

NDEM 31

T&A terminal for APS 400 system

User's guide



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2 Product description

The **NDEM 31** ¹⁾ (T&A terminal with a 3.5" display, an integrated 125 kHz RFID reader and a single door controller) is designed for to the **APS BUS** of the **APS 400** access control system. Up to 64 NDEM 31 terminals can be connected to a single MCA 168 system controller.

The terminal is intended for mounting in the indoor environment.



Pic. 1: NDEM 31 terminal

¹⁾ Commercial designation of available versions is described in table 1.

3 Technical parameters

3.1 Product version

Product version	Product designation	Catalogue number	Module features ²⁾	
			TF	EM
	NDEM 31 – TF	54431000	✓	✗
	NDEM 31 – EM	54431001	✓	✓

Table 1: Product version

²⁾ **TF** –TECHFASS factory ID media reading; **EM** – EM Marin ID media reading;

3.2 Technical features

Functional properties	Supply voltage		8 ÷ 18 VDC
	Current demand	Typical	200 mA
		Maximal	350 mA
	Display		4" LCD touch screen, 320x240 pixels, black & white
	ID technology, typical reading range	EM Marin	8 cm (with an ISO card)
	Memory	Configuration card	Micro SD card
		IDs count	748 IDs (for offline function)
	Inputs		2x logical potential-free contact
	Outputs		1x relay NC/NO, 2A/24V 1x transistor output 5V/5mA 1x OC for external reader buzzer control / Reading synchronization – MASTER mode
	Signalization		2x LED 1x PIEZO
	Tamper protection	Ag. opening cover	Integrated micro-switch
	Communication interface		1x RS 485 – APS BUS 1x RS 485 – AUX for future use
	Alternative data input/output		WIEGAND (configurable)

Table 2: Functional properties

3.3 Special accessories

Accessories	WIO 22	51901200	Remote control module, 2x relay
			

Table 3: Special accessories

3.4 Using WIO 22 module for remote output control

The **WIO 22** remote control **WIEGAND** relay module is designated for secure output control of APS system reader modules. The door open or other functions can be controlled from the module located inside the secure area, while the reader module can be located in the non-secure area.

The module is controlled by **WIEGAND** signal directly from the reader module working in standard operating mode. The module must be paired with appropriate reader module before use.

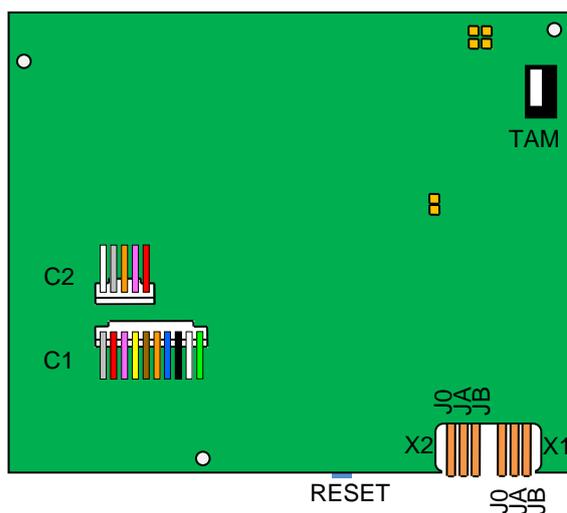
3.5 Mechanical design

Mechanical design	Weight	0,210 kg
	Operating temperature	-10 ÷ + 40 °C
	Humidity	Max 75%, non-condensing
	Cover	Plastic
	Environment	Indoor
	Color	Dark grey
	Dimensions	115x93x27 mm

Table 4: Mechanical design

4 Installation

4.1 Connectors and jumpers



Pic. 2: Rear part of the NDEM 31 terminal

Terminal description	C1	Connector C1 (10-core)
	C2	Connector C2 (5-core)
	X1	APS BUS jumpers
	X2	AUX jumpers (reserved)
	TAM	Tamper contact
	RESET	Reset button

