

# Bosch Monitor Wall JSON-RPC Reference

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## General Notes

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### Trade marks

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## Glossary

Hardware Decoder	Physical device that hosts one instance of the Monitor Wall application.
Monitor Wall	The name of the main application designed for showing streams (video, audio and metadata) from different video sources.
Line	One-based index for physical video out connectors of a hardware decoder. Each line corresponds thus to one connected physical screen.
Coder	One-based index for video panels on each line. Each video panel can display one video stream.
Layout	Arrangement of video panels (coders) on a line. Each line can have its own layout.
IP Matrix	Cluster of 1 to 4 hardware decoders that control up to 8 physical screens.

## JSON-RPC Server

The Bosch Monitor Wall's JSON-RPC server implements the JSON-RPC specification 2.0. JSON remote procedure calls can be executed by posting JSON requests with the according arguments to the Monitor Wall's http or https server using basic user name and password authentication.

The scope of the JSON requests is restricted to live operations which are supported with "user" credentials, configuration operations that require "service" credentials are only possible via the Bosch proprietary remote control protocol (RCP+), described in a separate document.

### Example

Posting the System.GetInfo request to the Monitor Wall server's endpoint "<myUrl>/api/monitorwall/v1"

```
{
  "id": 1234,
  "jsonrpc": "2.0",
  "method": "System.GetInfo"
}
```

will trigger the response

```
{
  "jsonrpc": "2.0",
  "result": {
    "unitName": "...",
    "unitId": "...",
    "serialNumber": "...",
    "softwareVersion": "10.00.0000",
    "productName": "Monitor Wall",
    "hardwareVersion": "F100FE40",
    "variantId": 0,
    "installationCode": "...",
    "licenseInfo": "MonitorWall license [authorization number ...]"
  },
  "id": 1234
}
```

As an example, the http POST can be executed via Microsoft's Powershell with the following code snippet:

```
$user = "user"
$password = "<myPassword>"
$pair = "${user}:${password}"
$bytes = [System.Text.Encoding]::ASCII.GetBytes($pair)
$base64 = [System.Convert]::ToBase64String($bytes)
$basicAuthentication = "Basic $base64"
$headers = @{ Authorization = $basicAuthentication }
$endpoint = "http://<myIPv4>:80/api/monitorwall/v1"
$request = '{"id":0,"jsonrpc":"2.0","method":"System.GetInfo"}'
```

```
$response = Invoke-WebRequest -uri "$endpoint" -Headers $headers -Method POST -ContentType  
"application/json" -Body "$request"
```

In order to post the request via a secure connection, the code line that defines the endpoint needs to be replaced with the following two lines:

```
[System.Net.ServicePointManager]::ServerCertificateValidationCallback = {$true}  
$endpoint = "https://<myIPv4>:443/api/monitorwall/v1"
```

The server certificate validation callback implementation allows connections to servers with self-signed certificates.

Further examples can be found in the ApiTestTool C# example.

## Data Sets in JSON Schema

The data sets in this chapter are referenced by the Monitor Wall's JSON-RPC requests.

### Screen Rectangle Data

Bounding box of a rectangular screen area in pixel.

```
"ScreenRectangleData":  
{  
  "required": [ "leftPx", "topPx", "widthPx", "heightPx" ],  
  "properties":  
  {  
    "leftPx": { "type": "integer", "minimum": -16384, "maximum": 16384 },  
    "topPx": { "type": "integer", "minimum": -16384, "maximum": 16384 },  
    "widthPx": { "type": "integer", "minimum": 0, "maximum": 16384 },  
    "heightPx": { "type": "integer", "minimum": 0, "maximum": 16384 }  
  }  
}
```

### Layout Data

Tile layout descriptor for a specific line.

```
"LayoutData":  
{  
  "required":  
  [  
    "lineId", "layoutId", "columnCount", "rowCount",  
    "thumbnailColumnCount", "thumbnailRowCount", "thumbnailFullColumnCount",  
    "thumbnailFullRowCount", "screenAspectX", "screenAspectY",  
    "tileAspectX", "tileAspectY"  
  ],  
  "properties":  
  {  
    "lineId": { "type": "integer", "minimum": 0, "maximum": 9 },  

