

Merya RTLS - RFID

RTLS monitoring of the people working at hazardous workplaces
 Detection of immobile person, lying person, or a free fall, SOS button
 Localization of people in real time (RTLS)

MERYA RTLS - RFID system description

Merya RTLS is a wireless system for monitoring people working predominantly at risk workplaces, using smart RFID tags and detectors. The transmission frequency is 868 MHz. The technology is used for a localization of people in real time (RTLS) in the form of 2D/3D visualization on a background map in the form of icons with corresponding names on. Personal tags have built-in sensors for the detection of a lying person, immobility (loss of consciousness, etc.), free fall, or a call for help (SOS button). Monitoring can be done in individual areas of the object (building), and also outside the object. Merya RTLS system also enables a detection and

signalling of a person who remains in the dangerous area. The batteries in the detectors are user changeable. The Merya RTLS system allows communication with all types of ESS. In case of an alarm situation, it is possible to rotate PTZ cameras to the position of the respective detector. The Merya RTLS system outputs can be integrated into the superstructure surveillance systems using SNMP-2 protocol. Each realization is preceded by thorough measurement of a radio signal in a given object. Based on this measurement and the requirement for monitoring precision, it is then determined the placement and the number of receiving detectors.



fig. 1 - Ground plan disposition of presence detection and detection of hazardous conditions of people online in the industrial hall



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Personal security tag RLK-07

The RLK-07 personal tag is an element of the MERYA RTLS system for locating and detecting people. Tag RLK-07 detects the person's immobility (in case of loss of consciousness, etc.), tilt tag, ev. absence in a defined area. The tag is worn according to the wrist design, the neckline, the clip attached to the garment, and so on. Tag is waterproof, allows showering and bathing. The battery is accessible to the user. The RLK-07 tag's range is max. 40 m from the RLS detector at a line of sight, and max. 100 m in case of using an omnidirectional high gain UMTS antenna. We are preparing free fall detection. Each RLK-07 tag has its own unique ID number, which is assigned to a specific person.

Tag properties

- to monitor the position of the person (where he / she is)
- sensor of person immobility
- free fall sensor⁽⁵⁾
- a SOS button to call for help
- vibration motor for alerts on the alarm aviso
- IP 66 cover
- An add-in mode in which the tag (which is vibration-free) transmits with a much shorter period than the standard.
- The communication with RLS detectors to determine the person's position in halls, in buildings, in complexes



RLK-07ns



RLK-07ps



RLK-07ps

The example of the alarm situations

>60 sek >60+30 sek detail

demonstration of person immobility detection

sample SOS call

Variant product design

type	Variant product	tag equipment	note
RLK-07n	wrist bracelet		IP66, material: ASA + TPE + Silikon
RLK-07ns	wrist bracelet	SOS button, LED	IP66, material: ASA + TPE + Silikon
RLK-07nsr	wrist bracelet	SOS button, LED, vibratory motor	IP66, material: ASA + TPE + Silikon
RLK-07p	hanging or ⁽¹⁾ clip		IP66, material: ASA + TPE
RLK-07ps	hanging or ⁽¹⁾ clip	SOS button, LED	IP66, material: ASA + TPE
RLK-07b	basic packaging		IP66, material: ASA + TPE
RLK-07i	to guard images	special firmware for Anarya system	IP66, material: ASA + ABC dim: 74*(55+15)*12 mm

(1) ... The product contains both options. The user chooses to use.



Personal security tag RLH-06b

Using the RLH-06b tag, the system monitors (using RLS detectors) where the monitored person is located. The personal tag RLH-06b detects (after a user-configured time) a lying person (even in the case that the person is moving), immobility of the person (in case of loss of consciousness, etc.) or a free fall from a height of at least 2 m. The RLH-06b tag has a small built-in vibrating motor for interactive communication with the user and an SOS emergency button. The RLH-06b tag's range is max. 40 m from the RLS detector at a line of sight, and max. 100 m in case of using an omnidirectional high gain UMTS antenna. The tag is powered by two 1.5V AAA batteries, which are user changeable. Each RLH-06b tag has its own unique ID number, which is assigned to a specific person. The tag is always worn in an upright position. It can be worn on the arm (fig. 3), it can be hung on the belt of the employee's trousers, or placed in a special pocket on work clothes.

