
Version 12
June 2003
SNVT Master List



LONMARK[®] SNVT Master List

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SNVT Master List Introduction

Standard Network Variable Types (SNVTs) facilitate interoperability by providing a well-defined interface for communication between devices made by different manufacturers. A device may be installed in a network and logically connected to other devices via network variables as long as the data types match.

This document provides information on all available SNVTs. A SNVT index is defined for each network variable that is used when defining self-identification for network variables. The SNVT names are provided for use with network and development tools.

SNVT Version Numbers

This version of the SNVT Master List corresponds to version 12 of the LONMARK resource files. New SNVTs are added in numerical order. The following table shows the number of SNVTs defined in this and several earlier versions of the resource files.

<i>Resource File Version</i>	<i>SNVT IDs Defined</i>
7	1 – 114
8	1 – 122
9	1 – 135
10	1 – 145
11	1 – 166
12	1 – 177

SNVT_abs_humid (160)

Absolute Humidity

Used for optimal control in heating, ventilation, and air conditioning applications. If a device measures relative humidity, it may calculate Absolute Humidity from this using the following:

Absolute_Humidity [g/kg] = maximal_absolute_Humidity [g/kg] x
relative_Humidity

Relative Humidity is specified by SNVT_lev_percent.

See also [SNVT_enthalpy](#).

SNVT Index	Measurement	Type Category	Type Size
160	Absolute Humidity	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 655.34	0.01	gram/kilogram	65,535 (0xFFFF)
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,534 (0 .. 0xFFFE)	1, -2, 0 $S = a*10^b*(R+c)$	N/A	N/A

SNVT_address (114)

Neuron Chip Address

SNVT Index	Measurement	Type Category	Type Size
114	Neuron Chip Address	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
16,384 .. 64,767	1	16-bit address value	64,768 (0xFD00)
Raw Range	Scale Factors	File Name	Default Value
16,384 .. 64,767 (0 .. 0xFCFF)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

SNVT_alarm (88)

Alarm Status

This type is used as an output network variable within a Node Object to report alarm status. **For new designs, SNVT_alarm_2 should be used instead of SNVT_alarm.**

See [SNVT_alarm_2](#).

SNVT Index	Measurement	Type Category	Type Size
88	Alarm status	Structure	29 bytes

location[6]: 6-character node location string, zone number, ASCII description, numeric site ID, etc. It is system-specific.

Field	Measurement	Field Type Category	Field Size
location[6]	Location array element	Unsigned Character	6 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
ASCII character	1	8-bit unsigned byte	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 255 (0 .. 0xFF)	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

object_id: ID of object within node

Field	Measurement	Field Type Category	Field Size
object_id	Object ID	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 65,535	1	object index	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,535 (0 .. 0xFFFF)	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

alarm_type: Alarm type

Field	Measurement	Field Type Category	Field Size
alarm_type	alarm_type_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
alarm_type_t	1	N/A	AL_NUL
Raw Range	Scale Factors	File Name	Default Value
alarm_type_t	N/A	SNVT_AL.H	N/A

priority_level: Priority level

Field	Measurement	Field Type Category	Field Size
priority_level	priority_level_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
priority_level_t	1	N/A	PR_NUL
Raw Range	Scale Factors	File Name	Default Value
priority_level_t	N/A	SNVT_PR.H	N/A

index_to_SNVT: This is the index of the network variable (index based on declaration order within a node) that is causing the alarm.

Field	Measurement	Field Type Category	Field Size
index_to_SNVT	Index of NV	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. [device NV count]	1	index of NV causing alarm	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. [device NV count] (0x000 .. 0x[device NV count])	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

value[4]: value, 4 bytes or fewer

Field	Measurement	Field Type Category	Field Size
value[4]	Value array element	Unsigned Short	4 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
specific to NVT	specific to NVT	specific to NVT	specific to NVT
Raw Range	Scale Factors	File Name	Default Value
specific to NVT	specific to NVT $S = a*10^b*(R+c)$	N/A	N/A

year: Zero (0) means year not specified.

Field	Measurement	Field Type Category	Field Size
year	Year	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 3000	1	year	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 3000 (0 .. 0x0BB8)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

month: Zero (0) means month not specified.

Field	Measurement	Field Type Category	Field Size
month	Month	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 12	1	month of year	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 12 (0 .. 0x0C)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

day: Zero (0) means day not specified.

Field	Measurement	Field Type Category	Field Size
day	Day	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 31	1	day of month	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 31 (0 .. 0x1F)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

hour: Hour

Field	Measurement	Field Type Category	Field Size
hour	Hour	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 23	1	Hour of Day	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 23 (0 .. 0x17)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

minute: Minute

Field	Measurement	Field Type Category	Field Size
minute	Minute	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 59	1	Minutes	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 59 (0 .. 0x3B)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

second: Second

Field	Measurement	Field Type Category	Field Size
second	Second	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 59	1	Seconds	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 59 (0 .. 0x3B)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

millisecond: Millisecond

Field	Measurement	Field Type Category	Field Size
millisecond	Millisecond	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 999	1	Milliseconds	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 999 (0 .. 0x03E7)	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

alarm_limit[4]: alarm limit, 4 bytes or fewer

Field	Measurement	Field Type Category	Field Size
alarm_limit	Alarm limit array element	Unsigned Short	4 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
specific to NVT	specific to NVT	specific to NVT	specific to NVT
Raw Range	Scale Factors	File Name	Default Value
specific to NVT	specific to NVT $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

```
typedef struct {
    unsigned short      location[6];
    unsigned long       object_id;
    alarm_type_t        alarm_type;
    priority_level_t    priority_level;
    unsigned long       index_to_SNVT;
    unsigned short      value[4];
    unsigned long       year;
    unsigned short      month;
    unsigned short      day;
    unsigned short      hour;
    unsigned short      minute;
    unsigned short      second;
    unsigned long       millisecond;
    unsigned short      alarm_limit[4];
} SNVT_alarm;
```

SNVT_alarm_2 (164)

Alarm Status

This type is used as an output network variable within a Node Object functional block to report alarm status. **This type should be used instead of SNVT_alarm for all new designs.**

Following are the summary requirements for this type:

- Alarm values specify the alarm type, priority, time, and description.

- ❑ Alarm descriptions support sufficient text description to be useful for a human interface like a summary log, historical log, Web page, email message, or SMS message.
- ❑ Alarm descriptions allow manufacturers to embed their own error codes.
- ❑ Alarm descriptions may include references to strings defined in LONMARK resource files.
- ❑ Alarm time stamps support a resolution of up to 1 millisecond.
- ❑ A receiving device can detect a missed update.
- ❑ A receiving device can determine when all alarm updates from an alarm producer have been sent.
- ❑ Multiple alarms may be reported for a single functional block. Receiving devices or applications may request an update of all alarms for a functional block, determine when an update sequence has started, and determine when an update sequence has ended. This requirement is supported by the Node Object functional block.
- ❑ Alarm processing is simple enough to be implemented in a Neuron[®] hosted device or other embedded controller.
- ❑ Alarm types are compatible between SNVT_alarm and SNVT_alarm_2 to simplify handling of both types of alarms.

SNVT Index	Measurement	Type Category	Type Size
164	Alarm status	Structure	31 bytes

alarm_type: The alarm condition reported by this update.

Field	Measurement	Field Type Category	Field Size
alarm_type	alarm_type_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
alarm_type_t	1	N/A	AL_NUL
Raw Range	Scale Factors	File Name	Default Value
alarm_type_t	N/A	SNVT_AL.H	N/A

priority_level: The priority level of the alarm reported by this update.

Field	Measurement	Field Type Category	Field Size
priority_level	priority_level_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
priority_level_t	1	N/A	PR_NUL
Raw Range	Scale Factors	File Name	Default Value
priority_level_t	N/A	SNVT_PR.H	N/A

alarm_time: Alarm time in seconds since 2000-01-01T00:00:00Z (the 0 hour of 1 January 2000, Universal Time Coordinated).

Field	Measurement	Field Type Category	Field Size
alarm_time	Time	Unsigned Quad	4 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 4,294,967,294	1	Seconds	4,294,967,295 (0xFFFFFFFF)
Raw Range	Scale Factors	File Name	Default Value
0 .. 4,294,967,294 (0 .. 0xFFFFFFFFE)	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

milliseconds: Alarm time in milliseconds since the second specified by the **alarm_time** field.

Field	Measurement	Field Type Category	Field Size
milliseconds	Millisecond	Signed Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 999	1	Milliseconds	-1 (0xFFFF)
Raw Range	Scale Factors	File Name	Default Value
0 .. 999 (0 .. 0x3E7)	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

sequence_number: A sequence number that is incremented for each update from an alarm source. The sequence number is set to zero after it reaches 255. An alarm receiver can use the sequence number to detect missed alarm messages.

Field	Measurement	Field Type Category	Field Size
sequence_number	Number	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 255	1	Milliseconds	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 255 (0 .. 0xFF)	1, 0, 0 $S = a * 10^b * (R+c)$	N/A	N/A

description[22]: Alarm description with NUL terminator. The NUL terminator is not required if the description requires all 22 characters of the array. The alarm description is manufacturer-defined, but may include the alarm location, an identification of the object in alarm, the current value of the data point in alarm, and the limit that caused the alarm. The alarm description may include a reference to a string defined in a language file. The 0x80 value is reserved to delimit a language string reference. See *Language File String Reference* below.

Field	Measurement	Field Type Category	Field Size
description	ASCII character string with NUL terminator	Unsigned Character Array	22 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
ASCII character	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 255 (0 .. 0xFF)	1, 0, 0 $S = a * 10^b * (R+c)$	N/A	N/A

```
typedef struct {
    alarm_type_t           alarm_type;
    priority_level_t      priority_level;
    unsigned_quad         alarm_time;
    signed long           milliseconds;
    unsigned short        sequence_number;
    unsigned char         description[22];
} SNVT_alarm_2;
```

Language File String Reference

The description field of a SNVT_alarm_2 value can reference a language string using the reserved 0x80 value (represented as an “\x80” ASCII string). This string must be contained in one or more LONMARK language files (one for each supported language), and may optionally also be contained in an XML file derived from the language file by a tool such as the NodeBuilder[®] Resource Report Generator.

The syntax for a string reference is as follows:

```
\x80[programIDTemplate-][scopeSpecifier:]languageStringIndex;
```

The components of a string reference are the following:

A byte containing the value 0x80, represented by the “\x80” string.

programIDTemplate is a hex byte string of up to 16 characters specifying the program ID template of the resource file set containing the language string. Unused characters within the program ID template may be omitted, shortening the string at all scope levels other than 6. For example, the program ID template for a scope 3 resource file may consist of six characters representing the hex values of the format and manufacturer ID fields of the program ID template. If not included, the program ID template equals the program ID template of the device reporting the alarm.

A hyphen (“-”) follows the program ID template. The hyphen is not included if the program ID template is not included, otherwise it is mandatory.

scopeSpecifier may be a “3”, “4”, “5”, or “6” to specify a scope 3, 4, 5, or 6 resource. If not included, the scope is 0.

A colon (“:”) following the scope specifier. The colon is not included if the scope specifier is not included, otherwise it is mandatory.

languageStringIndex is the index of the language string within the language file. This index ranges from 1 to 16’777’216.

A semicolon (“;”) terminates the string reference.

EXAMPLES

The following string reference specifies language string index 522 within the standard resource file set.

```
"\x80522;"
```

The following string reference specifies language string index 100 within a user resource file set at scope 3, with a program ID template matching the program ID of the device that originated the alarm.

```
"\x803:100;"
```

The following string reference specifies language string index 200 within a user resource file set with a program ID template of 80:00:9F:00:00:00:00:00 at scope 3.

```
"\x8080009F-3:200;"
```

SNVT_amp (1)

Electric Current

Used for amperage measurements.

SNVT Index	Measurement	Type Category	Type Size
1	Electric current	Signed Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-3276.8 .. 3276.7	0.1	Amperes	N/A
Raw Range	Scale Factors	File Name	Default Value
-31,768 .. 32,767 (0x8000 .. 0x7FFF)	1, -1, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

SNVT_amp_ac (139)

Electric Current

Used to represent amperage of a large range, rather than a fine resolution.

SNVT Index	Measurement	Type Category	Type Size
139	Alternating electric current	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 65,534	1	Amperes	0xFFFF (65,535)
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,534 (0 .. 0xFFFFE)	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

SNVT_amp_f (48)

Electric Current

Used for amperage measurements.

SNVT Index	Measurement	Type Category	Type Size
48	Electric current	Floating Point	4 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-3.40282E38 .. 3.40282E38	N/A	Amperes	NaN
Raw Range	Scale Factors	File Name	Default Value
IEEE 754	N/A	N/A	N/A

SNVT_amp_mil (2)

Electric Current

Used for amperage measurements.

SNVT Index	Measurement	Type Category	Type Size
2	Electric current	Signed Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-3.276.8 .. 3276.7	0.1	Milliamperes	N/A
Raw Range	Scale Factors	File Name	Default Value
-31,768 .. 32,767 (0x8000 .. 0x7FFF)	1, -1, 0 $S = a * 10^b * (R + c)$	N/A	N/A

SNVT_angle (3)

Phase/Rotation

SNVT Index	Measurement	Type Category	Type Size
3	Phase/Rotation	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 65.535	0.001	radians	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,535 (0 .. 0xFFFF)	1, -3, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

SNVT_angle_deg (104)

Phase/Rotation

SNVT Index	Measurement	Type Category	Type Size
104	Angular distance	Signed Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-359.98 .. 360.00	0.02	degrees	32,767 (0x7FFF)
Raw Range	Scale Factors	File Name	Default Value
-17,999 .. 18,000 (0xB9B1 .. 0x4650)	2, -2, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

SNVT_angle_f (49)

Phase/Rotation

SNVT Index	Measurement	Type Category	Type Size
49	Phase/Rotation	Floating Point	4 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-3.40282E38 .. 3.40282E38	N/A	Radians	NaN
Raw Range	Scale Factors	File Name	Default Value
IEEE 754	N/A	N/A	N/A

SNVT_angle_vel (4)

Angular Velocity

SNVT Index	Measurement	Type Category	Type Size
4	Angular velocity	Signed Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-3276.8 .. 3276.7	0.1	radians/second	N/A
Raw Range	Scale Factors	File Name	Default Value
-32,768 .. 32,767 (0x8000 .. 0x7FFF)	1, -1, 0 $S = a*10^b*(R+c)$	N/A	N/A

SNVT_angle_vel_f (50)

Angular Velocity

SNVT Index	Measurement	Type Category	Type Size
50	Angular Velocity	Floating Point	4 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-3.40282E38 .. 3.40282E38	N/A	Radians/Second	NaN
Raw Range	Scale Factors	File Name	Default Value
IEEE 754	N/A	N/A	N/A

SNVT_area (110)

Area

SNVT Index	Measurement	Type Category	Type Size
110	Area	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 13.1068	0.0002	square meters (m ²)	0xFFFF(65,535)
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,534 (0 .. 0xFFFFE)	2, -4, 0 $S = a*10^b*(R+c)$	N/A	N/A

SNVT_btu_f (67)

Thermal Energy

SNVT Index	Measurement	Type Category	Type Size
67	Thermal Energy	Floating Point	4 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 3.40282E38	N/A	British Thermal Units	NaN
Raw Range	Scale Factors	File Name	Default Value
IEEE 754	N/A	N/A	N/A

SNVT_btu_kilo (5)

Thermal Energy

SNVT Index	Measurement	Type Category	Type Size
5	Thermal Energy	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 65,535	1	Kilo-British Thermal Units	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,535 (0 .. 0xFFFF)	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

SNVT_btu_mega (6)

Thermal Energy

SNVT Index	Measurement	Type Category	Type Size
6	Thermal Energy	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 65,535	1	Mega-British Thermal Units	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,535 (0 .. 0xFFFF)	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

SNVT_char_ascii (7)

Character

SNVT Index	Measurement	Type Category	Type Size
7	Character	Unsigned Character	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 255	1	8-bit ASCII Character	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 255 (0 .. 0xFF)	1, 0, 0 $S = a \cdot 10^{b \cdot (R+c)}$	N/A	N/A

SNVT_chlr_status (127)

Chiller Status

SNVT Index	Measurement	Type Category	Type Size
127	Chiller Status	Structure	3 bytes

```
typedef struct {
    chiller_t    chlr_run_mode;
    hvac_t       chlr_op_mode;
    struct{
        unsigned in_alarm           :1;    // offset 0
        unsigned run_enabled        :1;    // offset 1
        unsigned local              :1;    // offset 2
        unsigned limited            :1;    // offset 3
        unsigned chw_flow           :1;    // offset 4
        unsigned condw_flow        :1;    // offset 5
        /* The last two bits (offset 6) are not defined */
    } chlr_state;
} SNVT_chlr_status;
```

chlr_run_mode: Chiller run mode

Field	Measurement	Field Type Category	Field Size
chlr_run_mode	chiller_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
chiller_t	1	N/A	CHLR_NUL
Raw Range	Scale Factors	File Name	Default Value
chiller_t	N/A	SNVT_CHL.H	N/A

chlr_op_mode: Chiller operating mode

Field	Measurement	Field Type Category	Field Size
chlr_op_mode	hvac_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
hvac_t	1	N/A	HVAC_NUL
Raw Range	Scale Factors	File Name	Default Value
hvac_t	N/A	SNVT_HV.H	N/A

in_alarm: Alarm flag.

Field	Measurement	Type Category	Type Size
in_alarm	boolean_t	Unsigned Bitfield	1 bit (offset 0)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

run_enabled: 1 means run is enabled.

Field	Measurement	Type Category	Type Size
run_enabled	boolean_t	Unsigned Bitfield	1 bit (offset 1)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

local: 1 means local.

Field	Measurement	Type Category	Type Size
local	boolean_t	Unsigned Bitfield	1 bit (offset 2)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

limited: 1 means that conditions may exist that prevent reaching the setpoint.

Field	Measurement	Type Category	Type Size
limited	boolean_t	Unsigned Bitfield	1 bit (offset 3)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

chw_flow: 1 means chilled water flow.

Field	Measurement	Type Category	Type Size
chw_flow	boolean_t	Unsigned Bitfield	1 bit (offset 4)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

condw_flow: 1 means water flowing.

Field	Measurement	Type Category	Type Size
condw_flow	boolean_t	Unsigned Bitfield	1 bit (offset 5)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

SNVT_color (70)

Color

The fields represent the CIELAB color coordinate system.

SNVT Index	Measurement	Type Category	Type Size
70	Color	Structure	6 bytes

```
typedef struct {
    unsigned long    L_star;
    signed   long    a_star;
    signed   long    b_star;
} SNVT_color;
```

L_star: Value L* represents Lightness.

Field	Measurement	Field Type Category	Field Size
L_star	L*	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0.0 .. 100.0	0.1	L*	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1000 (0 .. 0x03E8)	1, -1, 0 $S = a \cdot 10^{b \cdot (R+c)}$	N/A	N/A

a_star: Value a* represents the Redness/Greenness axis.

Field	Measurement	Field Type Category	Field Size
a_star	a*	Signed Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-200.0 .. 200.0	0.1	a*	N/A
Raw Range	Scale Factors	File Name	Default Value
-2000 .. 2000 (0xF830 .. 0x07D0)	1, -1, 0 $S = a \cdot 10^{b \cdot (R+c)}$	N/A	N/A

b_star: Value b* represents the yellowness/blueness axis.

Field	Measurement	Field Type Category	Field Size
b_star	b*	Signed Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-200.0 .. 200.0	0.1	b*	N/A
Raw Range	Scale Factors	File Name	Default Value
-2000 .. 2000 (0xF830 .. 0x07D0)	1, -1, 0 $S = a \cdot 10^{b \cdot (R+c)}$	N/A	N/A

SNVT_config_src (69)

Configuration Source

SNVT Index	Measurement	Type Category	Type Size
69	config_source_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
config_source_t	1	N/A	CFG_NUL
Raw Range	Scale Factors	File Name	Default Value
config_source_t	N/A	SNVT_CFG.H	N/A

SNVT_count (8)

Event Count

SNVT Index	Measurement	Type Category	Type Size
8	Event Count	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 65,535	1	Count	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,535 (0 .. 0xFFFF)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

SNVT_count_f (51)

Event Count

SNVT Index	Measurement	Type Category	Type Size
51	Event Count	Floating Point	4 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 3.40282E38	N/A	Count	NaN
Raw Range	Scale Factors	File Name	Default Value
IEEE 754	N/A	N/A	N/A

SNVT_count_inc (9)

Incremental Count

SNVT Index	Measurement	Type Category	Type Size
9	Incremental Count	Signed Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-32768 .. 32767	1	Count	N/A
Raw Range	Scale Factors	File Name	Default Value
-32768 .. 32767 (0x8000 .. 0x7FFF)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

SNVT_count_inc_f (52)

Incremental Count

SNVT Index	Measurement	Type Category	Type Size
52	Incremental Count	Floating Point	4 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-3.40282E38 .. 3.40282E38	N/A	Count	NaN
Raw Range	Scale Factors	File Name	Default Value
IEEE 754	N/A	N/A	N/A

SNVT_ctrl_req (148)

Control Request

The network variable of this type is used in a controlling device, to request control permission of a controllable device, addressed by the logical receiver_id number. A controlling device may be an operator keyboard; a PC based control system or a remote control unit. A controllable device may a camera telemetry receiver, a video matrix switch, etc.

