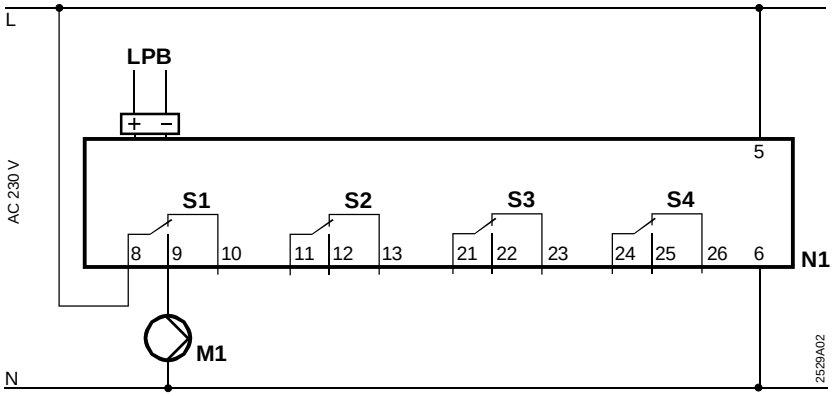
On the relay module, the following settings must be made:

- Setting knob «famil.» is used for setting the segment address (recommended: 5)
- Setting knob «n°» is used for setting the device number, which can be 1, 5, 9 or 13. This setting automatically assigns a number to each relay.
  If, for example, setting «n°» = 5, the following numbers will be assigned:
  Relay S1 is given number 5
  Relay S2 is given number 6
  Relay S3 is given number 7
  Relay S4 is given number 8
- The selectors for the relays are to be set to «auto»

**Notes on operation**

To check the connection, the orange LED «trans.» flashes when in operation.
The operating state of the 4 relays is indicated with a green LED (LED lit = relay energized).

**Connection diagram**




| | |
|---|---|
| LPB | Data bus |
| M1 | Circulating pump (example) |
| N1 | Relay module DOE4RE |
| S1...S4 | Relays 1...4 |

# Index

# Revision history

Edition 2.0 is a completely revised version of the Basic Documentation.

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