```

```
"layoutId": { "type": "integer", "minimum": 0, "maximum": 2147483647 },
"columnCount": { "type": "integer", "minimum": 1, "maximum": 9 },
"rowCount": { "type": "integer", "minimum": 1, "maximum": 9 },
"thumbnailColumnCount": { "type": "integer", "minimum": 0, "maximum": 99 },
"thumbnailRowCount": { "type": "integer", "minimum": 0, "maximum": 99 },
"thumbnailFullColumnCount": { "type": "integer", "minimum": 0, "maximum": 99 },
"thumbnailFullRowCount": { "type": "integer", "minimum": 0, "maximum": 99 },
"screenAspectX": { "type": "integer", "minimum": 1, "maximum": 16384 },
"screenAspectY": { "type": "integer", "minimum": 1, "maximum": 16384 },
"tileAspectX": { "type": "integer", "minimum": 1, "maximum": 16384 },
"tileAspectY": { "type": "integer", "minimum": 1, "maximum": 16384 }
}
}
```

## Digital Zoom Data

Zoom settings for a tile showing a standard video stream.

```
"DigitalZoomData":
{
  "type": "object",
  "required": [ "centerX", "centerY", "scale" ],
  "properties":
  {
    "centerX": { "type": "number", "minimum": 0.0, "maximum": 1.0 },
    "centerY": { "type": "number", "minimum": 0.0, "maximum": 1.0 },
    "scale": { "type": "number", "minimum": 1.0, "maximum": 32.0 }
  }
}
```

## Dewarping Zoom Data

View direction and zoom settings for a tile showing a panoramic video stream. Angles are defined in radians.

```
"DewarpingZoomData":
{
  "type": "object",
  "required": [ "pan", "tilt", "scale" ],
  "properties":
  {
    "pan": { "type": "number", "minimum": -6.284, "maximum": 6.284 },
    "tilt": { "type": "number", "minimum": -6.284, "maximum": 6.284 },
    "scale": { "type": "number", "minimum": 0.0, "maximum": 32.0 }
  }
}
```

## PTZ Speed Data

Relative speed settings for pan, tilt, zoom, iris, and focus.

```
"PTZSpeedsData":
{
```

```

    "type": "object",
    "properties":
    {
        "pan": { "type": "number", "minimum": -1.0, "maximum": 1.0 },
        "tilt": { "type": "number", "minimum": -1.0, "maximum": 1.0 },
        "zoom": { "type": "number", "minimum": -1.0, "maximum": 1.0 },
        "iris": { "type": "number", "minimum": -1.0, "maximum": 1.0 },
        "focus": { "type": "number", "minimum": -1.0, "maximum": 1.0 }
    }
}

```

## Input Data

Video source descriptor.

```

"InputData":
{
    "required": [ "url", "type" ],
    "properties":
    {
        "url": { "type": "string", "format": "uri" },
        "type": { "type": "string", "enum": [ "VIP", "ONVIF", "RTSP" ] },
        "lineId": { "type": "integer", "minimum": 0, "maximum": 9 },
        "coderId": { "type": "integer", "minimum": 0, "maximum": 4095 },
        "protocol": { "type": "string", "enum": [ "UDP", "TCP" ] },
        "forceUnicast": { "type": "boolean" },
        "audio": { "type": "integer", "minimum": 0, "maximum": 4095 },
        "ptzPresetId": { "type": "integer", "minimum": 0, "maximum": 4095 },
        "recording": { "type": "integer", "minimum": 0, "maximum": 4095 }
    }
}

```

## Output Data

Video panel (tile, coder) selector.

```

"OutputData":
{
    "required": [ "lineId", "coderId" ],
    "properties":
    {
        "lineId": { "type": "integer", "minimum": 1, "maximum": 9 },
        "coderId": { "type": "integer", "minimum": 1, "maximum": 64 }
    }
}

```

## Source Data

Video source selector.

```

"SourceData":
{

```



```

    "oneOf":
    [
        {
            "required": ["inputId"],
            "properties":
            {
                "inputId": { "type": "integer", "minimum": 0, "maximum": 4095 }
            }
        },
        {
            "required": ["salvoId"],
            "properties":
            {
                "salvoId": { "type": "integer", "minimum": 0, "maximum": 4095 }
            }
        },
        {
            "required": ["input"],
            "properties":
            {
                "input": { "$ref": "#/definitions/InputData" }
            }
        }
    ]
}

```

## Connection Data

Video connection descriptor.

```

"ConnectionData":
{
    "required": [ "source", "output" ],
    "properties":
    {
        "source": { "$ref": "#/definitions/SourceData" },
        "output": { "$ref": "#/definitions/OutputData" },
        "digitalZoom": { "$ref": "#/definitions/DigitalZoomData" },
        "dewarpingZoom": { "$ref": "#/definitions/DewarpingZoomData" }
    }
}

```

## Requests in JSON Schema

The requests in this chapter are referenced by the Monitor Wall's JSON-RPC requests.

