IZOELEKTRO

05/2022

Pametna IoT naprava RAM-1
Smart IoT device RAM-1

Korak pred časom
Ahead of it's time

Pametna naprava RAM-1

Smart IoT device RAM-1

Proizvod

Pametna IoT naprava RAM-1 je namenjena daljinskemu spremljanju in napredni analizi električnih omrežij. Električna omrežja z uporabo naprave RAM-1 postanejo pametna električna omrežja saj le ta izboljša obratovalni proces, zanesljivost ter stabilnost prenosa in distribucije električne energije. V primeru priključitve na prenapetostni odvodnik brez iskrišča s trajno obratovalno napetostjo nad 1 kV naprava RAM-1 z inovativno merilno metodo meri ohmsko komponento uhajavega toka v skladu s standardom IEC 60099-5 in spremlja stanje odvodnika. Rezultate meritev naprava RAM-1 prikaže v spletni in mobilni aplikaciji. Ena vgrajena naprava na SN odvodniku zadostuje za spremljanje skupine treh odvodnikov nameščenih na enem SN daljnovodnem stebru.

Lastnosti

Pametno IoT napravo RAM-1 odlikuje:
- strojno učenje
- enostavna namestitev
- komunikacija: mobilno omrežje 4G 5G ali LoRaWAN

Meritve

RAM-1 takoj javlja sledeče parametre:
- ohmsko komponent uhajavega toka,
- prekomerno temperaturo okolice (indikator požara),
- porušitev oziroma nagib visoke konstrukcije,
- izpad elektrike (prisotnost napetosti),
- štetje atmosferskih razelektritev in manipulacij v omrežju,
- uničenje odvodnika – takojšnje javljanje uporabniku,
- aktivacija odklopne naprave,
- Lokacijo dogodka ali okvare (navigacija do lokacije).

Product

The smart RAM-1 device is intended for remote monitoring and advanced analysis of power grids. Power grids become Smart with the use of the RAM-1 device, which improves the operating process and the reliability and stability of the electricity transmission and distribution networks. If attached to a gapless surge arrester with a continuous operating voltage above 1 kV the RAM-1 device can measure the resistive component of the leakage current. This innovative method of extracting the resistive component of the leakage current conforms to the standard IEC 60099-5. The measurements can be tracked either via an online or mobile application. One RAM-1 device installed on a surge arrester is sufficient for monitoring a group of three surge arresters installed on one post.

Characteristic

Smart IoT device offers
- *machine learning*
- *simple installation*
- *communication: mobile network 4G, 5G or LoRaWAN*

Measurements

RAM-1 reports the following parameters:
- *resistive component of leakage current*
- *excessive environment temperature (fire indication),*
- *inclination/tilt or collapse of the pole/pylon/tower,*
- *power outage (the presence of voltage),*
- *lightning counter and detection of other surge manipulations in network,*
- *destruction of arrester,*
- *operation of disconnecting device,*
- *Location of event or fault (provides navigation to the location).*

Prednosti pred konkurenco

- daljinsko spremljanje in napredno analiza električnih omrežij,
- merjenje ohmske komponente uhajavega toka odvodnikov,
- števec strel, temperatura naprave, temperatura okolice,
- nagib daljnovodnega stebra, mikrolokacija, najbližja pot do naprave,
- takojšnja daljinska indikacija kritičnih podatkov, avtonomno delovanje,
- Strojno učenje na podlagi predhodno zaznanih dogodkov,
- Namestitev na vse obstoječe ali nove prenapetostne odvodnike brez iskrišč.

Competitive advantages

- *remote monitoring and advances analysis of electricity transmission and distribution networks,*
- *measurement of resistive component of leakage current of surge arrester,*
- *surge counter, ambient temperature and temperature of device,*
- *collapse or tilt of pole/tower, micro location, navigation to location,*
- *instant indication of critical information, autonomous operating,*
- *machine learning based on collected information,*
- *installation on existing and new gapless surge arresters.*

