PERCo®

Controller
C-01

COMMUNICATION PROTOCOL

CE EAC

C-01 controller

Communication Protocol

C-01 Communication protocol

Application communication protocol over WebSockets (RFC 6455). Controller is connected via system server IP-address, set up during configuration. There is a possible use of WSS secure channel (WebSockets over SSL/TLS).

JSON (RFC 7159) data interchange format is used in the protocol.

Hereinafter by server is meant some “system server” – software of the upper layer. Connection should be initiated by the server itself (otherwise, operation via Web-browser (with WebSockets support)) until IP-address of this server is set up for the controller. After setting up server IP-address (either via browser or by the server itself) controller will connect to the server itself.

1. Authorization

Event for authorization necessity appears after successful socket opening from the device side if the password is set:

```
{
        "event": "need_auth",
        "need_auth": { "salt" : "wddywjml" }
}
```

For authorization it’s necessary to add the inserted password to the line from “salt” parameter with the help of line catenation and send md5 hash of the received line to the device.

```
{
        "set": "auth",
        "auth": { "hash": "cad73e33b32b1f8c696c75a806995707" }
}
```

Response on successful authorization:

```
{
        "answer": { "auth": "ok" },
        "auth": { "hash": "cad73e33b32b1f8c696c75a806995707" }
}
```

Response on error:

```
{
        "answer": { "auth": "error" }
}
```

2. Configuration

During configuration, in installation package it is enough to include only those parameters which are necessary and those parameters which haven't changed, can be left out.

Configuration, resource, direction numbers start from 0.

Within numbered configurations (readers, OD, etc.):

- By execution of "set" command availability of only one parameter "number" means configuration delete. In case "number" parameter is also not indicated all objects of this type are deleted. In order to delete unnumbered configurations empty object is transferred.
- By execution of "get" command without "number" parameter all objects of the required configuration return gradually.

2.1. Net configuration

Installation: server → controller:

```
{
        "set" : "net",
        "net" : {
                "ip" : "192.168.0.1",
                "mask" : "255.255.255.0",
                "gateway" : "192.168.0.254",
                "server" : "192.168.0.250",
                "password" : ""
        }
}
```

Configuration delete (default values set up):

```
{
        "set" : "net",
        "net" : {}
}
```

Query: server → controller:

```
{
        "get" : "net",
}
```

Response: controller → to all (execution result set or response for get):

```
{
        "answer" : { "net": "ok" },
        "net" : {
                "ip" : "192.168.0.1",
                "mask" : "255.255.255.0",
                "gateway" : "192.168.0.254",
                "server" : "192.168.0.250",
                "password" : ""
        }
}
```

2.2. Reader configuration

Installation: server → controller:

```
{
        "set" : "reader",
        "reader" : {
                "number" : 0,
                "type" : "Wiegand",
                "port" : 0,
                "exdev_number" : 0,
                "exdev_direction" : 0
        }
}
```

Delete:

```
{
        "set" : "reader"
        "reader" : {
            "number" : 0
        }
}
```

Query: server → controller:

```
{
        "get" : "reader",
        "number" : 0
}
```

Response: controller → to all (execution result set or response for get):

```
{
        "answer" : { "reader": "ok" },
        "reader" : {
            "number" : 0,
            "type" : "Wiegand",
            "port" : 0,
            "exdev_number" : 0,
            "exdev_direction" : 0
        }
}
```

Reader type "type" :

"Wiegand"
"Barcode_terminator" / "Barcode-USB_terminator"
"Barcode" / "Barcode-USB"

OD number "exdev number" : 0 / 1

OD direction number "exdev direction" : 0 / 1

2.3. Physical contact configuration

Installation: server → controller:

```
{
        "set" : "pad",
        "pad" : {
                "number" : 0,
                "function" : "input",
                "resource_number" : 0,
                "resource_direction" : 0,
                "normal_state" : "short",
                "debounce" : 50
        }
}
```

Query: server → controller:

```
{
        "get" : "pad",
        "number" : 0
}
```

Response: controller → to all (execution result set or response for get):

```
{
      "answer" : { "pad": "ok" },
            "pad" : {
                "number" : 0,
                "function" : "input",
                "resource_number" : 0,
                "resource_direction" : 0,
                "normal_state" : "short",
                "debounce" : 50
            }
}
```

Physical contact number "number" : 0 — 15

The following is located in groups on controller board:

Inputs (8 pcs. addressing 0— 7):

- 0 – 3 – inputs in inputs connector
- 4– 6 – inputs in RCP connector (8 – Stop)
- 7 – input “FireAlarm” RCP connector (fixed)