- lying person sensor (see fig. 4)
- immobile person sensor (see fig. 5)
- a free fall of a person sensor (see fig. 6)
- a button to call for help
- strong vibration motor for alerts on the alarm aviso
- IP 41 cover

The example of the alarm situations

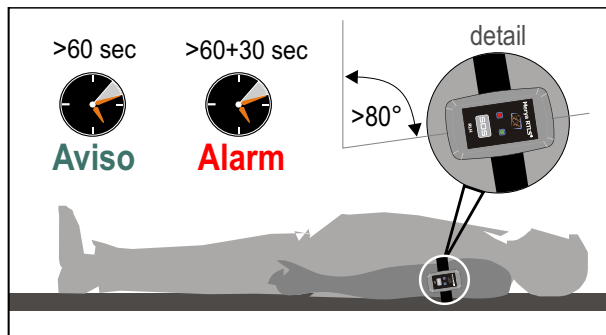


fig. 4 - Example of a lying person detection



fig. 2 - RLH-06b tag



fig. 3 - RLH tag on the employee's arm

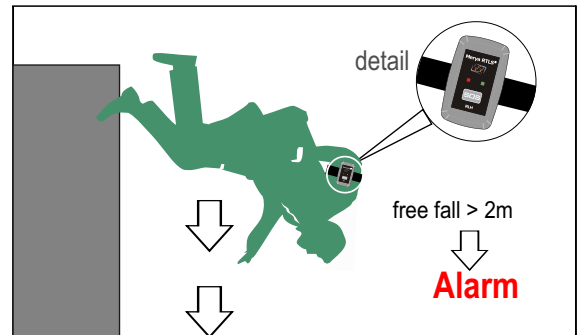


fig. 5 - Example of a free fall detection

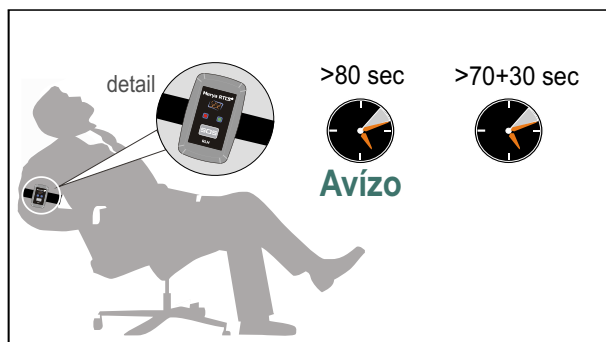


fig. 6 - Example of immobile person detection



fig. 7 - Example of SOS call



Monitoring of people working at hazardous workplaces

Merya RTLS system is suitable for hazardous workplaces like ironworks, foundries, hardening, freezer rooms, night “single-operations”. The RLS detectors can be placed at the workplaces, directly on the working machine, or are placed in areas where a detection and localization of people is required. Alarm and status information from personal tags is periodically transmitted in real time via RLS detectors to the RLU central unit. The RLU, in case of emergency, triggers alarm scenarios (outputs, SNMP, 3D visualization on a monitor, turning PTZ cameras, transfer to the superstructure surveillance systems, etc.). The system can control all analog PTZ cameras that have a Pelco-D control protocol, or implemented IP PTZ cameras, straight from the RLU unit. Operating and alarm records are stored in the RLU central unit. RLU central unit has an internal memory for 20,000 events that can be continuously downloaded to a computer database. Remote surveillance of the system and all the collected data can be done via standard web browser within LAN or the Internet. Merya RTLS program enables to display online the position and status of people using 3D graphic visualization. The program uses floor plans of individual floors of the building (in PNG format). The floor plans can also be used to visualize the position of people nearby buildings in such case that RLS detectors are installed in the vicinity. RLU contains the history of all alarm situations and also the information if the person was in the area authorized or unauthorized.



