Attachment 3: Diagnostic Unit Sensor Configuration Information Integration Definition Document

1. Purpose

This document aims to transmit the configuration information of alarms and events for each diagnostic element stored in the GIS partial discharge diagnostic system, as well as the reference waveform information of the circuit breaker, to the collection server using a RESTful API.

2. **Definition of Terms**

2.1 Collection Server: A server that collects data from the substation comprehensive preventive diagnostic system.

2.2 Diagnostic Unit: A device that sends sensor data, diagnostic results, and alarm/event configuration information to the collection server.

2.3 Diagnostic Element: Elements of substation equipment diagnosis (e.g., GIS partial discharge, bushing leakage current, etc.).

2.4 Manufacturer Code: A unique string assigned to each manufacturer of the substation comprehensive preventive diagnostic system.

2.5 EEName : An external equipment nameplate that specifies the sensor's location

2.6 URL : Internet address

2.7 SWPD : Sensor type (GIS partial discharge).

2.8 TRPD : Sensor type (transformer partial discharge).

2.9 TCPD : Sensor type (OLTC partial discharge).

2.10 CBOP : Sensor type (GIS circuit breaker operating characteristics).

2.11 TRDGA : Sensor type (transformer dissolved gas analysis).

2.12 BSHCUR: Sensor type (bushing leakage current).

2.13 TCMOT : Sensor type (OLTC motor).

3. Sensor Information Request and Response

3.1 When the Diagnostic Unit sends a message to the Collection Server, the Collection Server responds with the reception result. (Refer to 4.2)

3.2 Sensor Information Request (Collection Server → Diagnostic Unit)

3.2.1 Request the alarm configuration details for all sensors connected to the Diagnostic Unit, the event configuration details for partial discharge sensors, and the circuit breaker reference waveform configuration details for the circuit breaker operating characteristics sensor. (Refer to 4.5)

3.2.2 Request the event configuration details for the partial discharge sensor. (Refer to 4.3)

3.2.3 Request the circuit breaker reference waveform configuration details for the circuit breaker operating characteristics sensor. (Refer to 4.4)

3.3 Transmission of Sensor Configuration Details (Diagnostic Unit → Collection Server)

3.3.1 When requesting alarm configuration details: Transmit the alarm configuration details for each sensor. (Refer to 4.6 ~ 4.10)

3.3.2 When requesting partial discharge event configuration details: Transmit the event configuration details for each sensor. (Refer to 4.11)

3.3.3 When requesting circuit breaker reference waveform configuration details: Transmit the reference waveform configuration details for each sensor. (Refer to 4.12)

3.4 Transmission of changed sensor configuration details (Diagnostic Unit → Collection Server)

3.4.1 The Diagnostic Unit transmits the alarm setting change details to the Collection Server. (Refer to 4.13, 4.14)

3.4.2 The Diagnostic Unit transmits the event setting change details to the Collection Server. (Refer to 4.15)

3.4.3 The Diagnostic Unit transmits the circuit breaker reference waveform change details to the Collection Server. (Refer to 4.12)

4. RESTful API Message Structure

4.1 Common Matters for Data Transmission and Reception

4.1.1 Communication Port: The port for REST API communication of the diagnostic unit is set to 8080.

4.1.2 Message Format

4.1.2.1 String Types (Charset) : UTF-8

4.1.2.2 If there is no Type attribute value defined for each message, NULL or blank is sent..

4.1.2.3 메시지 Content-Type : application/json

--- Example) If the required properties to be entered are fstCon (Integer), scdCon (String), trdCon (float), and scdCon and trdCon have no values,

```
{
    "fstCon" : 10,
    "scdCon" : "",
    "trdCon" : NULL
}
```

4.2 Collection server response to diagnostic unit message transmission

When a message is transmitted from the diagnostic unit to the collection server, the collection server responds to the message transmission. If the result value is “error” or there is no response (Timeout), the diagnostic unit must retransmit the same message to the collection server up to three times (at 5-minute intervals).

4.2.1 Attribute Details

Attribute	Type	Required	Explaination	Value
result	String	O	Result value for the corresponding transmission	"success" : 성공(정상) "error" : Failure
description	String	O	Description of the result element	
msgTime	Long	O	Message sent time	Timestamp(ms, UTC+0)

4.2.2 Example of a response failure message

```
{"result":"error", "description":"data error", "msgTime" : 1595555254000}
```

4.2.3 Example of a successful response message

```
{"result":"success", "description":"", "msgTime" : 1595555254000}
```

4.3 Request for alarm/event setting details by sensor (Collection server → Diagnosis Unit)

4.3.1 Alarm Setting History Request URL

http://{Diagnosis Unit IP}:{PORT}/api/rule/{Manufacturer Code}_alarm_setting_request

