

NREx 73

Network reader modules

User's guide



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2 Product description

The **NREx 73** ¹⁾ reader modules are designed for connection to the **APS BUS** of the APS 400 identification system. Up to 64 reader modules NREx 73 can be connected to a single MCA 168 controller.

The reader modules are designed for surface mounting in outdoor and indoor environment. The modules are available in various modifications differing in the way of usage.



Pic. 1: NREM 73

2.1 NREM 73 reader module

Standard reader module for the APS 400 system; the user's identity is verified by reading ID media (Pic. 1).

2.2 NRED 73 reader module

Reader module with a reason keypad (Pic.2); the user may enter an operation code by pressing a key, e.g. a reason to leave the building. The module is designed mainly for attendance applications.



Pic. 2: NRED 73

2.3 NREP 73 reader module

Reader module with a PIN keypad (Pic.3); uses the combination of ID media and a PIN code for user identification.



Pic. 3: NREP 73

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

3 Technical parameters

3.1 Product version

Product version	Product designation	Keypad layout	Catalogue number	Module features ²⁾	
				TF	EM
	NREM 73 – TF	N/A	54473000	✓	✗
	NRED 73 – TF	Reason keypad	54473200	✓	✗
	NREP 73 – TF	PIN keypad	54473400	✓	✗
	MREM 73 – EM	N/A	54473001	✓	✓
	NRED 73 – EM	Reason keypad	54473201	✓	✓
	NREP 73 – EM	PIN keypad	54473401	✓	✓

Table 1: Product version

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

3.2 Technical features

Technical features	Supply voltage		8 ÷ 15 VDC
	Current demand	Typical	80 mA
		Maximal	120 mA
	Keypad layout	NREM 73	No keypad
		NRED 73	Reason keypad, 16 keys
		NREP 73	PIN keypad, 16 keys
	ID technology, typical reading range	EM Marin	8 cm (with ISO card)
	Memory		750 ID (for emergency function)
	Inputs		2x logical potential-free contact
	Outputs		Relay NC/NO, 2A/24V Transistor output 5V/5mA + yellow LED
	I/O Port	External device	Ext. tamper / ext. reader buzzer control / Reading synchronization: MASTER / SLAVE mode
	Indicators		3x LED 1x PIEZO
	Tamper protection		Reed contact
	Communication interface		RS 485 – APS BUS
	Alternative data output		WIEGAND (configurable)

Table 2: Technical features

3.3 Special accessories

Accessories	MAG	51900200	Magnet for reed contact
	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		0.25 kg
	Operating temperature		-25 ÷ 60 °C
	Humidity		Max 95%, non-condensing
	Housing	NREM 73	IP 54, IK 07
		NRED 73, NREP 73	IP 52
	Pigtail		0.5 m
	Color		Light grey
	Dimensions		105x90x20 mm

Table 4: Mechanical design

4 Installation

4.1 Wiring description

Wiring description	Color	Function	Color	Function
	Red	Power sup. +13 VDC	Green white	WIEGAND data 0
	Red blue	Power sup. +13 VDC	Brown green	WIEGAND data 1
	Green	IO Port 3	Yellow	Input 1 (IN1)
	Blue	GND (0 V)	Grey	Input 2 (IN2)
	Black	A wire - RS 485 line	Violet	NO relay contact
	White	B wire - RS 485 line	Brown	C relay contact
	Pink	Output 2 (AUX)	Grey pink	NC relay contact

Table 5: Wiring description

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

4.2 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 functions (transistor output +5 V/5mA) + yellow LED
	I/O Port	External tamper (Standard operating mode) External reader buzzer control (op. mode with entry reader) Reading synchronization: MASTER / SLAVE mode

Table 6: Standard connection

4.3 LED Indicators

LED indicators	D1	Red	Continuously lit	Online operating mode via RS 485
			Blinking with 2s period	Offline mode, emergency function enabled
			Short flashing with 1 s period	Offline mode, emergency function disabled
	D2	Red / green	Fast switching	Address setting mode
		Green	Single flash	ID media reading
	D2	Green	Controlled by the controller's program ³⁾ , copies 1st output status (Relay1)	
		Yellow	Controlled by the controller's program ³⁾ , copies 2nd output status (AuxOutput)	

Table 7: LED indicators

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

4.4 Installation instructions

The reader module 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 reader via wires from the power supply or the host. Sometimes, switching power supplies generate enough noise to cause reader 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.

