NRUE/A, NRUF/A (NRUT../A)

Control and interlock devices

Programmable compact devices for local control, interlock and energy management functions in HVAC systems.

They may be used for

- stand-alone control and interlock functions
- remote processing within a management system

Particularly suitable for packaged solutions, such as air-conditioning units for laboratories or computer rooms etc.

NRUE/A

NRUF/A

Types

Type	Inputs[1]		Outputs	
	Digital	Universal	Digital	Analogue
NRUE/A	8	8	10	6
NRUF/A	8	16	16	8
NRUT../A	NRUE/A + NITEL.. built-in communication module (see manual NT21)			

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	Max. 12.5 VA
– With output peripherals	Max. 20 VA
Fuse	T 4 A
Supply voltage for output peripheral devices	
Output voltage	DC 15 V ± 10 %, electrically isolated from AC 24 V
Output current	Max. 300 mA
Signal inputs [2]	
Digital inputs	
– Number	See table above
– Range	Low < AC/DC 6 V High = AC/DC 15 ... 45 V ± 10 %, Ri = 4 kΩ
Universal inputs [3]	
– Number	See table above
– Use	Can be structured as T1, Ni1000, DC 0 ... 10 V, digital volt-free or NMID connection
– Input impedance	Ri (pull-up resistor) = 10 kΩ to DC +15 V or 100 kΩ to GND (change-over facility, see p. 3)
Signal outputs [2]	
Digital outputs	
– Number	See table above
– Type	Volt-free normally open contact
– Contact rating	Max. AC/DC 45 V + 10 %, max. 2 A
– Voltage against earth	Max. AC/DC 45 V + 10 %
Analogue outputs	
– Number	See table above
– Range	DC 0 ... 10 V
– Source/sink current	Max. 2 mA
Product data	
Accuracy class	0.5
Sampling rate	
– Internal	100 ms
– System	0.2 ... 1 s
Data protection after power failure	
– Structures and parameters	> 10 years
– Time / date	> 12 months

Technical data continued on page 2

[1] The NMID multiplexer enables four digital inputs to be connected to a universal output. (see K21-06.55). Up to eight multiplexers can be connected to the NRUE/A and 16 to the NRUF/A. 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 some inputs (see page 4). The universal inputs can be switched from T1 to Ni1000 with DIP switches.

Technical data continued from page 1

Electrical protection

The digital inputs are electrically isolated from each other, from the auxiliary power supply and from the signal outputs. Variations in voltage are acceptable in the extra low voltage range.

The digital inputs are protected against overvoltages up to AC/DC 50 V. Higher voltages will damage the input (fusible link).

The analogue inputs can withstand overvoltages up to AC 30 V/DC 40 V. Higher voltages will damage the input (protection module).

Subject to certain limitations, the analogue outputs are short-circuit proof (max. 50 mA):

– *One* output: Sustained short-circuit protection.
– Two or more outputs simultaneously: The short-circuit protection is subject to a time limit (< 1 minute) after which thermal damage will ensue.

Important:

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

Connections	
Connection terminals	Screw terminals for 1.5 mm² cable or 2.5 mm² wire
Cable type and length	See installation instructions, K21-11.20
Communication	
RS bus	Electrically isolated from AC 24 V and signal outputs
– Transmission rate	9600 baud
– Max. cable length (RS bus)	2400 m
– NRU../A – RS bus connection	From service socket via 10-core ribbon cable to NARB/A adapter
Service terminal	NBRN operator terminal plugged directly into service socket
Weight excluding packaging	4 kg
Dimensions (W x H x D)	265 x 292 x 100 mm
Mounting	Vertical; screwed to a flat surface
Safety	
Product safety	EN 61010-1
– Contamination level	2
Electrical safety	SELV-E (PELV to IEC 364-4-41)
General ambient conditions	
Usage	Installed in control panel
Temperature range	
– Operation	5 ... 45 °C
– Storage	–25 ... 70 °C
Ambient humidity	10 ... 90 %rh, non-condensing
Conformity	This product meets the requirements for CE marking and is c UL us tested

Brief description

The RS compact controllers are programmable microprocessor-controlled DDC control and interlock devices.

The only difference between the two hardware models is the type and number of system inputs and outputs available (see table, page 1). Both controllers are capable of processing the control and interlock functions of several systems or subsystems.

Connections

The peripheral devices, power supply and the RS bus are connected directly via the two-part connectors on the side of RS compact controller (see page 4, *Terminal layout*).
The RS compact controllers incorporate a socket for the service and operator terminals.

Mounting

The RS compact controllers can be mounted directly on any flat surface (e.g. the base plate of a control panel) using four screws.

See K21-10 for detailed mounting instructions.

Construction

Basically, the RS compact controller consists of a metal housing and printed circuit boards.

The housing comprises a base with a cover and accommodates the RS card and either one or two I/O cards, depending on type. These are fitted with two-part connectors along the side of the housing for direct connection of the peripheral devices.