4.3.2 Partial discharge event setting details request URL

http://{Diagnosis Unit IP}:{PORT}/api/rule/{Manufacturer Code}_spdc_event_setting_request

4.3.3 Request method : POST

4.3.4 Attribute Details

Attribute	Type	Required	Explaination
eeName	String Array	O	eeName(a string that can specify the sensor) List ex) [K_S730_GLU101_CH03_SWPD_3527485, K_..., K_...]
msgTime	Long	O	Message sent time Timestamp (ms, UTC+0)

4.3.5 Message BODY Example

```
{
        "msgTime" : 1595555254000, (2020/07/24 10:47:56 의 millisecond)
        "eeName" : [ "K_S730_GLU101_CH01_SWPD_3440000",
"K_S730_GLU101_CH02_SWPD_3440001", "K_S730_GLU101_CH03_SWPD_3440002" ]
}
```

4.4 Request for circuit breaker reference waveform information by sensor (Collection server → Diagnosis Unit)

4.4.1 URL : http://{Diagnosis Unit IP}:{PORT}/api/rule/{Manufacturer Code}_scbr_crtr_wv_request

4.4.2 Request Method : POST

4.4.3 Attribute Detail

Attribute	Type	Required	Explaination
msgTime	Long	O	Message sent time Timestamp(ms, UTC+0)
contents	Json Object Array	O	Array of JSON Objects with the following Attributes (eeName ~ CRTR_TYP) as attributes
eeName	String Array	O	eeName(A string that can identify the sensor.) ex) K_S730_GLU101_CH03_SWPD_3527485
CRTR_TYP	Integer	O	Reference waveform Type (0: open, 1: input, 2: all [open, input])

4.4.4 Message BODY Example

--- --- When requesting reference waveform information for n circuit breakers

```
{
        "msgTime" : 1595555254000,
        "contents" :    [
                {
                        "eeName" : "K_S730_GLU101_CH01_CBOP_3527485",
                        "CRTR_TYP" : 2
                },
                {
                        "eeName" : "K_S730_GLU101_CH02_CBOP_3527486",
                        "CRTR_TYP" : 2
                }
        ]
}
```

--- 1개의 차단기 기준파형 정보를 요청하는 경우

```
{
        "msgTime" : 1595555254000,
        "contents" :    [ {
                        "eeName" : "K_S730_GLU101_CH01_CBOP_3527485",
                        "CRTR_TYP" : 0
                }
        ]
}
```

4.5 4.5 Request for alarm setting details of all sensors connected to the Diagnosis Unit, event setting details of the partial discharge sensor, and circuit breaker reference waveform details of the circuit breaker operation characteristic sensor (Collection Server → Diagnosis Unit)

4.5.1 URL : http://{Diagnosis Unit IP}:{PORT}/api/rule/{Manufacturer Code}_alarm_setting_all_request

4.5.2 Request Method : GET (Request without attribute)

4.6 Partial discharge sensor alarm setting details response (Diagnosis Unit → Collection Server)

4.6.1 URL : http://{Collection ServerIP}:{PORT}/api/rule/{Manufacturer Code}_spdc_alarm_setting

4.6.2 Response Method : POST

4.6.3 Attribute Detail

Attribute	Type	Required	Explaination
msgTime	Long	O	Message sent time Timestamp(ms, UTC+0)
contents	Json Object Array	O	Array of Json Objects with the following Attribute(eeName ~ HR24_WTHN_SAME_EVNT_B) as attributes
eeName	String	O	eeName(A string that can identify the sensor.) ex) K_S730_GLU101_CH03_SWPD_3527485
PD_TYPE	Integer	O	PD Measurement Target 0: GIS Partial Discharge 1: MTR Body Partial Discharge 6: Power Cable Partial Discharge 6 7: OLTC Partial Discharge

Attribute	Type	Required	Explaination
			127 : 외부 Noise 센서
EVENT_A_ENABLE	Integer	O	Use or not of alarm occurrence condition A (0: not used, 1: used)
EVENT_B_ENABLE	Integer	O	Use or not of alarm occurrence condition B (0: not used, 1: used)
HR1_WTHN_SAME_EVNT_A	Integer	O	Alarm occurrence A-1 condition (number of occurrences of the same type of event within 1 hour)
HR24_WTHN_SAME_EVNT_A	Integer	O	Alarm occurrence A-2 condition (number of occurrences of the same type of event within 24 hours)
HR24_WTHN_SAME_EVNT_B	Integer	O	Alarm occurrence condition B (number of occurrences of the same type of event within 24 hours)