Pametna naprava RAM-1

Smart IoT device RAM-1

Tehnični podatki

Technical data
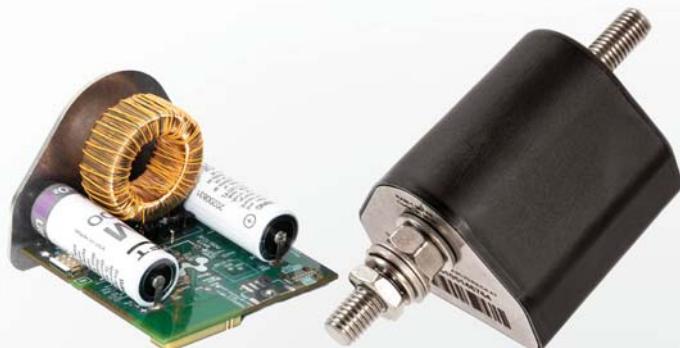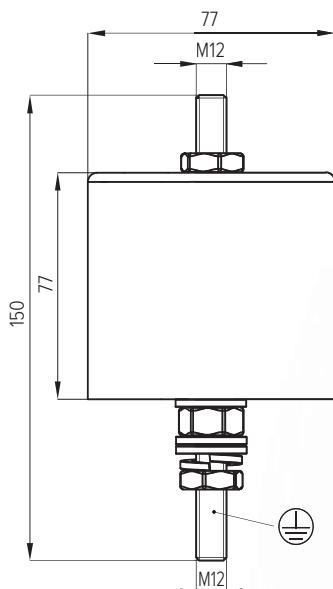
Uporaba	daljinski nadzor vgrajenih odvodnikov prenapetosti nad 1 kV		Use	remote monitoring of built-in surge arresters above 1 kV
Meritev odvodnika	ohmska komponenta uhajavega toka od < 0.03 ...3 mA (± 10%)		Basic measurement	resistive component of leakage current <0.03 ... 3 mA (± 10%)
Standard za meritev odvodnika	IEC 60099-5		Standard for basic measurement	IEC 60099-5
Ostale meritve	okvara, požar, napetost, števec udarov, temperatura naprave in okolice, nagib, lokacija		Other measurements	failure, fire, voltage, counter counter, device temperature, ambient temperature, slope, location
Temperaturno območje	- 40 °C... + 85 °C		Temperature range	- 40 °C ... + 85 °C
Stopnja zaščite ohišja	IP 67		Ingress protection IP	IP 67
Frekvenca	48 Hz ... 62 Hz		Frequency	48 Hz ... 62 Hz
Uporabniški vmesnik	mobilna aplikacija, spletna aplikacija, e-pošta		User interface	web, app, e-mail
Merilni cikel	1 ura		Measuring cycle	1 hour
Komunikacijski cikel	v realnem času: vse pomembne napake (požar, uničenje odvodnika, preseganje priporočenih meritev), enkrat na dan: UDP paket; za ostale meritve (s privzetimi nastavitvami), enkrat na sedem dni: MQTT paket; za ostale meritve (s privzetimi nastavitvami).		Communication cycle	in real time: all significant errors (fire, destruction of the arrester, exceeding the recommended measurements), once a day:UDP package; for other measurements (with default settings), once every seven days – MQTT package; for other measurements (with default settings).
Komunikacija	bluetooth, LTE/4G, 5G ali LoRaWAN		Communication	bluetooth, LTE/4G, 5G or LoRaWAN
Avtonomija baterije	do 20 let		Autonomy	up to 20 years without maintenance
Material ohišja	termoplast V-0 (UL 94), nerjavno jeklo A2 ali A4		Housing material	thermoplastic V-0 (UL 94), stainless steel A2 or A4
Material kovinskih delov	nerjavno jeklo A2 ali A4		Connection / material	stainless steel A2 or A4
Montaža	na ozemljitveni strani ZnO odvodnika prenapetosti ali zgornji tretini daljnovodnega stebra		Instalation	on earthing side of arrester surge arrester or in the top third of the pole/tower
Masa	0,580 kg		Weight	0,580 kg

M₁=26 Nm

M_1=26 Nm

19 mm

UP

RAM-1

↓ ↓ ↓

M_2=2 Nm

19 mm

M_3=26 Nm

19 mm
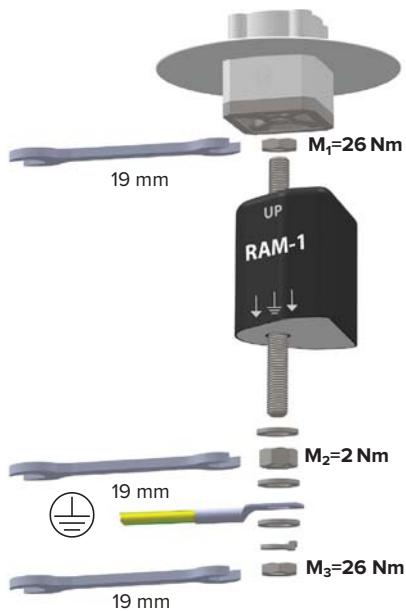
Prostozračna montaža
Installation on overhead power line