The *service socket,* also on the side of the housing, may be used to connect any of the following:

- NBE remote operator terminal
- NBRN.. operator terminal
- NARB/A RS bus adapter
- NARC RS bus adapter and interface converter
- A service PC for programming and commissioning the RS controllers

Display and labelling

The following *LEDs* indicate operating and alarm states:

Green = Power on (flashes duning download of software)
Yellow = Communication
Red = Error / Reset

Various labelling spaces are provided (e.g. for module address, number and type of inputs and outputs etc.).

Printed circuit boards

The NRUE/A accommodates the RS card and one I/O card, both of which are mounted on the housing base. A steel plate screens the RS card from the relays and facilitates the routing of the ribbon cable connections. The NRUF/A incorporates a second I/O card, mounted inside the housing cover.

Opening the controller see K21-10.20, p.14.

Caution:
Do not handle PCBs. Electronic components can be damaged by electrostatic charge.

Adjustment fecilities

Removal of the cover allows access to two DIP switches on the RS card for selection of the required sensor type, and jumpers to disable the sensor supply voltage. The rotary switch used to address the compact controller can be adjusted by inserting a screwdriver through the aperture on the right-hand side of the cover. This hole is sealed with an easily-removable plastic plug.

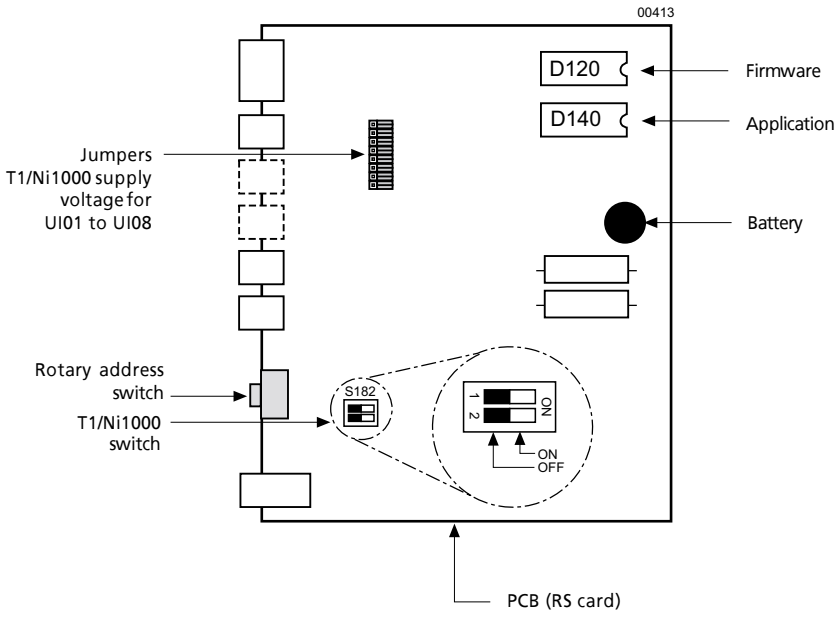
Selecting T1 or Ni1000 sensor

T1 or Ni1000 sensors can be connected to the RS compact controllers. DIP switch S183 is used to adapt the controller to the actual sensor type. The changeover is effected in blocks of eight inputs at a time.

Battery

A replaceable lithium battery provides protection against loss of data (battery life approx. 5 years).

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



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.

Settings for Switch S182, Ti / Ni1000

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

Addressing the compact modules

Switch setting	Address	Switch setting	Address
0	1	8	9
1	2	9	10
2	3	A	11
3	4	B	12
4	5	C	13
5	6	D	14
6	7	E	15
7	8	F	16

SAPIM structure for NRUF/A

When creating the SAPIM structure for an NRUF/A compact controller, note that any devices *not capable of sinking current* must be connected to inputs UI01 to UI08.

Disabling the T1/Ni1000 supply voltage

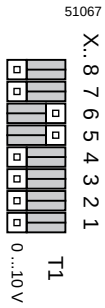
The pull-up resistors (Ri = 10kΩ) for the T1 and Ni1000 supply voltage can be disabled individually at inputs A (UI101) to H (UI08) with jumpers X1 to X8. This process is required whenever devices are connected which are *unable to sink current.*

The jumpers are located on the printed circuit board (see page 3) 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.