Tab. 5: Connectors and jumpers

4.2 Wiring and jumpers description

C1 cable wiring description	Grey	0 V
	Red	+8 ÷ +18 VDC power s.
	Pink	NO relay contact
	Yellow	NC relay contact
	Brown	IN 1
	Orange	IN 2
	Blue	C relay contact
	Black	APS BUS – A cable
	White	APS BUS – B cable
	Green	External reader beeper control / reading synchronization port

Table 6: C1 cable wiring description

C2 cable	White	Aux RS 485 – B cable
	Grey	Aux RS 485 – A cable
	Orange	Output 2 (AUX)
	Pink	WIEGAND data 0
	Red	WIEGAND data 1

Table 7: C2 cable wiring description

X1 jumpers	J0	Line terminator
	JA	Idle state definition (A)
	JB	Idle state definition (B)

Table 8: APS BUS jumpers

X2 jumpers	J0	Reserved
	JA	Reserved
	JB	Reserved

Table 9: Auxiliary BUS jumpers

Wires belonging to the cables that are not used must be insulated!

4.3 Standard connection (recommended, not obligatory) ³⁾

Connection	Input 1	Door contact, active when door closed
	Input 2	Request to exit button or handle contact, active when button or handle pressed
	Output 1	Door lock control (relay)
	Output 2	AUX function (transistor output +5V/5mA)

Table 10: Standard connection

4.4 LED Indicators

LED indicators	Red	Continuously lit	Online operating mode via APS BUS
		Blinking with 2s period	Offline mode, emergency function enabled
		Short flashing with 1 s period	Offline mode, emergency function disabled
		Fast switching followed green LED with 2s period	Address setting mode
	Green	ID media reading	

Table 7: LED indicators

³⁾ The function of inputs and outputs is defined by user's programming of the controller.

4.5 Installation instructions

The terminal uses passive RF/ID technology, which is sensitive to RF noise sources. Noise sources are generally of two types: radiating or conducting.

Conducted noise enters the terminal via wires from the power supply or the host. Sometimes, switching power supplies generate enough noise to cause terminal malfunction, it is recommended to use linear system power supplies.

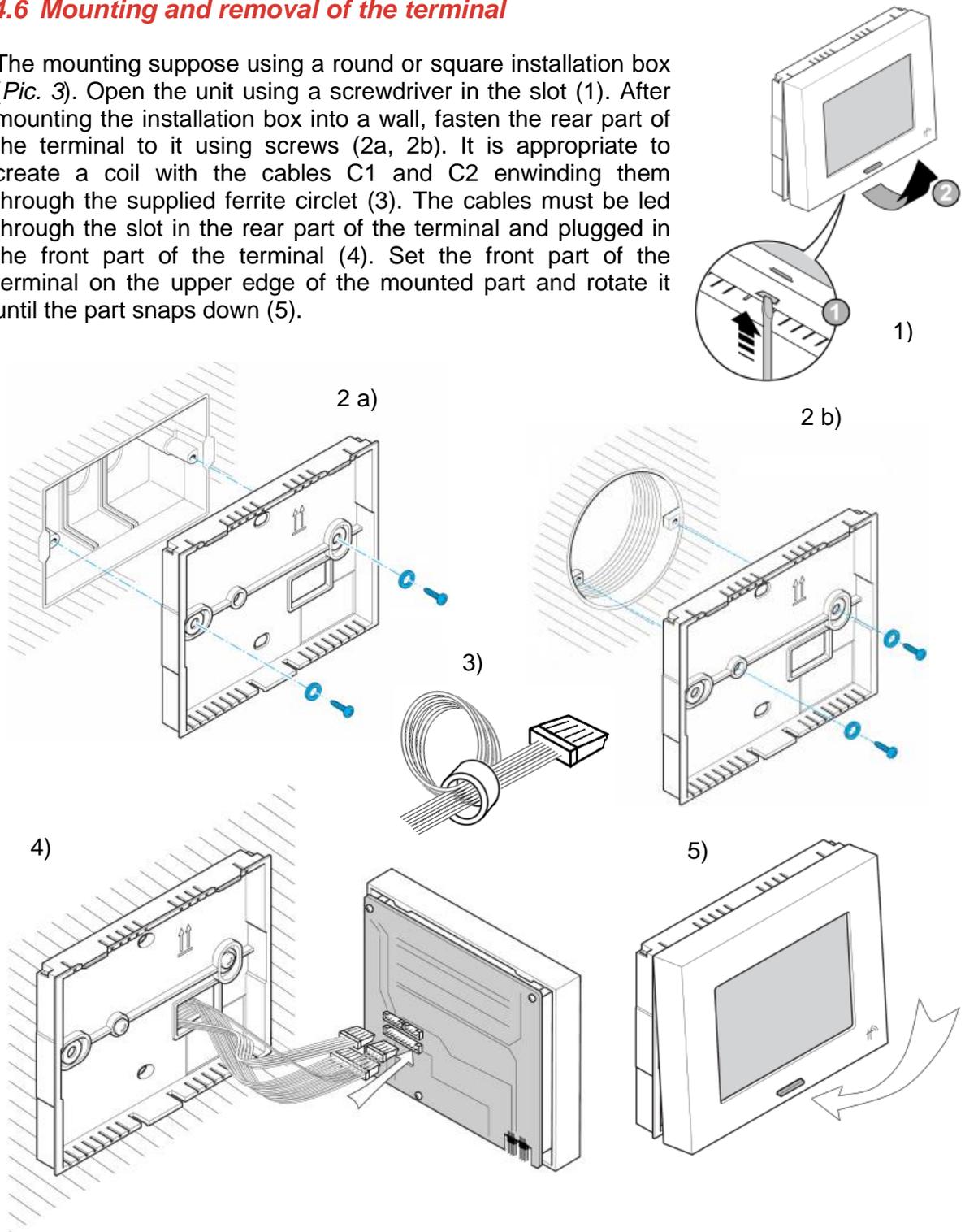
Radiated noise is transmitted through the air. It can be caused by computer monitors or other electrical equipment generating electromagnetic fields.