PA distančnik Ø60   *PA spacer Ø60*

PA podložka M12   *PA washer M12*

M_1=26 Nm

19 mm

UP

RAM-1

↓ ↓ ↓

M_2=2 Nm

19 mm

M_3=26 Nm

19 mm
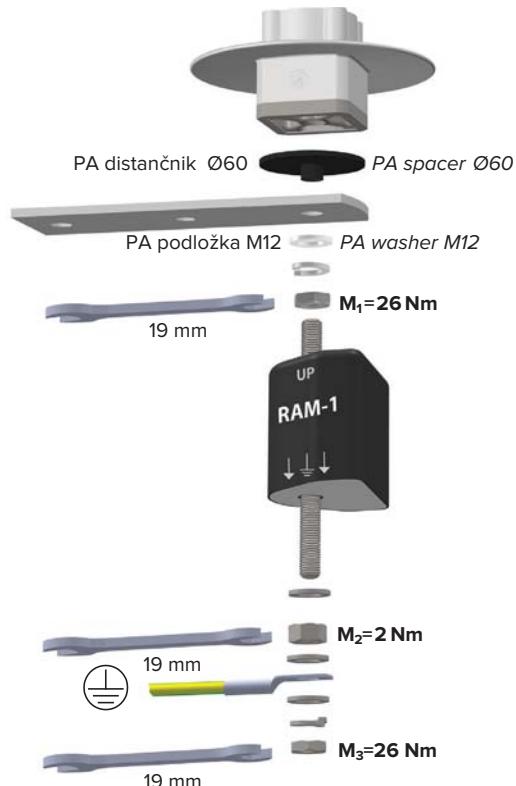
Montaža na kovinsko konzolo
Installation on steel bracket

M_1=26 Nm

UP

RAM-1

↓ ↓ ↓

M_2=2 Nm

19 mm

M_3=26 Nm

19 mm
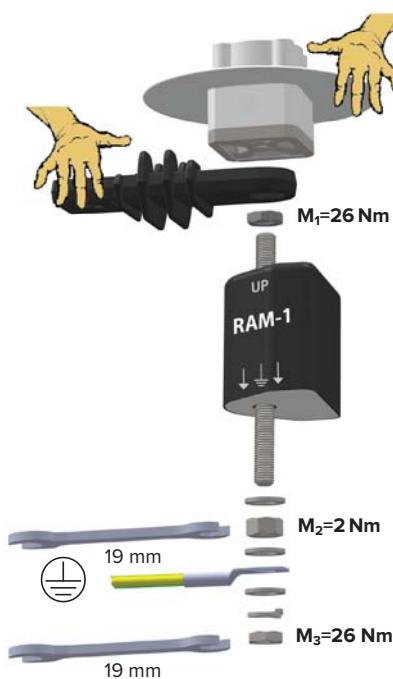
Montaža na izolacijsko konzolo
Installation on insulating bracket

M_1=26 Nm

UP

RAM-1

↓ ↓ ↓

M_2=2 Nm

19 mm

M_3=26 Nm

19 mm

ON

M_4=26 Nm

19 mm
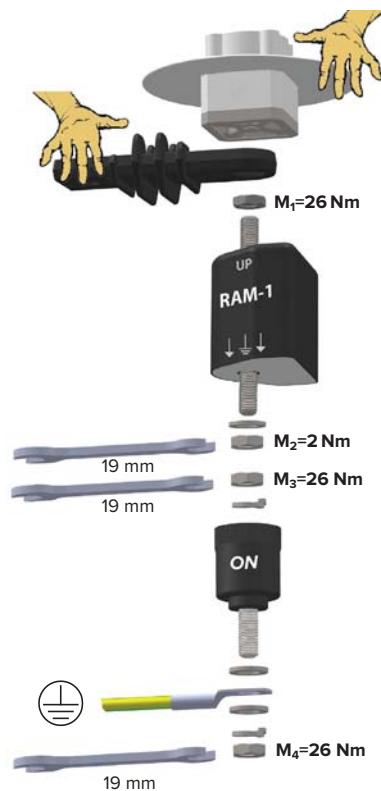
Montaža z odklopno napravo ON
Installation with disconnecting device ON