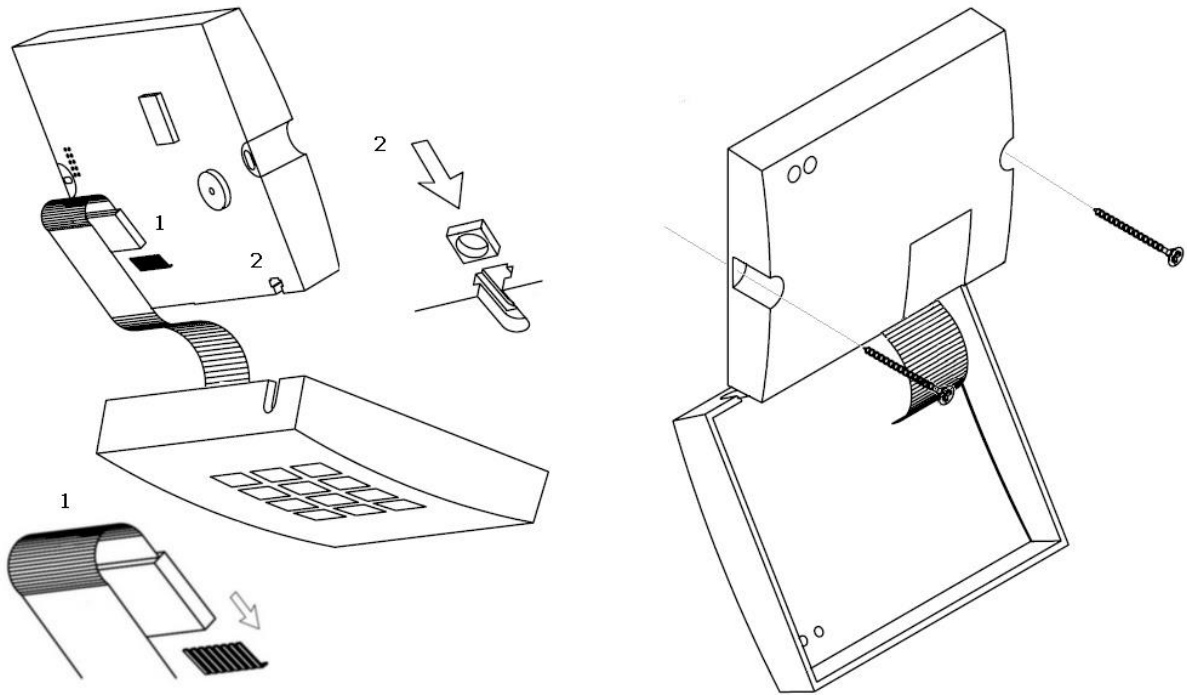
Consequently, a short distance between the reader modules themselves can cause reading malfunctions – for correct operation it is necessary to keep a minimum distance of 50 cm. Various metallic constructions may have a negative influence on this distance; if there are any doubts, it is recommended to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

4.5 Mounting and removal the module

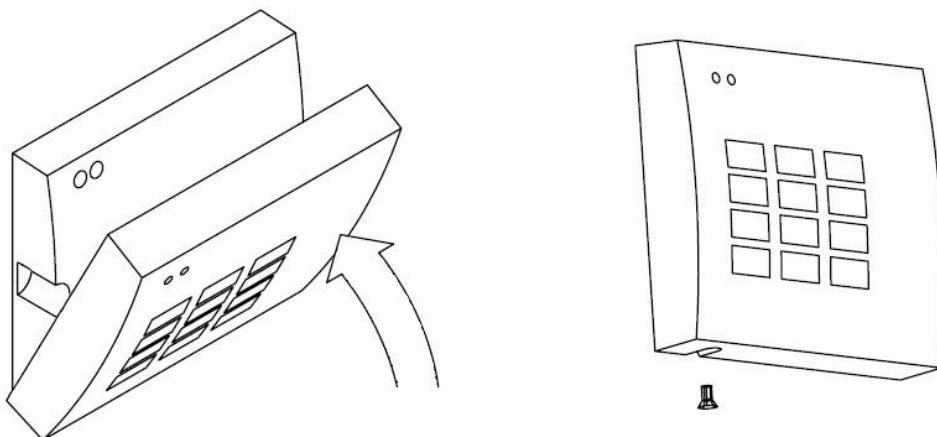
First drill the fastening and cable holes, then insert the flat keypad cable into the reader connector 1 carefully (when it is a keypad version), insert the enclosed square screw nut 2 and fasten the module on the wall, see *Pic. 4 a*).

