

**Application controllers**

**NRK16/A, NRK16-B/A,  
(NRK16-T../A, NRK14-T../A,  
NRK16-WEB/A)**

**Control and interlock devices**

Application controllers with pre-programmed system-specific application modules.

The controllers may be used

- as stand-alone control and interlock devices
- for remote process control within a management system

Especially suitable for use in small heating, ventilation and air conditioning systems.



**NRK16/A (with NSA)**



**NRK16-B/A (with NSA)**

**Types**

NRK16/A	Application controller with ten universal inputs <sup>1)</sup> and two analogue, two digital and two combined outputs
NRK16-B/A	Like NRK16/A, but with panel for simple local operation
NSA	Application modules, varying according to country or region, for plugging into base units
NRK16-T../A	NRK16/A + NITEL integrated communications module for a maximum of three additional devices (see manual NT21)
NRK14-T../A	Like NRK16-T../A, but without analogue outputs (see manual NT21)
NRK16-WEB/A	NRK16/A + integrated NIWEB communications module for operation of up to 15 additional devices via the Internet (K1-07.62)

**Electrical protection**

The power supply is overload-protected with a PTC thermal element.

All DC voltages are electrically isolated from the AC 24 V input.

All the inputs are protected against over-voltage (max. AC/DC 45 V). Low-pass filters prevent fluctuations in measurement.

All outputs are sustained short-circuit proof.

High frequency interference is suppressed by means of filters, or in the case of capacitive interference, discharged via the (earthed) housing or the TE terminal (functional earth).

**Important:**

**For direction connection of AC 24 V 3-wire peripheral devices, "GND" and "NS" (⊥) must be connected.**

- 1) The NMID multiplexer enables four digital inputs to be connected to a universal output. (see K21-06.55). The function is integrated by use of a structure macro.
- 2) When connecting peripheral devices with special input or output signals (e.g. Pt100, phase cut or 3-position signals), the NTIO (NTIOS) single module carrier or an NATU adapter can be used. (See K21-06.50 and K21-06.52).
- 3) The T1/Ni1000 supply voltage can be disabled at the inputs (see page 5). DIP switches are provided to switch the inputs from T1 to Ni1000 and vice versa.

**Technical data**

Supply voltage	Extra low voltage (SELV-E)
Nominal voltage	AC 24 V, 50/60 Hz
- Max. tolerance	+15 / -10 %
Power consumption	
- Without output peripherals	3 VA
- With output peripherals	Max. 12 VA
Fuse	Thermal element (PTC)
Supply voltage for peripheral devices and remote operator terminal	
Output voltage	DC15V ±10%, electrically isolated from AC24V
Output current	Max. 150 mA
Signal inputs <sup>2)</sup>	
Universal inputs <sup>3)</sup>	
- Number	10 <sup>1)</sup>
- Use	Can be structured as T1, Ni1000, DC 0...10 V, digital volt-free, or for connection of NMID
- Input impedance	R <sub>i</sub> (pull-up resistor) = 10 kΩ to DC +15 V or 100 kΩ to GND (change-over, see p. 6)
Remote control input	
- Use	Can be structured as T1, Ni1000, DC 0 ... 10 V, min. 1.5 sink, digital volt-free contacts, or NMID
- Input impedance	R <sub>i</sub> (pull-up resistor) = 10 kΩ to DC +15 V
Signal outputs <sup>2)</sup>	
Digital outputs	
- Number	2
- Signal	DC 0 / 24 V, -20 / +15 %
- Source current	Max. 50 mA
Analogue outputs	
- Number	2
- Range	DC 0 ... 10 V
- Source/sink current	Max. 2 mA

*Technical data continued on page 2*

**Battery**


In the event of a power failure, data is protected against loss by a replaceable lithium battery (service life approx. 5 ... 10 years).



Used and faulty batteries must be disposed of in accordance with local regulations.