The controlling device must use the nciDeviceId assigned, as the value of the SNVT_ctrl_req sender_id. The SNVT_ctrl_req sender_prio must use either the optional nciPriority value assigned, or a priority value supplied from the application.

‘Low priority values’ equals “high priority,” and ‘high priority values’ equals “low priority,” such that ‘1’ is of higher priority than ‘50.’

Standard control devices (e.g., keyboards) in normal control mode must have the priority assigned in the range 1 to 50. The range 51 to 200 is used in alarm control mode. The priority value zero (0) is used to release control.

SNVT Index	Measurement	Type Category	Type Size
148	N/A	Structure	5 bytes

```
typedef struct {  
    unsigned long    receiver_id;  
    unsigned long    sender_id;  
    unsigned short   sender_prio;  
} SNVT_ctrl_req;
```

receiver_id: Identifier of the request receiver.

Field	Measurement	Field Type Category	Field Size
receiver_id	Receiver ID	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
1 .. 65,535	1	ID number	0
Raw Range	Scale Factors	File Name	Default Value
1 .. 65,535 (1 .. 0xFFFF)	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

sender_id: Identifier of the request sender.

Field	Measurement	Field Type Category	Field Size
sender_id	Sender ID	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
1 .. 65,534	1	ID number	0xFFFF (65,535)
Raw Range	Scale Factors	File Name	Default Value
1 .. 65,534 (1 .. 0xFFFE)	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

sender_prio: 1-200 request priority range. Release = 0.

Field	Measurement	Field Type Category	Field Size
sender_prio	Sender priority	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
0; 1 .. 50; 51 .. 200	1	Priority Value	N/A
Raw Range	Scale Factors	File Name	Default Value
0; 1 .. 50; 51 .. 200 (0, 1 .. 0x32, 0x33 .. 0xC8)	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

Example

```
control.receiver_id = 1
control.sender_id   = nciDeviceId
control.serder_prio = nciGroupPriority
```

```
Physical value = Request controllable device #1,
                from this controlling device,
                having the configurable id,
                nciDeviceId, and configurable
                priority, nciGroupPriority
```

SNVT_ctrl_resp (149)

Control Response

The network variable of this type is used to send the status on a control request, from a controlling device (SNVT_pos_ctrl).

Valid status responses are:

CTRLR_NO, CTRLR_PEND, CTRLR_REL, CTRLR_QUERY, CTRLR_RES, CTRLR_ERR

The status response CTRLR_NO, is sent on a control request to signal a control permission has been granted to the controlling device number (no.) sent as controller_id. Depending on the priority of the requesting device and the priority of the controlling device having permission, the controller_id may be equal to the requesting device or the one currently having permission.

The status response CTRLR_QUERY is sent to the controller currently having permission, whenever a controlling device with lower priority is requesting permission to control. This status response requires a retransmitted request from the current controller to maintain permission.

If the current controller fails to retransmit within some timeout determined by the controllable device, the permission is given to the requesting controller with the lower priority.

The response is sent to verify if the controlling device is online—e.g. to resolve control status if the controlling device has been reset, or having a power failure.

The status response CTRLR_PEND, is used when control permission is switched from one controlling device to another, due to equal priority of the controllers, optionally by polling the operator of the controlling device with a programmable timeout.

The status response CTRLR_REL is sent as response if a controlling device request to release the present control, e.g. when a keyboard selects another camera, or if the keyboard has been reset.

The status response CTRLR_RES is sent from the controllable device if it is reset, to relinquish control in a controlling device.

The status response CTRLR_ERR is sent if a bad function in the controllable device has occurred.

A union holds the logical id of the controllable device. For camera telemetry receivers this value is a fixed value configured prior to use.

For matrixes, this value holds the currently selected monitor, by the specified controller in the controller_id field. The matrix is logically assigned by monitor range during configuration; thus, these values must be transmitted when the status is CTRLR_RES.

e.g., A matrix having the monitor range 1 to 16 must on reset send:

```
sender.range.lower = 1  
sender.range.upper = 16
```

SNVT Index	Measurement	Type Category	Type Size
149	none	Structure	7 bytes

```
typedef struct {
    control_resp_t status;
    union {
        unsigned long id;
        struct {
            unsigned long lower;
            unsigned long upper;
        } range;
    } sender;
    unsigned long controller_id;
} SNVT_ctrl_resp;
```

status: Enumeration list for response status.

Field	Measurement	Field Type Category	Field Size
status	control_resp_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
control_resp_t	1	N/A	CTRLR_NUL
Raw Range	Scale Factors	File Name	Default Value
control_resp_t	N/A	SNVT_CRS.H	N/A

sender.id: The identifier of the responding device.

Field	Measurement	Field Type Category	Field Size
sender.id	Sender ID	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
1 .. 65,534	1	ID Number	0xFFFF (65,535)
Raw Range	Scale Factors	File Name	Default Value
1 .. 65,534 (1 .. 0xFFFFE)	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

sender.range.lower: The lower range definition of sender.

Field	Measurement	Field Type Category	Field Size
sender.range.lower	Sender Range Lower ID	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
1 .. 65,534	1	ID Number	0xFFFF (65,535)
Raw Range	Scale Factors	File Name	Default Value
1 .. 65,534 (1 .. 0xFFFFE)	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

sender.range.upper: The upper range definition of sender.

Field	Measurement	Field Type Category	Field Size
sender.range.upper	Sender Range Upper ID	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
1 .. 65,534	1	ID Number	0xFFFF (65,535)
Raw Range	Scale Factors	File Name	Default Value
1 .. 65,534 (1 .. 0xFFFFE)	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

controller_id: The logical identifier of the current controller.

Field	Measurement	Field Type Category	Field Size
controller_id	Controller ID	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
1 .. 65,534	1	ID Number	0xFFFF (65,535)
Raw Range	Scale Factors	File Name	Default Value
1 .. 65,534 (1 .. 0xFFFFE)	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

Example

ctrl.status = CTRLR_NO
 ctrl.sender.id = 1
 ctrl.controller_id = 2

Physical value Control permission for controllable device #1,
 is granted to controlling device #2

SNVT_currency (89)

Currency

Used to represent a monetary value in a specified currency.

SNVT Index	Measurement	Type Category	Type Size
89	Currency	Structure	6 bytes

```
typedef struct {
    currency_t    currency;
    int           power_of_10;
    unsigned      value[4];
} SNVT_currency;
```

currency: Country currency code.

Field	Measurement	Field Type Category	Field Size
currency	currency_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
currency_t	1	N/A	CU_NUL
Raw Range	Scale Factors	File Name	Default Value
currency_t	N/A	SNVT_CU.H	N/A

power_of_10: Scales the value field.

Field	Measurement	Field Type Category	Field Size
power_of_10	Magnitude	Signed Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
-128 .. 127	1	Power of 10	N/A
Raw Range	Scale Factors	File Name	Default Value
-128 .. 127 (0x80 .. 0x7F)	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

value[4]: Credit is positive, debit is negative.

Field	Measurement	Field Type Category	Field Size
value[4]	Value	Signed Quad	4 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-2,147,483,648 .. 2,147,483,647	1	Currency Value	N/A
Raw Range	Scale Factors	File Name	Default Value
-2,147,483,648 .. 2,147,483,647 (0x80000000 .. 0x7FFFFFFF)	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

The value field is a 32-bit signed value compatible with the Neuron C Extended Arithmetic s32_type type. Positive values correspond to credits, negative values to debits. The power_of_10 field scales the value field, so that for example, USD(\$) -1.23 is represented as the following:

{CU_UNITED_STATES_DOLLAR, -2, {-1, -1, -1, -123}} or
{CU_UNITED_STATES_DOLLAR, -2, {0xFF, 0xFF, 0xFF, 0x85}}

EUR(€) 45.67 is represented as the following:

{CU_EUROPEAN_CURRENCY_UNIT, -2, {0, 0, 17, 215}} or
{CU_EUROPEAN_CURRENCY_UNIT, -2, {0, 0, 0x11, 0xD7}}

JPY(¥) 1000000 is represented as the following:

{CU_JAPAN_YEN, 0, {0, 15, 66, 64}} or
{CU_JAPAN_YEN, 0, {0, 0x0F, 0x42, 0x40}}

SNVT_date_cal (10)

This SNVT is obsolete. Use SNVT_time_stamp instead.

```
typedef struct {
    unsigned long      year;
    unsigned short    month;
    unsigned short    day;
} SNVT_date_cal;
```

SNVT_date_day (11)

Day of week

This is an enumerated list of the days of the week.

SNVT Index	Measurement	Type Category	Type Size
11	days_of_week_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
days_of_week_t	1	N/A	DAY_NUL
Raw Range	Scale Factors	File Name	Default Value
days_of_week_t	N/A	SNVT_DT.H	N/A

SNVT_date_event (176)

Date Event

This network variable type is used to report the status of a schedule.

SNVT Index	Measurement	Type Category	Type Size
176	Date Event	Structure	26 bytes

```
typedef struct {
    signed long      days_to_active;
    signed long      days_to_inactive;
    unsigned char    name[22];
} SNVT_date_event;
```


days_to_active: Identifies the number of days until this schedule will be active. This value is positive if an schedule is inactive and specifies the number of days until this schedule becomes active. This value is zero or negative if a schedule is active and the absolute value specifies the number of days that this schedule has been active.

Field	Measurement	Field Type Category	Field Size
days_to_active	Days	Signed Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-32,768 .. 32,766	1	Year	32,767 (0x7FFF)
Raw Range	Scale Factors	File Name	Default Value
-32,768 .. 32,766 (0xFFFF .. 0x7FFE)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	32,767 (0x7FFF)

days_to_inactive: Identifies the number of days until this schedule will be inactive. This value is positive if an schedule is active and specifies the number of days until this schedule becomes inactive. This value is zero or negative if an schedule is inactive and the absolute value specifies the number of days that this schedule has been inactive.

Field	Measurement	Field Type Category	Field Size
days_to_inactive	Days	Signed Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-32,767 .. 32,767	1	Year	-32,768 (0xFFFF)
Raw Range	Scale Factors	File Name	Default Value
-32,767 .. 32,767 (0xFFFE .. 0x7FFF)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	-32,768 (0xFFFF)

name[22]: A nul-terminated string of up to 22 characters that specifies an schedule name. The nul terminator is not required if the name is 22 characters.

Field	Measurement	Field Type Category	Field Size
name	Schedule Name	Unsigned Character Array	22 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
ASCII character for each byte	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
32 .. 126 for each byte (0x20 .. 0x7E)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	Nul string

SNVT_date_time (12)

This SNVT is obsolete. Use SNVT_time_stamp instead.

```
typedef struct {
    unsigned short    hour;
    unsigned short    minute;
    unsigned short    second;
```

```
} SNVT_date_time;
```

SNVT_defr_mode (120)

Defrost Mode

SNVT Index	Measurement	Type Category	Type Size
120	defrost_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
defrost_t	1	N/A	DFM_MODE_NUL
Raw Range	Scale Factors	File Name	Default Value
defrost_t	N/A	SNVT_DFM.H	N/A

SNVT_defr_state (122)

Defrost State

SNVT Index	Measurement	Type Category	Type Size
122	defrost_state_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
defrost_state_t	1	N/A	DFS_NUL
Raw Range	Scale Factors	File Name	Default Value
defrost_state_t	N/A	SNVT_DFS_H	N/A

SNVT_defr_term (121)

Defrost Termination

SNVT Index	Measurement	Type Category	Type Size
121	defrost_term_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
defrost_term_t	1	N/A	DFT_NUL
Raw Range	Scale Factors	File Name	Default Value
defrost_term_t	N/A	SNVT_DFT.H	N/A

SNVT_density (100)

Density

SNVT Index	Measurement	Type Category	Type Size
100	Density	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 32,767.5	0.5	kg/m ³ : kilograms per cubic meter	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,535 (0 .. 0xFFFF)	5, -1, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

SNVT_density_f (101)

Density

SNVT Index	Measurement	Type Category	Type Size
101	Density	Floating Point	4 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 3.40282E38	N/A	Kilograms per Cubic Meter (kg/m ³)	NaN
Raw Range	Scale Factors	File Name	Default Value
IEEE 754	N/A	N/A	N/A

SNVT_dev_c_mode (162)

Device Control Mode

A SNVT_dev_c_mode network variable is to used for heating, ventilation, and air-conditioning applications. This network variable defines and indicates the control mode of devices like pumps, fans and other actuator-based devices.

SNVT Index	Measurement	Type Category	Type Size
162	device_c_mode_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
device_c_mode_t	1	N/A	DCM_NUL
Raw Range	Scale Factors	File Name	Default Value
device_c_mode_t	N/A	SNVT_DCM.H	N/A

SNVT_dev_fault (174)

Device Fault

This network variable type is used to report fault information for a Pump Controller, Valve Positioner, or similar functional block.

SNVT Index	Measurement	Type Category	Type Size
174	Device Fault States	Structure	4 bytes

```
typedef struct {
    device_select_t    device_select;
    union {
        struct {
            sf_voltage_low           :1;
            sf_voltage_high          :1;
            sf_phase                  :1;
            sf_no_fluid              :1;
            sf_press_low             :1;
            sf_press_high            :1;
            sf_reserved1_6           :1;
            sf_reserved1_7           :1;
        };
    };
};
```

```

        df_motor_temp           :1;
        df_motor_failure        :1;
        df_pump_blocked         :1;
        df_elect_failure_nf     :1;
        df_elect_failure        :1;
        df_sensor_failure       :1;
        df_reserved2_7          :1;
        reserved3_0_7           :8;
    } pump_ctrl;
    struct {
        reserved1_0_7           :8;
        reserved2_0_7           :8;
        reserved3_0_7           :8;
    } valve_pos;
} dev_type
} SNVT_dev_status;

```

device_select: Determines the interpretation of the network-variable content.

Field	Measurement	Field Type Category	Field Size
device_select	device_select_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
device_select_t	1	N/A	DV_NUL
Raw Range	Scale Factors	File Name	Default Value
device_select_t	N/A	SNVT_DS.H	N/A

dev_type.pump_ctrl.sf_voltage_low: Supply voltage is too low.

Field	Measurement	Field Type Category	Field Size
sf_voltage_low	Supply fault - low voltage	Unsigned Bitfield	1 bit (offset 0)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	boolean	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1 (0 .. 0x1)	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

dev_type.pump_ctrl.sf_voltage_high: Supply voltage is too high.

Field	Measurement	Field Type Category	Field Size
sf_voltage_high	Supply fault - high voltage	Unsigned Bitfield	1 bit (offset 1)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	boolean	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1 (0 .. 0x1)	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

dev_type.pump_ctrl.sf_phase: Supply power is missing phase.

Field	Measurement	Field Type Category	Field Size
sf_phase	Supply fault - power phase	Unsigned Bitfield	1 bit (offset 2)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	boolean	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1 (0 .. 0x1)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

dev_type.pump_ctrl.sf_no_fluid: There is no fluid in the pump.

Field	Measurement	Field Type Category	Field Size
sf_no_fluid	Supply fault - no fluid	Unsigned Bitfield	1 bit (offset 3)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	boolean	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1 (0 .. 0x1)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

dev_type.pump_ctrl.sf_press_low: System pressure is too low.

Field	Measurement	Field Type Category	Field Size
sf_press_low	Supply fault - low pressure	Unsigned Bitfield	1 bit (offset 4)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	boolean	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1 (0 .. 0x1)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

dev_type.pump_ctrl.sf_press_high: System pressure is too high.

Field	Measurement	Field Type Category	Field Size
sf_press_high	Supply fault - high pressure	Unsigned Bitfield	1 bit (offset 5)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	boolean	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1 (0 .. 0x1)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

dev_type.pump_ctrl.df_motor_temp: Motor temperature is too high.

Field	Measurement	Field Type Category	Field Size
df_motor_temp	Device fault - motor temperature	Unsigned Bitfield	1 bit (offset 0)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	boolean	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1 (0 .. 0x1)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

dev_type.pump_ctrl.df_motor_failure: Motor has encountered a fatal failure.

Field	Measurement	Field Type Category	Field Size
df_motor_failure	Device fault - motor fatal failure	Unsigned Bitfield	1 bit (offset 1)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	boolean	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1 (0 .. 0x1)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

dev_type.pump_ctrl.df_pump_blocked: Pump is presently blocked.

Field	Measurement	Field Type Category	Field Size
df_pump_blocked	Device fault - pump blocked	Unsigned Bitfield	1 bit (offset 2)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	boolean	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1 (0 .. 0x1)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

dev_type.pump_ctrl.df_elect_temp: Temperature of the electronic circuitry is too high.

Field	Measurement	Field Type Category	Field Size
df_elect_temp	Device fault - electronics temperature	Unsigned Bitfield	1 bit (offset 3)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	boolean	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1 (0 .. 0x1)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

dev_type.pump_ctrl.df_elect_failure_nf: Electronic circuitry has encountered a non-fatal failure.

Field	Measurement	Field Type Category	Field Size
df_elect_failure_nf	Device fault - electronics failure	Unsigned Bitfield	1 bit (offset 4)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	boolean	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1 (0 .. 0x1)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

dev_type.pump_ctrl.df_elect_failure: Electronic circuitry has encountered a fatal failure.

Field	Measurement	Field Type Category	Field Size
df_elect_failure	Device fault - electronics fatal failure	Unsigned Bitfield	1 bit (offset 5)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	boolean	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1 (0 .. 0x1)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

dev_type.pump_ctrl.df_sensor_failure: Sensor has failed on the device.

Field	Measurement	Field Type Category	Field Size
df_sensor_failure	Device fault - sensor failure	Unsigned Bitfield	1 bit (offset 6)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	boolean	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1 (0 .. 0x1)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

SNVT_dev_maint (175)

Device Maintenance

This network variable type is used to report device-maintenance states of a Pump Controller, Valve Positioner, or similar functional block.

SNVT Index	Measurement	Type Category	Type Size
175	Device Maintenance	Structure	4 bytes


```

typedef struct {
    device_select_t    device_select;
    union {
        struct {
            service_required      :1;
            bearings_change       :1;
            bearings_lubricate    :1;
            shaftseal_change      :1;
            reserved1_4_7         :4;
            reserved2_0_7         :8;
            reserved3_0_7         :8;
        } pump_ctrl;
        struct {
            reserved1_0_7         :8;
            reserved2_0_7         :8;
            reserved3_0_7         :8;
        } valve_pos;
    } dev_type
} SNVT_dev_status;

```

device_select: Determines the interpretation of the network-variable content.

Field	Measurement	Field Type Category	Field Size
device_select	device_select_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
device_select_t	1	N/A	DV_NUL
Raw Range	Scale Factors	File Name	Default Value
device_select_t	N/A	SNVT_DS.H	N/A

dev_type.pump_ctrl.service_required: Service/maintenance is required.

Field	Measurement	Field Type Category	Field Size
service_required	Service required	Unsigned Bitfield	1 bit (offset 0)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	boolean	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1 (0 .. 0x1)	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

dev_type.pump_ctrl.bearings_change: Bearings need to be replaced.

Field	Measurement	Field Type Category	Field Size
bearings_change	Change bearings	Unsigned Bitfield	1 bit (offset 1)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	boolean	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1 (0 .. 0x1)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

dev_type.pump_ctrl.bearings_lubricate: Bearings need to be greased.

Field	Measurement	Field Type Category	Field Size
bearings_lubricate	Lubricate bearings	Unsigned Bitfield	1 bit (offset 2)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	boolean	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1 (0 .. 0x1)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

dev_type.pump_ctrl.shaftseal_change: Seal on the shaft needs to be replaced.

Field	Measurement	Field Type Category	Field Size
shaftseal_change	Change shaft seal	Unsigned Bitfield	1 bit (offset 3)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	boolean	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1 (0 .. 0x1)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

SNVT_dev_status (173)

Device Status

This network variable type is used to report the status of a Pump Controller, Valve Positioner, or similar functional block.

SNVT Index	Measurement	Type Category	Type Size
173	Device Status	Structure	4 bytes

```

typedef struct {
    device_select_t    device_select;
    union {
        struct {
            device_fault           :1;
            supply_fault           :1;
            reserved1_2           :1;
            speed_low              :1;
            speed_high            :1;
            reserved1_5           :1;
            setpt_out_of_range    :1;
            reserved1_7           :1;
            local_control          :1;
            reserved2_1           :1;
            running                :1;
            reserved2_3           :1;
            remote_press           :1;
            remote_flow           :1;
            remote_temp           :1;
            reserved2_7           :1;
            reserved3_0_7         :8;
        } pump_ctrl;
        struct {
            reserved1_0_7         :8;
            reserved2_0_7         :8;
            reserved3_0_7         :8;
        } valve_pos;
    } dev_type
} SNVT_dev_status;

```

device_select: Determines the interpretation of the network-variable content.

