

Application Note DK9222-0810-0040

I/O, Building Automation

Keywords

KM1644

KM2614

KM2652

KM4602

Local override device (LOD)

operating level

local override

local indication

Local indication device (LID)

analog output

relay module

manual operating level

Building Automation

Interfaces for Local Override Operation

This application example covers complementary operating modes for building automation and describes how local operation and local override operation can be realized with Beckhoff Bus Terminals. With local operation, the individual system units are operated through manual user intervention; with local override operation important system components can be kept operational in the event of a fault. The two operating modes are usually combined. Manual operation requires system-compliant interfaces for the operation of field devices and line components, independent of the central unit. The manual operating terminals from Beckhoff are designed for this purpose and can be extended to form a local override operation system in conjunction with an independent power supply.

1. Operating levels in building automation

Depending on the building control requirements, different operating levels are available within the building automation system. Typically, the following operating modes are used in building automation in addition to automatic operation of systems or system components:

Operating modes in addition to automatic operation	
manual operation	meets the minimum requirements in terms of local operation and signalling, but can only be used if the substation is intact
local override device (LOD)	enables direct intervention in the technical installation, even if the substation is not available. Emergency operation mode is only used for maintaining the operation of important systems and system components.
local operation	enables direct dialog with the technical installation via the substation, provided it is operational

Tab. 1 Complementary building automation operating modes

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Local override operation

Local override operation enables the direct intervention in the building control system. Via this operating level important system components can be controlled manually in order to maintain important functions, if the substation is not available, has failed or is faulty. The operating elements at this level act directly without regard to the automation device.

Local override operation can be realized conventionally with switches and buttons, although it is important to ensure that all elements are supplied via an independent power supply. To avoid manipulations, access to the local override operation control elements must be secured, for example through integration in the control cabinet.

If a manual/local operating level or local override operating level is used, all safety functions should be triggered externally. The local operation system must not be used for safety shutdown. The local override operations are executed directly in accordance with ISO 16 484-2, section 3.110, without protection or interlock, so that the operator has full responsibility for all interventions.

2. System-compliant interfaces for field devices and system components, independent of the central unit

The Beckhoff product range includes the following Bus Terminals for full system integration of manual intervention within the building control system. The manual operating terminals are system-compliant interfaces for field devices and system components, which operate independent of the central unit:

KM1644 | 4-channel manual operation

KM2614 | 4-channel relay module, 230 V AC, 16 A, potential-free changeover contacts, with manual operation

KM2652 | 2-channel relay module, manual/automatic operation 6 A, 230 V AC

KM4602 | 2-channel analog output terminal 0...10 V, manual/automatic operation

The four switches and four LEDs in the front panel of the KM1644 are available as digital inputs or outputs in the control system and they enable the direct input and display of process parameters at the terminal. The combination of four digital inputs and outputs in a 24 mm terminal block reduces to a minimum the space requirement in the control cabinet as well as the number of operating elements that have to be installed in the control cabinet door. The avoidance of additional external operating elements at the door also reduces the personnel requirements, material use and possible error sources (incorrect wiring).

Consumers from different rating classes can be connected directly to the KM2614 and KM2652 relay module terminals so that they can be controlled via the changeover contact either by the controller or manually. The KM2614 enables manual control of four high-power consumers with a current consumption of up to 16 A at 230 V AC. The KM2652 can be used to switch two

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lower-power consumers up to 6 A, 230 V AC to On/Off and auto mode. The priority function for manual interventions is realized through the internal configuration (see Fig. 1).

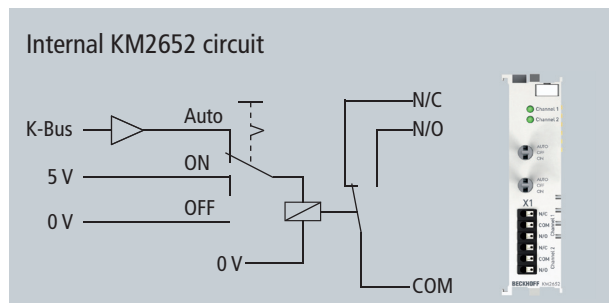


Fig. 1 Internal circuit of the KM2652 relay module terminal

The KM4602 2-channel analog output terminal is the corresponding equivalent for analog signals from 0 to 10 V. The operating mode (manual/auto) is selected via a toggle switch in the front panel and the analog value is set via a potentiometer.

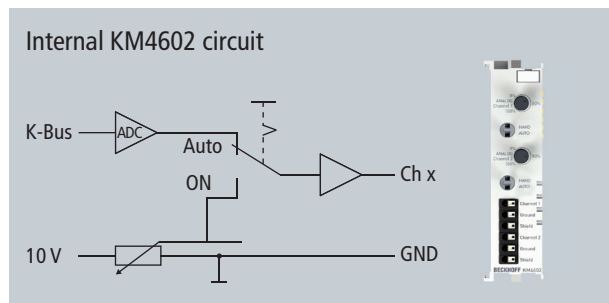


Fig. 2 Internal circuit of the analog KM4602 output terminal

To protect from improper operation by unauthorized or unqualified persons, the implementation of local operation and local override operation with components from Beckhoff assumes that access to the elements within the control cabinet is restricted to qualified personnel. If this requirement is met, local override operation can be implemented within the control cabinet.

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4. Practical example for local override: commissioning of a ventilation system

To start the following ventilation system, the individual units are operated manually.