Caution

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



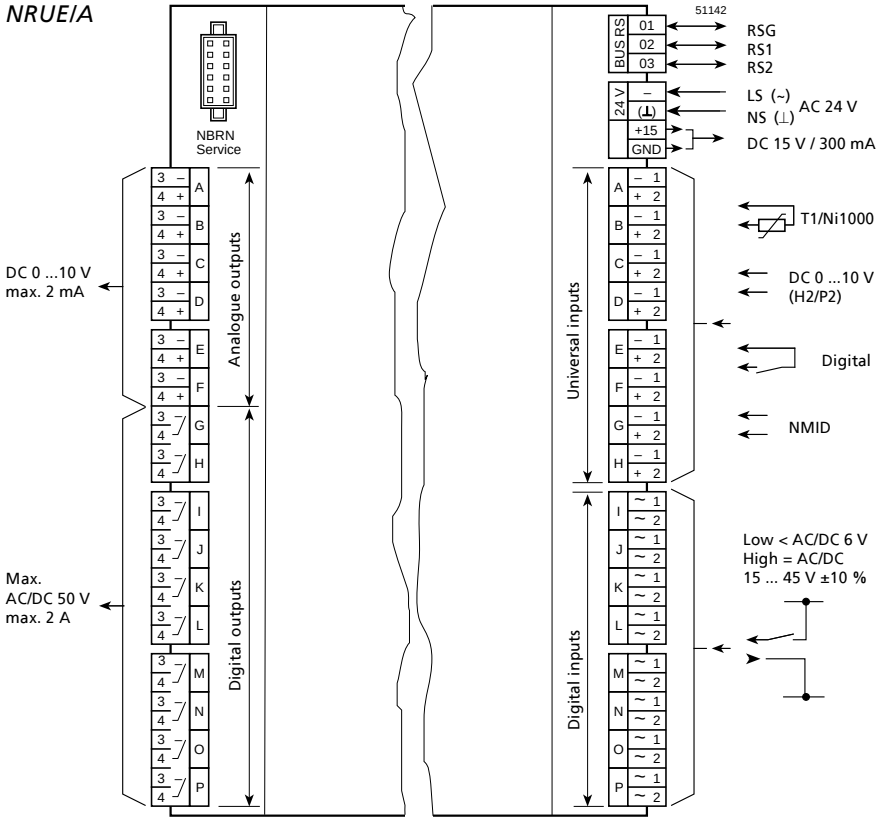
Inputs and jumpers

Input		Jumper	Input		Jumper
A	UI101	X1	F	UI05	X5
B	UI102	X2	G	UI06	X6
C	UI103	X3	H	UI07	X7
D	UI104	X4	I	UI08	X8

View of part of PCB: In this example, apart from X5 and X6 (T1 supply OFF) all the jumpers are shown in their factory-set position.

Terminal layout

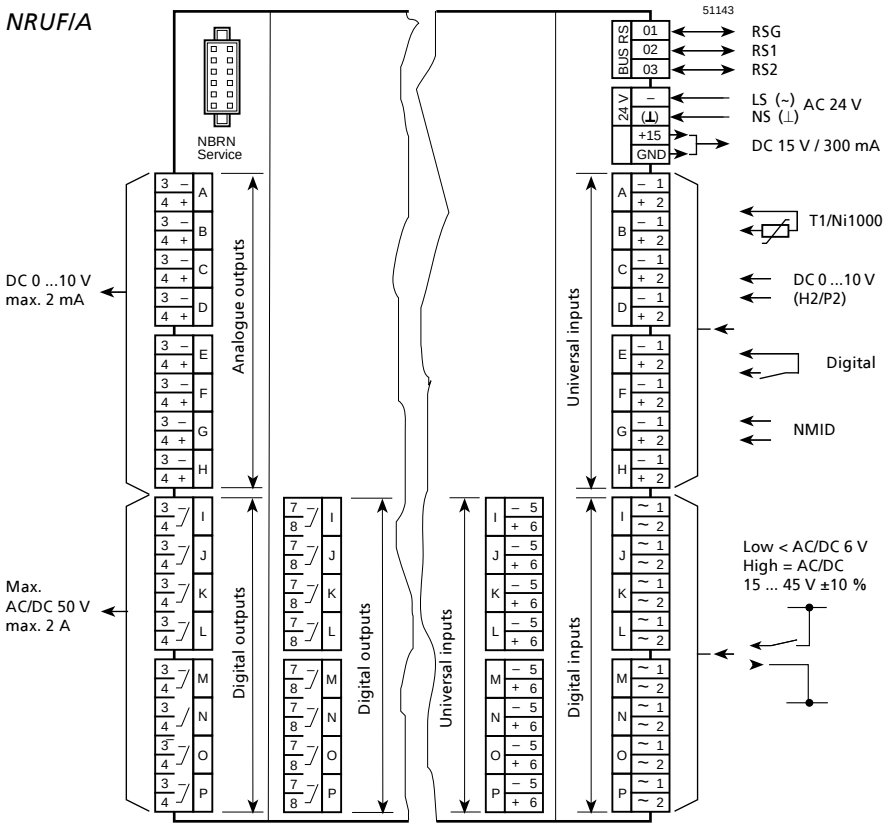
NRUE/A



Inputs	Software addresses
A 1/2 ... H 1/2	UI01 ... UI08
I 1/2 ... P 1/2	DI01 ... DI08

Outputs	Software addresses
A 3/4 ... F 3/4	UO01 ... UO06
G 3/4 ... H 3/4	UO07 ... UO08 [1]
I 3/4 ... P 3/4	DO01 ... DO08

NRUF/A



Inputs	Software addresses
A 1/2 ... H 1/2	UI01 ... UI08
I 1/2 ... P 1/2	DI01 ... DI08
I 5/6 ... P 5/6	UI09 ... UI16

Outputs	Software addresses
A 3/4 ... H 3/4	UO01 ... UO08
I 3/4 ... P 3/4	DO01 ... DO08
I 7/8 ... P 7/8	UO09 ... UO16 [1]

[1] Must be structured as time-proportioning or DO.