Field	Measurement	Field Type Category	Field Size
device_select	device_select_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
device_select_t	1	N/A	DV_NUL
Raw Range	Scale Factors	File Name	Default Value
device_select_t	N/A	SNVT_DS.H	N/A

dev_type.pump_ctrl.device_fault: See SNVT_pump_fault network variable declaration on device.

Field	Measurement	Field Type Category	Field Size
device_fault	Pump controller fault	Unsigned Bitfield	1 bit (offset 0)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	boolean	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1 (0 .. 0x1)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

dev_type.pump_ctrl.supply_fault: No electrical power, no fluid in pump, etc.
See SNVT_pump_fault network-variable declaration on device.

Field	Measurement	Field Type Category	Field Size
supply_fault	Supply fault	Unsigned Bitfield	1 bit (offset 1)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	boolean	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1 (0 .. 0x1)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

dev_type.pump_ctrl.speed_low: Pump is running at the lowest possible speed, therefore the requested performance is not possible.

Field	Measurement	Field Type Category	Field Size
speed_low	Low-speed limit of pump	Unsigned Bitfield	1 bit (offset 3)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	boolean	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1 (0 .. 0x1)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

dev_type.pump_ctrl.speed_high: Pump is running at the highest possible speed, therefore the requested performance is not possible.

Field	Measurement	Field Type Category	Field Size
speed_high	High-speed limit of pump	Unsigned Bitfield	1 bit (offset 4)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	boolean	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1 (0 .. 0x1)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

dev_type.pump_ctrl.setpt_out_of_range: Chosen override setpoint value is lower than the manufacturer-defined low-setpoint limit or higher than the manufacturer-defined high-setpoint limit.

Field	Measurement	Field Type Category	Field Size
setpt_out_of_range	Setpoint out of range	Unsigned Bitfield	1 bit (offset 6)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	boolean	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1 (0 .. 0x1)	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

dev_type.pump_ctrl.local_control: Pump is locally operated (hardware override).

Field	Measurement	Field Type Category	Field Size
local_control	Locally controlled pump	Unsigned Bitfield	1 bit (offset 0)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	boolean	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1 (0 .. 0x1)	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

dev_type.pump_ctrl.running: Pump is presently running.

Field	Measurement	Field Type Category	Field Size
running	Running pump	Unsigned Bitfield	1 bit (offset 2)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	boolean	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1 (0 .. 0x1)	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

dev_type.pump_ctrl.remote_press: Pump controller is using a remote pressure sensor.

Field	Measurement	Field Type Category	Field Size
remote_press	Remote pressure sensor	Unsigned Bitfield	1 bit (offset 4)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	boolean	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1 (0 .. 0x1)	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

dev_type.pump_ctrl.remote_flow: Pump controller is using a remote flow sensor.

Field	Measurement	Field Type Category	Field Size
remote_flow	Remote flow sensor	Unsigned Bitfield	1 bit (offset 5)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	boolean	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1 (0 .. 0x1)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

dev_type.pump_ctrl.remote_temp: Pump controller is using a remote temperature sensor.

Field	Measurement	Field Type Category	Field Size
remote_temp	Remote temperature sensor	Unsigned Bitfield	1 bit (offset 6)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	boolean	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1 (0 .. 0x1)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

SNVT_earth_pos (135)

Earth Position

SNVT Index	Measurement	Type Category	Type Size
135	Earth Position	Structure	11 bytes

```
typedef struct {
    unsigned          latitude_direction    :1;
    unsigned          longitude_direction   :1;
    unsigned short    latitude_deg;
    unsigned long     latitude_min;
    unsigned short    longitude_deg;
    unsigned long     longitude_min;
    float_type        height_above_sea;
} SNVT_earth_pos;
```

latitude_direction: Direction of latitude. 0 = South latitude, 1 = North latitude.

Field	Measurement	Type Category	Type Size
latitude_direction	Direction Flag	Unsigned Bitfield	1 bit (offset 0)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

longitude_direction: Direction of longitude. 0 = East longitude, 1 = West longitude.

Field	Measurement	Type Category	Type Size
longitude_direction	Direction Flag	Unsigned Bitfield	1 bit (offset 1)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

latitude_deg: Latitude degrees

Field	Measurement	Field Type Category	Field Size
latitude_deg	Latitude degrees	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
1 .. 90	1	Degrees	255 (0xFF)
Raw Range	Scale Factors	File Name	Default Value
1 .. 90 (1 .. 0x5A)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

latitude_min: Latitude minutes

Field	Measurement	Field Type Category	Field Size
latitude_min	Latitude Minutes	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
1 .. 59.999	0.001	Minutes	65,535 (0xFFFF)
Raw Range	Scale Factors	File Name	Default Value
1 .. 59,999 (1 .. 0xEA5F)	1, -3, 0 $S = a*10^b*(R+c)$	N/A	N/A

longitude_deg: Longitude degrees

Field	Measurement	Field Type Category	Field Size
longitude_deg	Longitude Degrees	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
1 .. 180	1	Degrees	255 (0xFF)
Raw Range	Scale Factors	File Name	Default Value
1 .. 180 (1 .. 0xB4)	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

longitude_min: Longitude minutes

Field	Measurement	Field Type Category	Field Size
longitude_min	Longitude Minutes	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
1 .. 59,999	0.001	Minutes	65,535 (0xFFFF)
Raw Range	Scale Factors	File Name	Default Value
1 .. 59,999 (1 .. 0xEA5F)	1, -3, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

height_above_sea: Height above sea level

Field	Measurement	Field Type Category	Field Size
height_above_sea	Height Above Sea Level	Floating Point	4 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-3.40282E38 .. 3.40282E38	N/A	Meters (m)	NaN
Raw Range	Scale Factors	File Name	Default Value
IEEE 754	N/A	N/A	N/A

SNVT_elapsed_tm (87)

Elapsed Time

SNVT Index	Measurement	Type Category	Type Size
87	Elapsed Time	Structure	7 bytes

```
typedef struct {
    unsigned long           day;
    unsigned short         hour;
    unsigned short         minute;
    unsigned short         second;
    unsigned long          millisecond;
} SNVT_elapsed_tm;
```


day: The value 65535 represents NULL or unknown elapsed time.

Field	Measurement	Field Type Category	Field Size
day	Days	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 65,534	1	Days	0xFFFF (65535)
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,534 (0 .. 0xFFFE)	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

hour: This field uses a 24-hour value.

Field	Measurement	Field Type Category	Field Size
hour	Hours	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 23	1	Hours	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 23 (0 .. 0x17)	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

minute: Minutes

Field	Measurement	Field Type Category	Field Size
minute	Minutes	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 59	1	Minutes	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 59 (0 .. 0x3B)	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

second: Seconds

Field	Measurement	Field Type Category	Field Size
second	Seconds	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 59	1	Seconds	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 59 (0 .. 0x3B)	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

millisecond: Milliseconds

Field	Measurement	Field Type Category	Field Size
millisecond	Milliseconds	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 999	1	Milliseconds	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 999 (0 .. 0xF3E7)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

SNVT_elec_kwh (13)

Electrical Energy

For new designs, SNVT_elec_kwh_I should be used instead of SNVT_elec_kwh.

SNVT Index	Measurement	Type Category	Type Size
13	Electrical energy	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 65,535	1	Kilowatt-hours	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,535 (0 .. 0xFFFF)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

SNVT_elec_kwh_I (146)

Electricity

Used to communicate electricity-metering data to data-logging or energy management devices.

For new designs, SNVT_elec_kwh_I should be used instead of SNVT_elec_kwh.

SNVT Index	Measurement	Type Category	Type Size
146	Electricity – Kilowatt-Hours	Signed Quad	4 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-214,748,364.8 .. 214,748,364.6	0.1	Kilowatt-hour	0xFFFFFFFF (214,748,364.7)
Raw Range	Scale Factors	File Name	Default Value
-2,147,483,648 .. 2,147,483,646 (0x80000000 .. 0x7FFFFFFE)	1, -1, 0 $S = a*10^b*(R+c)$	N/A	N/A

SNVT_elec_whr (14)

Electric Energy

SNVT Index	Measurement	Type Category	Type Size
14	Electric energy	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 6553.5	0.1	Watt-hours	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,535 (0 .. 0xFFFF)	1, -1, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

SNVT_elec_whr_f (68)

Electric Energy

SNVT Index	Measurement	Type Category	Type Size
68	Electric Energy	Floating Point	4 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 3.40282E38	N/A	Watt-hour	NaN
Raw Range	Scale Factors	File Name	Default Value
IEEE 754	N/A	N/A	N/A

SNVT_ent_opmode (168)

Entry Operation Mode

Used to send operation-mode information to an entry functional block such as a door, lock, sluice, or something that allows or prohibits entry to an area.

SNVT Index	Measurement	Type Category	Type Size
168	ent_opmode_cmd_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
ent_opmode_cmd_t	1	N/A	EM_NUL
Raw Range	Scale Factors	File Name	Default Value
ent_opmode_cmd_t	N/A	SNVT_ENO.H	N/A

SNVT_ent_state (169)

Entry State

Desired state for an entry functional block such as a door, lock, sluice, or something that controls entry of an area.

SNVT Index	Measurement	Type Category	Type Size
169	ent_cmd_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
ent_cmd_t	1	N/A	ES_NUL
Raw Range	Scale Factors	File Name	Default Value
ent_cmd_t	N/A	SNVT_ENS.H	N/A

SNVT_ent_status (170)

Entry Status

Status information from an entry functional block such as a door, lock, sluice, or something that allows or prohibits entry into an area.

SNVT Index	Measurement	Type Category	Type Size
170	Entry Status	Structure	5 bytes

```
typedef struct {
    unsigned    unlocked           : 1;    // offset 0
    unsigned    locked             : 1;    // offset 1
    unsigned    security_locked    : 1;    // offset 2
    unsigned    closed             : 1;    // offset 3
    unsigned    open               : 1;    // offset 4
    unsigned    in_alarm           : 1;    // offset 5
    unsigned    in_error_cond      : 1;    // offset 6
    unsigned    open_pre_alarm     : 1;    // offset 7
    unsigned    open_alarm         : 1;    // offset 0
    unsigned    service_alarm      : 1;    // offset 1
    unsigned    tamper             : 1;    // offset 2
    unsigned    entry_req          : 1;    // offset 3
    unsigned    exit_req           : 1;    // offset 4
    unsigned    key_req            : 1;    // offset 5
    unsigned    safety_ext_req     : 1;    // offset 6
    unsigned    emergency_req      : 1;    // offset 7
    unsigned    unable_lock        : 1;    // offset 0
    unsigned    unable_unlock     : 1;    // offset 1
    unsigned    stuck              : 1;    // offset 2
    unsigned    forced_open        : 1;    // offset 3
    unsigned    forced_close       : 1;    // offset 4
    unsigned    opening            : 1;    // offset 5
    unsigned    closing            : 1;    // offset 6
}
```

```

unsigned          moving          : 1; // offset 7
unsigned          stopped         : 1; // offset 0
unsigned          safety_alarm    : 1; // offset 1
unsigned          unknown_state   : 1; // offset 2
/* The last five bits (offset 3) are not defined
*/
ent_opmode_cmd_t  cmd_fb;
} SNVT_ent_status;

```

unlocked: Device is in unlocked position.

Field	Measurement	Field Type Category	Field Size
unlocked	Unlocked device	Unsigned Bitfield	1 bit (offset 0)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

locked: Device is in locked position.

Field	Measurement	Field Type Category	Field Size
locked	Locked device	Unsigned Bitfield	1 bit (offset 1)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

unlocked: Device is in a security-driven locked position.

Field	Measurement	Field Type Category	Field Size
security_locked	Security locked	Unsigned Bitfield	1 bit (offset 2)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

closed: Device is in a closed position.

Field	Measurement	Field Type Category	Field Size
closed	Closed device	Unsigned Bitfield	1 bit (offset 2)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

open: Device is in an open position.

Field	Measurement	Field Type Category	Field Size
open	Open device	Unsigned Bitfield	1 bit (offset 4)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

in_alarm: The device is in the alarm state.

Field	Measurement	Field Type Category	Field Size
unlocked	In alarm state	Unsigned Bitfield	1 bit (offset 5)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

in_error_cond: Device has an error condition.

Field	Measurement	Field Type Category	Field Size
in_error_cond	In error condition	Unsigned Bitfield	1 bit (offset 6)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

open_pre_alarm: Device is open, and in warning state.

Field	Measurement	Field Type Category	Field Size
open_pre_alarm	Open device, pre-alarm	Unsigned Bitfield	1 bit (offset 7)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

open_alarm: Device is open, and in not-closed alarm state.

Field	Measurement	Field Type Category	Field Size
open_alarm	Open Device, alarm state	Unsigned Bitfield	1 bit (offset 0)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

service_alarm: Device needs service.

Field	Measurement	Field Type Category	Field Size
service_alarm	Service alarm	Unsigned Bitfield	1 bit (offset 1)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

tamper: Device has detected tamper.

Field	Measurement	Field Type Category	Field Size
tamper	Tamper mode	Unsigned Bitfield	1 bit (offset 2)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

entry_req: Device has a pending entry request.

Field	Measurement	Field Type Category	Field Size
entry_req	Entry request pending	Unsigned Bitfield	1 bit (offset 3)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

exit_req: Device has a pending exit request.

Field	Measurement	Field Type Category	Field Size
exit_req	Exit request pending	Unsigned Bitfield	1 bit (offset 4)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

key_req: Device has a pending key request.

Field	Measurement	Field Type Category	Field Size
key_req	Key request pending	Unsigned Bitfield	1 bit (offset 5)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

safety_ext_req: Device has a pending safety-exit request.

Field	Measurement	Field Type Category	Field Size
safety_ext_req	Safety-exit request pending	Unsigned Bitfield	1 bit (offset 6)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

emergency_req: Device has a pending emergency-exit request.

Field	Measurement	Field Type Category	Field Size
emergency_req	Emergency-exit request pending	Unsigned Bitfield	1 bit (offset 7)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

unable_lock: Device is unable to close and/or lock.

Field	Measurement	Field Type Category	Field Size
unable_lock	Unable to lock	Unsigned Bitfield	1 bit (offset 0)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

unable_unlock: Device is unable to open and/or unlock.

Field	Measurement	Field Type Category	Field Size
unable_unlock	Unable to unlock	Unsigned Bitfield	1 bit (offset 1)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

stuck: Device is unable to move.

Field	Measurement	Field Type Category	Field Size
stuck	Device is stuck	Unsigned Bitfield	1 bit (offset 2)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

forced_open: Device has been (or currently is) forced open.

Field	Measurement	Field Type Category	Field Size
forced_open	Forced-open Device	Unsigned Bitfield	1 bit (offset 3)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

forced_close: Device has been (or currently is) forced closed.

Field	Measurement	Field Type Category	Field Size
forced_close	Forced-closed Device	Unsigned Bitfield	1 bit (offset 4)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

opening: Device is currently opening from a closed position.

Field	Measurement	Field Type Category	Field Size
opening	Device is opening	Unsigned Bitfield	1 bit (offset 5)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

closing: Device is currently closing from an open position.

Field	Measurement	Field Type Category	Field Size
closing	Device is closing	Unsigned Bitfield	1 bit (offset 6)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

moving: Device is currently changing position.

Field	Measurement	Field Type Category	Field Size
moving	Device is in motion	Unsigned Bitfield	1 bit (offset 7)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

stopped: The device is stopped and can be moved manually.

Field	Measurement	Field Type Category	Field Size
stopped	Device Stopped	Unsigned Bitfield	1 bit (offset 0)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

safety_alarm: Device is in a safety-alarm state.

Field	Measurement	Field Type Category	Field Size
safety_alarm	Safety-alarm	Unsigned Bitfield	1 bit (offset 1)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

unknown_state: The state of the device is currently unknown.

Field	Measurement	Field Type Category	Field Size
unknown_state	Unknown state	Unsigned Bitfield	1 bit (offset 2)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

cmd_fb: Feedback of requested-operation-mode of device.

Field	Measurement	Field Type Category	Field Size
cmd_fb	Command feedback	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
ent_opmode_cmd_t	1	N/A	EM_NUL
Raw Range	Scale Factors	File Name	Default Value
ent_opmode_cmd_t	N/A	SNVT_ENO.H	N/A

SNVT_enthalpy (153)

Enthalpy (quantity of heat per unit mass)

A SNVT_enthalpy network variable may be used to communicate enthalpy values in air conditioning and other process applications.

SNVT Index	Measurement	Type Category	Type Size
153	Enthalpy	Signed Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-327.68 .. 327.66	0.01	KiloJoules per Kilogram (kJ/kg)	32,767 (0x7FFF)
Raw Range	Scale Factors	File Name	Default Value
-32,768 .. 32,766 (0x8000 .. 0x7FFF)	1, -2, 0 $S = a * 10^{b * (R+c)}$	N/A	N/A

Example

The enthalpy of the outdoor air is transmitted by an enthalpy sensor as 54.86 kJ/kg. An air-handling unit with an economizer controller transmits the difference in enthalpy between indoor and outdoor air as -16.72 kJ/kg.

SNVT_evap_state (118)

Evaporation State

SNVT Index	Measurement	Type Category	Type Size
118	evap_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
evap_t	1	N/A	EVAP_NUL
Raw Range	Scale Factors	File Name	Default Value
evap_t	N/A	SNVT_EVP.H	N/A

SNVT_ex_control (157)

Control

This SNVT contains a definition of what device has exclusive control of an item.

Each time this SNVT is used, the documentation must specify to what item the exclusive control applies. Any functional block using this SNVT should provide a timeout or other means to prevent lockout of the item.

If the value of control_status is unknown or not applicable, it will have the value EX_CONTROL_NUL. If control_status is not EX_CONTROL_THIS_ADDR then control_device_addr does not contain valid data.

SNVT Index	Measurement	Type Category	Type Size
157	Control	Structure	10 bytes

```
typedef struct {
    ex_control_t control_status;
    struct {
        unsigned short domain_id[6];
        unsigned short domain_id_length;
        unsigned short subnet;
        unsigned short node;
    } control_device_addr;
} SNVT_ex_control;
```

control_status:

Field	Measurement	Field Type Category	Field Size
Control_status	ex_control_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
ex_control_t	1	N/A	EX_CONTROL_NUL
Raw Range	Scale Factors	File Name	Default Value
ex_control_t	N/A	SNVT_EXC.H	N/A

control_device_addr.domain_id[6]: LonWorks domain ID

Field	Measurement	Field Type Category	Field Size
control_device_addr. domain_id[6]	Domain ID	Unsigned Short	6 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 256	1	Domain	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 256 (0 .. 0xFF)	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

control_device_addr.domain_length: Valid domain lengths are 0, 1, 3, and 6.

Field	Measurement	Field Type Category	Field Size
control_device_addr. domain_length	Domain length	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 6	1	Domain Length	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 6 (0 .. 0x06)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

control_device_addr.subnet: There can be 255 subnets (1-255) in a domain.

Field	Measurement	Field Type Category	Field Size
control_device_addr. subnet	Subnet	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
1 .. 255	1	Subnet Number	0
Raw Range	Scale Factors	File Name	Default Value
1 .. 255 (1 .. 0xFF)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

control_device_addr.node: There can be 127 nodes (1-127) in a subnet.

Field	Measurement	Field Type Category	Field Size
control_device_addr. node	Node	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
1 .. 127	1	Node Number	0
Raw Range	Scale Factors	File Name	Default Value
1 .. 127 (1 .. 0x7F)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

SNVT_file_pos (90)

File Position

Used to control the position of the read/write pointer in a file used for random access, as well as to specify the length of the next file transfer.

SNVT Index	Measurement	Type Category	Type Size
90	File Position	Structure	6 bytes

```
typedef struct {
    unsigned                rw_ptr[4];
    unsigned long           rw_length;
} SNVT_file_pos;
```

rw_ptr[4]: Read/Write pointer

Field	Measurement	Field Type Category	Field Size
rw_ptr[4]	Read/Write Pointer	Signed Quad	4 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 2,147,483,647	1	File Byte Address	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 2,147,483,647 (0 .. 0x7FFFFFFF)	1, 0, 0 S = a*10 ^b *(R+c)	N/A	N/A

rw_length: Read/Write length in bytes.

Field	Measurement	Field Type Category	Field Size
rw_length	Read/Write Length	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 65,535	1	Number of Bytes	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,535	1, 0, 0 S = a*10 ^b *(R+c)	N/A	N/A

SNVT_file_req (73)

File Request

The sn and gp structures are compatible with the snode_struct and group_struct structures defined in ADDRDEFS.H.