4) Applies to permanently plugged-in application modules

Technical data continued from page 1

<b>Combined outputs</b>	
– Number	2
– Type	One terminal with a digital and one with an analogue output (see data above)
– Digital/analogue relationship	High > 50 %, low < 30 % of analogue signal
<b>Remote control output</b>	
– Range	DC 0 ... 10 V
– Source current	Max. 10 mA
– Sink current	Max. 3 mA
<b>Product data</b>	
Accuracy	Class 0.5
<b>Sampling rate</b>	
– Internal	100 ms
– Structure	0.2 ... 1 s
<b>Data protection after power failure</b>	
– Structures and parameters 4)	> 10 years
– Time / date 4)	Equivalent to battery life
– Adjustable values in NRK16-B/A <sup>4)</sup>	Equivalent to battery life
NSA application module	EEPROM Type 28C64
<b>Connections</b>	
Connection terminals	2.5 mm <sup>2</sup> screw terminals
Cable type and length	See installation instructions, K21-11.20
<b>Communication</b>	
RS bus	Electrically isolated from AC 24 V and signal outputs
– Transmission speed	9600 baud
– Max. cable length (RS bus)	2400 m
– NRK16../A connection to RS bus	From service socket via 10-core ribbon cable to NARB/A adapter
Service terminal	NBRN operator terminal; plugs directly into service socket
<b>Weight excluding packaging</b>	
NRK16/A	1.15 kg
NRK16-B/A	1.25 kg
NSA application module	0.06 kg
<b>Dimensions (W x H x D)</b>	
NRK16../A	162 x 252 x 52 mm
NSA application module	24 x 59 x 49 mm
<b>Mounting</b>	
	Snap-mounted on DIN rails or screwed to a flat surface; NRK16-B/A installed in control panel front with the Z402 mounting kit
<b>Safety</b>	
Product safety	EN 61010-1
– Contamination level	2
Electrical safety	SELV-E (PELV to IEC 364-4-41)
<b>General ambient conditions</b>	
Use	Installed in control panel
<b>Temperature range</b>	
– Operation	5 ... 45 °C
– Storage	–25 ... 70 °C
Ambient humidity	10 ... 90 %rh, non-condensing
<b>Conformity</b>	
	This product meets the requirements for CE marking and is  tested

## Brief description

The RSA controllers are microprocessor-based DDC controllers comprising a base unit and a plug-in application module.

Each plug-in application module contains an EEPROM preprogrammed with a given application chosen from a wide range of heating, ventilation and air conditioning applications. The application modules are held in application libraries in the various national and regional Staefa offices. They can be selected according to the system and plugged into the base unit. The engineering required is thus minimal, and since suitable default settings are provided for setpoints, parameters etc., commissioning is extremely easy.

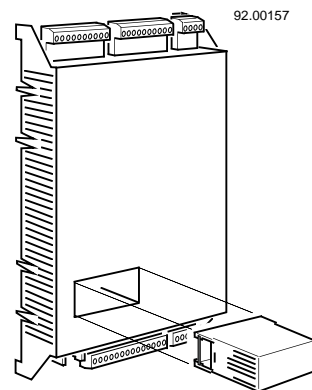
If no suitable standard solution is available, a program for the specific application can be designed in SAPIM and downloaded to the module from a PC.

At the same time, the application modules are freely programmable, so that if no suitable standard solution is available, a program can be designed in SAPIM and downloaded to the module from a PC.

The EEPROM also holds the NBRN-modifiable setpoints, parameters and time programmes but not the setpoints from the local operator panel of the NRK16-B/A.

### Note:

SAPIM (Structure and Parameter Identification Menu) is a programming language developed by Landis & Staefa for the programming of control and interlock modules. It consists of a wide range of basic functions (software modules) which can be combined to create all the structures required.



## Construction

Essentially, the base unit consists of a metal housing and printed circuit board.

The housing comprises a base and a cover, and accommodates the PCB and two-part plug-in connection terminals. These terminals are accessible at the top and bottom of the housing, so that peripheral devices can be connected directly without removing the cover plate.

Additional terminals and a 10-pin ribbon cable connector are provided for the power supply, operator terminal and RS bus communication (see page 5, *Connection diagram and suitable devices*).