Consequently, a short distance between the reader modules or terminals themselves can cause reading malfunctions – for correct operation it is necessary to keep a minimum distance of 50 cm. Various metallic constructions may have a negative influence on this distance; if there are any doubts, it is recommended to perform a practical test before final mounting.

Nearby metal surfaces may cause a decrease in reading distance and speed. This is caused by the combined effects of parasitic capacitance and conductance.

4.6 Mounting and removal of the terminal

The mounting suppose using a round or square installation box (Pic. 3). Open the unit using a screwdriver in the slot (1). After mounting the installation box into a wall, fasten the rear part of the terminal to it using screws (2a, 2b). It is appropriate to create a coil with the cables C1 and C2 enwinding them through the supplied ferrite circllet (3). The cables must be led through the slot in the rear part of the terminal and plugged in the front part of the terminal (4). Set the front part of the terminal on the upper edge of the mounted part and rotate it until the part snaps down (5).



Pic. 3: Terminal mounting

The dismounting of the terminal is performed similarly. Open the unit using a screwdriver in the slot (1). Continue with an opposite procedure than performed when mounting the terminal.

5 Terminal functional properties and settings

5.1 Terminal control



Pic. 4: NDEM 31 terminal control

5.1.1 Display description

Display description	#	Symbol	Meaning	
	1	-		No ID read at the internal reader
		?		ID read at the internal reader is unknown
		✗		ID read at the internal reader is invalid
		↑		ID read at the internal reader is valid
	2	⚠ ? ⚠		Alarm status (according to its description)
	3	▶		Output 2 / input 2 (WIEGAND operating mode) status indication
	4	-		No ID read at the external reader
		?		ID read at the external reader is unknown
		✗		ID read at the external reader is invalid
		↑		ID read at the external reader is valid
	5			Date 1 in preset format
	6			Date 2 in preset format
	7			Selected reason icon
	8			Text description of the selected reason icon
9			Time in preset format	
10			Arrows allowing movement among the reason icons	
11			Area for entering configuration menu	
BUT			Terminal functional button with LED signalization	

Table 12: Display description

5.1.2 BUT – functional button description

BUT button	Signalization	Red LED
		Green LED
	Press	Toggle help screen display

Table 13: BUT – functional button description

5.1.3 LED indicators

LEDs	Red	Continuous lit	Online operating mode on APS BUS
		Blinking with 2s period	Offline mode, emergency function enabled
		Short flashing with 1 s period	Offline mode, emergency function disabled
		Fast switching followed green LED with 2s period	Address setting mode
	Green		ID media reading