Spletni strežnik / Web server

Internet
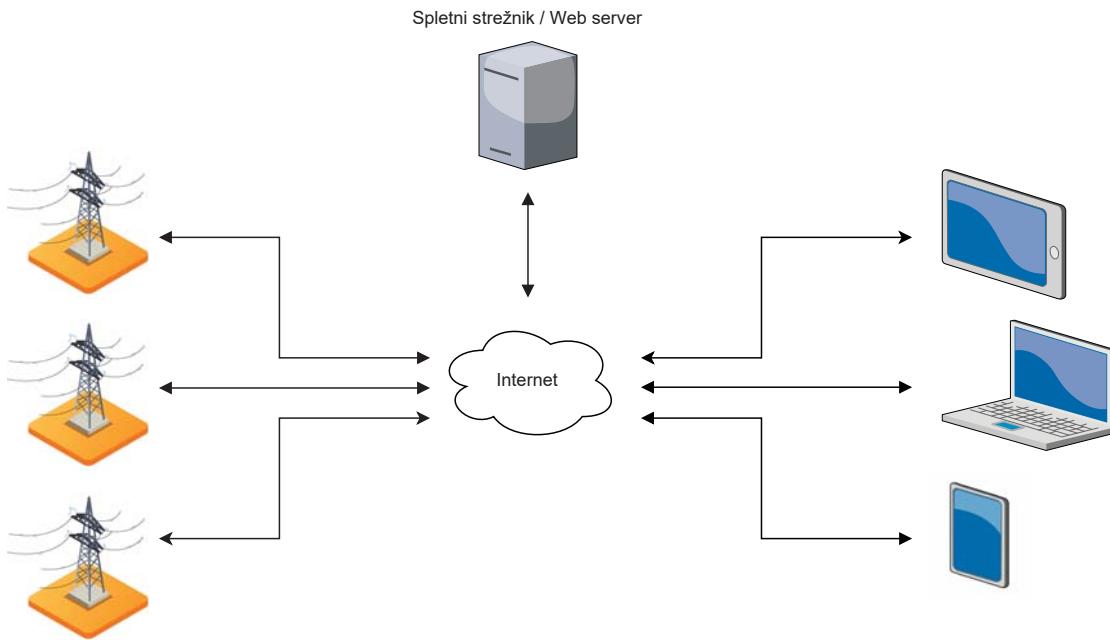
Koncentrator

Koncentrator osnovan na Raspberry Pi računalniku, omogoča vgradnjo naprave RAM-1 in komunikacijo z njo/od nje tudi tam kjer NB-IoT signala ni. Med drugim so takšne lokacije tudi razne transformatorske postaje kjer je signal slab zaradi elektro-magnetne interference ali pa materialnih ovir (npr. betonski zidovi, kovinsko ohišje). Koncentrator je narejen tako, da se lahko na eni strani poveže z RAM-1 napravo preko BLE/LoRa povezave, na drugi strani pa preko standardne kabelske povezave (Ethernet). Primarno je takšen koncentrator uporaben samo tam kjer je takšna kabelska povezava na voljo. Kjer je, bo potrebno poskrbeti tudi za primerne nastavitve omrežja, tako, da bodo lahko podatki od RAM-1 naprave nemoteno tekli skozi omrežje do oblačne rešitve RAM-center ali pa do internega strežnika/ baze podatkov v uporabnikovem omrežju.

V primerih kjer ni kabelske povezave, je napravo možno nastaviti z uporabo brezžične povezave na obeh straneh. Na eni strani se uporablja BLE/LoRa povezava, na drugi strani LoRa/mobilno omrežje (ali kakšna druga brezžična povezava na dolge razdalje, ki je na voljo). Takšna rešitev je zelo odvisna od pokritosti omrežja na posamezni lokaciji, katero je potrebno preveriti eksperimentalno pred vgradnjo.