The cover plate incorporates an aperture for the plug-in application module, a rotary switch for setting the RS bus address and three LEDs:

- Green (power): Power supply / basic test (on = OK)
- Yellow (Tx RS): Normal operation / RS bus communication (flashing = OK)
- Red (error) Error

The NRK16-B/A incorporates additional elements for control and display (see page 8).

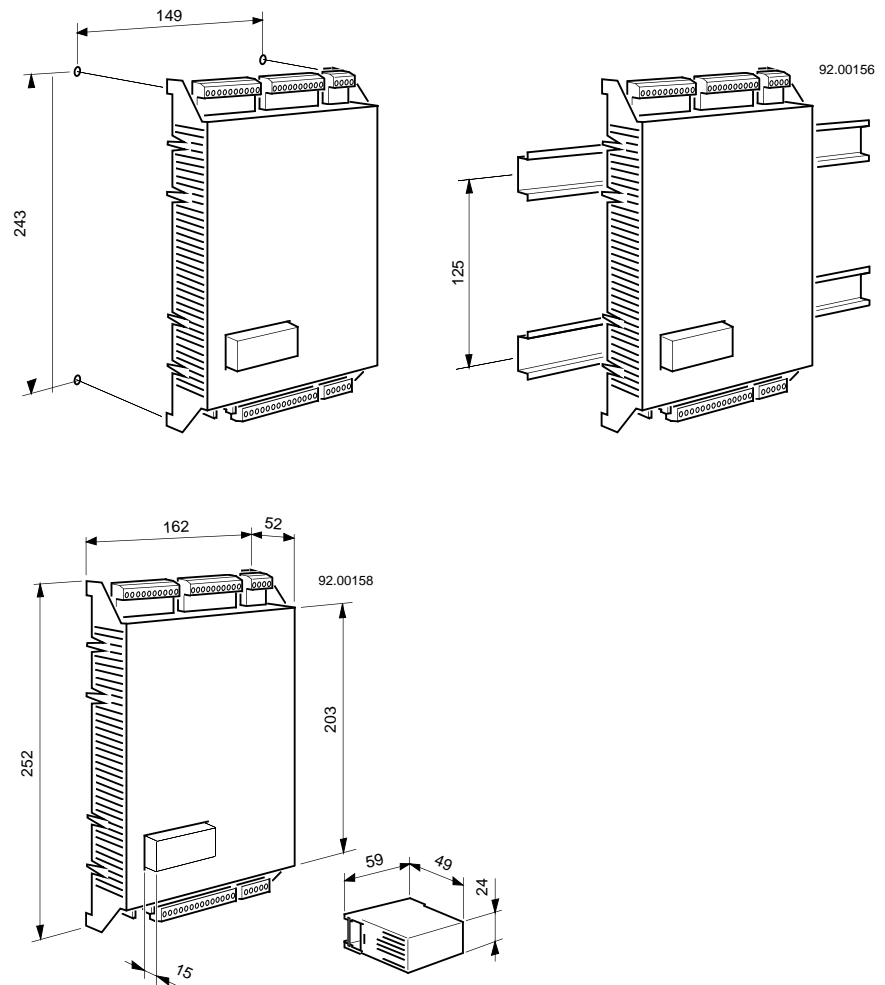
### Mounting and dimensions [mm]

The base unit can be fixed with four screws directly onto any surface, or snap-mounted on two rails.

If mounting rails are used, proceed as follows:

1. Fix the top rail
2. Fit the bottom rail to the base unit and snap-mount the unit onto the top rail
3. Fix the bottom rail

The terminal connections are grouped in blocks, making for easy wiring without the need to remove the unit cover.