SNVT Index	Measurement	Type Category	Type Size
73	File Request	Structure	12 bytes

```
typedef struct {
    file_request_t      request;
    unsigned long       index;
    unsigned long       receive_timeout;
    union {
        struct {
            unsigned    type;
            // 'type' set to 33 for "address table"
            unsigned long index;
        } addrt;
        struct {
            unsigned    type;
            // 'type' set to 1 for "subnet/node"
            unsigned    domain      : 1;
            unsigned    node       : 7;
            unsigned    : 4;
            unsigned    retry      : 4;
            unsigned    : 4;
            unsigned    tx_timer   : 4;
        };
    };
};
```

```

        unsigned          subnet;
    } sn;
    struct {
        unsigned          type      : 1;
        // 'type' set to 1 for "group"
        unsigned          size      : 7;
        unsigned          domain    : 1;
        unsigned          unused    : 7;
        unsigned          : 4;
        unsigned          retry     : 4;
        unsigned          : 4;
        unsigned          tx_timer  : 4;
        unsigned          group;
    } gp;
} dest_address;
int auth_on;
int prio_on;
} SNVT_file_req;

```

request: Request

Field	Measurement	Field Type Category	Field Size
69	file_request_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
file_request_t	1	N/A	FR_NUL
Raw Range	Scale Factors	File Name	Default Value
file_request_t	N/A	SNVT_CFG.H	N/A

index: Index

Field	Measurement	Type Category	Type Size
index	Index	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 65,535	1	file index	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,535 (0 .. 0xFFFF)	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

receive_timeout: Receive timeout

Field	Measurement	Type Category	Type Size
receive_timeout	Receive Timeout	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 65,535	1	Milliseconds	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,535 (0 .. 0xFFFF)	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

dest_address.addrt.type: If using address-table addressing, the type is 33.

Field	Measurement	Field Type Category	Field Size
dest_address.addrt.type	Address type	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
33 .. 33	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
33 .. 33 (0x21 .. 0x21)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

dest_address.addrt.index: Index into the device's internal address table.

Field	Measurement	Field Type Category	Field Size
dest_address.addrt.index	Index	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 65,535	1	Index	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,535 (0 .. 0xFFFF)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

dest_address.sn.type: If using subnet-node addressing, the type is 1.

Field	Measurement	Field Type Category	Field Size
dest_address.sn.type	Address type	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
1 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1 (0 .. 1)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

dest_address.sn.domain: Domain

Field	Measurement	Type Category	Type Size
dest_address.sn.domain	Domain Index	Unsigned Bitfield	1 bit (offset 0)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	Index	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

dest_address.sn.node: There can be 127 nodes (1-127) in a subnet.

Field	Measurement	Type Category	Type Size
dest_address.sn.node	Node ID	Unsigned Bitfield	7 bits (offset 1)
Valid Type Range	Type Resolution	Units	Invalid Value
1 .. 127	1	Node ID	0
Raw Range	Scale Factors	File Name	Default Value
1 .. 127 (1 .. 0x7F)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

dest_address.sn.retry: Retry count

Field	Measurement	Type Category	Type Size
dest_address.sn.retry	Retry Count	Unsigned Bitfield	4 bits (offset 4)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 15	1	Number of Retries	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 15 (0 .. 0xF)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

dest_address.sn.tx_timer: Transaction timer

Field	Measurement	Type Category	Type Size
dest_address.sn.tx_timer	Transaction Timer	Unsigned Bitfield	4 bits (offset 4)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 15	1	Time Code	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 15 (0 .. 0xF)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

dest_address.sn.subnet: There can be 255 subnets (1-255) in a domain.

Field	Measurement	Field Type Category	Field Size
dest_address.sn.subnet	Subnet	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
1 .. 255	1	Subnet Number	0
Raw Range	Scale Factors	File Name	Default Value
1 .. 255 (1 .. 0xFF)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

dest_address_gp.type: If using group addressing, the type is 1.

Field	Measurement	Type Category	Type Size
dest_address_gp.type	Address Type Flag	Unsigned Bitfield	1 bit (offset 0)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

dest_address_gp.size: An acknowledged group can have from 0-64 addressees, plus the sender.

Field	Measurement	Type Category	Type Size
dest_address_gp.size	Group Size	Unsigned Bitfield	7 bit (offset 1)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 65	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 65 (0 .. 0x41)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

dest_address_gp.domain: Domain

Field	Measurement	Type Category	Type Size
dest_address_gp.domain	Domain Index	Unsigned Bitfield	1 bit (offset 0)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

dest_address_gp.unused: This field is reserved.

Field	Measurement	Type Category	Type Size
dest_address_gp.unused	N/A	Unsigned Bitfield	7 bits (offset 1)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 0	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 0	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

dest_address.gp.retry: Retry count

Field	Measurement	Type Category	Type Size
dest_address.gp.retry	Retry Count	Unsigned Bitfield	4 bits (offset 4)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 15	1	Number of Retries	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 15 (0 .. 0xF)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

dest_address.gp.tx_timer: Transaction timer

Field	Measurement	Type Category	Type Size
dest_address.gp.tx_timer	Transaction Timer	Unsigned Bitfield	4 bits (offset 4)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 15	1	Time Code	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 15 (0 .. 0xF)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

dest_address.gp.group: There can be 256 groups (0-255) in a domain.

Field	Measurement	Field Type Category	Field Size
dest_address.gp.group	Group	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 255	1	Group Number	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 255 (0 .. 0xFF)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

auth_on: This field specifies whether the message requires authentication.

Field	Measurement	Field Type Category	Field Size
auth_on	Authentication on	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	Boolean	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1 (0 .. 1)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

prio_on: This field specifies whether the message is to be sent with priority.

Field	Measurement	Field Type Category	Field Size
prio_on	Priority on	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
0..1	1	Boolean	N/A
Raw Range	Scale Factors	File Name	Default Value
0..1 (0..1)	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

SNVT_file_status (74)

File Status

Part of the LONWORKS File Transfer Protocol.

SNVT Index	Measurement	Type Category	Type Size
74	File Status	Structure	27 bytes

```
typedef struct {
    file_status_t          status;
    unsigned long         number_of_files;
    unsigned long         selected_file;
    union {
        struct {
            char          file_info[16];
            unsigned     size[4];
            unsigned long type;
        } descriptor;
        struct {
            unsigned     domain_id[6];
            unsigned     domain_length;
            unsigned     subnet;
            unsigned     node;
        } address;
    } adr;
} SNVT_file_status;
```

status: Status

Field	Measurement	Field Type Category	Field Size
69	file_status_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
file_status_t	1	N/A	FS_NUL
Raw Range	Scale Factors	File Name	Default Value
file_status_t	N/A	SNVT_FS.H	N/A

number_of_files: Number of files

Field	Measurement	Type Category	Field Size
number_of_files	Number of files	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 65,535	1	Count	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,535 (0 .. 0xFFFF)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

selected_file: Selected file

Field	Measurement	Type Category	Type Size
selected_file	Selected File	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 65,535	1	File Index	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,535 (0 .. 0xFFFF)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

adr.descriptor.file_info[16]: File info

Field	Measurement	Field Type Category	Field Size
adr.descriptor .file_info[16]	File Info	Signed Char	16 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-128 .. 127	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
-128 .. 127 (0x80 .. 0x7F)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

adr.descriptor.size[4]: Size

Field	Measurement	Field Type Category	Field Size
adr.descriptor.size[4]	Size	Signed Quad	4 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 2,147,483,647	1	Bytes	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 2,147,483,647 (0 .. 0xFFFFFFFF)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

adr.descriptor.type: Type

Field	Measurement	Type Category	Type Size in Bits
adr.descriptor.type	Type	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 65,535	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,535 (0 .. 0xFFFF)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

adr.address.domain_id[6]: LONWORKS domain ID

Field	Measurement	Field Type Category	Field Size
adr.address.domain_id[6]	Domain ID	Unsigned Short	6 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 255	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 255 (0 .. 0xFF)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

adr.address.domain_length: Valid domain lengths are 0, 1, 3, and 6.

Field	Measurement	Field Type Category	Field Size
adr.address.domain_length	Domain Length	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 6	1	Domain Length	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 6 (0 .. 0x06)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

adr.address.subnet: There can be 255 subnets (1-255) in a domain.

Field	Measurement	Field Type Category	Field Size
adr.address.subnet	Subnet	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
1 .. 255	1	Subnet Number	0
Raw Range	Scale Factors	File Name	Default Value
1 .. 255 (1 .. 0xFF)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

adr.address.node: There can be 127 nodes (1-127) in a subnet. A node number of zero (0) is for an unconfigured node.

Field	Measurement	Field Type Category	Field Size
adr.address.node	Node	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 127	1	Node Number	0
Raw Range	Scale Factors	File Name	Default Value
0 .. 127 (0 .. 0x7F)	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

SNVT_fire_indcte (133)

Fire Indicator

SNVT Index	Measurement	Type Category	Type Size
133	fire_indicator_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
fire_indicator_t	1	N/A	FN_NUL
Raw Range	Scale Factors	File Name	Default Value
fire_indicator_t	N/A	SNVT_FN.H	N/A

SNVT_fire_init (132)

Fire Initiator

SNVT Index	Measurement	Type Category	Type Size
132	fire_initiator_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
fire_initiator_t	1	N/A	FI_NUL
Raw Range	Scale Factors	File Name	Default Value
fire_initiator_t	N/A	SNVT_FI.H	N/A

SNVT_fire_test (130)

Fire Test Request

SNVT Index	Measurement	Type Category	Type Size
130	fire_test_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
fire_test_t	1	N/A	FT_NUL
Raw Range	Scale Factors	File Name	Default Value
fire_test_t	N/A	SNVT_FT.H	N/A

SNVT_flow (15)

Flow Volume

SNVT Index	Measurement	Type Category	Type Size
15	Flow volume	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 65,534	1	Liters/Second	65,535 (0xFFFF)
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,534 (0 .. 0xFFFFE)	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

SNVT_flow_dir (171)

Flow Direction

Desired state for an entry functional block such as, a door, lock, sluice, or something that controls entry of an area.

SNVT Index	Measurement	Type Category	Type Size
171	flow_direction_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
flow_direction_t	1	N/A	ES_NUL
Raw Range	Scale Factors	File Name	Default Value
flow_direction_t	N/A	SNVT_FD.H	N/A

SNVT_flow_f (53)

Flow Volume

SNVT Index	Measurement	Type Category	Type Size
53	Flow Volume	Floating Point	4 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-3.40282E38 .. 3.40282E38	N/A	Liters/Second	NaN
Raw Range	Scale Factors	File Name	Default Value
IEEE 754	N/A	N/A	N/A

SNVT_flow_mil (16)

Flow Volume

SNVT Index	Measurement	Type Category	Type Size
16	Flow volume	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 65,535	1	Milliliters/Second (ml/s)	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,535 (0 .. 0xFFFF)	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

SNVT_flow_p (161)

Flow Volume

Used for heating, ventilation, and air conditioning applications. The typical flow in this area is 0.01 to 650 m³/h.

SNVT Index	Measurement	Type Category	Type Size
161	Flow Volume	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 655.34	0.01	Cubic Meters per Hour (m ³ /h)	65,535 (0xFFFF)
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,534 (0 .. 0xFFFFE)	1, -2, 0 $S = a \cdot 10^{b \cdot (R+c)}$	N/A	N/A

SNVT_freq_f (75)

Frequency

SNVT Index	Measurement	Type Category	Type Size
75	Frequency	Floating Point	4 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 3.40282E38	N/A	Hertz	NaN
Raw Range	Scale Factors	File Name	Default Value
IEEE 754	N/A	N/A	N/A

SNVT_freq_hz (76)

Frequency

SNVT Index	Measurement	Type Category	Type Size
76	Frequency	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 6553.5	0.1	Hertz	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,535 (0 .. 0xFFFF)	1, -1, 0 $S = a \cdot 10^{b \cdot (R+c)}$	N/A	N/A

SNVT_freq_kilohz (77)

Frequency

SNVT Index	Measurement	Type Category	Type Size
77	Frequency	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 6553.5	0.1	Kilohertz	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,535 (0 .. 0xFFFF)	1, -1, 0 $S = a*10^{b*(R+c)}$	N/A	N/A

SNVT_freq_milhz (78)

Frequency

SNVT Index	Measurement	Type Category	Type Size
78	Frequency	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 6.5535	0.0001	Hertz	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,535 (0 .. 0xFFFF)	1, -4, 0 $S = a*10^{b*(R+c)}$	N/A	N/A

SNVT_gfci_status (154)

GFCI Status Type

Used to communicate the status of the Ground-Fault Circuit-Interrupter (GFCI) device.

SNVT Index	Measurement	Type Category	Type Size
154	gfci_status_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
gfci_status_t	1	N/A	GFCI_NUL
Raw Range	Scale Factors	File Name	Default Value
gfci_status_t	N/A	SNVT_GFL.H	N/A

SNVT_grammage (71)

Grammage

SNVT Index	Measurement	Type Category	Type Size
71	Grammage	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 6553.5	0.1	Grams/Square-meter (gsm, g/m ²)	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,535 (0 .. 0xFFFF)	1, -1, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

SNVT_grammage_f (72)

Grammage

SNVT Index	Measurement	Type Category	Type Size
72	Grammage	Floating Point	4 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 3.40282E38	N/A	Grams/Square-meter (gsm, g/ m ²)	NaN
Raw Range	Scale Factors	File Name	Default Value
IEEE 754	N/A	N/A	N/A

SNVT_hvac_emerg (103)

HVAC Emergency Mode

Used for heating, ventilation, and air-conditioning applications.

SNVT Index	Measurement	Type Category	Type Size
103	emerg_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
emerg_t	1	N/A	EMERG_NUL
Raw Range	Scale Factors	File Name	Default Value
emerg_t	N/A	SNVT_EM.H	N/A

SNVT_hvac_mode (108)

HVAC Mode

Used for heating, ventilation, and air-conditioning applications.

SNVT Index	Measurement	Type Category	Type Size
108	hvac_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
hvac_t	1	N/A	HVAC_NUL
Raw Range	Scale Factors	File Name	Default Value
hvac_t	N/A	SNVT_HV.H	N/A

SNVT_hvac_overid (111)

HVAC Output Override

Used for heating, ventilation, and air-conditioning applications

SNVT Index	Measurement	Type Category	Type Size
111	HVAC Override	Structure	5 bytes

```
typedef struct {  
    hvac_overid_t          state;  
    signed long            percent;  
    unsigned long          flow;  
} SNVT_hvac_overid;
```

state: HVAC override state

Field	Measurement	Field Type Category	Field Size
state	hvac_overid_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
hvac_overid_t	1	N/A	HVO_NUL
Raw Range	Scale Factors	File Name	Default Value
hvac_overid_t	N/A	SNVT_HVO.H	N/A

percent: Position or flow override value

Field	Measurement	Field Type Category	Field Size
percent	Percent	Signed Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-163.840 .. 163.830	0.005	Percent of Full Scale	32,767 (0x7FFF)
Raw Range	Scale Factors	File Name	Default Value
-32,768 .. 32,766 (0x8000 .. 0x7FFE)	5, -3, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

flow: Flow override value

Field	Measurement	Field Type Category	Field Size
flow	Flow	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 65,534	1	Liters per Second	65,535 (0xFFFF)
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,534 (0 .. 0xFFFE)	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

SNVT_hvac_satsts (172)

HVAC Saturation Status

A value of 0 indicates that the resource associated with that field has not saturated or reached an end stop before attaining the required setpoint. A value of 1 indicates that the resource associated with that field has saturated or reached an end stop without attaining the required setpoint.

SNVT Index	Measurement	Type Category	Type Size
172	Entry Status	Structure	5 bytes

```
typedef struct {
    unsigned    pri_heat           : 1; // offset 0
    unsigned    sec_heat           : 1; // offset 1
    unsigned    pri_cool           : 1; // offset 2
    unsigned    sec_cool           : 1; // offset 3
    unsigned    pri_duct_starved   : 1; // offset 4
    unsigned    sec_duct_starved   : 1; // offset 5
    unsigned    reserved           : 2; // offset 6
    unsigned    reserved1         : 4; // offset 0
    unsigned    manufacturer_defined : 4; // offset 4
} SNVT_hvac_satsts;
```

pri_heat: A value of 0 indicates primary heating is not saturated. A value of 1 indicates primary heating is saturated.

Field	Measurement	Field Type Category	Field Size
pri_heat	Primary heating saturation status	Unsigned Bitfield	1 bit (offset 0)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

sec_heat: A value of 0 indicates secondary heating is not saturated. A value of 1 indicates secondary heating is saturated.

Field	Measurement	Field Type Category	Field Size
sec_heat	Secondary heating saturation status	Unsigned Bitfield	1 bit (offset 1)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

pri_cool: A value of 0 indicates primary cooling is not saturated. A value of 1 indicates primary cooling is saturated.

Field	Measurement	Field Type Category	Field Size
pri_cool	Primary cooling saturation status	Unsigned Bitfield	1 bit (offset 2)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

sec_cool: A value of 0 indicates secondary cooling is not saturated. A value of 1 indicates secondary cooling is saturated.

Field	Measurement	Field Type Category	Field Size
sec_cool	Secondary cooling saturation status	Unsigned Bitfield	1 bit (offset 3)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

pri_duct_starved: A value of 0 indicates primary duct is not saturated (starved).
 A value of 1 indicates primary duct is saturated (starved).

Field	Measurement	Field Type Category	Field Size
pri_duct_starved	Primary duct saturation status	Unsigned Bitfield	1 bit (offset 4)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

sec_duct_starved: A value of 0 indicates secondary duct is not saturated (starved). A value of 1 indicates secondary duct is saturated (starved).

Field	Measurement	Field Type Category	Field Size
sec_duct_starved	Secondary duct saturation status	Unsigned Bitfield	1 bit (offset 5)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

manufacturer_defined: This field is available for manufacturer-specific data and must be documented in the manufacturer's documentation.

Field	Measurement	Field Type Category	Field Size
manufacturer_defined		Unsigned Bitfield	4 bits (offset 4)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 15	1	N/A	Manufacturer-defined
Raw Range	Scale Factors	File Name	Default Value
0 .. 15 (0x0 .. 0xF)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

SNVT_hvac_status (112)

HVAC Status

Used for heating, ventilation, and air-conditioning applications.

SNVT Index	Measurement	Type Category	Type Size
112	HVAC Status	Structure	12 bytes

```
typedef struct {
    hvac_t
```

```

signed long          heat_output_primary;
signed long          heat_output_secondary;
signed long          cool_output;
signed long          econ_output;
signed long          fan_output;
unsigned short       in_alarm;
} SNVT_hvac_status;

```

mode: HVAC status mode

Field	Measurement	Field Type Category	Field Size
mode	hvac_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
hvac_t	1	N/A	HV_NUL
Raw Range	Scale Factors	File Name	Default Value
hvac_t	N/A	SNVT_HV.H	N/A

heat_output_primary: Primary heat output

Field	Measurement	Field Type Category	Field Size
heat_output_primary	Primary Heat Output	Signed Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-163.840 .. 163.830	0.005	Percent of Full Scale	32,767 (0x7FFF)
Raw Range	Scale Factors	File Name	Default Value
-32,768 .. 32,766 (0x8000 .. 0x7FFE)	5, -3, 0 $S = a*10^b*(R+c)$	N/A	N/A

heat_output_secondary: Secondary heat output

Field	Measurement	Field Type Category	Field Size
heat_output_secondary	Secondary Heat Output	Signed Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-163.840 .. 163.830	0.005	Percent of Full Scale	32,767 (0x7FFF)
Raw Range	Scale Factors	File Name	Default Value
-32,768 .. 32,766 (0x8000 .. 0x7FFE)	5, -3, 0 $S = a*10^b*(R+c)$	N/A	N/A

cool_output: Cooling output (primary)

Field	Measurement	Field Type Category	Field Size
cool_output	Cooling Output	Signed Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-163.840 .. 163.830	0.005	Percent of Full Scale	32,767 (0x7FFF)
Raw Range	Scale Factors	File Name	Default Value
-32,768 .. 32,766 (0x8000 .. 0x7FFE)	5, -3, 0 $S = a*10^b*(R+c)$	N/A	N/A

econ_output: Economizer output (also used as “cool_output_secondary” in supporting Profiles, such as the SCC-series of Profiles).

Field	Measurement	Field Type Category	Field Size
econ_output	Economizer Output	Signed Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-163.840 .. 163.830	0.005	Percent of Full Scale	32,767 (0x7FFF)
Raw Range	Scale Factors	File Name	Default Value
-32,768 .. 32,766 (0x8000 .. 0x7FFE)	5, -3, 0 $S = a*10^b*(R+c)$	N/A	N/A

fan_output: Fan output

Field	Measurement	Field Type Category	Field Size
fan_output	Fan Output	Signed Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-163.840 .. 163.830	0.005	Percent of Full Scale	32,767 (0x7FFF)
Raw Range	Scale Factors	File Name	Default Value
-32,768 .. 32,766 (0x8000 .. 0x7FFE)	5, -3, 0 $S = a*10^b*(R+c)$	N/A	N/A

in_alarm: Zero (0) means that the unit is not in an alarm state. 255 (0xFF) means that alarming is disabled. All other values (between 1 and 254, inclusive) means that the unit is in the alarm state. The specific numbers (between 1 and 254) are manufacturer-specific as to their meaning, but all represent an alarm state.

Field	Measurement	Field Type Category	Field Size
month	In Alarm State	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 255	1	Alarm Value	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 255 (0x00 .. 0xFF)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

SNVT_hvac_type (145)

HVAC Unit Type

Used to indicate the type of HVAC equipment that is being controlled.