4.6.4 Message BODY Example

```
{
        "msgTime" : 1595555254000, (2020/07/24 10:47:56 의 millisecond)
        "contents" : [ {
                        "eeName" : "K_S730_GLU101_CH05_SWPD_3440003",
                        "PD_TYPE" : 0,
                        "EVENT_A_ENABLE" : 1,
                        "HR1_WTHN_SAME_EVNT_A" : 10,
                        "HR24_WTHN_SAME_EVNT_A" : 20,
                        "EVENT_B_ENABLE" : 1,
                        "HR24_WTHN_SAME_EVNT_B" : 60
                },
                {
                        ....
                }
        ]
}
```

4.7 Circuit breaker operation characteristic sensor alarm setting details response (Diagnosis Unit → Collection Server)

4.7.1 URL : http://{Collection ServerIP}:{PORT}/api/rule/{Manufacturer Code}_scbr_alarm_setting

4.7.2 Response Method : POST

4.7.3 Attribute Detail

Attribute	Type	Required	Explaination
msgTime	Long	O	Message sent time Timestamp(ms, UTC+0)

contents	Json Object	O	With the following Attribute(eeName ~ GAPTIME_OPEN_CAUT) as an attribute

Attribute	Type	Required	Explaination
	Array		Json Object의 Array
eeName	String	O	eeName(A string that can identify the sensor.) ex) K_S730_GLU101_CH03_CBOP_3527485
CLOSE_HH_CRTR_VAL	Float	O	Input time alarm threshold: {value}ms
CON_PART_HH_CRTR_VAL	Float	O	Opening time alarm threshold: {value}ms
CLOSE_HH_CAUT_ENABLE	Integer	O	Use of alarm for time-lapse alerts (0: not used, 1: used)
CLOSE_HH_CAUT	Float	O	{value}% exceeds the threshold for the time-in-use warning alarm
CON_PART_HH_CAUT_ENABLE	Integer	O	Use of alarm for opening time caution (0: not used, 1: used)
CON_PART_HH_CAUT	Float	O	Opening time warning alarm threshold exceeded {value}%
COILCURRFLOW_CLOSE_CRTR_VAL	Float	O	Coil energization time (activation) alarm threshold: {value}ms
COILCURRFLOW_OPEN_CRTR_VAL	Float	O	Coil energization time (release) alarm threshold: {value}ms
COILCURRFLOW_CLOSE_CAUT_CRTR_ENABLE	Integer	O	Whether to use the caution alarm for coil energization time (activation)
COILCURRFLOW_CLOSE_CAUT_CRTR	Float	O	Coil energization time (activation) caution alarm threshold Exceeding {value}% compared to the reference value
COILCURRFLOW_OPEN_CAUT_CRTR_ENABLE	Integer	O	Whether to use the caution alarm for coil energization time (release) (0: Not used, 1: Used)
COILCURRFLOW_OPEN_CAUT_CRTR	Float	O	Coil energization time (release) caution alarm threshold Exceeding {value}% compared to the reference value
GAPTIME_CLOSE_CAUT_ENABLE	Integer	O	Whether to use the caution alarm for gap difference (activation) (0: Not used, 1: Used)
GAPTIME_CLOSE_CAUT	Float	O	Gap difference (activation) caution alarm threshold: {value}ms
GAPTIME_OPEN_CAUT_ENABLE	Intege	O	Whether to use the caution alarm for gap difference (release) (0: Not used, 1: Used)
GAPTIME_OPEN_CAUT	Float	O	Gap difference (release) caution alarm threshold: {value}ms

4.7.4 Message BODY Example

```
{
        "msgTime" : 1595555254000,
        "contents" : [ {
                "eeName" : "K_S730_GLU101_CH01_SWPD_3440000",
                "CLOSE_HH_CRTR_VAL" : 150.0,
                "CON_PART_HH_CRTR_VAL" : 50.0,
                "CLOSE_HH_CAUT_ENABLE" : 1,
                "CLOSE_HH_CAUT" : 3.0,
                "CON_PART_HH_CAUT_ENABLE" : 1,
                "CON_PART_HH_CAUT" : 3.0,
                "COILCURRFLOW_CLOSE_CRTR_VAL" : 10.0,
                "COILCURRFLOW_OPEN_CRTR_VAL" : 10.0,
                "COILCURRFLOW_CLOSE_CAUT_CRTR_ENABLE" : 1,
                "COILCURRFLOW_CLOSE_CAUT_CRTR" : 3.0,
                "COILCURRFLOW_OPEN_CAUT_CRTR_ENABLE" : 1,
                "COILCURRFLOW_OPEN_CAUT_CRTR" : 3.0,
                "GAPTIME_CLOSE_CAUT_ENABLE" : 1,
                "GAPTIME_CLOSE_CAUT" : 6.0,
                "GAPTIME_OPEN_CAUT_ENABLE" : 1,
                "GAPTIME_OPEN_CAUT" : 4.0
                },
                {
                        ....
                }
        ]
}
```

4.8 Response of Alarm Setting Details for Transformer Dissolved Gas Analysis Sensor (Diagnosis Unit → Collection Server)

Transformers are divided into initial transformers and mid-to-long-term transformers based on the pressurization date. When transmitting alarm setting values, the alarm setting values for the initial transformer must be responded to first, followed immediately by the alarm setting values for the mid-to-long-term transformer. (The setting information for the initial transformer and the mid-to-long-term transformer must not be combined within the same contents Attribute.)