#### Caution:

**The application module is a static-sensitive component. Before inserting or removing the module, the base unit must be disconnected from the power supply. Do not touch the contact pins in the base unit.**

#### Caution:

**Do not touch the PCB. Electronic components can be damaged by electrostatic discharge. Handling the PCB without observing electrostatic precautions will invalidate the warranty.**

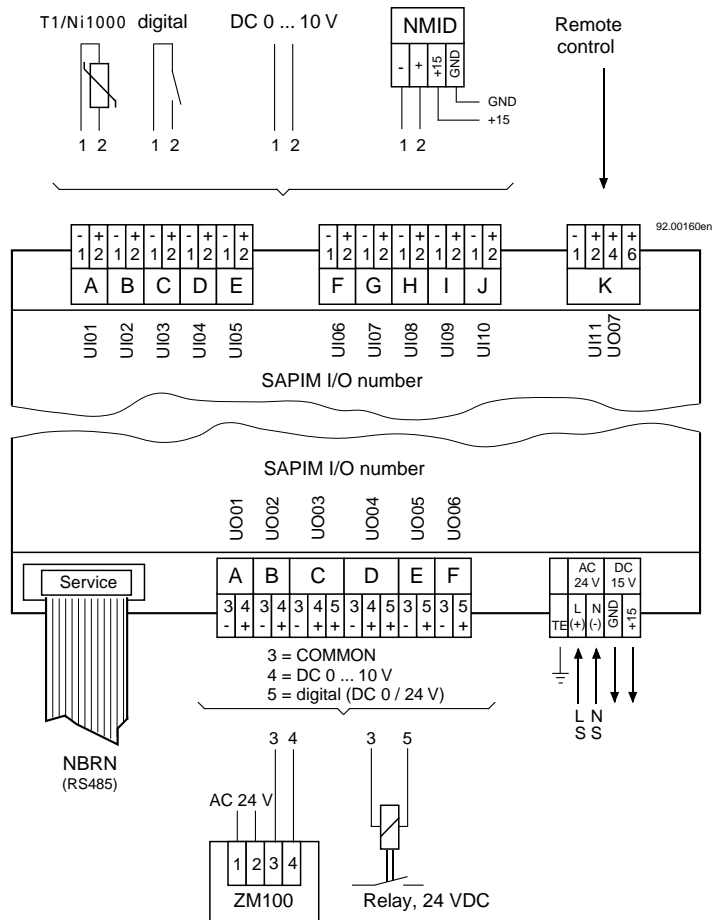
### Opening the controller

1. Ensure that the necessary EMC precautions have been taken.
2. Undo the four cross-head screws between the terminal blocks.
3. Carefully lift off the cover.

For the NRK16-B/A: Press the four white plastic clips together with pliers, carefully release the pcb for the display and operating unit, and pull upwards.

Observe similar precautions when re-assembling the controller, paying special attention to the fibre optic cables of the LEDs and the extension of switch S100.

Connection diagram and suitable peripheral devices



Notes:

1. The digital outputs (C, D, E and F) are active-type outputs, DC 0 or 24 V (max. 50 mA).
2. Outputs C and D may be used as both digital *and* analogue outputs. The digital (24 V) signal switches on when the analogue output is > 5 V, and off when it is < 3 V.
3. Other input and output types may be connected via the NTIO adapter and suitable input or output modules.

Suitable peripheral devices (examples)

T1/Ni1000	Sensors with T1 or Ni1000 measuring elements
ZM100/A	Terminal housing for DC 0 ... 10 V valves
NTIO	Single terminal module carrier
NATU	Adapter for special signals
NMID	Multiplexer (to increase the number of digital inputs)

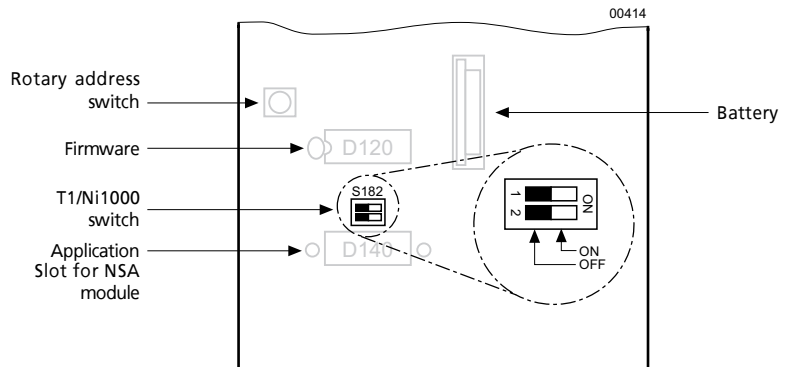
Documentation

Various
CA2N4591
K21-06.50
K21-06.52
K21-06.55

Room operating units, see page 7

*Selection of T1 or Ni1000 sensor*

Both T1 and Ni1000 sensors can be connected to the RSA application controllers. DIP switch S182 is used to adapt the controller to the required sensor type. External access to this DIP switch is possible after removal of the NSA plug-in application module. The change-over from one sensor type to the other is applied in blocks of eight and three inputs (UI01...UI08 and UI09...UI11 respectively).