SNVT Index	Measurement	Type Category	Type Size
145	hvac_hvt_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
hvac_hvt_t	1	N/A	HVT_NUL
Raw Range	Scale Factors	File Name	Default Value
hvac_hvt_t	N/A	SNVT_HVT.H	N/A

SNVT_ISO_7811 (80)

This SNVT is obsolete. Use SNVT_magcard instead.

```
typedef struct {  
    unsigned digit1      : 4;  
    unsigned digit2      : 4;  
    .. .. .. ..  
    unsigned digit38     : 4;  
} SNVT_ISO_7811;
```

SNVT_length (17)

Length

SNVT Index	Measurement	Type Category	Type Size
17	Length	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 6553.5	0.1	Meters (m)	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,535 (0 .. 0xFFFF)	1, -1, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

SNVT_length_f (54)

Length

SNVT Index	Measurement	Type Category	Type Size
54	Length	Floating Point	4 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 3.40282E38	N/A	Meters (m)	NaN
Raw Range	Scale Factors	File Name	Default Value
IEEE 754	N/A	N/A	N/A

SNVT_length_kilo (18)

Length

SNVT Index	Measurement	Type Category	Type Size
18	Length	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 6533.5	0.1	Kilometers (km)	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,535 (0 .. 0xFFFF)	1, -1, 0 $S = a \cdot 10^{b \cdot (R+c)}$	N/A	N/A

SNVT_length_micr (19)

Length

SNVT Index	Measurement	Type Category	Type Size
19	Length	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 6533.5	0.1	Micrometers, Microns (μm)	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,535 (0 .. 0xFFFF)	1, -1, 0 $S = a \cdot 10^{b \cdot (R+c)}$	N/A	N/A

SNVT_length_mil (20)

Length

SNVT Index	Measurement	Type Category	Type Size
20	Length	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 6533.5	0.1	Millimeters (mm)	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,535 (0 .. 0xFFFF)	1, -1, 0 $S = a * 10^{b * (R+c)}$	N/A	N/A

SNVT_lev_cont (21)

Continuous Level

SNVT Index	Measurement	Type Category	Type Size
21	Continuous Level	Unsigned Short	1 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 100	0.5	Percent of Full Level	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 200 (0 .. 0xC8)	5, -1, 0 $S = a * 10^{b * (R+c)}$	N/A	N/A

SNVT_lev_cont_f (55)

Continuous Level

SNVT Index	Measurement	Type Category	Type Size
55	Continuous Level	Floating Point	4 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 100	N/A	Percent of Full Scale	NaN
Raw Range	Scale Factors	File Name	Default Value
IEEE 754	N/A	N/A	N/A

SNVT_lev_disc (22)

Discrete level

Obsolete. SNVT_switch should be used for communicating state with discrete devices as well as level with continuous devices.

SNVT Index	Measurement	Type Category	Type Size
22	discrete_levels_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
discrete_levels_t	1	N/A	ST_NUL
Raw Range	Scale Factors	File Name	Default Value
discrete_levels_t	N/A	SNVT_LEV.H	N/A

SNVT_lev_percent (81)

Percent level

SNVT_switch should be used instead of SNVT_lev_percent, with the exception of network variables that are used to communicate a percentage value and that require the additional resolution provided by SNVT_lev_percent.

SNVT_lev_percent may also be used for network variable members of functional profiles that are designed primary for interfacing with network variable members of existing profiles that are defined as SNVT_lev_percent. SNVT_switch be used for communicating state with discrete devices as well as level with continuous devices.

Note: The SNVT_lev_percent type is marked as obsolete in the Version 11.00 standard resource file set. This will be changed in the next update to the standard resource file set.

SNVT Index	Measurement	Type Category	Type Size
81	Percentage Level	Signed Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-163.840 .. 163.830	0.005	Percent of Full Scale, or Parts-per-Million (ppm)	32,767 (0x7FFF)
Raw Range	Scale Factors	File Name	Default Value
-32,768 .. 32,766 (0x8000 .. 0x7FFE)	5, -3, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

SNVT_lux (79)

Illumination (luminous-flux intensity)

1 lux = 1 lumen/m²

As a comparison: 1 foot-candle = 1 lumen/ft². 1 foot-candle = 10.76 lux.

SNVT Index	Measurement	Type Category	Type Size
79	Illumination	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 65,335	1	Lux	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,535 (0 .. 0xFFFF)	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

SNVT_magcard (86)

Magnetic Card Data

This data item contains data according to the ISO 7811 standard for card stripes. A card reader conforming to ISO 7811 will read standard financial transaction cards (credit cards and ATM cards). ISO 7811 is similar to the credit-card account numbering system given in ANSI Standard X4.13-1971. This data type is compatible with the “magcard” I/O model in Neuron C. SNVT_magcard is NOT compatible with ISO 3554 (the “magtrack1” I/O model in Neuron C). See the *Neuron C Reference Guide* for more details.

The start-sentinel (0xB) is always present in digit1. The “value not available” for SNVT_magcard is defined as a start-sentinel in digit1, and an end-sentinel (0xF) in digit2. Parity fields are not included in the structure, and are not part of the 4-bit digits.

The longitudinal-redundancy check (LRC) character is not required, and therefore characters after the end-sentinel character should be ignored by a receiving device. For a sending device, digit40 should always contain 0x0, as it would only contain an LRC character anyway, and is stored as 0x0 in a Neuron Chip-based device.

SNVT Index	Measurement	Type Category	Type Size
86	Magnetic Cards	Structure	20 bytes

```
typedef struct {
    unsigned digit1    : 4;
    unsigned digit2    : 4;
    .. .. .. ..
    unsigned digit40   : 4;
} SNVT_magcard;
```


digit1: Must contain the Start-Sentinel character

Field	Measurement	Type Category	Type Size
digit1	Start Sentinel	Unsigned Bitfield	4 bits (offset 0)
Valid Type Range	Type Resolution	Units	Invalid Value
11 .. 11	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
11 .. 11 (0xB .. 0xB)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

digit2: Optionally contains a “value not available” indicator for the entire SNVT_magcard network variable instance if the value is 0xF.

Field	Measurement	Type Category	Type Size
digit2	N/A	Unsigned Bitfield	4 bits (offset 4)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 14	1	N/A	15 (0xF)
Raw Range	Scale Factors	File Name	Default Value
0 .. 14 (0 .. 0xE)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

digit3 through digit38: Digit 3 through digit 38

Field	Measurement	Type Category	Type Size
digit3 through digit38	N/A	Unsigned Bitfield	4 bits (offsets 0 and 4)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 15	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 15 (0 .. 0xF)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

digit39: Only the end-sentinel is significant for digit39.

Field	Measurement	Type Category	Type Size
digit39	End Sentinel	Unsigned Bitfield	4 bits (offset 0)
Valid Type Range	Type Resolution	Units	Invalid Value
15 .. 15	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
15 .. 15 (0xF .. 0xF)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

digit40: Digit 40 is not used.

Field	Measurement	Type Category	Type Size
digit40	N/A	Unsigned Bitfield	4 bits (offset 4)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 0	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 0	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

SNVT_mass (23)

Mass

SNVT Index	Measurement	Type Category	Type Size
23	Mass	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 6553.5	0.1	Grams	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,535 (0 .. 0xFFFF)	1, -1, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

SNVT_mass_f (56)

Mass

SNVT Index	Measurement	Type Category	Type Size
56	Mass	Floating Point	4 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 3.40282E38	N/A	Grams	NaN
Raw Range	Scale Factors	File Name	Default Value
IEEE 754	N/A	N/A	N/A

SNVT_mass_kilo (24)

Mass

SNVT Index	Measurement	Type Category	Type Size
24	Mass	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 6553.5	0.1	Kilograms (kg)	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,535 (0 .. 0xFFFF)	1, -1, 0 $S = a \cdot 10^{b \cdot (R+c)}$	N/A	N/A

SNVT_mass_mega (25)

Mass

SNVT Index	Measurement	Type Category	Type Size
25	Mass	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 6553.5	0.1	Metric Tons; Tonne	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,535 (0 .. 0xFFFF)	1, -1, 0 $S = a \cdot 10^{b \cdot (R+c)}$	N/A	N/A

SNVT_mass_mil (26)

Mass

SNVT Index	Measurement	Type Category	Type Size
26	Mass	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 6553.5	0.1	Milligrams (mg)	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,535 (0 .. 0xFFFF)	1, -1, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

SNVT_motor_state (155)

Motor State

Defines the state of a mechanical motor; whether pump, fan, or other. A network variable using this SNVT does not explicitly define whether the motor's drive is enabled, or whether any brake (decelerator) is actively slowing the motor.

SNVT Index	Measurement	Type Category	Type Size
155	motor_state_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
motor_state_t	1	N/A	MOTOR_NUL
Raw Range	Scale Factors	File Name	Default Value
motor_state_t	N/A	SNVT_MOT.H	N/A

SNVT_muldiv (91)

Multiply/Divide

May be used as a gain factor for fixed-point sensor objects. It is compatible with the Neuron C `muldiv()` function, which provides a 16 x 16 unsigned multiplication with a 32-bit intermediate result, followed by a 32/16 unsigned division with a 16-bit end result. For more details, see the *Neuron C Reference Guide*.

SNVT Index	Measurement	Type Category	Type Size
91	Gain	Structure	4 bytes

```
typedef struct {
```

```

    unsigned long      multiplier;
    unsigned long      divisor;
} SNVT_muldiv;

```

multiplier: Multiplier

Field	Measurement	Field Type Category	Field Size
multiplier	Multiplier	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 65,535	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,535 (0 .. 0xFFFF)	1, 0, 0 $S = a \cdot 10^{b \cdot (R+c)}$	N/A	N/A

divisor: Divisor

Field	Measurement	Field Type Category	Field Size
divisor	Divisor	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
1 .. 65,535	1	N/A	0
Raw Range	Scale Factors	File Name	Default Value
1 .. 65,535 (1 .. 0xFFFF)	1, 0, 0 $S = a \cdot 10^{b \cdot (R+c)}$	N/A	N/A

SNVT_multiplier (82)

Multiplier

SNVT Index	Measurement	Type Category	Type Size
82	Multiplier	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 32.7675	0.0005	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,535	5, -4, 0 $S = a \cdot 10^{b \cdot (R+c)}$	N/A	N/A

SNVT_nv_type (166)

Network Variable Type

This SNVT specifies the type of a network variable. A SNVT_nv_type network variable can be used to create a configuration network variable that specifies the

type of a second network variable. The configuration network variable must be declared as a SCPTnvType configuration property. A SCPTnvType configuration property may also be declared within a configuration file, not using the SNVT_nv_type type. See the SCPTnvType description for further details on using this SCPT.

SNVT Index	Measurement	Type Category	Type Size
166	Network variable type	Structure	19 bytes

```
typedef struct {
    unsigned short    type_program_ID[8];
    unsigned short    type_scope;
    unsigned long     type_index;
    nv_type_category_t type_category;
    unsigned short    type_length;
    signed long       scaling_factor_a;
    signed long       scaling_factor_b;
    signed long       scaling_factor_c;
} SNVT_nv_type;
```

type_program_ID[8]: The program ID template of the resource file that defines the specified type.

Field	Measurement	Type Category	Type Size in Bytes
type_program_ID[8]	Program ID	Unsigned Short Array	8 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
Any valid program ID template.	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
Any valid program ID template.	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	0

type_scope: The scope of the resource file that defines the specified type. The scope may be any of the following values:

- 0** – Standard – applies to all devices.
- 1** – Reserved for future use.
- 2** – Reserved for future use.
- 3** – Manufacturer – applies to all devices from the manufacturer specified in the program ID template.
- 4** – Manufacturer and Device Class – applies to all devices from the manufacturer with the device class specified in the program ID template.
- 5** – Manufacturer, Device Class, and Device Subclass – applies to all devices from the manufacturer with the device class and device subclass specified in the program ID template.
- 6** – Manufacturer, Device Class, Device Subclass, and Device Model – applies to all devices of the specified type and manufacturer specified in the program ID template.

Field	Measurement	Type Category	Type Size in Bytes
type_scope	Scope	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 6	1	Scope	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 6	1, 0, 0 $S = a*10^b*(R+c)$	N/A	0

type_index: The index within the specified resource file of the network variable type definition.

Field	Measurement	Type Category	Type Size in Bytes
type_index	Type Index	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
1 .. 65,535	1	N/A	0
Raw Range	Scale Factors	File Name	Default Value
1 .. 65,535 (1 .. 0xFFFF)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	0

type_category: The type category of the specified network variable type, as defined by the nv_type_category_t enumeration type.

Field	Measurement	Type Category	Type Size in Bytes
type_category	nv_type_category_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
nv_type_category_t	1	N/A	NVT_CAT_NUL
Raw Range	Scale Factors	File Name	Default Value
nv_type_category_t	N/A	snvt_nvt.h	NVT_CAT_NUL

type_length: The length of the specified network variable type.

Field	Measurement	Type Category	Type Size in Bytes
type_length	Type Length	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
1 .. 31	1	Bytes	0
Raw Range	Scale Factors	File Name	Default Value
1 .. 31 (1 .. 0x1F)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	0

scaling_factor_a: Scaling multiplier a for the specified network variable type, where $ScaledValue = a*10^b*(RawValue+c)$.

Field	Measurement	Type Category	Type Size in Bytes
scaling_factor_a	Scaling Multiplier	Signed Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-32,768 .. 32,766	1	N/A	32,767 (0x7FFF)
Raw Range	Scale Factors	File Name	Default Value
-32,768 .. 32,766 (0x8000 .. 0x7FFE)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	1

scaling_factor_b: Scaling exponent b for the specified network variable type, where ScaledValue = $a*10^b*(RawValue+c)$.

Field	Measurement	Type Category	Type Size in Bytes
scaling_factor_b	Scaling Exponent	Signed Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-32,768 .. 32,766	1	N/A	32,767 (0x7FFF)
Raw Range	Scale Factors	File Name	Default Value
-32,768 .. 32,766 (0x8000 .. 0x7FFE)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	0

scaling_factor_c: Scaling offset b for the specified network variable type, where ScaledValue = $a*10^b*(RawValue+c)$.

Field	Measurement	Type Category	Type Size in Bytes
scaling_factor_b	Scaling Offset	Signed Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-32,768 .. 32,766	1	N/A	32,767 (0x7FFF)
Raw Range	Scale Factors	File Name	Default Value
-32,768 .. 32,766 (0x8000 .. 0x7FFE)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	0

SNVT_obj_request (92)

Object Request

Allows a functional block to be placed in one of several functional modes. For more details, see the definition of the Node Object (SFPTnodeObject) functional profile.

Additions not found in version 3.2 or earlier:

The RQ_CLEAR_RESET request clears the reset_complete flag in SNVT_obj_status (nvoStatus in the Node Object) of the corresponding Object (object_id). Further requests have no effect, until the next Reset sequence has again been executed.

The RQ_RESET request initiates the Reset sequence in SNVT_obj_status (nvoStatus in the Node Object) of the corresponding object (object_id) every time that it is sent. The reset_complete flag (SNVT_obj_status) is set when the Reset sequence is complete, and the flag must be cleared by RQ_CLEAR_RESET (SNVT_obj_request).

The existing RQ_CLEAR_STATUS and RQ_CLEAR_ALARM functions (SNVT_obj_request) remain unchanged.

SNVT Index	Measurement	Type Category	Type Size
92	Object Request	Structure	3 bytes

```
typedef struct {
    unsigned long      object_id;
    object_request_t  object_request;
} SNVT_obj_request;
```

object_id: Object ID

Field	Measurement	Field Type Category	Field Size
object_id	Object ID	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 65,535	1	object index	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,535 (0 .. 0xFFFF)	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

object_request: ID of object within node

Field	Measurement	Field Type Category	Field Size
object_request	object_request_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
object_request_t	1	N/A	RQ_NUL
Raw Range	Scale Factors	File Name	Default Value
object_request_t	N/A	SNVT_RQ.H	N/A

SNVT_obj_status (93)

Object Status

Used to indicate the status of the various objects within a node. For more details, see the definition of the Node Object (SFPTnodeObject) in the Application Layer Interoperability Guidelines.

Addition not found in Guidelines version 3.2 or earlier:

The reset_complete field, indicates the execution of the Reset sequence of any object (object_id) within the device. After a Reset sequence, the reset_complete

flag goes to TRUE (1) and it remains '1' until it is cleared (acknowledged) via SNVT_obj_request (nviRequest in the Node Object) on in the corresponding Object (object_id).

(The additional reset flag uses reserved1 of the previous SNVT_obj_status structure definition.)

SNVT Index	Measurement	Type Category	Type Size
93	Object Status	Structure	6 bytes

```
typedef struct {
    unsigned long    object_id;
    unsigned         invalid_id           :1;
    unsigned         invalid_request      :1;
    unsigned         disabled             :1;
    unsigned         out_of_limits        :1;
    unsigned         open_circuit         :1;
    unsigned         out_of_service       :1;
    unsigned         mechanical_fault     :1;
    unsigned         feedback_failure     :1;
    unsigned         over_range           :1;
    unsigned         under_range          :1;
    unsigned         electrical_fault     :1;
    unsigned         unable_to_measure    :1;
    unsigned         comm_failure         :1;
    unsigned         fail_self_test       :1;
    unsigned         self_test_in_progress :1;
    unsigned         locked_out           :1;
    unsigned         manual_control       :1;
    unsigned         in_alarm             :1;
    unsigned         in_override          :1;
    unsigned         report_mask          :1;
    unsigned         programming_mode     :1;
    unsigned         programming_fail     :1;
    unsigned         alarm_notify_disabled :1;
    unsigned         reset_complete       :1;
    unsigned         reserved2           :8;
} SNVT_obj_status;
```

object_id: ID of functional block within device.

Field	Measurement	Field Type Category	Field Size
object_id	Functional Block ID	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 65,535	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,535 (0 .. 0xFFFF)	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

invalid_id: 1 means requested ID is not implemented in this device.

Field	Measurement	Type Category	Type Size
invalid_id	boolean_t	Unsigned Bitfield	1 bit (offset 0)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

invalid_request: 1 means requested ID is not implemented in this device.

Field	Measurement	Type Category	Type Size
invalid_request	boolean_t	Unsigned Bitfield	1 bit (offset 1)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

disabled: 1 means object disabled.

Field	Measurement	Type Category	Type Size
disabled	boolean_t	Unsigned Bitfield	1 bit (offset 2)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

out_of_limits: 1 means functional block exceeded alarm limits.

Field	Measurement	Type Category	Type Size
out_of_limits	boolean_t	Unsigned Bitfield	1 bit (offset 3)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

open_circuit: 1 means open-circuit detected.

Field	Measurement	Type Category	Type Size
open_circuit	boolean_t	Unsigned Bitfield	1 bit (offset 4)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

out_of_service: 1 means functional block is not functional.

Field	Measurement	Type Category	Type Size
out_of_service	boolean_t	Unsigned Bitfield	1 bit (offset 5)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

mechanical_fault: 1 means mechanical-fault detected.

Field	Measurement	Type Category	Type Size
mechanical_fault	boolean_t	Unsigned Bitfield	1 bit (offset 6)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

feedback_failure: 1 means feedback-signal not received.

Field	Measurement	Type Category	Type Size
feedback_failure	boolean_t	Unsigned Bitfield	1 bit (offset 7)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

over_range: 1 means maximum-range exceeded.

Field	Measurement	Type Category	Type Size
over_range	boolean_t	Unsigned Bitfield	1 bit (offset 0)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

under-range: 1 means minimum-range exceeded.

Field	Measurement	Type Category	Type Size
under_range	boolean_t	Unsigned Bitfield	1 bit (offset 1)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

electrical_fault: 1 means electrical-fault detected.

Field	Measurement	Type Category	Type Size
electrical_fault	boolean_t	Unsigned Bitfield	1 bit (offset 2)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

unable_to_measure: 1 means I/O-line failure.

Field	Measurement	Type Category	Type Size
unable_to_measure	boolean_t	Unsigned Bitfield	1 bit (offset 3)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

comm_failure: 1 means network-communications failure.

Field	Measurement	Type Category	Type Size
comm_failure	boolean_t	Unsigned Bitfield	1 bit (offset 4)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

fail_self_test: 1 means self-test failed.

Field	Measurement	Type Category	Type Size
fail_self_test	boolean_t	Unsigned Bitfield	1 bit (offset 5)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

self_test_in_progress: 1 means self-test in progress.

Field	Measurement	Type Category	Type Size
self_test_in_progress	boolean_t	Unsigned Bitfield	1 bit (offset 6)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

locked_out: 1 means device is online, but actuator movement is prevented.

Field	Measurement	Type Category	Type Size
locked_out	boolean_t	Unsigned Bitfield	1 bit (offset 7)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

manual_control: 1 means actuator is under local control.

Field	Measurement	Type Category	Type Size
manual_control	boolean_t	Unsigned Bitfield	1 bit (offset 0)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

in_alarm: 1 means functional block is in alarm.

Field	Measurement	Type Category	Type Size
in_alarm	boolean_t	Unsigned Bitfield	1 bit (offset 1)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

in_override: 1 means functional block is overridden.

Field	Measurement	Type Category	Type Size
in_override	boolean_t	Unsigned Bitfield	1 bit (offset 2)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

report_mask: 1 means 'status' is an event mask.