4.8.1 URL : http://{Collection ServerIP}:{PORT}/api/rule/{Manufacturer Code}_scbr_alarm_setting

4.8.2 Response Method : POST

4.8.3 Attribute Detail

Attribute	Type	Required	Explaination
msgTime	Long	O	Message sent time Timestamp(ms, UTC+0)
contents	Json Object Array	O	Array of Json Objects with attributes (prsrzType, eeName, prsrzType, dgaSettings) below
prsrzTime	String	O	Transformer pressurization date Ex) 20200724
eeName	String	O	eeName(A string that can identify the sensor.) ex) K_S730_MLU101_CH05_TRDGA_3440003
prsrzType	Integer	O	Transformer Early/Mid-Long-Term Classification (0: Early Transformer, 1: Mid-Long-Term Transformer)
dgaSettings	Json Object Array	O	Array of Json Objects with attributes (enable, gasName, alarmType, value) below

Attribute	Type	Required	Explaination
enable	Integer	O	Whether to use the alarm (0: not used, 1: used)
gasName	String	O	Gas name (H2, C2H4, etc.)
alarmType	String	O	Alarm type (observation, caution, etc.)
value	Integer	O	Changed settings

4.8.4 Message BODY Example 1 (Initial Transformer)

```
{
        "msgTime" : 1595555254000,
        "contents" :
        [{
                "prsrzTime" : 20200724,
                "prsrzType" : 0,
                "eeName" : "K_S730_GLU101_CH05_TRDGA_3440003",
                "dgaSettings" :
                [
                        {
                                "enable" : 1,
                                "gasName" : "H2",
                                "alarmType" : "요주의",
                                "value" : 200},
                        {
                                "enable" : 0,
                                "gasName" : "H2",
                                "alarmType" : "고장위험",
                                "value" : 400
                        }
                ]
        },
        {
                "prsrzTime" : 20200724,
                "prsrzType" : 0,
                "eeName" : "K_S730_GLU101_CH06_TRDGA_3440004",
                "dgaSettings" : [{
                                "enable" : 1,
                                "gasName" : "H2",
                                "alarmType" : "요주의",
                                "value" : 200
```

```
                        },
                        {
                                "enable" : 0,
                                "gasName" : "H2",
                                "alarmType" : "고장위험",
                                "value" : 400
                        }
                ]
        }]
}
```


4.8.5 메시지 BODY 예제2(중장기 변압기)


```
{
        "msgTime" : 1595555254000,
        "contents" :
        [{
                "prsrzTime" : 20200724,
                "prsrzType" : 1,
                "eeName" : "K_S730_GLU101_CH05_TRDGA_3440003",
                "dgaSettings" :
                [
                        {
                                "enable" : 1,
                                "gasName" : "H2",
                                "alarmType" : "관찰",
                                "value" : 200},
                        {
                                "enable" : 0,
                                "gasName" : "H2",
                                "alarmType" : "요주의",
                                "value" : 400
                        },
                        {
                                "enable" : 0,
                                "gasName" : "H2",
                                "alarmType" : "심각",
                                "value" : 400
                        },
                        {
                                "enable" : 0,
                                "gasName" : "H2",
                                "alarmType" : "고장위험",
```

```
                                        "value" : 400
                                    }
                                ]
                        },
                        { …
                        }]
}
```