### System Get Info

Retrieves basic information about Monitor Wall server. See initial example.

```
"System.GetInfo.Request": {}
```

```
"System.GetInfo.Response":
{
  "required":
  [
    "unitName", "unitId", "serialNumber", "softwareVersion", "productName",
    "hardwareVersion", "variantId", "installationCode", "licenseInfo"
  ],
  "properties":
  {
    "unitName": { "type": "string" },
    "unitId": { "type": "string" },
    "serialNumber": { "type": "string" },
    "softwareVersion": { "type": "string" },
    "productName": { "type": "string" },
    "hardwareVersion": { "type": "string" },
    "variantId": { "type": "integer", "minimum": 0, "maximum": 4095 },
    "installationCode": { "type": "string" },
    "licenseInfo": { "type": "string" }
  }
}
```

## Connections Get

Retrieves descriptors for all active video streaming connections

```
"Connections.Get.Request": {}

"Connections.Get.Response":
{
  "type": "array",
  "items": { "$ref": "#/definitions/ConnectionData" }
}
```

Here is an example on how the schema translates into an actual JSON-RPC request and response for a Monitor Wall server with two cameras A and B streaming to the first two video panels of line 1:

Request:

```
{
  "id": 2345,
  "jsonrpc": "2.0",
  "method": "Connections.Get"
}
```

Response:

```
{
  "jsonrpc": "2.0",
  "result":
  [
    {
      "source":
      {
        "input":
        {
          "url": "rcpp://user:*@<myIPv4_camA>",
          "type": "VIP",
          "lineId": 1,
          "coderId": 0,
          "audio": 1
        }
      },
      "output":
      {

```

```

        "lineId": 1,
        "coderId": 1
    },
    {
        "source":
        {
            "input":
            {
                "url": "rcpp://user:*@<myIPv4_camB>",
                "type": "VIP",
                "lineId": 1,
                "coderId": 0,
                "audio": 1
            }
        },
        "output":
        {
            "lineId": 1,
            "coderId": 2
        }
    }
],
"id": 2345
}

```

Please note that input line and coder IDs refer to camera lines and coders (encoders), and output line and coder IDs refer to Monitor Wall lines (screens) and coders (video panels, tiles, decoders).

## Connection Open

Connects a selected video source to a selected video panel.

```

"Connection.Open.Request":
{
    "$ref": "#/definitions/ConnectionData"
}

```

```

"Connection.Open.Response": {}

```

## Connection Close

Closes the active connection of a selected video panel.

```

"Connection.Close.Request":
{
    "required": [ "output" ],
    "properties":
    {
        "output": { "$ref": "#/definitions/OutputData" }
    }
}

```

```

"Connection.Close.Response": {}

```

## Connections Close All

Closes all active connections.

```

"Connections.CloseAll.Request": {}

```

```

"Connections.CloseAll.Response": {}

```

## Output Set Highlighting

Activates one of four independent highlighting rectangles for a selected video panel.

```
"Output.SetHighlighting.Request":
{
  "required": [ "output", "highlightingIndex" ],
  "properties":
  {
    "output": { "$ref": "#/definitions/OutputData" },
    "highlightingIndex": { "type": "integer", "minimum": 1, "maximum": 4 }
  }
}

"Output.SetHighlighting.Response": {}
```

## Output Clear Highlighting

Deactivates either all or one of four highlighting rectangles. All will be cleared if the optional highlighting index is omitted.

```
"Output.ClearHighlighting.Request":
{
  "properties":
  {
    "highlightingIndex": { "type": "integer", "minimum": 1, "maximum": 4 }
  }
}

"Output.ClearHighlighting.Response": {}
```