Field	Measurement	Type Category	Type Size
report_mask	boolean_t	Unsigned Bitfield	1 bit (offset 3)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

programming_mode: 1 means functional block is in programming mode.

Field	Measurement	Type Category	Type Size
programming_mode	boolean_t	Unsigned Bitfield	1 bit (offset 4)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

programming_fail: 1 means functional block-programming has failed.

Field	Measurement	Type Category	Type Size
programming_fail	boolean_t	Unsigned Bitfield	1 bit (offset 5)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

alarm_notify_disabled: 1 means functional block-alarm is disabled.

Field	Measurement	Type Category	Type Size
alarm_notify_disabled	boolean_t	Unsigned Bitfield	1 bit (offset 6)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

object_id: 1 means that the corresponding functional block has finished executing its Reset sequence, but has not yet been acknowledged as completing the Reset (by receiving RQ_CLEAR_RESET).

Field	Measurement	Type Category	Type Size
object_id	boolean_t	Unsigned Bitfield	1 bit (offset 7)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

reserved2: This field is reserved.

Field	Measurement	Type Category	Type Size
reserved2	N/A	Unsigned Bitfield	8 bits (offset 0)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 0	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 0	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

SNVT_occupancy (109)

Occupancy

SNVT Index	Measurement	Type Category	Type Size
109	occup_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
occup_t	1	N/A	OC_NUL
Raw Range	Scale Factors	File Name	Default Value
occup_t	N/A	SNVT_OC.H	N/A

SNVT_override (97)

Override Code

SNVT Index	Measurement	Type Category	Type Size
97	override_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
override_t	1	N/A	OV_NUL
Raw Range	Scale Factors	File Name	Default Value
override_t	N/A	SNVT_OV.H	N/A

SNVT_ph (125)

Acidity

Ratio of concentration of ions.

SNVT Index	Measurement	Type Category	Type Size
125	Acidity	Signed Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-32.768 .. 32.767	0.001	pH	N/A
Raw Range	Scale Factors	File Name	Default Value
-32,768 .. 32,766 (0x8000 .. 0x7FFE)	1, -3, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

SNVT_ph_f (126)

Acidity

Ratio of concentration of ions.

SNVT Index	Measurement	Type Category	Type Size
126	Acidity	Floating Point	4 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-3.40282E38 .. 3.40282E38	N/A	pH	NaN
Raw Range	Scale Factors	File Name	Default Value
IEEE 754	N/A	N/A	N/A

SNVT_pos_ctrl (152)

Position control

Used for the programmable-position camera-command interface.

The command interface consists of three different command functions:

- Programmable camera-position presets/prepositions (CMF_REL),
- Programmable tables of preposition tours (CMF_TOUR), and
- Absolute positions for pan and tilt, in degrees (CMF_ABS).

The three command functions each have a set of actions, and arguments.

The programmable table of prepositions, a *preposition tour table*, can be called by number. A network tool configures the preposition tour table. The programmable prepositions are used by:

- Saving a preposition by number (CMA_SAV), and
- Recalling (going to) a previously saved preposition by number (CMA_CALL).

The absolute position can be:

- Read for the current position (CMA_READ), or
- Invoked (set) by using the ‘write’ command.

Each command input may have a response output, giving the status of the command.

If any illegal command function has been used, the response status is CMF_NUL (cam_func_t).

If any legal command function has been used, with an illegal action, the response status is CMA_NUL (cam_action_t).

The SNVT_pos_ctrl may be used also in a control-arbitration scenario. The receiver_id is used to refer to one particular device in a group of equal, controllable devices.

The controller_id is used to identify the requesting device from a group of equal, controlling devices. The controller_prio is used for the control arbitration in the controllable device. Standard control devices (e.g., keyboards) in normal control mode must have the priority assigned in the range 1 to 50. The range 51 to 200 is used in alarm control mode. The priority value zero (0) is used to release control.

SNVT Index	Measurement	Type Category	Type Size
152	Position control	Structure	13 bytes

```
typedef struct{
    unsigned long          receiver_id;
    unsigned long          controller_id;
    unsigned short         controller_prio;
    cam_func_t             function;
    cam_act_t              action;
    union{
        unsigned short number;
        struct{
            signed long    pan;
            signed long    tilt;
            signed long    zoom;
        } abspos;
        } value;
} SNVT_pos_ctrl;
```

receiver_id: Logical ID for receiver of this command.

Field	Measurement	Field Type Category	Field Size
receiver_id	Receiver ID	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
1 .. 65,535	1	ID Number	0
Raw Range	Scale Factors	File Name	Default Value
1 .. 65,535 (1 .. 0xFFFF)	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

controller_id: Logical ID for the controller sending this command.

Field	Measurement	Field Type Category	Field Size
controller_id	Controller ID	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
1 .. 65,534	1	ID Number	N/A
Raw Range	Scale Factors	File Name	Default Value
1 .. 65,534 (1 .. 0xFFFFE)	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

controller_prio: 1-200 request priority range. Release = 0.

Field	Measurement	Field Type Category	Field Size
controller_prio	Controller Priority	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
0; 1 .. 50; 51 .. 200	1	Priority Value	N/A
Raw Range	Scale Factors	File Name	Default Value
0; 1 .. 50; 51 .. 200 (0, 1 .. 0x32, 0x33 .. 0xC8)	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

function: Function to be performed.

Field	Measurement	Field Type Category	Field Size
function	cam_func_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
cam_func_t	1	N/A	CMF_NUL
Raw Range	Scale Factors	File Name	Default Value
cam_func_t	N/A	SNVT_CMF.H	N/A

action: Action to be preformed.

Field	Measurement	Field Type Category	Field Size
action	cam_act_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
cam_act_t	1	N/A	CMA_NUL
Raw Range	Scale Factors	File Name	Default Value
cam_act_t	N/A	SNVT_CMA.H	N/A

value.number: Preposition number to be used in the action.

Field	Measurement	Field Type Category	Field Size
value.number	Action Number	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
1 .. 255	1	Action Number	0
Raw Range	Scale Factors	File Name	Default Value
1 .. 255 (1 .. 0xFF)	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

value.abspos.pan: Absolute pan position to be saved or retrieved.

Field	Measurement	Field Type Category	Field Size
value.abspos.pan	Pan Position	Signed Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-359.98 .. 360.00	0.02	Degrees	32,767 (0x7FFF)
Raw Range	Scale Factors	File Name	Default Value
-17,999 .. 18,000 (0xB9B1 .. 0x4650)	2, -2, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

value.abspos.tilt: Absolute tilt position to be saved or retrieved.

Field	Measurement	Field Type Category	Field Size
tilt	Tilt Position	Signed Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-359.98 .. 360.00	0.02	Degrees	32,767 (0x7FFF)
Raw Range	Scale Factors	File Name	Default Value
-17,999 .. 18,000 (0xB9B1 .. 0x4650)	2, -2, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

value.abspos.zoom: Absolute zoom position to be saved or retrieved.

Field	Measurement	Field Type Category	Field Size
value.abspos.zoom	Zoom Position	Signed Long	2 bits
Valid Type Range	Type Resolution	Units	Invalid Value
-163.840 .. 163.830	0.005	Percent of Full Scale, or Parts-per-Million (ppm)	32,767 (0x7FFF)
Raw Range	Scale Factors	File Name	Default Value
-32,768 .. 32,766 (0x8000 .. 0x7FFE)	5, -3, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

Example 1, call of a preposition

```
nvoPositionCtrl.controller_id    = 2
nvoPositionCtrl.controller_prio  = 20
nvoPositionCtrl.receiver_id     = 1
nvoPositionCtrl.action          = CMA_CALL
nvoPositionCtrl.function        = CMF_REL
nvoPositionCtrl.value.number    = 4
Physical value                   controller #2,
having priority 20,
requests camera telemetry receiver #1,
to go to (recall),
a relative position,
preposition #4.
```

Example 2, call of a preposition tour table

```
nvoPositionCtrl.controller_id    = 2
nvoPositionCtrl.controller_prio  = 20
nvoPositionCtrl.receiver_id     = 1
nvoPositionCtrl.action          = CMA_CALL
nvoPositionCtrl.function        = CMF_TOUR
nvoPositionCtrl.value.number    = 2
Physical value                   controller #2,
having priority 20,
requests camera telemetry receiver #1,
to start (recall) a preposition tour,
preposition tour #2.
```

Example 3, read current position as absolute values

```
nvoPositionCtrl.controller_id    = 2
nvoPositionCtrl.controller_prio  = 20
nvoPositionCtrl.receiver_id     = 1
nvoPositionCtrl.action          = CMA_READ
nvoPositionCtrl.function        = CMF_ABS
Physical value                   controller #2,
having priority 20,
requests camera telemetry receiver #1,
to retrieve (read),
absolute positions of pan, tilt, and zoom.
```

Example 4, call of a position as absolute values

```

nvoPositionCtrl.controller_id    = 2
nvoPositionCtrl.controller_prio  = 20
nvoPositionCtrl.receiver_id     = 1
nvoPositionCtrl.action          = CMA_CALL
nvoPositionCtrl.function        = CMF_ABS
nvoPositionCtrl.value.abspos.pan =
nvoPositionCtrl.value.abspos.tilt =
nvoPositionCtrl.value.abspos.zoom =
Physical value      controller #2,
having priority 20,
requests camera telemetry receiver #1,
to go to an absolute position,
defined by values of pan, tilt, and zoom.

```

SNVT_power (27)*Power*

SNVT Index	Measurement	Type Category	Type Size
27	Power	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 6553.5	0.1	Watts (W)	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,535 (0 .. 0xFFFF)	1, -1, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

SNVT_power_f (57)*Power*

SNVT Index	Measurement	Type Category	Type Size
57	Power	Floating Point	4 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-3.40282E38 .. 3.40282E38	N/A	Watts (W)	NaN
Raw Range	Scale Factors	File Name	Default Value
IEEE 754	N/A	N/A	N/A

SNVT_power_kilo (28)

Power

SNVT Index	Measurement	Type Category	Type Size
28	Power	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 6553.5	0.1	kiloWatts	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,535 (0 .. 0xFFFF)	1, -1, 0 $S = a*10^b*(R+c)$	N/A	N/A

SNVT_ppm (29)

Concentration

SNVT Index	Measurement	Type Category	Type Size
29	Concentration	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 65,535	1	Parts per Million (ppm)	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,535 (0 .. 0xFFFF)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

SNVT_ppm_f (58)

Concentration

SNVT Index	Measurement	Type Category	Type Size
58	Concentration	Floating Point	4 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 3.40282E38	N/A	Parts per Million (ppm)	NaN
Raw Range	Scale Factors	File Name	Default Value
IEEE 754	N/A	N/A	N/A

SNVT_preset (94)

Preset

Network variables of SNVT_preset type are used to allow a sensor or actuator functional block to control and adopt one of several programmable values and ramp rates, in addition to the normal control mode. For a usage example, see the definition for the Closed Loop Sensor (SFPTclosedLoopSensor).

To program a preset, the SNVT_preset output is transmitted from a sensor with updated values for SNVT_preset.value, SNVT_preset.selector, and the time-related fields. In addition, SNVT_preset.learn is set to LN_LEARN_VALUE — or alternatively set to LN_LEARN_CURRENT, which causes the receiving actuator to learn whatever its current value is. A pre-programmed preset can be selected by transmitting the SNVT_preset output with the relevant preset number set in SNVT_preset.selector, and with SNVT_preset.learn set to LN_RECALL.

The time-related fields specify the time period over which the actuator should progress from the current level to the newly selected preset level. A benefit of this mechanism is that any set of actuators that are preset with a common rate value for a particular preset number, will all arrive at this new value at the same time, regardless of the individual preset values to which they ramp.

SNVT Index	Measurement	Type Category	Type Size
94	Preset	Structure	14 bytes

```
typedef struct {
    learn_mode_t          learn;
    unsigned long         selector;
    unsigned              value[4];
    unsigned long         day;
    unsigned short        hour;
    unsigned short        minute;
    unsigned short        second;
    unsigned long         millisecond;
} SNVT_preset;
```

learn: Preset function code.

Field	Measurement	Field Type Category	Field Size
learn	learn_mode_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
learn_mode_t	1	N/A	LN_NUL
Raw Range	Scale Factors	File Name	Default Value
learn_mode_t	N/A	SNVT_LN.H	N/A

selector: The selector is used to choose which preset.

Field	Measurement	Field Type Category	Field Size
selector	Selector	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 65,535	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,535 (0 .. 0xFFFF)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

value[4]: Value

Field	Measurement	Field Type Category	Field Size
value[4]	Value	Unsigned Short	4 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
Specific to SNVT	1	Specific to SNVT	Specific to SNVT
Raw Range	Scale Factors	File Name	Default Value
0 .. 255 (0 .. 0xFF)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

day: The value 65,535 represents an invalid or unknown elapsed time.

Field	Measurement	Field Type Category	Field Size
day	Days	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 65,534	1	Days	0xFFFF (65,535)
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,534 (0 .. 0xFFFFE)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

hour: This field uses a 24-hour value.

Field	Measurement	Field Type Category	Field Size
hour	Hours	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 23	1	Hour	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 23 (0 .. 0x17)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

minute: Minutes

Field	Measurement	Field Type Category	Field Size
minute	Minutes	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 59	1	Minutes	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 59 (0 .. 0x3B)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

second: Seconds

Field	Measurement	Field Type Category	Field Size
second	Seconds	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 59	1	Seconds	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 59 (0 .. 0x3B)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

millisecond: Milliseconds

Field	Measurement	Field Type Category	Field Size
millisecond	Milliseconds	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 999	1	Milliseconds	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 999 (0 .. 0xF3E7)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

SNVT_press (30)

Pressure (gauge)

SNVT Index	Measurement	Type Category	Type Size
30	Pressure (gauge)	Signed Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-3276.8 .. 3276.7	0.1	kiloPascals	32,767 (0x7FFF)
Raw Range	Scale Factors	File Name	Default Value
-32,768 .. 32,767 (0x8000 .. 0x7FFF)	1, -1, 0 $S = a*10^b*(R+c)$	N/A	N/A

SNVT_press_f (59)

Pressure (gauge)

SNVT Index	Measurement	Type Category	Type Size
59	Pressure (gauge)	Floating Point	4 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-3.40282E38 .. 3.40282E38	N/A	Pascals	NaN
Raw Range	Scale Factors	File Name	Default Value
IEEE 754	N/A	N/A	N/A

SNVT_press_p (113)

Pressure (gauge)

SNVT Index	Measurement	Type Category	Type Size
113	Pressure (gauge)	Signed Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-32,768 .. 32,766	1	Pascals	32,767 (0x7FFF)
Raw Range	Scale Factors	File Name	Default Value
-32,768 .. 32,766 (0x8000 .. 0x7FFE)	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

SNVT_privacyzone (151)

Privacy Zone

Used to support programmable privacy zones. The command consists of an action type, the number of the privacy zone, and the ID value of the camera telemetry receiver having this privacy zone.

SNVT Index	Measurement	Type Category	Type Size
151	Privacy Zone	Structure	4 bytes

```
typedef struct {  
    privacyzone_t          action;  
    unsigned short         number;  
    unsigned long          camera_id;  
} SNVT_privacyzone;
```

action: Privacy zone action type

Field	Measurement	Field Type Category	Field Size
action	privacyzone_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
privacyzone_t	1	N/A	PZ_NUL
Raw Range	Scale Factors	File Name	Default Value
privacyzone_t	N/A	SNVT_PZ.H	N/A

number: The privacy zone to program, or the privacy zone giving a warning.

Field	Measurement	Field Type Category	Field Size
number	Zone Number	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
1 .. 255	1	Privacy Zone Number	0
Raw Range	Scale Factors	File Name	Default Value
1 .. 255 (1 .. 0xFF)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

camera_id: The camera, from a group of cameras, sending the warning.

Field	Measurement	Field Type Category	Field Size
camera_id	Camera ID	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
1 .. 65,535	1	Camera ID	0
Raw Range	Scale Factors	File Name	Default Value
1 .. 65,535 (1 .. 0xFFFF)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

Example 1, input

nvoPZset.action = PZ_UPPER_LEFT

nvoPZset.number = *(unused)*

Physical value = programming the upper left corner for privacy zone #1

Example 1, output

nvoPZreport.action = PZ_ENTER

nvoPZreport.number = 1

Physical value = the camera is inside privacy zone #1

SNVT_ptz (150)

The pan and tilt speed values, as well as the pan and tilt directions, have to be updated simultaneously, since in most applications, a joystick is used to control camera movements. The movement must be smooth in all directions, for all magnitudes of pan and tilt speed.

The network output variable of this type transmits the speed and direction for pan, tilt, and zoom, in each update, to meet the requirements described above. If the speed is zero, e.g., in case of a network variable of SNVT_ptz from a non-joystick, a default speed will be used. This default speed may optionally be programmable, via a configuration property.

SNVT Index	Measurement	Type Category	Type Size
150	None	Structure	6 bytes

```
typedef struct {
    pan_dir_t      pan_dir;      // Pan direction
    unsigned short pan_speed;    // Pan speed
    tilt_dir_t     tilt_dir;     // Tilt direction
    unsigned short tilt_speed;   // Tilt speed
    zoom_t         zoom;         // Zoom direction
    unsigned short zoom_speed;   // Zoom speed
} SNVT_ptz;
```

pan_dir: Pan Direction

Field	Measurement	Field Type Category	Field Size
pan_dir	pan_dir_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
pan_dir_t	1	N/A	PAN_NUL
Raw Range	Scale Factors	File Name	Default Value
pan_dir_t	N/A	SNVT_PAN.H	N/A

pan_speed: Pan speed

Field	Measurement	Field Type Category	Field Size
pan_speed	Pan Speed	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
0.0 .. 100.0	0.4	Percent of Full Level	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 250 (0 .. 0xFA)	4, -1, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

tilt_dir: Tilt Direction

Field	Measurement	Field Type Category	Field Size
tilt_dir	tilt_dir_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
tilt_dir_t	1	N/A	TLT_NUL
Raw Range	Scale Factors	File Name	Default Value
tilt_dir_t	N/A	SNVT_TLT.H	N/A

tilt_speed: Tilt speed

Field	Measurement	Field Type Category	Field Size
pan_speed	Tilt Speed	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
0.0 .. 100.0	0.4	Percent of Full Level	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 250 (0 .. 0xFA)	4, -1, 0 $S = a * 10^b * (R+c)$	N/A	N/A

zoom: Zoom Direction

Field	Measurement	Field Type Category	Field Size
zoom	zoom_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
zoom_t	1	N/A	ZOOM_NUL
Raw Range	Scale Factors	File Name	Default Value
zoom_t	N/A	SNVT_ZM.H	N/A

zoom_speed: Zoom speed

Field	Measurement	Field Type Category	Field Size
tilt_speed	Zoom Speed	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
0.0 .. 100.0	0.4	Percent of Full Level	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 250 (0 .. 0xFA)	4, -1, 0 $S = a * 10^b * (R+c)$	N/A	N/A

Example

```

pan.direction      = PAN_RIGHT
pan.speed          = 125 (0x7D)
Physical value     = Pan to the right by 50.0%

```

Example

```
tilt.direction      = TILT_UP
tilt.speed          = 63 (0x3F)
Physical value     = Tilt up by 25.2%
```

SNVT_pump_sensor (159)

Pump Sensor

Contains readings from sensors on a mechanical vacuum pump.

SNVT Index	Measurement	Type Category	Type Size
159		Structure	19 bytes

```
typedef struct {
SNVT_freq_hz      rotational_speed;
SNVT_temp         body_temperature;
SNVT_temp         motor_external_temperature;
SNVT_temp         motor_internal_temperature;
boolean_t         motor_overloaded;
boolean_t         oil_level_low;
boolean_t         phase_imbalance_detected;
SNVT_amp          current_usage;
SNVT_power_kilo   power_usage;
unit_temp_t       temperature_control;
boolean_t         electromagnetic_brake_active;
boolean_t         friction_brake_active;
boolean_t         gas_brake_active;
} SNVT_pump_sensor;
```

rotational_speed: Revolutions per second (Hertz) of the pump's main drive shaft.

Field	Measurement	Type Category	Type Size in Bits
rotational_speed	Frequency	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 6553.4	0.1	Hertz	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,534 (0 .. 0xFFFE)	1, -1, 0 $S = a * 10^b * (R+c)$	N/A	N/A

body_temperature: Temperature of the pump casing/body.

Field	Measurement	Type Category	Type Size in Bits
body_temperature	Temperature	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-274.0 .. 6279.4	0.1	Degrees Celsius	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,534 (0 .. 0xFFFFE)	1, -1, -2740 $S = a*10^b*(R+c)$	N/A	N/A

motor_external_temperature: Temperature of the pump motor.

Field	Measurement	Type Category	Type Size in Bits
motor_external_temperature	Temperature	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-274.0 .. 6279.4	0.1	Degrees Celsius	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,534 (0 .. 0xFFFFE)	1, -1, -2740 $S = a*10^b*(R+c)$	N/A	N/A

motor_internal_temperature: Temperature of the pump motor windings.