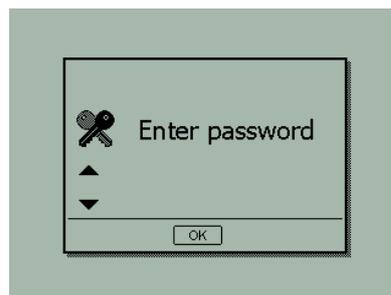
Table 14: LED indicators description

5.2 Terminal RESET button

The terminal password can be reset to factory default value by pressing the **RESET** (pic. 2, tab. 5) button for **5 seconds period** or more. The exceeding of this period is signaled with a fast flashing of a red LED. A shorter depression of the **RESET** button restarts the terminal and keeps its former settings.

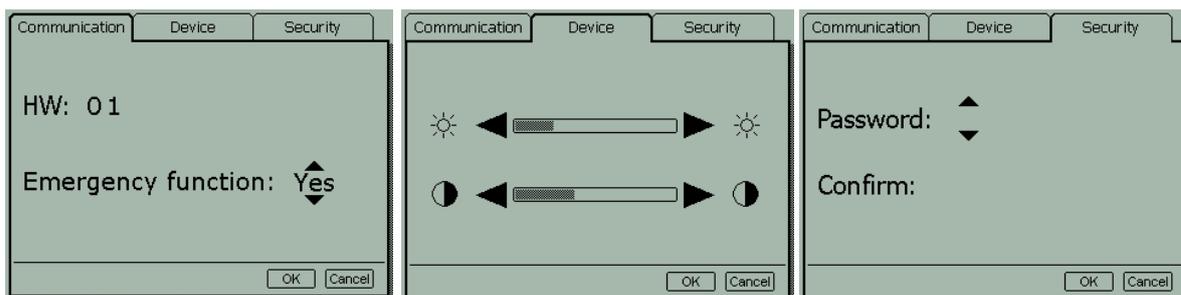
5.3 Configuring terminal from the configuration screen

To enter the **configuration screen** touch the terminal screen in **area 11** (see pic. 4) 5 times in a row. A **login dialog** will appear (pic. 5). Use the arrows to enter the password (for next character touch the empty space just next to the first character) and then press the **OK** button.



Pic. 5: Configuration screen login

After entering the configuration screen you can change terminal communication, screen and security settings (pic. 6a, b, c).



Pic. 6a, b, c: Communication, device and security settings from the configuration screen

5.3.1 Communication screen

At this tab of the configuration screen you can change the **HW address** and **Emergency function** of the terminal. Use arrows to set desired values. After setting up all parameters, use the **OK** button to save the settings or the **Cancel** button to cancel all changes.

5.3.2 Device screen

At this tab of the configuration screen you can change **brightness** and **contrast** of the display. Use arrows to set desired intensity. After setting up all parameters, use the **OK** button to save the settings or the **Cancel** button to cancel all changes.

5.3.3 Security screen

At this tab of the configuration screen you can set up a **new configuration password**. Use arrows to set the password in the password and confirmation fields. After setting up the password, use the **OK** button to save the settings or the **Cancel** button to cancel all changes.

6 Terminal setting

6.1 Configurable parameters

Parameters	Parameter	Possible range	Default setting
	Enabling of emergency function	YES / NO	NO
	Address on a communication line	1 ÷ 64	1
	Internal reader configuration	Configurable	Standard
	WIEGAND interface configuration	Configurable	Off
	Operating mode	Standard/Wiegand OUT	Standard
	All parameters are given by programming through the MCA 168 control module, see http://www.techfass.cz/files/aps_400_config_en.pdf		

Table 15: Configurable parameters

6.2 Terminal parameters setting

Setting of all parameters of the terminal can be done only when the module is connected to the system bus of MCA 168 controller. Detailed instructions for setting reader module parameters are described in the *APS 400 Network Reader* configuration program user's guide available at: http://www.techfass.cz/files/m_aps_400_network_reader_en.pdf.