It is recommended to place an installation box for connection of incoming cables on the other side of the wall or in highly secured area (with in/out readers).



Pic. 4 a): Fastening the module on the wall

Shut the cover and lock it using enclosed screw, see *Pic. 4 b*).



Obr. 5 4): Swinging on and locking the cover

Removal of the module can be performed in reverse order.

5 Setting parameters of the reader module

5.1 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
	Operating mode	Standard / Wiegand Input / Wiegand Output	Standard
	Keypad function	Reason/PIN/Code	Acc. to reader type
All parameters are given by programming through the MCA 168 control module, see http://www.techfass.cz/files/aps_400_config_en.pdf			

Table 8: Configurable parameters

The NREM 73 reader modules do not feature any keypad. The keypad function of NRED 73 is set to Reason keypad by default; NREP 73 modules have PIN keypad set by default.

5.2 Reader module parameters setting

Setting of all parameters of the reader module 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 Reader module functioning

6.1 Operating modes

The *NREx 73* reader modules are intended for online operating mode on APS 400 system BUS (*APS BUS*). The activity of the modules is defined by the system controller; so the modules are able to provide various functions not only controlling of the door.

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

6.2 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 reader memory.

6.3 Read ID media format

6.3.1 EM Marin ID media format

The EM Marin ID media format can be changed into selected 24, 32 or 40 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).

6.4 Wiegand interface configuration

6.4.1 Standard operating mode

This is the module default operating mode. The Wiegand interface is used for controlling the WIO 22 module in this configuration. When the reader module operates in the standard operating mode, the I/O Port (*tab. 6*) is used as an input for monitoring an external device tamper status.

6.4.2 Wiegand output

The module 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 setting first (see *chapter 6.3.1*), 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 9: 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 10*.

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 10: Signal function in WIEGAND operating mode

Key codes sent in **WIEGAND output** operating mode are described in *table 11*.

Pressed key interpretation	Keypad version	Pressed key	Keypad function set in program	
			PIN / ID keypad function	Key code keypad function
	NREP 73	Keys 1 ÷ 9	Code 1 ÷ 9	
		Keys 0	Code 0	Code 10
		X (ESC)	Code 10	Code 0
		↵ (ENTER)	Code 11	
		↑ (up arrow)	Code 12	
		↓ (down arrow)	Code 13	
		→ (right arrow)	Code 14	
		← (left arrow)	Code 15	
	NRED 73	Keys 1 ÷ 9	Code 1 ÷ 9	
		Keys 10	Code 0	Code 10
		ESC	Code 10	Code 0
		ENTER	Code 11	
		F1	Code 12	
		F2	Code 13	
		F3	Code 14	
		F4	Code 15	

Table 11: Pressed key interpretation in WIEGAND output 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.

6.4.3 Wiegand input (entry reader)

The module can be configured into a mode of controlling the door from both sides (**entry reader mode**).

In the **entry reader mode** an identification at an external reader connected via the **WIEGAND interface** acquires a **reason code 255**; at the same time the reader module operates standardly, the reason codes equal zero.

When the reader module operates in the entry reader operating mode, the I/O Port (*tab. 6*) is used as an output for controlling the entry reader buzzer.

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.

6.5 Keypad function

The keypad function setting can be set to one of the following options:

- *Key code* – this option is used when the keypad is used for entering a code of reason to exit. The key code is sent together with the card ID as well as stored in the events archive of the control module. It is necessary to press the key before identification, last pressed key is considered as the valid one
- *PIN* – with this option selected the keypad is used for entering PIN codes, a correct PIN is required for valid identification when this option is selected. PIN can be entered before or after identification. Last 4 digits entered are considered to be a PIN code.

The PIN code entering requirement can be operatively changed (allowed/suppressed) by appropriate command in the system controller's program created in *APS Config* program.