Strojna oprema podpira:
• ethernet
• bluetooth/LoRa/NB-IoT
Programska oprema podpira:
• TCP/IP in zgornje protokole
Dimenzije:
• 9,6 x 7.3 x 2,8 cm

Gateway

Based on a Raspberry Pi, the RAM-1 Gateway enables the RAM-1 device to be installed and communicate even in areas where there is no NB-IoT signal. Such areas include different types of transformer stations where the signal is poor because of EM interference or because of physical obstacles (e.g. walls, metal casing...). The gateway is designed on one side be able to connect to the RAM-1 devices installed in such a station through BLE/LoRa and on the other to a standard industry grade wired connection (Ethernet). It can be used only where such a wired connection can be found. Where such a connection can be found, the configuration of the network will have to be set-up so that the data can either pass to our RAM-Center cloud solution or an internal server/database/data processing unit in your network.

Where a wire connection is not available, it is possible to configure the gateway to function through a wireless connection on both sides – thus using BLE/LoRa on one side and LoRA/NB-IoT (or another long-range wireless connection) on the other side as well. This type of solution depends highly on signal strength in each installation location and will have to be determined experimentally.

Hardware support:
• ethernet
• bluetooth/LoRa/NB-IoT
Software suppport:
• primarily TCP/IP and the above protocol stacks
Dimensions:
• 9,6 x 7.3 x 2,8 cm

Dodatna oprema / Additional equipment
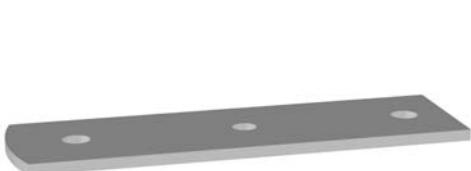
PA distančnik Ø60 *PA spacer Ø60*	**kovinska konzola** *steal bracket*	**PA podložka M12** *PA washer M12*
adapter M12 *adapter M12*	**Izolacijski nosilec PA6** *Insulated bracket PA6*	**koncentrator** *gateway*

Embalaža / Packaging

RAM-center

RAM-center

Spletna stran

Na spletnem naslovu www.ram-center.com se nahaja portal oziroma nadzorni center za spremljanje in napredno analizo električnih omrežij ter nadzor prenapetostnih odvodnikov. Ob prijavi uporabnika se prikaže seznam vgrajenih naprav.

Osnovni seznam prikazuje informacije o kraju namestitve, identifikacijsko številko naprave, datum in čas zadnje meritve ter stanje odvodnika v semaforskem prikazu. Vrednosti stanja odvodnika so izmerjene ohmske komponente uhajavega toka v mA, in obarvane glede na vrednost:
• rdeče - nad 0,6 mA (slab),
• rumeno - med 0,2 in 0,6 mA (pogojno dober),
• zeleno - do 0,2 mA (dober).

Željeno napravo izberemo s klikom na napravo. Odpre se novo okno s podrobnejšimi informacijami. Izmerjene rezultate lahko tudi izvozimo v poročilo.

Mobilna aplikacija

Za spremljanje in analizo obstaja tudi mobilna aplikacija. Mobilna aplikacija omogoča uporabnikom hiter in enostaven dostop do vpogleda in urejanja podatkov za naprave. Za urejanje podatkov v spletni aplikaciji moramo pridobiti ustrezne pravice. Mobilna aplikacija ponuja enako funkcionalnost kot spletna aplikacija, ki je prilagojena mobilnim napravam kot so: pregledi, vnosi in dopolnjevanje podatkov.

Web page

At www.ram-center.com there is a web portal or control center for monitoring and advanced analysis of electrical networks and surge arresters. When the user logs in, a list of built-in devices is displayed.

The basic list shows information about the place of installation, the identification number of the device, the date and time of the last measurement and the status of the arrester in the traffic light display. The surge arresters state of health is indicated by it's resistive komponent of the leakage current in mA and colored according to the it's state:
• red - above 0.6 mA (poor),
• yellow - between 0.2 and 0.6 mA (conditionally good),
• green - up to 0.2 mA (good).

If we select a specific device and click on it, a new window with more detailed information will open. The measured results can also be exported to a report.

Mobile application

There is also a mobile application for monitoring and analysis. The mobile application allows users quick and easy access to view and edit data on the device. For editing data pre-arranged rights in the web application must be deligated. The mobile application offers the same functions as the web application functionality but it is adapted to mobile devices: reports, entries and data updates.

IZOELEKTRO

ISO 9001
Q-262

ISO 14001
E-238

CERTIFIED
IQNet
MANAGEMENT SYSTEM