4.9 Bushing leakage current sensor alarm setting details response (Diagnosis Unit → Collection Server)

4.9.1 URL : http://{Collection ServerIP}:{PORT}/api/rule/{Manufacturer Code}_sbsh_alarm_setting

4.9.2 Response Method : POST

4.9.3 Attribute Detail

Attribute	Type	Required	Explaination
msgTime	Long	O	Message sent time Timestamp(ms, UTC+0)
contents	Json Object Array	O	Array of JSON Objects with the following Attributes (eeName ~ LEAK_CRN_DECR_CAUT) as attributes
eeName	String	O	eeName(A string that can identify the sensor.) ex) K_S730_MLU103_CH05_BSHCUR_3527451
BUSHING_TYP	Integer	O	Bushing Manufacturing Type - 0: No setting value - 1: Condenser type (OIP) - 2: GIB type - 3: RIP type
CRTR_CAPE_VAL	float	O	Initial measured capacitance value: {value}pF
CRTR_CURR_VAL	float	O	Initial measured leakage current value: {value}mA
LEAK_CRN_INCR_OBSERVE_ENABLE	Integer	O	Whether to use leakage current increase observation alarm (0: not used, 1: used)
LEAK_CRN_INCR_OBSERVE	float	O	Leakage current increase observation alarm threshold: {value}% Exceeded
LEAK_CRN_INCR_CAUT_ENABLE	Integer	O	Whether to use leakage current increase caution alarm (0: not used, 1: used)
LEAK_CRN_INCR_CAUT	float	O	Leakage current increase caution alarm threshold {value}% Exceeded

LEAK_CRN_INCR_CRIL_ENABLE	Integer	O	Whether to use leakage current increase serious alarm (0: not used, 1: used)
LEAK_CRN_INCR_CRIL	float	O	Leakage current increase serious alarm threshold {value}% Exceeded
LEAK_CRN_DECR_CAUT_ENABLE	Integer	O	Leakage current decrease caution alarm (0: not used, 1: used)

Attribute	Type	Required	Explaination
LEAK_CRN_DECR_CAUT	float	O	Leakage current decrease caution alarm threshold {value}% Exceeded

4.9.4 Message BODY Example

```
{
        "msgTime" : 1595555254000,
        "contents" :
        [ {
                "eeName" : "K_S730_MLU103_CH05_BSHCUR_ 3527451",
                "BUSHING_TYP" : 1,
                "CRTR_CAPE_VAL" : 373.221,
                "CRTR_CURR_VAL" : 0.0,
                "LEAK_CRN_INCR_OBSERVE_ENABLE" : 1,
                "LEAK_CRN_INCR_OBSERVE" : 2.0,
                "LEAK_CRN_INCR_CAUT_ENABLE" : 1,
                "LEAK_CRN_INCR_CAUT" : 3.0,
                "LEAK_CRN_INCR_CRIL_ENABLE" : 1,
                "LEAK_CRN_INCR_CRIL" : 5.0,
                "LEAK_CRN_DECR_CAUT_ENABLE" : 1,
                "LEAK_CRN_DECR_CAUT" : 2.0
        }, {...}
        ]
}
```

4.10 OLTC Motor Sensor Alarm Setting History Response (Diagnosis Unit → Collection Server)

4.10.1 URL : http://{Collection ServerIP}:{PORT}/api/rule/{Manufacturer Code}_sltc_alarm_setting

4.10.2 Response Method : POST

4.10.3 Attribute Detail

Attribute	Type	Required	Explaination
msgTime	Long	O	Message sent time Timestamp(ms, UTC+0)
contents	Json Object Array	O	Array of Json Objects with the following Attributes (eeName ~ NORM_ISEG_MOTN_HH_CAUT_MIDTAB) as attributes
eeName	String	O	eeName(A string that can identify the sensor.) ex) K_S730_MLU104_CH22_TCMOT_ 3527453

MANUFACTURER	Integer	O	OLTC Manufacturer - Uses KEPCO ERP substation equipment manufacturer code