Field	Measurement	Type Category	Type Size in Bits
motor_internal_temperature	Temperature	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-274.0 .. 6279.4	0.1	Degrees Celsius	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,534 (0 .. 0xFFFFE)	1, -1, -2740 $S = a*10^b*(R+c)$	N/A	N/A

motor_overloaded: TRUE if the pump motor is overloaded.

Field	Measurement	Field Type Category	Field Size
motor_overloaded	boolean_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
boolean_t	1	N/A	BOOL_NUL
Raw Range	Scale Factors	File Name	Default Value
boolean_t	N/A	SNVT_BLN.H	N/A

oil_level_low: TRUE if the oil level is too low.

Field	Measurement	Field Type Category	Field Size
oil_level_low	boolean_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
boolean_t	1	N/A	BOOL_NUL
Raw Range	Scale Factors	File Name	Default Value
boolean_t	N/A	SNVT_BLN.H	N/A

phase_imbalance_detected: TRUE if the imbalance is high, or FALSE if the imbalance is within normal operating limits.

Field	Measurement	Field Type Category	Field Size
phase_imbalance_detected	boolean_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
boolean_t	1	N/A	BOOL_NUL
Raw Range	Scale Factors	File Name	Default Value
boolean_t	N/A	SNVT_BLN.H	N/A

current_usage: Current (amperes) being used by the pump.

Field	Measurement	Type Category	Type Size in Bits
current_usage	Electric Current	Signed Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-3276.8 .. 3276.6	0.1	Amperes	N/A
Raw Range	Scale Factors	File Name	Default Value
-31,768 .. 32,766 (0x8000 .. 0x7FFE)	1, -1, 0 $S = a * 10^b * (R+c)$	N/A	N/A

power_usage: Power (kilowatts) consumption of the pump.

Field	Measurement	Type Category	Type Size in Bits
power_usage	Power	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 6553.4	0.1	Kilowatts	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,534 (0 .. 0xFFFFE)	1, -1, 0 $S = a * 10^b * (R+c)$	N/A	N/A

temperature_control: Status of the pump body temperature-control unit (not the pump motor or pump windings).

Field	Measurement	Field Type Category	Field Size
temperature_control	unit_temp_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
unit_temp_t	1	N/A	TEMP_NUL
Raw Range	Scale Factors	File Name	Default Value
unit_temp_t	N/A	SNVT_TMP.H	N/A

electromagnetic_brake_active: TRUE if an electromagnetic braking mechanism is active.

Field	Measurement	Field Type Category	Field Size
electromagnetic_brake_active	boolean_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
boolean_t	1	N/A	BOOL_NUL
Raw Range	Scale Factors	File Name	Default Value
boolean_t	N/A	SNVT_BLN.H	N/A

friction_brake_active: TRUE if a brake, which uses friction to slow the pump, is active.

Field	Measurement	Field Type Category	Field Size
friction_brake_active	boolean_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
boolean_t	1	N/A	BOOL_NUL
Raw Range	Scale Factors	File Name	Default Value
boolean_t	N/A	SNVT_BLN.H	N/A

gas_brake_active: TRUE if the inlet valve, which lets gas in to brake the pump, is open.

Field	Measurement	Field Type Category	Field Size
gas_brake_active	boolean_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
boolean_t	1	N/A	BOOL_NUL
Raw Range	Scale Factors	File Name	Default Value
boolean_t	N/A	SNVT_BLN.H	N/A

SNVT_pumpset_mn (156)

This SNVT contains the status of the main features of a pumpset, which consists of one or more mechanical vacuum pumps operating in unison.

SNVT Index	Measurement	Type Category	Type Size
156	Pumpset	Structure	8 bytes

```
typedef struct {
    motor_state_t    main_pump;
    motor_state_t    booster_pump;
    priority_level_t priority_level;
    boolean_t        process_ready;
    boolean_t        emergency_stop_activated;
    boolean_t        main_pump_drive_enabled;
    boolean_t        booster_pump_drive_enabled;
    boolean_t        maintenance_required;
} SNVT_pumpset_mn;
```

main_pump: State of the main pump.

Field	Measurement	Field Type Category	Field Size
main_pump	motor_state_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
motor_state_t	1	N/A	MOTOR_NUL
Raw Range	Scale Factors	File Name	Default Value
motor_state_t	N/A	SNVT_MOT.H	N/A

booster_pump: State of the booster pump, if present.

Field	Measurement	Field Type Category	Field Size
booster_pump	motor_state_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
motor_state_t	1	N/A	MOTOR_NUL
Raw Range	Scale Factors	File Name	Default Value
motor_state_t	N/A	SNVT_MOT.H	N/A

priority_level: Overall alarm priority level of the pumpset. This will equate to the highest alarm priority that any component in the pumpset has currently.

Field	Measurement	Field Type Category	Field Size
priority_level	priority_level_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
priority_level_t	1	N/A	PR_NUL
Raw Range	Scale Factors	File Name	Default Value
priority_level_t	N/A	SNVT_PR.H	N/A

process_ready: TRUE means that the process, which depends on the operation of the pumpset, can start or continue. A value of FALSE shall specify that the pumpset is not running and ready to process, and that gas flow through the pumpset should be stopped.

Field	Measurement	Field Type Category	Field Size
process_ready	boolean_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
boolean_t	1	N/A	BOOL_NUL
Raw Range	Scale Factors	File Name	Default Value
boolean_t	N/A	SNVT_BLN.H	N/A

emergency_stop_activated: TRUE if-and-only-if the emergency-stop circuit has been activated.

Field	Measurement	Field Type Category	Field Size
emergency_stop_activated	boolean_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
boolean_t	1	N/A	BOOL_NUL
Raw Range	Scale Factors	File Name	Default Value
boolean_t	N/A	SNVT_BLN.H	N/A

main_pump_drive_enabled: TRUE if the main pump's drive is enabled. While this value is FALSE, the main pump cannot accelerate.

Field	Measurement	Field Type Category	Field Size
main_pump_drive_enabled	boolean_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
boolean_t	1	N/A	BOOL_NUL
Raw Range	Scale Factors	File Name	Default Value
boolean_t	N/A	SNVT_BLN.H	N/A

booster_pump_drive_enabled: TRUE if the booster pump's drive is enabled. While this value is FALSE, the booster pump cannot accelerate.

Field	Measurement	Field Type Category	Field Size
booster_pump_drive_enabled	boolean_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
boolean_t	1	N/A	BOOL_NUL
Raw Range	Scale Factors	File Name	Default Value
boolean_t	N/A	SNVT_BLN.H	N/A

maintenance_required: TRUE if the pumpset requires scheduled maintenance.

Field	Measurement	Field Type Category	Field Size
maintenance_required	boolean_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
boolean_t	1	N/A	BOOL_NUL
Raw Range	Scale Factors	File Name	Default Value
boolean_t	N/A	SNVT_BLN.H	N/A

SNVT_pumpset_sn (158)

This SNVT contains readings from sensors in a 'pumpset', which consists of one or more pumps operating in unison.

SNVT Index	Measurement	Type Category	Type Size
158	Pumpset Sensor	Structure	23 bytes

```
typedef struct {
    SNVT_flow_mil    total_dilution_flow;
    SNVT_temp        exhaust_temperature;
    SNVT_press       exhaust_pressure;
    SNVT_press       shaft_seal_purge_pressure;
    SNVT_press_f     inlet_vacuum;
    SNVT_volt        supply_voltage;
    SNVT_flow_mil    coolant_flow;
    boolean_t        coolant_flow_low;
    boolean_t        dilution_active;
    boolean_t        ballast_dilution_active;
    boolean_t        inlet_purge_dilution_active;
    boolean_t        exhaust_dilution_active;
    boolean_t        dilution_flow_out_of_range;
    boolean_t        power_supply_on;
} SNVT_pumpset_sn;
```

total_dilution_flow: Total dilution gas flow through the pumpset.

Field	Measurement	Type Category	Type Size in Bits
total_dilution_flow	Flow Volume	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 65,534	1	Milliliters/Second (ml/s)	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,534 (0 .. 0xFFFFE)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

exhaust_temperature: External temperature of the exhaust line.

Field	Measurement	Type Category	Type Size in Bits
exhaust_temperature	Temperature	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-274.0 .. 6279.4	0.1	Degrees Celsius	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,534 (0 .. 0xFFFFE)	1, -1, -2740 $S = a*10^b*(R+c)$	N/A	N/A

exhaust_pressure: Pressure in the exhaust line.

Field	Measurement	Type Category	Type Size in Bits
exhaust_pressure	Pressure (Gauge)	Signed Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-3276.8 .. 3276.6	0.1	Kilopascals	N/A
Raw Range	Scale Factors	File Name	Default Value
-32,768 .. 32,766 (0x8000 .. 0x7FFE)	1, -1, 0 $S = a*10^b*(R+c)$	N/A	N/A

shaft_seal_purge_pressure: Pressure in the shaft-seal purge section of the pumpset.

Field	Measurement	Type Category	Type Size in Bits
shaft_seal_purge_pressure	Pressure (Gauge)	Signed Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-3276.8 .. 3276.6	0.1	Kilopascals	N/A
Raw Range	Scale Factors	File Name	Default Value
-32,768 .. 32,766 (0x8000 .. 0x7FFE)	1, -1, 0 $S = a*10^b*(R+c)$	N/A	N/A

inlet_vacuum: Pressure in the process gas inlet to the pumpset.

Field	Measurement	Field Type Category	Field Size
inlet_vacuum	Pressure (Gauge)	Floating Point	4 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-3.40282E38 .. 3.40282E38	N/A	Pascals	NaN
Raw Range	Scale Factors	File Name	Default Value
IEEE 754	N/A	N/A	N/A

supply_voltage: Voltage of the pumpset power supply.

File Name	Measurement	Type Category	Type Size in Bits
supply_voltage	Voltage	Signed Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-3276.8 .. 3276.6	0.1	Volts	N/A
Raw Range	Scale Factors	File Name	Default Value
-32,768 .. 32,766 (0x8000 .. 0x7FFE)	1, -1, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

coolant_flow: Total cooling-water flow through the pumpset.

Field	Measurement	Type Category	Type Size in Bits
coolant_flow	Total Coolant Flow	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 65,534	1	Milliliters/Second (ml/s)	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,534 (0 .. 0xFFFFE)	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

coolant_flow_low: TRUE if the cooling-water flow is too low.

Field	Measurement	Field Type Category	Field Size
coolant_flow_low	boolean_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
boolean_t	1	N/A	BOOL_NUL
Raw Range	Scale Factors	File Name	Default Value
boolean_t	N/A	SNVT_BLN.H	N/A

dilution_active: TRUE if any dilution gas is being used by the pumpset. This will normally be TRUE whenever the pumpset is running.

Field	Measurement	Field Type Category	Field Size
dilution_active	boolean_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
boolean_t	1	N/A	BOOL_NUL
Raw Range	Scale Factors	File Name	Default Value
boolean_t	N/A	SNVT_BLN.H	N/A

ballast_dilution_active: TRUE if dilution gas is being used as ballast to dilute process gas. This will normally be TRUE while the pumpset is in process.

Field	Measurement	Field Type Category	Field Size
ballast_dilution_active	boolean_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
boolean_t	1	N/A	BOOL_NUL
Raw Range	Scale Factors	File Name	Default Value
boolean_t	N/A	SNVT_BLN.H	N/A

inlet_purge_dilution_active: TRUE if dilution gas is being used to purge the process gas inlet. This will normally be TRUE while the pumpset is performing a delayed auto-shutdown.

Field	Measurement	Field Type Category	Field Size
inlet_purge_dilution_active	boolean_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
boolean_t	1	N/A	BOOL_NUL
Raw Range	Scale Factors	File Name	Default Value
boolean_t	N/A	SNVT_BLN.H	N/A

exhaust_dilution_active: TRUE if dilution gas is being used to dilute exhaust gas.

Field	Measurement	Field Type Category	Field Size
exhaust_dilution_active	boolean_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
boolean_t	1	N/A	BOOL_NUL
Raw Range	Scale Factors	File Name	Default Value
boolean_t	N/A	SNVT_BLN.H	N/A

dilution_flow_out_of_range: TRUE if the measured flow of dilution gas is outside of its normal range.

Field	Measurement	Field Type Category	Field Size
dilution_flow_out_of_range	boolean_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
boolean_t	1	N/A	BOOL_NUL
Raw Range	Scale Factors	File Name	Default Value
boolean_t	N/A	SNVT_BLN.H	N/A

power_supply_on: TRUE if the mains power supply, which is used to drive the pumpset, is switched on.

Field	Measurement	Field Type Category	Field Size
power_supply_on	boolean_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
boolean_t	1	N/A	BOOL_NUL
Raw Range	Scale Factors	File Name	Default Value
boolean_t	N/A	SNVT_BLN.H	N/A

SNVT_pwr_fact (98)

Power Factor

SNVT Index	Measurement	Type Category	Type Size
98	Power Factor	Signed Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-1.00000 .. 1.00000	0.00005	Multiplier	N/A
Raw Range	Scale Factors	File Name	Default Value
-20,000 .. 20,000 (0xB1E0 .. 0x4E20)	5, -5, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

SNVT_pwr_fact_f (99)

Power Factor

SNVT Index	Measurement	Type Category	Type Size
99	Power Factor	Floating Point	4 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-1 .. 1	N/A	N/A	NaN
Raw Range	Scale Factors	File Name	Default Value
IEEE 754	N/A	N/A	N/A

SNVT_reg_val (136)

Register Value

Used to send a value and appropriate unit of measure to a recording or displaying device that would use the unit field to properly handle the 32-bit value.

SNVT Index	Measurement	Type Category	Type Size
136	Register value	Structure	6 bytes

```
typedef struct {
    unsigned                raw(4);
    reg_val_unit_t         unit;
    unsigned short         nr_decimals : 3;
} SNVT_reg_val;
```

raw[4]: Raw value whose units and decimal float depend on the unit and nr_decimals values.

Field	Measurement	Type Category	Type Size
raw	Raw value	Signed Quad	4 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-2,147,483,648 .. 2,147,483,647	1	Defined by unit field	N/A
Raw Range	Scale Factors	File Name	Default Value
-2,147,483,648 .. 2,147,483,647 (0x80000000 .. 0x7FFFFFFF)	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

unit: Defines unit of measure.

Field	Measurement	Field Type Category	Field Size
unit	reg_val_unit_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
reg_val_unit_t	1	N/A	RVU_NUL
Raw Range	Scale Factors	File Name	Default Value
reg_val_unit_t	N/A	SNVT_RVU.H	N/A

nr_decimals: Number of decimals

Field	Measurement	Type Category	Type Size
nr_decimals	Decimal Place	Unsigned Bitfield	3 bits (offset 0)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 7	1	Digits to Right of Decimal Point	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 7	1, 0, 0 $S = a \cdot 10^{b \cdot (R+c)}$	N/A	N/A

Example

```
raw = 123456
unit = RVU_KWH
nr_decimals = 2
Physical value = 1234.56 kWh
```

The reg_val_unit_t enumeration is a fixed list and will not be modified nor extended due to its use in SNVT_reg_val, and SNVT_reg_val_ts.

SNVT_reg_val_ts (137)

Register Value

Used to send a value and appropriate unit of measure to a recording or displaying device that would use the unit field to properly handle the 32-bit value.

The status bitfield has the following two representations, and the functional profile or installation should specify the representation used:

<i>Singular, enumerated</i>	<i>Mask, bitmapped</i>	<i>Description</i>
0x1 (b0001)	0x1 (b0001)	Time has been changed during the measuring period and the change exceeds the error limit, or time is invalid time.

0x2 (b0010)	0x2 (b0010)	Internal/External error during the measuring period (e.g., watchdog reset, error in EEPROM operation, memory checksum error, Polling error from the external device, register overflow or underflow—with subtracting pulse inputs—during the measuring period).
0x3 (b0011)	0x4 (b0100)	Power failure during the measuring period.
0x4 (b0100)	0x8 (b1000)	Illegal value request (e.g., uninitiated after boot up, input values out of range).

SNVT Index	Measurement	Type Category	Type Size
137	Register Value	Structure	13 bytes

```
typedef struct {
    SIGNED_QUAD          raw(4);
    reg_val_unit_t      unit;
    unsigned             nr_decimals    : 3;
    unsigned             status         : 4;
    unsigned             reg_state      : 1;
    unsigned long        year;
    unsigned short       month;
    unsigned short       day;
    unsigned short       hour;
    unsigned short       minute;
    unsigned short       second;
} SNVT_reg_val_ts;
```

raw[4]: Raw value whose units and decimal float depend on the unit and nr_decimals values.

Field	Measurement	Type Category	Type Size
raw	Raw Value	Signed Quad	4 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-2,147,483,648 .. 2,147,483,647	1		
Raw Range	Scale Factors	File Name	Default Value
-2,147,483,648 .. 2,147,483,647 (0x80000000 .. 0x7FFFFFFF)	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

unit: Defines unit of measure.

Field	Measurement	Field Type Category	Field Size
unit	reg_val_unit_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
reg_val_unit_t	1	N/A	RVU_NUL
Raw Range	Scale Factors	File Name	Default Value
reg_val_unit_t	N/A	SNVT_RVU.H	N/A

nr_decimals: Number of decimals

Field	Measurement	Type Category	Type Size
nr_decimals	Decimal Place	Unsigned Bitfield	3 bits (offset 0)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 7	1	Digits to Right of Decimal Point	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 7	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

status: The description of the bitfield is above.

Field	Measurement	Type Category	Type Size
status	Status	Unsigned Bitfield	4 bits (offset 3)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 15	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 15 (0 .. 0xF)	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

reg_state: 1 means the register is activated (functional block measures into the register).

Field	Measurement	Type Category	Type Size
reg_state	boolean_t	Unsigned Bitfield	1 bit (offset 7)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

year: Zero (0) means year not specified. Minus one (-1) represents NULL date.

Field	Measurement	Field Type Category	Field Size
year	Year	Signed Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 3000	1	Year	-1 (0xFFFF)
Raw Range	Scale Factors	File Name	Default Value
0 .. 3000 (0 .. 0x0BB8)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

month: Zero (0) means month not specified.

Field	Measurement	Field Type Category	Field Size
month	Month	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 12	1	Month of Year	0
Raw Range	Scale Factors	File Name	Default Value
0 .. 12 (0 .. 0x0C)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

day: Zero (0) means day not specified.

Field	Measurement	Field Type Category	Field Size
day	Day	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 31	1	Day of Month	0
Raw Range	Scale Factors	File Name	Default Value
0 .. 31 (0 .. 0x1F)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

hour: This field uses a 24-hour value.

Field	Measurement	Field Type Category	Field Size
hour	Hours	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 23	1	Hour of Day	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 23 (0 .. 0x17)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

minute: Minutes

Field	Measurement	Field Type Category	Field Size
minute	Minutes	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 59	1	Minute of Hour	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 59 (0 .. 0x3B)	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

second: Seconds

Field	Measurement	Field Type Category	Field Size
second	Second	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 59	1	Second of Minute	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 59 (0 .. 0x3B)	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

Example

```
raw = 1.23456E5 = 123456
unit = RVU_KW
nr_decimals = 2
status = 0x1
reg_state = 1
year = 2000
month = 1
day = 31
hour = 23
minute = 45
second = 00
```

Physical value = 1234.56 kW.
 Time has been changed during the measuring period and the change exceeds the error limit, or time is invalid time.
 Register is activated.
 Start time of measuring is January 31, 2000 at 23:45:00.

SNVT_res (31)

Electrical Resistance

SNVT Index	Measurement	Type Category	Type Size
31	Electric Resistance	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 6553.5	0.1	Ohms (Ω)	N/A
Raw Value	Scale Factors	File Name	Default Value
0 .. 65,535 (0 .. 0xFFFF)	1, -1, 0 $S = a \cdot 10^{b \cdot (R+c)}$	N/A	N/A

SNVT_res_f (60)

Electrical Resistance

SNVT Index	Measurement	Type Category	Type Size
60	Electrical Resistance	Floating Point	4 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 3.40282E38	N/A	Ohms (Ω)	NaN
Raw Range	Scale Factors	File Name	Default Value
IEEE 754	N/A	N/A	N/A

SNVT_res_kilo (32)

Electrical Resistance

SNVT Index	Measurement	Type Category	Type Size
32	Electrical Resistance	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 6553.5	0.1	KiloOhms ($k\Omega$)	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,535 (0 .. 0xFFFF)	1, -1, 0 $S = a \cdot 10^{b \cdot (R+c)}$	N/A	N/A

SNVT_rpm (102)

Angular Velocity

SNVT Index	Measurement	Type Category	Type Size
102	Angular Velocity	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 65,534	1	Revolutions per Minute (RPM)	65,535 (0xFFFF)
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,534 (0 .. 0xFFFE)	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

SNVT_scene (115)

Scene Control

SNVT Index	Measurement	Type Category	Type Size
115	Scene control	Structure	2 bytes

```
typedef struct {  
    scene_t          function;  
    unsigned short  scene_number;  
} SNVT_scene;
```

function: Scene control function

Field	Measurement	Field Type Category	Field Size
function	scene_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
scene_t	1	N/A	SC_NUL
Raw Range	Scale Factors	File Name	Default Value
scene_t	N/A	SNVT_SC.H	N/A

scene_number: Scene number

Field	Measurement	Field Type Category	Field Size
scene_number	Scene Number	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
1 .. 255	1	Scene Number	N/A
Raw Range	Scale Factors	File Name	Default Value
1 .. 255 (1 .. 0xFF)	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

SNVT_scene_cfg (116)

Scene Configuration

Used to tell an actuator functional block to save a specified setting as a scene, report the scene data for a specified scene, and manage scene storage space.