fig. 12 - A look at the screen of the visualization software

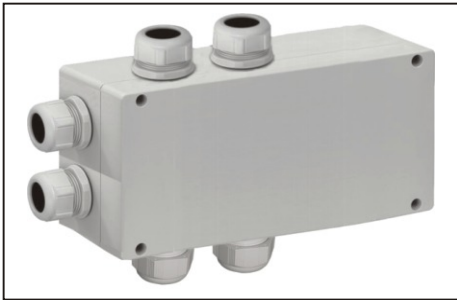
fig. 13 - Solution's disposition - Cloak monitoring



RLS series detectors



fig. 19 - RLS-07a detector



obr. 20 - RLS-07ab

Features:

- detector for RLK, RLH, FLA tags
- detection range is adjustable
- Rs485 interface
- optional wireless communication with FLM
- shake and tilt sensor, tamper
- 4x logic input
- 2x logic output
- 8-28 V power, Ip66 cover, -25°C / +70°C
- ability to connect Wiegand* device (RLS-07w)
- detector for Bypass function
- autonomous access system for one door (RLS-07ab)
- ability to connect an UMTS external antenna (RLS-07r)

RLS detectors are used to receive periodic radio signals from the personal tags and their subsequent transfer to the RLU central unit. RLS detectors are placed in areas where the detection and localization of people is required (e.g. at each workspace - one RLS detector). In case that the personal tag gets into user-defined range of RLS detector (optionally from 0.5 to max 40 m), the detector evaluates this event as „person in the area”.

Configuration of the area around the detector and behaviour of the tags in this area

The basic principle of the system is to define user areas around individual RLS detectors. The detection range of individual areas X1-X3 is user-configurable in SW for each detector separately (fig. 16-18, a green circle). This ensures great variability of Merya RTLS system. Then, it's possible to define permissions for individual personal tags - a permission whether they may be present in these areas, including the option of detection and indication of alarm events in these areas. The detector can receive safety alarm messages from tags that are in radio range determined by the type of antenna (fig. 16-18, a gray circle). In case of an alarm situation, this information is indicated locally at RLS detector's outputs, centrally in RLU unit, or in superstructure surveillance systems with which RLU communicates directly.

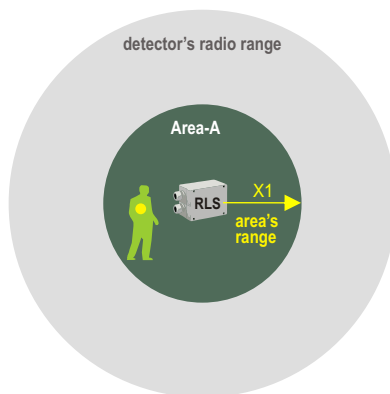


fig. 16 - authorized person in the area

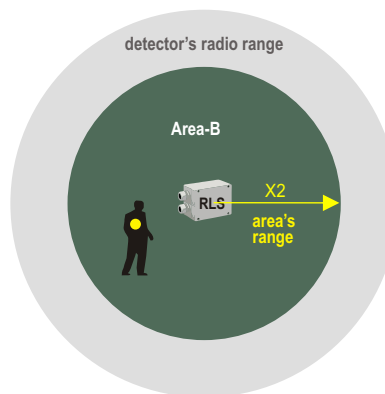


fig. 17 - unauthorized person in the area

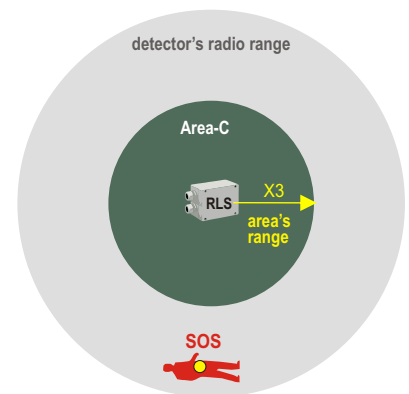


fig. 18 - alarm call of the person



The architecture of "A" variant

The RLS detectors are powered by and communicate via RS485 bus that is terminated in FLM monitoring unit, which communicates with the RLU central unit. The RLS detectors are connected by FTP cable. **The Merya RTLS system requires no computer or software at the installation site. All modules work as embedded (without the need of a computer).** This fact guarantees a very high stability and an independent functioning of the entire system!