- *ID* – this option enables entering a code at the keypad which is used as a user's read ID medium; at the same time the ID medium can be used as well. ID code must contain at least 4 digits; last 10 digits entered are used at max.

Table 12 defines the interpretation of keys pressed at the individual keypads design of *NREx 73 reader modules* according to the program configuration of the keypad function.

Pressed key interpretation	Keypad version	Pressed key	Keypad function set in program	
			PIN / ID keypad function	Key code keypad function
	NREP 73	Keys 1 ÷ 9	Digits 1 ÷ 9	Reason 1 ÷ 9
		Keys 0	Digit 0	Reason 10
		X (ESC)	Digits input cancel, reason 0	Reason 0
		↵ (ENTER)	Input submit	Reason 11
		↑ (up arrow)	Reason 12	Reason 12
		↓ (down arrow)	Reason 13	Reason 13
		→ (right arrow)	Reason 14	Reason 14
		← (left arrow)	Reason 15	Reason 15
	NRED 73	Keys 1 ÷ 9	Digits 1 ÷ 9	Reason 1 ÷ 9
		Keys 10	Digit 0	Reason 10
		ESC	Digits input cancel, reason 0	Reason 0
		ENTER	Input submit	Reason 11
		F1	Reason 12	Reason 12
		F2	Reason 13	Reason 13
		F3	Reason 14	Reason 14
		F4	Reason 15	Reason 15

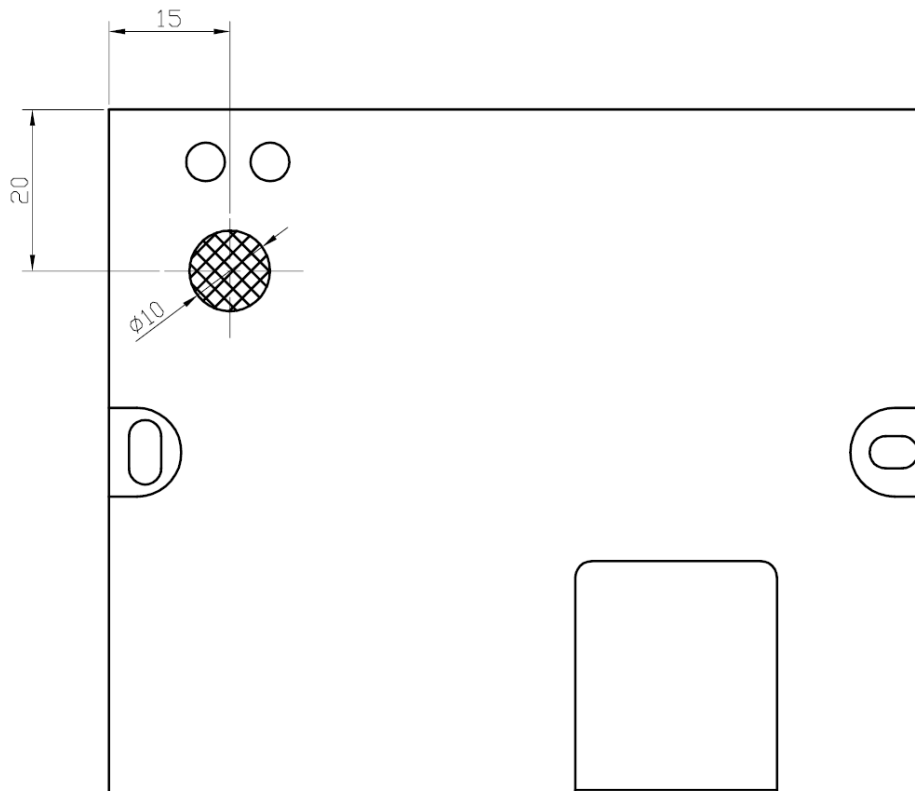
Table 12: Pressed key interpretation

6.6 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 both *MASTER* and *SLAVE* mode. The *input/output port 3* is used as the *synchronization signal*.

7 Placing a magnet for tearing-off indication

Drill a $\varnothing 10$ mm hole 12 mm deep in a wall behind the reader module at designated place (*Pic. 6*). Insert a magnet (ordering number 51900200) and attach it in the hole with appropriate mastic to ensure the top surface of the magnet matches with the wall surface. Mount the reader module in formerly prepared holes mounted with plugs.



Pic. 6: Magnet placement

8 Useful links

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