Outputs (8 pcs. addressing 8 — 15):

- 8, 9 – relay outputs in outputs connector
- 10, 11 – outputs “open collector” in outputs connector
- 12 – 14 – outputs in RCP connector (8 – Stop)
- 15 – piezoelectric element output (4 kHz) in RCP connector (fixed)

Physical contact function "function" :
"input" ; normal input
"remote control input»; RC-panel button (output button) — RCP
"pass»; passage signal
"fire alarm input" ; fire alarm input
"remove card input»; input "Card captured"
"output" ; normal output
"exdev output" ; OD control output
"remote control output»; RC indication output
"fire alarm output" ; output “FireAlarm”
"remove card output" ; output "Capture card"

Resource number (see the function), which physical contact "resource number" : 0 — 7 is connected to

Resource direction number (see the function), which physical contact "resource_direction" : 0 — 3 is connected to

Normalized mode of physical contact "normal_state" :
"short" / "break" ; for inputs
"not powered" / "powered" ; for outputs

Debouncing (for inputs), ms "debounce" : 1 — 10000

2.4. OD configuration

Installation: server → controller:

```
{
        "set" :  "exdev",
        "exdev" : {
                "number" : 0,
                "type" : "lock",
                "opt_fix" : "card",
                "analysis _time" : 123,
                "unblock_time" : 546,
                "opt_mode" : "potencial"
                "opt_norm" : "afterclosed",
                "impulse_time" : 150,
                "remove_card_time" : 150,
                "wait_command_time" : 150
        }
}
```

Query: server → controller:

```
{
        "get" : "exdev",
        "number" : 0
}
```

Response: controller → to all (execution result set or response for get):

```
{
        "answer" : { "exdev": "ok" },
              "exdev" : {
                  "number" : 0,
                  "type" : "lock",
                  "opt_fix" : "card",
                  "analysis_time" : 123,
                  "unblock_time" : 546,
                  "opt_mode" : "potencial"
                  "opt_norm" : " afterclosed",
                  "impulse_time" : 150,
                  "remove_card_time" : 150,
                  "wait_command_time" : 150
              }
}
```

Operation device number (OD) "number" : 0 — 1

OD type "type" :

"lock" ; one-sided lock
"double lock" ; double-sided lock
"turnstyle" ; turnstile with unified interface
"gate" ; boom-barrier

Passage fixation "opt_fix" :

"card"; by card presentation (no vehicular passage sensor)
"pass" ; by actual passage

Card analysis time, ms "analysis_time" : 1 – 1000000

Unblock time limit OD, ms "unblock_time" : 1 – 1000000

OD operation mode of control outputs "opt_mode" :

“potencial" ; potential
“pulse" ; pulse

OD control outputs normalization "opt_norm" :

"afterclosed” ; after closing
“afteropened" ; after closing

OD control pulse duration for pulse mode, ms "impulse_time" : 1 – 1000000

Card withdrawal time, ms "remove_card_time" : 1 – 1000000

Server response waiting time for a presented card (for event p. 4.1), ms "wait_ command_time" : 1 – 1000000

2.5. Internal responses configuration

Installation: server → controller:

```
{
        "set" : "cross",
        "cross" : {
                "number" : 0,
                "source" : "activating input",
                "source_number" : 0,
                "source_direction" : 0,
                "destination" : "energized output",
                "destination_number" : 0,
                "destination_direction" : 0,
                "time_criteria" : "work time",
                "time_reaction" : 0
        }
}
```

Query: server → controller:

```
{
        "get" : "cross",
        "number" : 0
}
```

Response: controller → to all (outcome set or response on get):

```
{
       "answer" : { "cross": "ok" },
            "cross" : {
                "number" : 0,
                "source" : "activating input",
                "source_number" : 0,
                "source_direction" : 0,
                "destination" : " activated output",
                "destination_number" : 0,
                "destination_direction" : 0,
                "time_criteria" : "work time",
                "time_reaction" : 0
            }
}
```

Internal response number "number" : 0 — 999

Response source "source":

"activating input" ; input activation (standard type)
"unlocking exdev" ; OD unblocking (OD control output activation)
"opening exdev" ; OD opening (PASS input activation)
"get card" ; identifier presentation
"command" ; command from the server
"breaking exdev" ; OD unauthorized unblocking in “CONTROL” ACM
"long time opening exdev" ; OD invalid long opening in “CONTROL” ACM
"cover on" ; housing opening sensor activation
"activating fire alarm input" ; FIREALARM input activation
"normalizing fire alarm input" ; FIREALARM input normalization