*Settings for switch S182 T1/Ni1000*

1) When setting the input parameters in INTEGRAL PLAN, note that the T1 input range should be used for Ni1000 sensors. The controller is adapted to the sensor via the hardware only. The SAPIM software is not affected.

1	2	Sensor	Inputs
OFF		T1	UI01 to UI08
	OFF	T1	UI09 to UI16
ON		Ni1000 1)	UI01 to UI08
	ON	Ni1000 1)	UI09 to UI16

The factory setting is T1

**Disabling the sensor supply voltage**

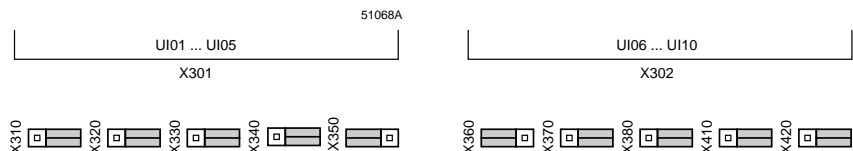
The pull-up resistors ( $R_i = 10k\Omega$ ) for the T1 and Ni1000 sensor supply voltage can be disabled individually at inputs A (UI101) to J (UI110) with jumpers X310 to X420. This process is required whenever devices are connected which are *unable to sink current*.

The jumpers are located on the printed circuit board and cannot be adjusted without opening the controller housing.

When delivered from the factory, the jumper settings are such that the sensor supply voltage is enabled. To disable the supply, each jumper must be moved one position to the left.

**Inputs and jumpers**

Input	Jumper	Input	Jumper
A UI01	X310	F UI06	X360
B UI02	X320	G UI07	X370
C UI03	X330	H UI08	X380
D UI04	X340	I UI09	X410
E UI05	X350	J UI10	X420



**Caution**

**The incorrect positioning of jumpers can give rise to offset voltages when active signal transmitters are connected (failure to reach a zero-point).**

*View of part of the PCB: In this example, apart from X350 and X360 (T1/Ni1000 supply OFF) all the jumpers are shown in their factory-set position.*

## Operation and service

The controller can be operated by various means:

- Remotely, from a room operating unit
- Via the RS bus, with an operator terminal or PC
- NBRN-.. operator terminal or service PC for service and commissioning
- NRK16-B/A for simple local operation (see page 8)
- NRK16-WEB/A for operation with an Internet browser

### Remote operation

Connection terminals K1, K2, K4 and K6 are provided for remote operation from a type KR.. room operating unit. The PB.. operating units should be connected to universal inputs A..J.

<i>Suitable room operating units</i>	<i>Documentation</i>
KRT-1B Room temperature measurement Room temperature setpoint adjustment Mode selection (AUT, ON or OFF) Heating time extension (by 1, 2 or 4 hours)	CA2N1612
KRT-1L Room temperature measurement Room temperature setpoint adjustment Mode selection (AUT, ON or OFF) Holiday mode extension (by 1, 2 or 3 days)	CA2N1613
KRU-1 Room temperature measurement Mode selection (AUT, ON or OFF) Timer module with independent time function	CA2N1614
PBA Room temperature measurement Room temperature setpoint adjustment	CA2N1651
PBC Room temperature measurement Room temperature setpoint adjustment Digital display of room temperature	CA2N1655

See the relevant documentation for maximum cable lengths

### Operation via RS bus

Since the controller is compatible with the RS bus, it can be operated remotely from any of the following devices:

- NBE remote operator terminal (see K21-05.18)
- NBRN-.. operator terminal (see K21-05.10 and 12)
- From a PC running the INTEGRAL DIALOG service software, connected via the NITEL.. communications module (see K21-07.30) or NARC RS485-RS232 adapter
- Internet browser, via the NIWEB communications module

Where the INTEGRAL RS system is integrated into a higher-level system, the controllers can also be operated as follows:

- In an INTEGRAL MS1000, MS2000 or TS1500 building management system
- In the DESIGO INSIGHT building management system, with advanced graphics-based operation

### Service and commissioning

For service and commissioning purposes an NBRN-.. terminal or a PC can be connected directly to the service socket on the controller. The same socket is used to download an application-specific SAPIM program from a suitable PC (not required for pre-programmed modules).

### User manuals

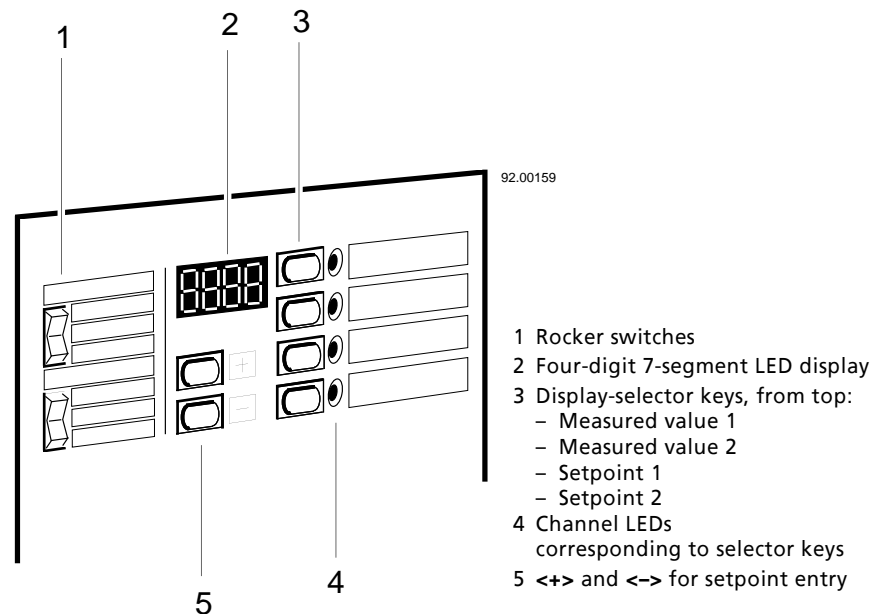
The following user manuals are available for the operator software described above:

- K23 NBRN.. operator terminals
- K9 INTEGRAL DIALOG
- CA12U3290 NIWEB User manual
- CA1B9110 DESIGO INSIGHT

**Important:**  
For communication on the RS bus, the controller must be assigned the appropriate address, by use of the rotary switch on the cover plate. (Factory-setting: Address 1).

### Simple local operation with the NRK16-B/A

The cover plate of the NRK16-B/A incorporates facilities for direct operation. The functions of the selectable display and switches are defined by the application module selected.



Each rocker switch has three positions with functions which vary depending on the application module used. The allocation of the two setpoints and two measured values also depends on the application. These four values can be displayed in the four-digit LED display panel by use of the appropriate selector key. The setpoints can be modified with the <+> and <-> keys; these also operate as repeating keys when continuously depressed. Each of the four values is associated with one of the red channel LEDs. With some applications, the setpoints can have upper and lower limits, adjustable from an operator terminal.

#### LED function test

Depressing the two lower selector keys simultaneously should cause all segments of the display panel and the channel LEDs to light up..

#### Alarm handling

Subject to the application selected, the display panel can also be used to indicate alarms. A code between A1 and A9 can be displayed (A1...A8 for alarms defined in accordance with the application, and A9 for a common alarm). The operation of the controller is not affected by the presence of an alarm. While the measured value or setpoint is displayed, the associated channel LED will flash, i.e. the alarm remains active. The alarm code can be displayed again by pressing the two upper selector keys simultaneously.