Attribute	Type	Required	Explaination
			(0 :Not set, 27 : BULGARIA, 119 : MR)
MIDTAB	Integer	O	OLTC Middle tap position
TOTAL_MOTN_HH_CRTR_VAL_GNRLTAB	Float	O	OLTC Total operating time alarm threshold (normal tap): {value}ms
TOTAL_MOTN_HH_CRTR_VAL_MIDTAB	Float	O	OLTC Total Operating Time Alarm Threshold (Middle Tab): {Value}ms
TOTAL_MOTN_HH_CAUT_GNRLTAB_ENABLE	Integer	O	OLTC Total Operation Time Caution (General Tab) Alarm Usage (0: Not used, 1: Used)
TOTAL_MOTN_HH_CAUT_GNRLTAB	Float	O	OLTC Total Operating Time Caution (General Tab) Alarm Reference Value ±{Value}%
TOTAL_MOTN_HH_CAUT_MIDTAB_ENABLE	Integer	O	OLTC Total Operation Time Caution (Middle Tap) Alarm. Use or not (0: Not used, 1: Used)
TOTAL_MOTN_HH_CAUT_MIDTAB	Float	O	OLTC Total Operating Time Caution (Middle Tap) Alarm. Reference Value ±{Value}%
START_ISEG_MAX_CRN_CRTR_VAL	Float	O	Inrush section maximum current alarm threshold: {value} mA
START_ISEG_MOTN_HH_CRTR_VAL_GNRLTAB	Float	O	Inrush section operation time alarm threshold (general tab): {value} ms
START_ISEG_MOTN_HH_CRTR_VAL_MIDTAB	Float	O	Inrush section operation time alarm threshold (middle tap): {value} ms
START_ISEG_MAX_CRN_CAUT_ENABLE	Integer	O	Whether to use the alarm for maximum current warning in the inrush section (0: not used, 1: used)
START_ISEG_MAX_CRN_CAUT	Float	O	Maximum current in the inrush section Caution alarm threshold value ±{value}%
START_ISEG_MOTN_HH_CAUT_GNRLTAB_ENABLE	Integer	O	Inrush section operation time (general tab) Caution alarm Use or not (0: not used, 1: used)
START_ISEG_MOTN_HH_CAUT_GNRLTAB	Float	O	Inrush section operation time (general tab) Caution alarm Reference value ±{value}%
START_ISEG_MOTN_HH_CAUT_MIDTAB_ENABLE	Integer	O	Inrush section operation time (middle tap) Caution alarm Use or not (0: not used, 1: used)
START_ISEG_MOTN_HH_CAUT_MIDTAB	Float	O	Inrush section operation time (middle tap) Caution alarm Reference value ±{value}%
NORM_ISEG_MAX_HH_CRTR_VAL	Float	O	Normal section maximum current alarm threshold {value} mA
NORM_ISEG_MOTN_HH_CRTR_VAL_GNRLTAB	Float	O	Normal section operation time (general tab) alarm threshold: {value} ms

NORM_ISEG_MOTN_HH_CRTR_VAL_MIDTAB	Float	O	Normal section operation time (middle tap) alarm threshold: {value} ms
NORM_ISEG_MAX_CRN_CAUT_ENABLE	Integer	O	Use of alarm for maximum current warning in normal section (0: not used, 1: used)
NORM_ISEG_MAX_CRN_CAUT	Float	O	Normal section maximum current warning alarm threshold value ±{value}%
NORM_ISEG_MOTN_HH_CAUT_	Integer	O	Normal section operation time (general tab) Caution alarm

Attribute	Type	Required	Explaination
GNRLTAB_ENABLE			Usage (0: not used, 1: used)
NORM_ISEG_MOTN_HH_CAUT_GNRLTAB	Float	O	Normal section operation time (general tab) Caution alarm Reference value ±{value}%
NORM_ISEG_MOTN_HH_CAUT_MIDTAB_ENABLE	Integer	O	Normal section operation time (middle tap) Use of caution alarm (0: not used, 1: used)
NORM_ISEG_MOTN_HH_CAUT_MIDTAB	Float	O	Normal section operation time (middle tap) Caution alarm Reference value ±{value}%

4.10.4 메시지 BODY 예제

```
{
        "msgTime" : 1595555254000,
        "contents" :
        [ {
                "eeName" : "K_S730_MLU103_CH05_BSHCUR_ 3527451",
                "MANUFACTURER" : 119,
                "MIDTAB" : 11,
                "TOTAL_MOTN_HH_CRTR_VAL_GNRLTAB" : 4100.501,
                "TOTAL_MOTN_HH_CRTR_VAL_MIDTAB" : 8201.002,
                ...(중략)
                "NORM_ISEG_MOTN_HH_CAUT_MIDTAB" : 3.501
        }, {...} ]
}
```

4.11 Response of Event Setting Details for Partial Discharge Sensor (Diagnosis Unit → Collection Server)

4.11.1 URL : http://{Collection ServerIP}:{PORT}/api/rule/{Manufacturer Code}_spdc_event_setting

4.11.2 Response Method : POST

4.11.3 Attribute Detail

Attribute	Type	Required	Explaination
msgTime	Long	O	Message sent timeTimestamp(ms, UTC+0)
contents	Json Object Array	O	Array of Json Objects with the following Attributes (eeName ~ SMLT_OVR_EVNT_OCCR_CNT) as attributes
eeName	String	O	eeName(A string that can identify the sensor.) ex) K_S730_GLU101_CH03_SWPD_3527485

THRS_VAL	Integer	O	Threshold of event occurrence condition A [dBm]
THRS_PPS_VAL	Integer	O	PPS threshold for event occurrence condition B [dBm]
PPS_VAL	Integer	O	PPS value of event occurrence condition B

Attribute	Type	Required	Explaination
EVNT_OCCR_CNT	Integer	O	부분방전 이벤트(1분)를 발생시키기 위한 1초 단위 부분방전 최소 발생 횟수

4.11.4 메시지 BODY 예제

```
{
        "msgTime" : 1595555254000, (2020/07/24 10:47:56 의 millisecond)
        "contents" : [ {
                        "eeName" : "K_S730_GLU101_CH05_SWPD_3440003",
                        "THRS_VAL" : 60,
                        "THRS_PPS_VAL" : 20,
                        "PPS_VAL" : 60,
                        "EVNT_OCCR_CNT" : 100
                },
                {
                        ....
                }
        ]
}
```

4.12 Response to reference waveform setting details of circuit breaker operation characteristic sensor and transmission of change details (Diagnosis Unit → Collection Server).