Response source number "source_number" : 0 — 6

Response source direction number "source_direction" : 0 — 1

Response object "destination" :

"mask input" ; input to be masked (standard type)
"energized output" ; energized output
"normalized output" ; normalized output

Response object number " destination number" : 0 — 6

Response object direction number " destination_direction" : 0 — 1

Response time criterion "time_criteria" :

"work time" ; action time
"absolute time" ; absolute time
"after work time" ; time after action

Response time, ms "time_reaction" : 0 - 1000000

3. Mode word request

Query: server → controller:

```
{
        "get": "state"
}
```

Response: controller → server:

```
{
        "answer" : { "state": "ok" },
        "state" : {
                "exdev" : [
                        {
                                "physical_state" : [
                                        "",
                                        ""
                                ]
                                "unlock_state" : [
                                        "",
                                        ""
                                ]
                                "access_mode" : [
                                        "",
                                        ""
                                ]
                        },
                        {
                                "physical state" : [
                                        "",
                                        ""
                                ]
                                "unlock state" : [
                                        "",
                                        ""
                                ]
                                "access mode" : [
                                        "",
                                        ""
                                ]
                        }
                ],
                "cover_on" : false,
                "ip_mode" : false,
                "ip_default" : false,
                "value_suply" : 12
        }
}
```

OD physical state "physical_state" (door state – opened/closed, or PASS signal level):
"normal" ; door closed / PASS normalized
"active" ; door opened / PASS energized

OD unblocking state "unlock state" (operation mechanism condition – lock / turnstile / boom-barrier, etc.):
"lock" ; OD blocked
"unlock" ; OD unblocked
"break" ; OD broke-in

Access control mode ACM "access_mode" :
"open" ; OPEN
"control" ; CONTROL

OD housing opening "cover_on" :
true ; OD housing opened
false ; OD housing closed

IP MODE jumper state "ip_mode" :
true ; jumper installed
false ; jumper removed

IP DEFAULT jumper state "ip_default" :
true ; jumper installed
false ; jumper removed

Supply voltage value, mV "value_suply" : 0 - 20000

4. Control

4.1. Set ACM

Installation: server → controller:

```
{
        "control" : "acm",
        "acm" : {
                "number" :  0,
                "direction" :  0,
                "access_mode" : "open"
        }
}
```

Response: controller → to all:

```
{
       "result" : { "acm": "ok" },
            "acm" : {
                "number" :  0,
                "direction" :  0,
                "access_mode" : "open"
            }
}
```

OD number "number" : 0 — 1

OD direction number "number" : 0 — 1

Access control mode ACM "access_mode" :
"open" ; OPEN
"control" ; CONTROL

4.2. OD open / close

Installation: server → controller:

```
{
        "control" : "exdev",
        "exdev" : {
                "number" :  0,
                "direction" : 0,
                "action" : "open",
                "open_type" : "",
                "open_time" : 1000
        }
}
```

Response: controller → to all:

```
{
       "result" : { "exdev": "ok" },
            "exdev" : {
                "number" :  0,
                "direction" : 0,
                "action" : "open",
                "open_type" : "",
                "open_time" : 1000
            }
}
```

OD number "number" : 0 — 1

OD direction number "number" : 0 — 1

Action "action" :

"open" ; OD unblock

"close" ; OD block

Unblock type "open_type" :

"open once" ; open for one-time passage

"open oncealways" ; open for one-time passage with infinite waiting (of passage)

"open once remove card" ; open for one-time passage with card withdrawal

"open always" ; open for multiple passages (always)

Unblock time, ms "open_time" : 100 - 1000000

4.3. Passage denial

Installation: server → controller:

```
{
        "control" : "access",
        "access" : {
                "number" : 0,
                "direction" : 0
        }
}
```

Response: controller → to all:

```
{
       "result" : { "access": "ok" },
            "access" : {
                "number" : 0,
                "direction" : 0
            }
}
```

OD number "number" : 0 — 1

OD direction number "number" : 0 — 1

4.4. Inside response control

Installation: server → controller:

```
{
        "control" : "cross reference",
        "cross reference" : {
                "activate" : true / false,
                "number" : 0
        }
}
```

Response: controller → to all:

```
{
       "result" : { "cross reference": "ok" },
            "cross reference" : {
                "activate" : true / false,
                "number" : 0
            }
}
```