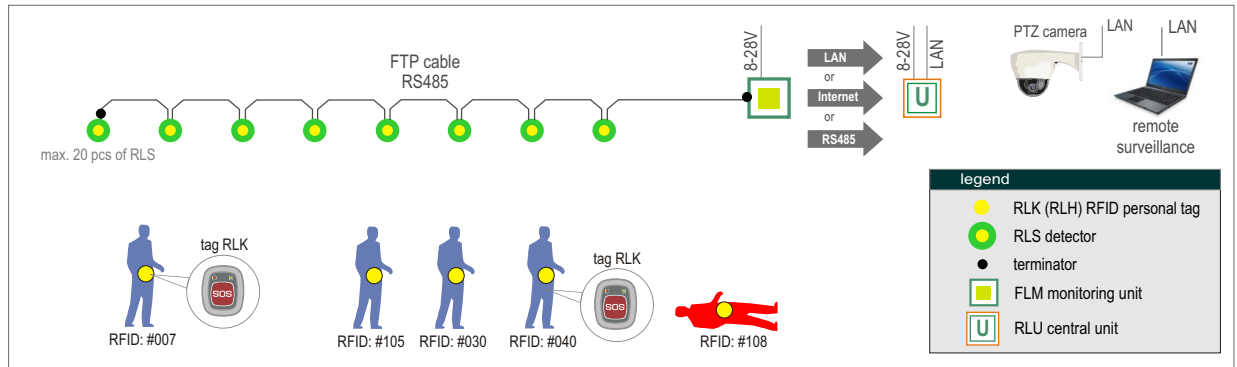


fig. 19

The architecture of "B" variant

RLS detectors are powered from a local 7-28 V source. The RLS detectors communicate via radio signal with nearest FLM monitoring unit. The radio range between RLS detectors and FLM unit depends on antenna type (max. 80-120 m).

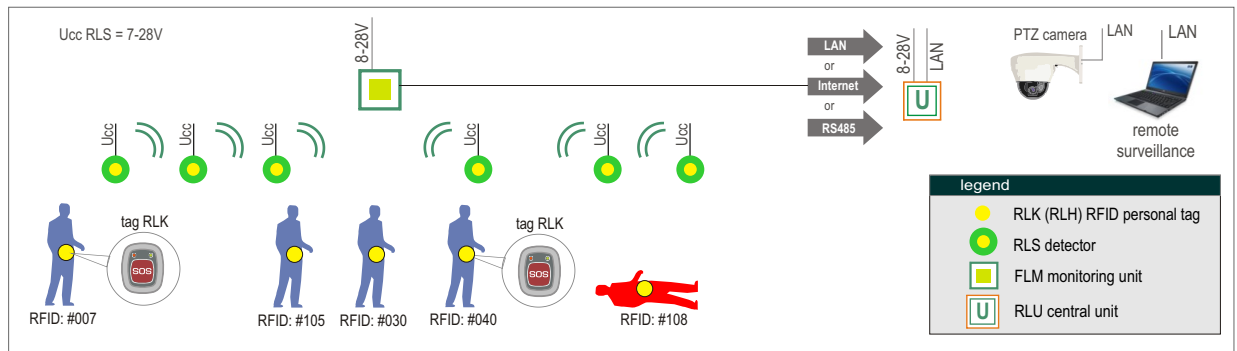


fig. 20

Interconnection of FLM monitoring units

FLM monitoring units can communicate with the central unit optionally either via Ethernet (in LAN network) or via RS485 bus, which also serves to distribute power to all modules. There is only one RLU unit, and it forms the heart of the entire system.