6.3 Terminal display setting

The terminal display setting is provided by *xDEM 31 Configuration Tool* program, which can be downloaded at www.techfass.cz. All information about the terminal display setting can be found in the user's guide to the program.

7 Terminal operating

7.1 Operating modes

The *NDEM 31* terminals are intended for online operating mode on APS 400 system BUS (*APS BUS*). The activity of the terminals is defined by the system controller; so the terminals are able to provide various functions not only controlling of the door.

In case of the communication line fails the terminals can work in offline mode (when the *emergency function* is enabled). The "Door Open" function for last 750 valid cards registered before can be performed in this mode only.

7.2 Emergency "Door Open" function description

When the "Door Open" function is activated, the door lock is released and the beeper activated until the door is open or 5 s preset door lock release time has elapsed.

All events triggered while the offline mode is in progress are saved neither in the controller nor in the terminal memory.

7.3 Read ID media format

7.3.1 EM Marin ID media format

The EM Marin ID media format can be changed into selected 24, 32, 40 or 44 bits length of ID code. The default length is 40 bits. This setting is only changed when unifying of the ID media codes length is required – in combined systems with WIEGAND output readers with a fixed WIEGAND data format IDs (more information in *APS 400 Network Reader* user's guide available at http://www.techfass.cz/files/m_aps_400_network_reader_en.pdf).

7.4 Wiegand output

The terminal can be configured into a standard reader with a *WIEGAND output* in 26, 32, 42 or 44 bits format for *EM Marin* technology ID media. Read IDs are formatted with the previous internal reader configuration first, after that they are sent in the output format.

Wieg	ID media technology	Available configuration of the WIEGAND output format
	EM Marin	26bit, 32bit, 42bit, 44bit

Table 16: ID media format in WIEGAND operating mode

Two long beeps and the red LED lit feature powering up the module. The green LED blink indicates an ID reading.

Individual signals function in *WIEGAND output* operating mode is described in *table 17*.

Wiegand	Input 1	Beeper control (0 V active)
	Input 2	Yellow LED control (0 V active)
	Output 1 (relay)	Tamper signaling; it follows the alarm state of tamper sensors (tamper signal = relay switched on) ³⁾

Table 17: Signal function in WIEGAND operating mode

Since the *FW version 2.79* the reading synchronization of a *couple of TECHFASS readers* is implemented, enabling to *cancel the mutual disturbance* of the modules. The reader module offers the *Wiegand data interface synchronization* in *MASTER* mode.

7.5 Wiegand input (*WIEGAND interface configuration*)

The terminal can be configured into a mode of controlling the door from both sides (*entry reader mode*) or into a mode, where the reading of IDs is provided by an external reader only (*external reader mode*).

In the *entry reader mode* an identification at an external reader connected via the *WIEGAND interface* acquires a *reason code 255*, the terminal own reader operates standardly, the reason codes are acquired according to a reason icon selected at the display.

In the *external reader mode* the terminal own reader is disabled. The ID media reading is provided by an external reader, which is connected to the terminal with the *WIEGAND interface*. The code of the reason selected at the terminal display is assigned directly to the identification event raised at the external reader.

The acoustic signalization of the events raised at the external reader is announced directly at the external device itself – the signal for the beeper control is present at the cable 1 (see *tab. 6*).

Since the *FW version 2.79* the reading synchronization of a *couple of TECHFASS readers* is implemented, enabling to *cancel the mutual disturbance* of the modules. The reader module offers the *Wiegand data interface synchronization* in *SLAVE* mode.

The *WIEGAND input* and *WIEGAND output* operating modes are mutually exclusive.

7.6 Reading synchronization

Since the *FW version 2.79* the reading synchronization of a *couple of TECHFASS readers* is implemented, enabling to *cancel the mutual disturbance* of the modules. The reader module offers to use the *IO synchronization* in *MASTER* mode. The *output 3* is used as the *synchronization signal*.

8 Useful links

- Wiring diagrams: <http://techfass.cz/diagrams-aps-400-en.html>
- Program equipment: <http://techfass.cz/software-and-documentation-en.html>