Inside response number "number" : 0 — 999

Inside reaction energizing "activate" :

true ; activate
false ; deactivate

5. Events

5.1. Card presented

controller → server:

```
{
        "event" : "card",
        "card" : {
                "number" :  0,
                "direction" :  0,
                "id" : "12345"
        }
}
```

OD number "number" : 0 — 1

OD direction number "number" : 0 — 1

5.2. Passage

Personolized passage (by card)

controller → server:

```
{
        "event" : "pass_personal",
        "pass_personal" : {
                "number" : 0,
                "direction" : 0,
                "remove_card" : false,
                "id" : "12345"
        }
}
```

OD number "number" : 0 — 1

OD direction number "number" : 0 — 1

Card withdrawal sign "remove_card" :

true ; card is captured

false ; card is not captured

Not personalized passage (by RCP / software command)

controller → server:

```
{
        "event" : "pass_impersonal",
        "pass_impersonal" : {
                "number" : 0,
                "direction" : 0,
                "command_source" : "server"
        }
}
```

OD number "number" : 0 — 1

OD direction number "number" : 0 — 1

OD unblock command source "command_source" :

"server" ; server

"remote_control" ; press one of the “PASS” buttons on RCP

5.3. Passage denial

Personalized passage denial (by card)

controller → server:

```
{
        "event" : "refusal_personal",
        "refusal_personal" : {
                "number" :  0,
                "direction" :  0,
                "remove_card" : false,
                "id" : "12345"
        }
}
```

OD number "number" : 0 — 1

OD direction number "number" : 0 — 1

Card withdrawal sign "remove_card" :
true ; card is captured
false ; card is not captured

Not personalized passage denial (by RCP / software command)

controller → server:

```
{
        "event" : "refusal_impersonal",
        "refusal_impersonal" : {
                "number" :  0,
                "direction" :  0,
                "command_source" : "server"
        }
}
```

OD number "number" : 0 — 1

OD direction number "number" : 0 — 1

OD unblock command source "command_source" :
"server" ; server
"remote_control" ; press one of the “PASS” buttons on RCP

5.4. Passage denial

Personolized passage denial (by card)

controller → server:

```
{
        "event" : "pass_ban_personal",
        "pass_ban_personal" : {
                "number" :  0,
                "direction" :  0,
                "command_source" : "server",
                "remove_card" : false,
                "id" : "12345"
        }
}
```

OD number "number" : 0 — 1

OD direction number "number" : 0 — 1

Card withdrawal sign "remove_card" :
true ; card is captured
false ; card is not captured

Denial command source "command_source" :
"server" ; server
"remote_control" ; press STOP button on RCP
"sensor_fault" ; controller passage sensor failure

Not personalized passage denial (by RCP / software command)

controller → server:

```
{
        "event" : "pass_ban_impersonal",
        "pass_ban_impersonal" : {
                "number" :  0,
                "direction" :  0,
                "command_source" : "server"
        }
}
```

OD number "number" : 0 — 1

OD direction number "number" : 0 — 1

Denial command source "command_source" :
"server" ; server
"remote_control" ; press STOP button on RCP
"sensor_fault" ; controller passage sensor failure

5.5. OD break-in

controller → server:

```
{
        "event" : "break",
        "break" : {
                "number" : 0,
                "direction" : 0
        }
}
```

OD number "number" : 0 — 1

OD direction number "number" : 0 — 1

5.6. Door not closed after the passage

controller → server:

```
{
        "event" : "exdev_long_open",
        "exdev_long_open" : {
                "number" : 0,
                "direction" : 0,
        }
}
```

OD number "number" : 0 — 1

OD direction number "number" : 0 — 1

5.7. OD unblocked / blocked

controller → server:

```
{
        "event" : "exdev_unlock",
        "exdev_unlock" : {
                "number" : 0,
                "direction" : 0,
                "unlock" : true
        }
}
```

OD number "number" : 0 — 1

OD direction number "number" : 0 — 1

Unblock "unlock" :

true ; OD unblocked
false ; OD blocked

5.8. Input activation/normalization

controller → server

```
{
        "event" : "input",
        "input" : {
                "function": "input",
                "on" : true / false,
                "number" : 0
        }
}
```

Input function "function": "input" / "fire alarm input"

Input number "number" : 0 — 7

Input activation "on" :

true ; input energized

false ; input normalized

5.9. Output activation/normalization

controller → server

```
{
        "event" : "output",
        "output" : {
                "function" : "output",
                "on" : true / false,
                "number" : 0
        }
}
```

Output number "number" : 0 — 7

Output activation "on" :

true ; output energized

false ; output normalized

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