When reference waveform setting details are requested from the Collection Server or the reference waveform is changed, a message is transmitted in the format below.

4.12.1 URL : http://{Collection ServerIP}:{PORT}/api/rule/{Manufacturer Code}_scbr_crtr_wv

4.12.2 Response Method : POST

4.12.3 Attribute Detail

Attribute	Type	Required	Explaination
msgTime	Long	O	Message sent time Timestamp(ms, UTC+0)
contents	Json Object Array	O	Array of Json Objects with the following Attributes (eeName ~ CRTR_WV_TIME) as attributes
eeName	String	O	eeName(A string that can identify the sensor.) ex) K_S730_GLU101_CH03_CBOP_3527485
CRTR_TYP	Integer	O	Reference Waveform Type (0: Open, 1: Input)

CRTR_WV_TIME	String	O	YYYYMMDDHHMMSSsss (20200723203400289 : 2020년 07월 23일 20시 34분 00초 289ms)

4.12.4 Message BODY Example 1 (Response to Reference Waveform Request)

```
--- When requesting the open and closed reference waveform of
K_S730_GLU101_CH03_CBOP_3527485
{
          "msgTime" : 1595555254000,
          "contents" :    [ {
                    "eeName" : "K_S730_GLU101_CH01_CBOP_3527485",
                    "CRTR_TYP" : 0,
                    "CRTR_WV_TIME" : "20200723203400289"
          },
          {
                    "eeName" : "K_S730_GLU102_CH01_CBOP_3527485,
                    "CRTR_TYP" : 1,
                    "CRTR_WV_TIME" : "20191223203400299"
          }, {...} ]
}
```

4.12.5 Message BODY Example 2 (Sending a message for changing the reference waveform)

```
-- If the input reference waveform of K_S730_GLU101_CH03_CBOP_3527485 is changed
{
          "msgTime" : 1595555254000,
          "contents" :    [ {
                    "eeName" : "K_S730_GLU102_CH01_CBOP_3527485,
                    "CRTR_TYP" : 1,
                    "CRTR_WV_TIME" : "20191223203400299"
          } ]
}
```

4.13 Send alarm change history for each sensor when alarm setting is changed (Diagnosis Unit → Collection Server)

When the alarm setting values of all diagnostic elements (partial discharge, circuit breaker operation characteristics, bushing leakage current, OLTC motor) except for the transformer oil gas analysis sensor are changed, the alarm setting change details are sent to the Collection Server as shown below.

4.13.1 URL : http://{Collection ServerIP}:{PORT}/api/rule/{Manufacturer Code}_alarm_setting_dchg

4.13.2 송신 방식 : POST

4.13.3 Attribute Detail

Attribute	Type	Required	Explaination
msgTime	Long	O	Message sent time Timestamp(ms, UTC+0)

Attribute	Type	Required	Explaination
contents	Json Object Array	O	Array of Json Objects with the following Attributes (eeName ~ dchgs) as attributes
eeName	String	O	eeName(A string that can identify the sensor.) ex) K_S730_GLU101_CH05_SWPD_3440003
revisedTime	Long	O	Alarm setting change time Timestamp (ms, UTC+0)
dchgs	Json Object Array	O	Array of Json Objects with the following Attribute(key, value) as Attribute
key	String	O	Alarm Setting Attribute Name
value	Integer or Float	O	Changed alarm settings
comment	String	O	Reason for changing alarm settings
username	String	O	Name or ID of the person who changed the alarm setting

4.13.4 메시지 BODY 예제1 (여러개의 설정값을 한번에 변경한 경우)

```
{
        "msgTime" : 1595555254000,
        "contents" :
                [ {
                        "eeName" : "K_S730_GLU101_CH05_SWPD_3440003",
                        "revisedTime" : 1595545254000,
                        "dchgs" : [ {
                                "key" : "HR1_WTHN_SAME_EVNT",
                                "value" : 30
                            },
                            {
                                "key" : "HR24_WTHN_SAME_EVNT_1",
                                "value" : 60
                            } ],
                },
                {
                        "eeName" : "K_S730_GLU101_CH01_SWPD_3440001",
                        "revisedTime" : 1595545254000,
                        "dchgs" : [ {
                                "key" : "HR1_WTHN_SAME_EVNT",
                                "value" : 20
                         } ],
                 }, {...}
                ],
        "comment" : "민감도 조정",
        "username" : "kepcoUser1"
```

```
}
```