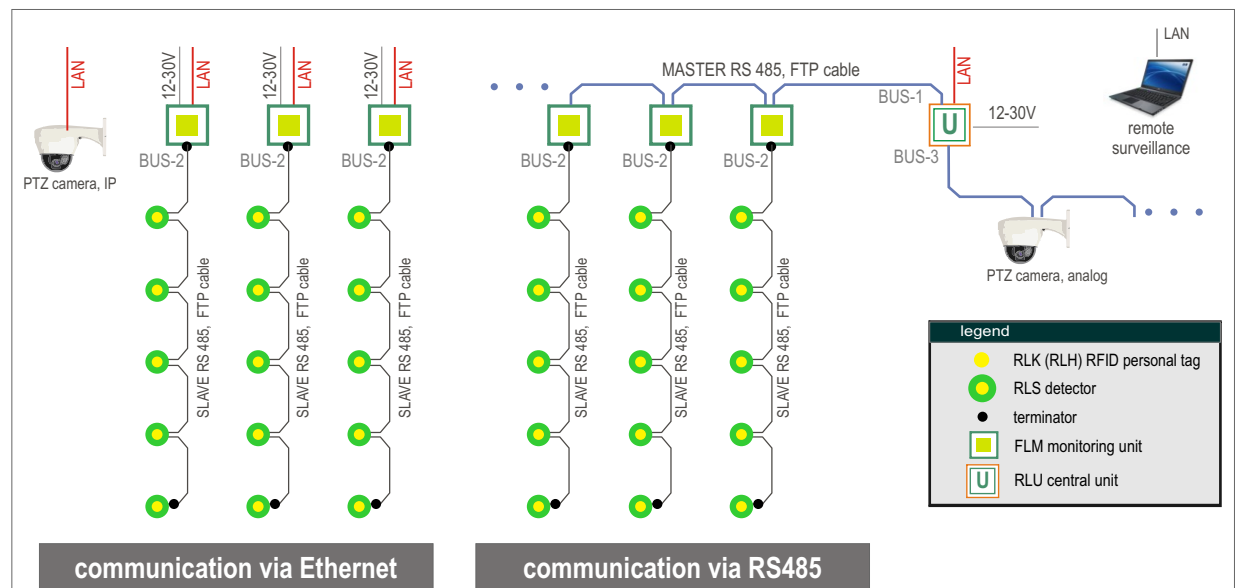


fig. 21



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Merya RTLS surveillance software

The Merya RTLS software is user friendly and displays all necessary user information about operation and the technical state of all elements.

Merya RTLS: 0330 - Vitkovice Steel

home history users Detectors Tags People Groups Areas Access Safety FLU FLM FLE PTZ cameras 3D Viewer Close on-line

configuration of the person:
Surname: Dvořák
Name: Filip
Personal number: PE 0042
Tag ID: 12 502

show following form:
 Edit people
 ON-LINE state of people

on-line state of people

Operating states Technical parameters Number of shown records: 10

Tag ID	Type	Person	Group	in in area	authorization	time	Movement	Inclination	Alarm	Battery Ucc
12 501	RLK-07	Joshua Davies	Blacksmiths	lathe	ok	25 min	ok	ok	ok	3.55 V
12 502	RLK-07	Thomas Smith	Blacksmiths	lathe	ok	85 min	ok	ok	ok	3.54 V
12 503	RLK-07	Eric Clapton	Blacksmiths	storage	unauthorized	5 min	ok	ok	ok	3.55 V
12 504	RLK-07	Pelan	Founders	-	-	24 hours				3.51 V
12 505	RLK-07	Kalandra	Founders	-	-	26 hours				3.38 V
12 506	RLK-07	Joseph Brown	Blacksmiths	resting place	ok	25 min	ok	ok	SOS	3.02 V
12 507	RLK-07	Sam Williams	Blacksmiths	press	ok	85 min	still	lying	ok	3.75 V
12 508	RLK-07	Sophie Evans	Founders	welder	ok	12 min	ok	ok	ok	3.76 V
12 509	RLK-07	Maria Wagner	Founders	welder	ok	61 min	ok	ok	ok	3.52 V
12 510	RLK-07	Kubista	Founders	smoking room	ok	5 min	ok	ok	ok	3.40 V

fig. 22 - User section - operating screen online

Merya RTLS: 0330 - Vitkovice Steel

home history users Detectors Tags People Groups Areas Access Safety FLU FLM FLE PTZ cameras 3D Viewer Close on-line