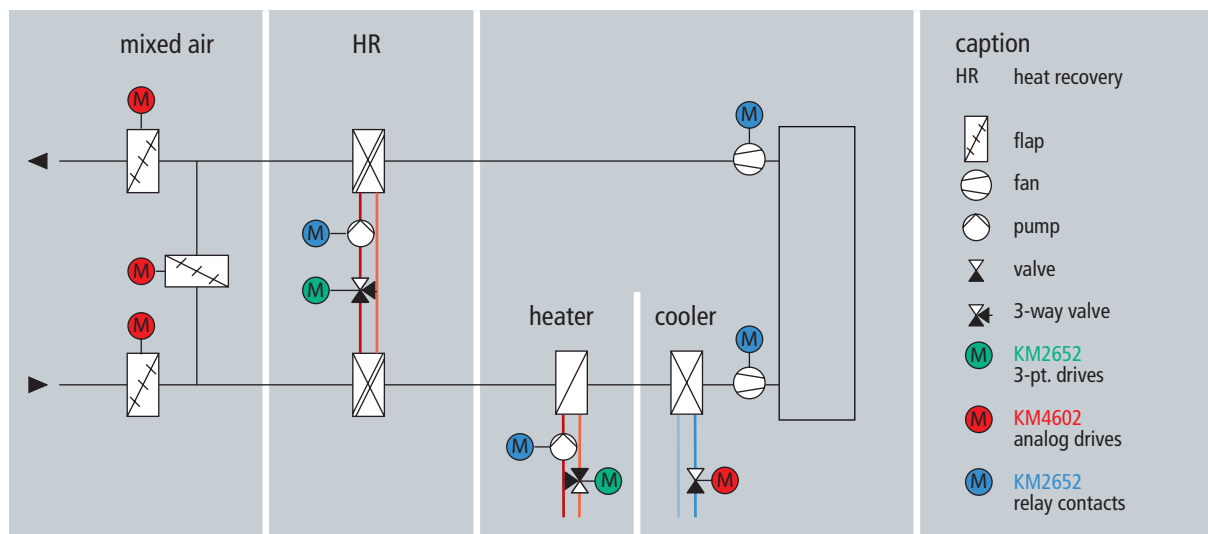


Fig. 3 Local override

Depending on the performance class of the connected consumers, the manual operating terminals with relay contacts KM2614 (230 V AC, 16 A) and KM2652 (230 V AC, 6 A) are used. The KM4602 manual operating terminal for analog set value specification is used for controlling the analog valves. The KM2652 can be used for controlling 3-point valves based on the following configuration:

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5. Practical example for local override operation: activation of a heating circuit

Since the focus in the event of malfunctions/failures is more on finding the source of error than on permanent availability, targeted, limited operation of important building functions through manual interventions is required. This is where local override operation comes in, explained here using the example of a heating circuit:

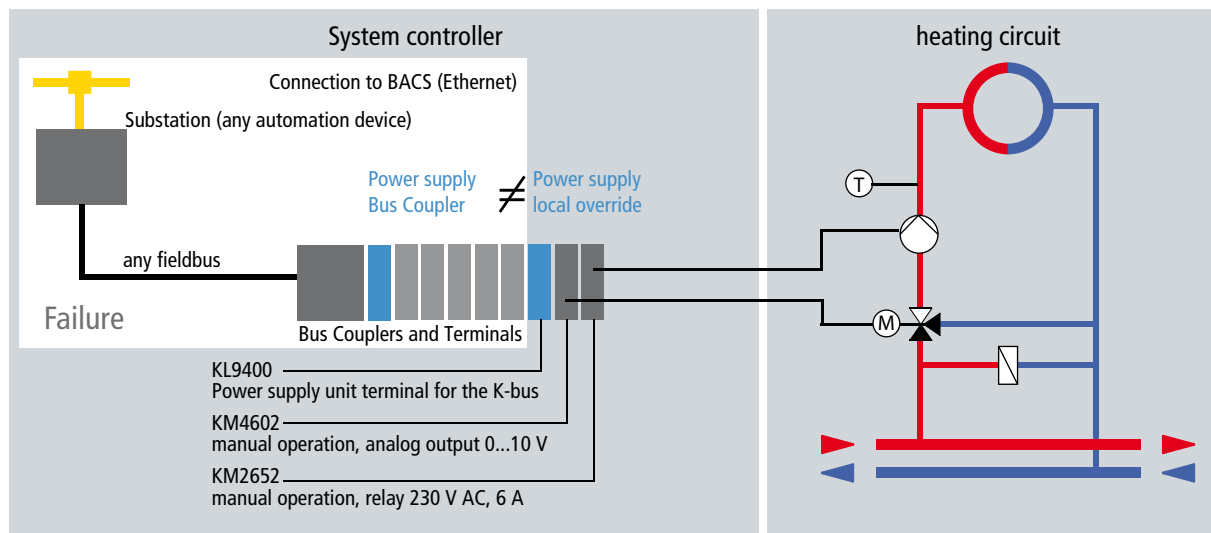


Fig. 5 In the event of a failure of the communication, the controller or the power at the Bus Coupler, local override operation can occur through the separate power supply of the manual operating terminals.

Despite failure of the communication to the building management system or the automation device, failure of the controller or a power failure at the Bus Coupler, the configuration shown in Fig. 5 enables local override operation through the separate power supply of the manual operating terminals. The KM2652 relay terminal activates the pump for the heating circuit. The analog value specification of the KM4602 specifies the valve position. Since the terminal switch positions are submitted to the controller (and therefore the building management system), the status of the switches can be queried once the fault has been rectified. In the event of a failure of the 230 V AC power supply within the heating circuit, local override operation can no longer be ensured.

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- 2-channel analog output terminal 0...10 V, manual/automatic operation www.beckhoff.com/KM4602
- Beckhoff Building Automation www.beckhoff.com/building

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