4.13.54.13.5 Message BODY Example 2 (When changing one setting value at a time)

```
{
        "msgTime" : 1595555254000,
        "contents" :    [ {
                "eeName" : "K_S730_GLU101_CH05_SWPD_3440003",
                "revisedTime" : 1595545254000,
                "dchgs" : [{
                        "key" : "HR1_WTHN_SAME_EVNT",
                        "value" : 30
                        },
                        {
                        "key" : "HR24_WTHN_SAME_EVNT_1",
                        "value" : 60
                        } ],
                } ],
        "comment" : "민감도 조정",
        "username" : "kepcoUser1"
}
```

4.14 Transmission of change details when the transformer oil gas analysis sensor alarm setting is changed (Diagnosis Unit → Collection Server) When the alarm setting value of the transformer oil gas analysis sensor is changed, the change details are transmitted to the Collection Server as follows.

4.14.1 URL : http://{Collection ServerIP}:{PORT}/api/rule/{Manufacturer Code}_trdga_alarm_setting_dchg

4.14.2 송신 방식 : POST

4.14.3 Attribute Detail

Attribute	Type	Required	Explaination
msgTime	Long	O	Message sent time Timestamp(ms, UTC+0)
contents	Json Object Array	O	Array of Json Objects with attributes (eeName, prsrzType, revisedTime, dgaSettings) below
eeName	String	O	eeName(A string that can identify the sensor.) ex) K_S730_MLU101_CH05_TRDGA_3440010
prsrzType	Integer	O	Transformer Early/Mid-Long-Term Classification(0: Early Transformer, 1: Mid-Long-Term Transformer)

revisedTime	Long	O	Alarm setting change time Timestamp (ms, UTC+0)

Attribute	Type	Required	Explaination
dgaSettings	Json Object Array	O	Array of Json Objects with the following Attributes (enable, gasName, alarmType, value)
enable	Integer	O	Whether to use the alarm (0: not used, 1: used)
gasName	String	O	Gas names (H2, C2H4, etc.)
alarmType	String	O	Alarm type (observation, caution, etc.)
value	Integer	O	Changed alarm settings
comment	String	O	Reason for changing alarm settings
username	String	O	Name or ID of the person who changed the alarm setting

4.14.4 Message BODY Example

```
{
        "msgTime" : 1595555254000,
        "contents" :    [ {
                "prsrzType" : 1,
                "eeName" : "K_S730_GLU101_CH05_TRDGA_3440010",
                "revisedTime" : 1595555254000,
                "dgaSettings" : [{
                        "enable" : 0,
                        "gasName" : "H2",
                        "alarmType" : "관찰",
                        "value" : 200
                }],
        } ],
        "comment" : "",
        "username" : "admin"
}
```

4.15 Transmitting change information when changing the partial discharge sensor event settings (Diagnosis Unit → Collection Server)

4.15.1 URL : http://{Collection ServerIP}:{PORT}/api/rule/{Manufacturer Code}_event_setting_dchg

4.15.2 송신 방식 : POST

4.15.3 Attribute Detail

Attribute	Type	Required	Explaination
msgTime	Long	O	Message sent timeTimestamp(ms, UTC+0)

contents	Json Object Array	O	Array of Json Objects with attributes (eeName, revisedTime) below

Attribute	Type	Required	Explaination
eeName	String	O	eeName(A string that can identify the sensor.) ex) K_S730_GLU101_CH05_SWPD_3440003
revisedTime	Long	O	Change alarm settings time Timestamp(ms, UTC+0)
dchgs	Json Object Array	O	Array of Json Objects with the following Attributes (key, value) as Attributes
key	String	O	Event Setting Attribute Name
value	Integer	O	Changed alarm settings value
comment	String	O	Reason for changing alarm settings
username	String	O	Name or ID of the person who changed the alarm setting

4.15.4 Message BODY Example

```
{
    "msgTime" : 1595555254000,
    "contents" :    [ {
        "eeName" : "K_S730_GLU101_CH05_SWPD_3440003",
        "revisedTime" : 1595555254000,
        "dchgs" : [{
                "key" : "THRS_VAL",
                "value" : 30
            },
            {
                "key" : "PPS_VAL",
                "value" : 60
            }],
      },
      {
        "eeName" : "K_S730_GLU101_CH01_SWPD_3440001",
        "time" : 1595555254000,
        "dchgs" : [{
                "key" : "PPS_VAL",
                "value" : 20
            }],
      }, {...}, ...
      ],
    "comment" : "민감도 조정",
    "username" : "admin"
}
```