Filter: from: 2011-03-15 5:00 to: 2011-03-15 15:00 Category: history H1

Read from module to database
Read from database

Date	time	Category	Status	Event	User	Area	Authorization	Module	Module ID
2011-03-15	6:00	detection	#	GPS coordinate	Daniel Walker	entrance "A"	yes	RLS	10 250
2011-03-15	6:01	detection	#	GPS coordinate	Daniel Walker	hall "A"	yes	RLS	10 262
2011-03-15	6:10	alarm	#	lying person	Daniel Walker	working area - "lathe"	yes	RLS	10 268
2011-03-15	7:35	alarm	#	immobility	Daniel Walker	working area - "lathe"	yes	RLS	10 268
2011-03-15	7:40	detection	#	GPS coordinate	Daniel Walker	Hall "B"	yes	RLS	10 311
2011-03-15	12:01	detection	#	GPS coordinate	Daniel Walker	Hall "C"	yes	RLS	10 344
2011-03-15	12:40	detection	#	GPS coordinate	Daniel Walker	working area - "press"	yes	RLS	10 345
2011-03-15	14:33	detection	#	GPS coordinate	Daniel Walker	working area - "welder"	yes	RLS	10 389
2011-03-15	14:35	alarm	#	GPS coordinate	Daniel Walker	working area - "storage"	no	RLS	10 397

fig 23 - User section - operating screen of a history

Integration of Merya RTLS system into other superstructure SW systems

Merya RTLS program allows integration into other higher-level SW systems. Communication with these higher-level systems is provided directly by RLU central unit, which has an integrated standard configurable communication protocol **SAP**, **SNMP-2**, or proprietary protocols. The RLU central unit then sends detailed messages about alarm events in real time, such as the person is lying, immobility, free fall, SOS call, person in the area, unauthorized stay in the area, passing through the door, incognito pass, etc.

As a further exemplary use of integration, it's possible to connect RLU central unit to **Milestone CCTV's** database. During alarm events, the RLU sends and stores in the CCTV's database, the description of the event and a number of „strings“, by which then Milestone enables you to conveniently search videos of alarm events. Possible query: Find all the videos, in which the user "Koudelka" had detected the event "immobility" in hall "A-expedition".

Merya RTLS also allows HW integration with other systems, by using FLE expanders with 16 logic outputs, or using RLS personal tag readers, which can send information about person's access into other systems, via standard Wiegand interface.



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Manual tag tracing using a smartphone

The Merya RSSI app (for Android OS) is used, among other things, for a physical searching for RFID tag. The app in the smartphone can (via FLR module) communicate by a radio signal e.g. with only one particular tag, whose ID number is entered into app by user. It displays a signal strength and the status of searched tag (whether the searched tag is e.g. at slightest movement). The shortest detectable distance between tag and phone is about 20 cm. The longest detectable distance at direct visibility is about 40 m. The person who is searching for the tag in the app can switch the searched tag (which already receives signal) to a faster mode of communication (every 500 ms). In standard mode of beacon transmitting, the period may be longer, e.g. 3 s.



fig. B - application settings



fig. C - example of tag search



fig. D - a phone with FLR receiver

USB RFID receiver FLR for measuring and configuration of personal tags

FLR receiver is a mandatory equipment for each trained installation technician. It serves for the measurement and configuration of personal tags. The details are described in the Merya RTLS **configuration manual**. The Perimon software is an integral part of FLR.

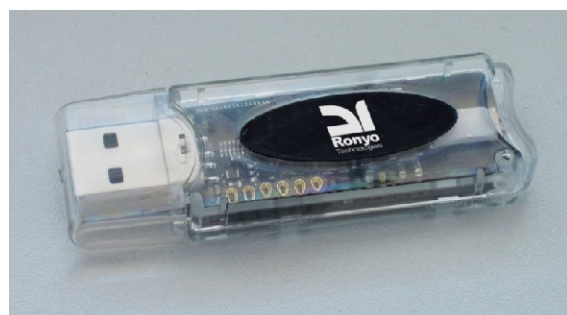


fig. 11 - RFID receiver FLR-03

* Low-energy mode is activated by FLR-03 Perimon and uses the fact that the tag is in motion only around one third of the day.



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