## Output Get Zoom

Retrieves the current zoom settings for a selected video panel. This can be either a digital zoom setting for standard cameras or a dewarping zoom settings for panoramic cameras.

```
"Output.GetZoom.Request":
{
  "required": [ "output" ],
  "properties":
  {
    "output": { "$ref": "#/definitions/OutputData" }
  }
}

"Output.GetZoom.Response":
{
  "required": [ "output" ],
  "properties":
  {
    "output": { "$ref": "#/definitions/OutputData" },
    "digitalZoom": { "$ref": "#/definitions/DigitalZoomData" },
    "dewarpingZoom": { "$ref": "#/definitions/DewarpingZoomData" }
  }
}
```

## Output Set PTZ Preset

Activates a PTZ preset on the camera connected to a selected video panel.

```
"Output.SetPTZPreset.Request":
{
  "required": [ "output", "presetId" ],
```

```

    "properties":
    {
        "output": { "$ref": "#/definitions/OutputData" },
        "presetId": { "type": "integer", "minimum": 0, "maximum": 4095 }
    }
}

"Output.SetPTZPreset.Response": {}

```

## Output Set PTZ Speeds

Sets speed values for pan, tilt, zoom, iris, and focus for a PTZ-capable camera connected to the selected video panel. If the camera is not PTZ-capable, falls back to digital zoom or dewarping zoom.

```

"Output.SetPTZSpeeds.Request":
{
    "required": [ "output", "speeds" ],
    "properties":
    {
        "output": { "$ref": "#/definitions/OutputData" },
        "speeds": { "$ref": "#/definitions/PTZSpeedsData" }
    }
}

"Output.SetPTZSpeeds.Response": {}

```

## Output Freeze

Freezes a selected video panel.

```

"Output.Freeze.Request":
{
    "required": [ "output" ],
    "properties":
    {
        "output": { "$ref": "#/definitions/OutputData" }
    }
}

"Output.Freeze.Response": {}

```

## Output Un-Freeze

Un-freezes a selected video panel.

```

"Output.UnFreeze.Request":
{
    "required": [ "output" ],
    "properties":
    {
        "output": { "$ref": "#/definitions/OutputData" }
    }
}

"Output.UnFreeze.Response": {}

```

## Line Enter Fullscreen

Enters an optionally selected fullscreen mode for a selected video panel. The picture-in-picture (PiP) fullscreen mode will display all other active video panels with reduced size on top of the maximized video panel.

```

"Line.EnterFullscreen.Request":
{

```

```

    "required": [ "output" ],
    "properties":
    {
        "output": { "$ref": "#/definitions/OutputData" },
        "mode": { "type": "string", "enum": [ "Single", "PiP" ], "default": "Single" }
    }
}

"Line.EnterFullscreen.Response": {}

```

## Line Leave Fullscreen

Leaves the fullscreen mode for a selected line.

```

"Line.LeaveFullscreen.Request":
{
    "required": [ "lineId" ],
    "properties":
    {
        "lineId": { "type": "integer", "minimum": 1, "maximum": 9 }
    }
}

"Line.LeaveFullscreen.Response": {}

```

## Line Set Layout ID

Activates a selected video panel layout on a selected line.

```

"Line.SetLayoutId.Request":
{
    "required": [ "lineId", "layoutId" ],
    "properties":
    {
        "lineId": { "type": "integer", "minimum": 1, "maximum": 9 },
        "layoutId": { "type": "integer", "minimum": 0, "maximum": 2147483647 }
    }
}

"Line.SetLayoutId.Response": {}

```

## Line Get Layout ID

Retrieves the identifier for the active layout of a selected line.

```

"Line.GetLayoutId.Request":
{
    "required": [ "lineId" ],
    "properties":
    {
        "lineId": { "type": "integer", "minimum": 0, "maximum": 9 }
    }
}

"Line.GetLayoutId.Response":
{
    "required": [ "lineId", "layoutId" ],
    "properties":
    {
        "lineId": { "type": "integer", "minimum": 0, "maximum": 9 },
        "layoutId": { "type": "integer", "minimum": 0, "maximum": 2147483647 }
    }
}

```

## Line Get Layout

Retrieves a detailed video panel layout descriptor for a selected line and selected identifier of a supported layout on that line. Layout identifiers are specific for different line and screen configurations, supported layouts can be retrieved with the Lines.Get request.

```
"Line.GetLayout.Request":
{
  "required": [ "lineId", "layoutId" ],
  "properties":
  {
    "lineId": { "type": "integer", "minimum": 1, "maximum": 9 },
    "layoutId": { "type": "integer", "minimum": 0, "maximum": 2147483647 }
  }
}

"Line.GetLayout.Response":
{
  "required": [ "layout" ],
  "properties":
  {
    "layout": { "$ref": "#/definitions/LayoutData" }
  }
}
```

## Line Get Coders

Retrieves detailed video panel information for a selected line.

```
"Line.GetCoders.Request":
{
  "required": [ "lineId" ],
  "properties":
  {
    "lineId": { "type": "integer", "minimum": 1, "maximum": 9 }
  }
}

"Line.GetCoders.Response":
{
  "required": [ "lineId", "coders" ],
  "properties":
  {
    "lineId": { "type": "integer", "minimum": 1, "maximum": 9 },
    "coders":
    {
      "type": "array",
      "items":
      {
        "type": "object",
        "required": [ "coderId", "tile" ],
        "properties":
        {
          "coderId": { "type": "integer", "minimum": 1, "maximum": 64 },
          "tile": { "$ref": "#/definitions/ScreenRectangleData" }
        }
      }
    }
  }
}
```

## Lines Get

Retrieves detailed information about all available lines.

```

"Lines.Get.Request": {}

"Lines.Get.Response":
{
  "type": "array",
  "items":
  {
    "type": "object",
    "required": [ "lineId", "screen", "refreshRateHz", "supportedLayoutIds" ],
    "properties":
    {
      "lineId": { "type": "integer", "minimum": 1, "maximum": 9 },
      "screen": { "$ref": "#/definitions/ScreenRectangleData" },
      "refreshRateHz": { "type": "integer", "minimum": 0, "maximum": 999 },
      "supportedLayoutIds":
      {
        "type": "array",
        "items": { "type": "integer", "minimum": 0, "maximum": 2147483647 }
      }
    }
  }
}

```

## Lines Freeze All

Freezes all video panels on all lines.

```

"Lines.FreezeAll.Request": {}

"Lines.FreezeAll.Response": {}

```

## Lines Un-Freeze

Un-freeze all video panels on all lines.

```

"Lines.UnFreezeAll.Request": {}

"Lines.UnFreezeAll.Response": {}

```

## Inputs Get

Retrieves details for all pre-configured video inputs (cameras). Pre-configuration is supported e.g. in the Bosch Configuration Manager application's section for IP matrix setup. The input ID is then reflecting the PTZ keyboard's key code for the according camera.

```

"Inputs.Get.Request": {}

"Inputs.Get.Response":
{
  "type": "array",
  "items":
  {
    "type": "object",
    "required": [ "inputId", "input" ],
    "properties":
    {
      "inputId": { "type": "integer", "minimum": 0, "maximum": 4095 },
      "input": { "$ref": "#/definitions/InputData" },
      "digitalZoom": { "$ref": "#/definitions/DigitalZoomData" },
      "dewarpingZoom": { "$ref": "#/definitions/DewarpingZoomData" }
    }
  }
}

```



```
}
```

## Outputs Get

Retrieves details for all pre-configured video panels. Pre-configuration is supported e.g. in the Bosch Configuration Manager application's section for IP matrix setup. The output ID is then reflecting the PTZ keyboard's key code for the according video panel.

```
"Outputs.Get.Request": {}

"Outputs.Get.Response":
{
  "type": "array",
  "items":
  {
    "type": "object",
    "required": [ "outputId", "output" ],
    "properties":
    {
      "outputId": { "type": "integer", "minimum": 0, "maximum": 4095 },
      "output": { "$ref": "#/definitions/OutputData" }
    }
  }
}
```

## Salvos Get

Retrieves details for all pre-configured video salvos. Pre-configuration is supported e.g. in the Bosch Configuration Manager application's section for IP matrix setup. The salvo ID is then reflecting the PTZ keyboard's key code for the according video salvo.

```
"Salvos.Get.Request": {}

"Salvos.Get.Response":
{
  "type": "array",
  "items":
  {
    "type": "object",
    "required": [ "salvoId", "inputIds", "salvoCycleTimeS" ],
    "properties":
    {
      "salvoId": { "type": "integer", "minimum": 0, "maximum": 4095 },
      "inputIds":
      {
        "type": "array",
        "items": { "type": "integer", "minimum": 0, "maximum": 4095 }
      },
      "salvoCycleTimeS": { "type": "integer", "minimum": 0, "maximum": 4294967295 }
    }
  }
}
```