SNVT Index	Measurement	Type Category	Type Size
116	Scene Configuration	Structure	10 bytes

```
typedef struct {
    scene_config_t          function;
    unsigned short         scene_number;
    unsigned short         setting;
    signed long            rotation;
    unsigned long          fade_time;
    unsigned long          delay_time;
    unsigned short        scene_priority;
} SNVT_scene_cfg;
```

function: Scene configuration function

Field	Measurement	Field Type Category	Field Size
function	scene_config_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
scene_config_t	1	N/A	SCF_NUL
Raw Range	Scale Factors	File Name	Default Value
scene_config_t	N/A	SNVT_SCF.H	N/A

scene_number: Scene number

Field	Measurement	Field Type Category	Field Size
scene_number	Scene Number	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
1 .. 255	1	Scene Number	N/A
Raw Range	Scale Factors	File Name	Default Value
1 .. 255 (1 .. 0xFF)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

setting: Scene setting level

Field	Measurement	Field Type Category	Field Size
setting	Scene Setting Level	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 100	0.5	Percent of Full Level	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 200 (0 .. 0xC8)	5, -1, 0 $S = a*10^b*(R+c)$	N/A	N/A

rotation: Scene rotation angle

Field	Measurement	Field Type Category	Field Size
rotation	Scene Rotation Angle	Signed Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-359.98 .. 360.00	0.02	Degrees	32,767 (0x7FFF)
Raw Range	Scale Factors	File Name	Default Value
-17,999 .. 18,000 (0xB9B1 .. 0x4650)	2, -2, 0 $S = a*10^b*(R+c)$	N/A	N/A

fade_time: Scene fade time

Field	Measurement	Field Type Category	Field Size
fade_time	Scene Fade Time	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0.0 to 6553.4	0.1	Seconds	65,535 (0xFFFF)
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,534 (0 .. 0xFFFFE)	1, -1, 0 $S = a*10^b*(R+c)$	N/A	N/A

delay_time: Scene delay time

Field	Measurement	Field Type Category	Field Size
delay_time	Scene Delay Time	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0.0 to 6553.4	0.1	Seconds	65,535 (0xFFFF)
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,534 (0 .. 0xFFFFE)	1, -1, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

scene_priority: 0-255 scene priority range. Zero (0) is the highest priority.

Field	Measurement	Field Type Category	Field Size
scene_priority	Scene Priority	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 255	1	Priority Value	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 255 (0 .. 0xFF)	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

SNVT_sched_val (177)

Schedule Value

This network variable type is used to report the state of a schedule. The value is used as the output of a Scheduler functional block, or is used as an index into a **SCPTvalueDefinition** array, where the corresponding **SCPTvalueDefinition** array value is used as the output value.

SNVT Index	Measurement	Type Category	Type Size
177	Value Definition Index	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 254	1	N/A	255 (0xFF)
Raw Range	Scale Factors	File Name	Default Value
0 .. 254 (0 .. 0xFE)	N/A	N/A	255

SNVT_setting (117)

Scene Setting

Used to tell an actuator functional block to invoke a stored setting/scene.

SNVT Index	Measurement	Type Category	Type Size
117	Setting control	Structure	4 bytes

```
typedef struct {
    setting_t          function;
    unsigned short    setting;
    signed long       rotation;
} SNVT_setting;
```

function: Setting control function

Field	Measurement	Field Type Category	Field Size
function	setting_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
setting_t	1	N/A	SET_NUL
Raw Range	Scale Factors	File Name	Default Value
setting_t	N/A	SNVT_SET.H	N/A

setting: Scene setting level

Field	Measurement	Field Type Category	Field Size
setting	Scene Setting Level	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 100	0.5	Percent of Full Level	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 200 (0 .. 0xC8)	5, -1, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

rotation: Rotational angle

Field	Measurement	Field Type Category	Field Size
rotation	Rotation Angle	Signed Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-359.98 .. 360.00	0.02	Degrees	(0x7FFF) 32,767
Raw Range	Scale Factors	File Name	Default Value
-17,999 .. 18,000 (0xB9B1 .. 0x4650)	2, -2, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

SNVT_smo_obscur (129)

Smoke Obscuration

SNVT Index	Measurement	Type Category	Type Size
129	Smoke Obscuration	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0.000 .. 5.000	0.001	Percent Obscuration	65,535 (0xFFFF)
Raw Range	Scale Factors	File Name	Default Value
0 .. 5000 (0 .. 0x1388)	1, -3, 0 $S = a \cdot 10^{b \cdot (R+c)}$	N/A	N/A

SNVT_sound_db (33)

Sound Level

SNVT Index	Measurement	Type Category	Type Size
33	Sound Level	Signed Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-327.68 .. 327.67	0.01	Decibels (dB)	N/A
Raw Range	Scale Factors	File Name	Default Value
-32768 .. 32767 (0x8000 .. 0x7FFF)	1, -2, 0 $S = a \cdot 10^{b \cdot (R+c)}$	N/A	N/A

SNVT_sound_db_f (61)

Sound Level

SNVT Index	Measurement	Type Category	Type Size
61	Sound Level	Floating Point	4 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-3.40282E38 .. 3.40282E38	N/A	Decibels from Sound Pressure Level (dBSPL)	NaN
Raw Range	Scale Factors	File Name	Default Value
IEEE 754	N/A	N/A	N/A

SNVT_speed (34)

Linear Velocity

SNVT Index	Measurement	Type Category	Type Size
34	Linear Velocity	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 6553.5	0.1	Meters per Second (m/s)	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,535 (0 .. 0xFFFF)	1, -1, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

SNVT_speed_f (62)

Linear Velocity

SNVT Index	Measurement	Type Category	Type Size
62	Speed	Floating Point	4 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-3.40282E38 .. 3.40282E38	N/A	Meters per Second (m/s)	NaN
Raw Range	Scale Factors	File Name	Default Value
IEEE 754	N/A	N/A	N/A

SNVT_speed_mil (35)

Linear Velocity

SNVT Index	Measurement	Type Category	Type Size
35	Linear Velocity	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 65.535	0.001	Meters per Second (m/s)	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,535 (0 .. 0xFFFF)	1, -3, 0 $S = a*10^b*(R+c)$	N/A	N/A

SNVT_state (83)

State

Each state is a Boolean, single-bit value. SNVT_state_64 is preferred.

SNVT Index	Measurement	Type Category	Type Size
83	State Vector	Structure	2 bytes

```
typedef struct {  
    unsigned bit0 : 1;  
    unsigned bit1 : 1;  
    .. ..  
    unsigned bit15 : 1;  
} SNVT_state;
```

bit0 through **bit15**: State bits 0 through 15

Field	Measurement	Type Category	Type Size
bit0 through bit15	boolean_t	Unsigned Bitfield	1 bit x 16
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

SNVT_state_64 (165)

State

Each state is a Boolean, single-bit value.

SNVT Index	Measurement	Type Category	Type Size
165	State Vector	Bitfield	8 bytes

```
typedef struct {
    unsigned          bit0   : 1;
    unsigned          bit1   : 1;
    .. .. .
    unsigned          bit63  : 1;
} SNVT_state_64;
```

bit0 through **bit63**: State bits 0 through 63

Field	Measurement	Type Category	Type Size
bit0 through bit63	boolean_t	Unsigned Bitfield	1 bit x 64
Valid Type Range	Type Resolution	Units	Invalid Value
0..1	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0..1	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

SNVT_str_asc (36)

Character String

An ASCII string of up to 30 characters plus a terminator (ASCII 0) that must be stored within the 'ascii' field, immediately after the last character of the string.

The maximum string length is therefore 30 characters plus the terminator.

SNVT_str_asc must only be used for communicating textual information to system integrators and operators. It must not be used for encoding commands or state information for other devices. Commands and state information must be encoded in appropriate scalar or structure network variable types.

SNVT Index	Measurement	Type Category	Type Size
36	Character String (30 characters max)	Structure	31 bytes

```
typedef struct {
    unsigned char          ascii[31];
} SNVT_str_asc;
```

ascii[31]: ASCII character string with NUL terminator

Field	Measurement	Field Type Category	Field Size
ascii[31]	ASCII character string with NUL terminator	Unsigned Character Array	31 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
ASCII character	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 255 (0 .. 0xFF)	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

SNVT_str_int (37)

Character String

A wide-character string of up to 14 characters plus a terminator (ASCII 0) that must be stored within the wide_char field, immediately after the last character of the string. The maximum string length is therefore 14 characters plus the terminator. SNVT_str_asc must only be used for communicating textual information to system integrators and operators. It must not be used for encoding commands or state information for other devices. Commands and state information must be encoded in appropriate scalar or structure network variable types.

SNVT Index	Measurement	Type Category	Type Size
37	Character String	Structure	31 bytes

```
typedef struct {
    unsigned short          char_set;
    unsigned long          wide_char[15];
} SNVT_str_int;
```

char_set: Locale code. Contact the LONMARK Principal Engineer for more detail.

Field	Measurement	Field Type Category	Field Size
char_set	Locale Code	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 255	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 255 (0 .. 0xFF)	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

wide_char[15]: Wide-character character string with NUL terminator

Field	Measurement	Field Type Category	Field Size
ascii[31]	Wide-character string with NUL terminator	Unsigned Long Array	30 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
char_set-dependent	1	N/A	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,565 (0 .. 0xFFFF)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

SNVT_switch (95)

Switch

A structure reporting a percentage level or load value and a discrete on/off state. Separate fields report the percentage value and state. This type should be used for both discrete (on/off) and analog control.

The value field is used to control the load's value, i.e. position, speed, or intensity, the state field being used to control whether the load is on or off (enabled or disabled).

When used as the output of a discrete sensor device, the OFF state is represented by a SNVT_switch network variable with state = FALSE and value = 0. The other discrete states are represented by state = TRUE and value > 0. When used as the output of a two-state sensor device, the ON state is represented by state = TRUE and value = 200 (meaning 100%).

When used as the input of a two-state discrete actuator, a SNVT_switch network variable with state = TRUE will be interpreted as the ON state if value > 0, and as the OFF state if value = 0. Additionally, a SNVT_switch input network variable with state = FALSE should be interpreted as the OFF state, whether or not value = 0. A state value of 0xFF indicates the switch value is undefined.

Input Network Variable		
<i>value (raw)</i>	<i>state</i>	<i>2-state interpretation</i>
any	0	off (0; 0)
0	1	off (0; 1)
>0	1	on (200; 1)
any	-1 (0xFF)	invalid (no action)

Output Network Variable		
<i>value (raw)</i>	<i>state</i>	<i>2-state interpretation</i>
0	0	off
200 (0xC8)	1	on
0 .. 200 (0 .. 0xC8) (any valid value)	-1 (0xFF)	invalid (NULL)

SNVT Index	Measurement	Type Category	Type Size
95	Switch	Structure	2 bytes

```
typedef struct {
    unsigned          value;
    signed            state;
} SNVT_switch;
```

value: Intensity as percentage of full scale, resolution 0.5%

Field	Measurement	Field Type Category	Field Size
value	Value	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 100	0.5	Percent of Full Scale	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 200 (0 .. 0xC8)	5, -1, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

state: This field can either be -1 (NULL), 0 (OFF), or 1 (ON).

Field	Measurement	Field Type Category	Field Size
state	State	Signed Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	-1 (0xFF)
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

SNVT_telcom (38)

Telecom States

SNVT Index	Measurement	Type Category	Type Size
38	telcom_states_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
telcom_states_t	1	N/A	TEL_NUL
Raw Range	Scale Factors	File Name	Default Value
telcom_states_t	N/A	SNVT_TEL.H	N/A

SNVT_temp (39)

Temperature

SNVT_temp represents tenths of a degree Celsius above -274°C. To get SNVT_temp units define a constant: C_to_K equal to 2740, which is added to temperature, expressed in tenths of degrees C.

SNVT Index	Measurement	Type Category	Type Size
39	Temperature	Signed Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-274.0 .. 6279.5	0.1	Degrees Celsius	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,535 (0 .. 0xFFFF)	1, -1, -2740 $S = a*10^b*(R+c)$	N/A	N/A

SNVT_temp_diff_p (147)

Temp Difference

Used to communicate temperature differences. e.g., a unit has two temperature probes A and B. The value to be reported is A – B. This type would be used allow another device to format the data from a network variable using this SNVT correctly when converting from °C to °F, if needed. This conversion requires a 32°F offset converting to or from Fahrenheit temperature values, but no offset when converting to or from differential Fahrenheit temperature values. If there was no differential temperature SNVT, then the conversion can only be accomplished by the front-end system, or HMI, knowing the particular network variable.

SNVT Index	Measurement	Type Category	Type Size
147	Temp difference	Signed Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-327.68 .. 327.66	0.01	Degrees Celsius	32,767 (0x7FFF)
Raw Range	Scale Factors	File Name	Default Value
-32,768 .. 32,767 (0x8000 .. 0x7FFE)	1, -2, 0 $S = a*10^b*(R+c)$	N/A	N/A

SNVT_temp_f (63)

Temperature

SNVT Index	Measurement	Type Category	Type Size
63	Incremental Count	Floating Point	4 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-3.40282E38 .. 3.40282E38	N/A	Degrees Celcius	NaN
Raw Range	Scale Factors	File Name	Default Value
IEEE 754	N/A	N/A	N/A

SNVT_temp_p (105)

Temperature

To be used for heating, ventilation, and air-conditioning (HVAC) applications.

SNVT Index	Measurement	Type Category	Type Size
105	Temperature	Signed Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-273.17 .. 327.66	0.01	Degrees Celsius	32,767 (0x7FFF)
Raw Range	Scale Factors	File Name	Default Value
-27,317 .. 32,767 (0x954B .. 0x7FFE)	1, -2, 0 $S = a * 10^b * (R+c)$	N/A	N/A

SNVT_temp_ror (131)

Temperature Rate of Change/Rise

SNVT Index	Measurement	Type Category	Type Size
147	Temperature Rate of Change/Rise	Signed Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-16384.0 .. 16383.0	0.5	Degrees Celsius per Minute (°C/min)	32,767 (0x7FFF)
Raw Range	Scale Factors	File Name	Default Value
-32,768 .. 32,767 (0x8000 .. 0x7FFE)	5, -1, 0 $S = a * 10^b * (R+c)$	N/A	N/A

SNVT_temp_setpt (106)

Temperature Setpoints

SNVT Index	Measurement	Type Category	Type Size
106	Temperature Setpoints	Structure	12 bytes

```
typedef struct {
    signed long          occupied_cool;
    signed long          standby_cool;
    signed long          unoccupied_cool;
    signed long          occupied_heat;
    signed long          standby_heat;
    signed long          unoccupied_heat;
} SNVT_temp_setpt;
```

occupied_cool: Occupied cooling setpoint

Field	Measurement	Type Category	Field Size
occupied_cool	Occupied Cooling Setpoint	Signed Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-273.17 .. 327.66	0.01	Degrees Celsius	32,767 (0x7FFF)
Raw Range	Scale Factors	File Name	Default Value
-27,317 .. 32,767 (0x954B .. 0x7FFE)	1, -2, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

standby_cool: Standby cooling setpoint

Field	Measurement	Type Category	Field Size
standby_cool	Standby Cooling Setpoint	Signed Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-273.17 .. 327.66	0.01	Degrees Celsius	32,767 (0x7FFF)
Raw Range	Scale Factors	File Name	Default Value
-27,317 .. 32,767 (0x954B .. 0x7FFE)	1, -2, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

unoccupied_cool: Unoccupied cooling setpoint

Field	Measurement	Type Category	Field Size
unoccupied_cool	Unoccupied cooling setpoint	Signed Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-273.17 .. 327.66	0.01	degrees Celsius	32,767 (0x7FFF)
Raw Range	Scale Factors	File Name	Default Value
-27,317 .. 32,767 (0x954B .. 0xFFFE, 0 .. 0x7FFE)	1, -2, 0 $S = a*10^b*(R+c)$	N/A	N/A

occupied_heat: Occupied heating setpoint

Field	Measurement	Type Category	Field Size
occupied_heat	Occupied Heating Setpoint	Signed Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-273.17 .. 327.66	0.01	Degrees Celsius	32,767 (0x7FFF)
Raw Range	Scale Factors	File Name	Default Value
-27,317 .. 32,767 (0x954B .. 0x7FFE)	1, -2, 0 $S = a*10^b*(R+c)$	N/A	N/A

standby_heat: Standby heating setpoint

Field	Measurement	Type Category	Field Size
standby_heat	Standby Heating Setpoint	Signed Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-273.17 .. 327.66	0.01	Degrees Celsius	32,767 (0x7FFF)
Raw Range	Scale Factors	File Name	Default Value
-27,317 .. 32,767 (0x954B .. 0x7FFE)	1, -2, 0 $S = a*10^b*(R+c)$	N/A	N/A

unoccupied_heat: Unoccupied heating setpoint

Field	Measurement	Type Category	Field Size
unoccupied_heat	Unoccupied Heating Setpoint	Signed Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-273.17 .. 327.66	0.01	Degrees Celsius	32,767 (0x7FFF)
Raw Range	Scale Factors	File Name	Default Value
-27,317 .. 32,767 (0x954B .. 0x7FFE)	1, -2, 0 $S = a*10^b*(R+c)$	N/A	N/A

SNVT_therm_mode (119)

Thermostat Mode

SNVT Index	Measurement	Type Category	Type Size
119	therm_mode_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
therm_mode_t	1	N/A	THERM_NUL
Raw Range	Scale Factors	File Name	Default Value
therm_mode_t	N/A	SNVT_THM.H	N/A

SNVT_time_f (64)

Elapsed Time

SNVT Index	Measurement	Type Category	Type Size
64	Elapsed Time	Floating Point	4 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-3.40282E38 .. 3.40282E38	N/A	Seconds	NaN
Raw Range	Scale Factors	File Name	Default Value
IEEE 754	N/A	N/A	N/A

SNVT_time_hour (124)

Elapsed Time

SNVT Index	Measurement	Type Category	Type Size
39	Elapsed time	Signed Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 65,535	1	Hours	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,535 (0 .. 0xFFFF)	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

SNVT_time_min (123)

Elapsed Time

SNVT Index	Measurement	Type Category	Type Size
123	Elapsed Time	Signed Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 65,535	1	Minutes	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,535 (0 .. 0xFFFF)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

SNVT_time_passed (40)

Elapsed Time

This SNVT is obsolete. Use SNVT_time_stamp instead.

SNVT Index	Measurement	Type Category	Type Size
40	Elapsed Time	Structure	4 bytes

```
typedef struct {  
    unsigned short      hours;  
    unsigned short      minutes;  
    unsigned short      seconds  
    unsigned short      milliseconds  
}SNVT_time_passed;
```

hours: Hours

Field	Measurement	Field Type Category	Field Size
hours	Hours	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 255	1	Hours	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 255 (0 .. 0xFF)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

minutes: Minutes

Field	Measurement	Field Type Category	Field Size
minutes	Minutes	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 59	1	Minutes	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 59 (0 .. 0x3B)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

seconds: Seconds

Field	Measurement	Field Type Category	Field Size
seconds	Seconds	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 59	1	Seconds	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 59 (0 .. 0x3B)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

milliseconds: Milliseconds

Field	Measurement	Field Type Category	Field Size
milliseconds	Milliseconds	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 990	10	Milliseconds	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 99 (0 .. 0x63)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

SNVT_time_sec (107)

Elapsed Time

SNVT Index	Measurement	Type Category	Type Size
102	Elapsed time	Signed Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 6553.4	0.1	Seconds	65,535 (0xFFFF)
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,534 (0 .. 0xFFFFE)	1, -1, 0 $S = a*10^b*(R+c)$	N/A	N/A

SNVT_time_stamp (84)

Time Stamp

SNVT Index	Measurement	Type Category	Type Size
84	Time Stamp	Structure	7 bytes

```
typedef struct {
    signed long          year;
    unsigned short      month;
    unsigned short      day;
    unsigned short      hour;
    unsigned short      minute;
    unsigned short      second;
} SNVT_time_stamp;
```

year: Zero (0) means year not specified. Minus one (-1) represents NULL date.

Field	Measurement	Field Type Category	Field Size
year	Year	Signed Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 3000	1	Year	-1 (0xFFFF)
Raw Range	Scale Factors	File Name	Default Value
0 .. 3000 (0 .. 0x0BB8)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

month: Zero (0) means month not specified.

Field	Measurement	Field Type Category	Field Size
month	Month	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 12	1	Month of Year	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 12 (0 .. 0x0C)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

day: Zero (0) means day not specified.

Field	Measurement	Field Type Category	Field Size
day	Day	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 31	1	Day of Month	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 31 (0 .. 0x1F)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

hour: This field uses a 24-hour value.

Field	Measurement	Field Type Category	Field Size
hour	Hours	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 23	1	Hour of Day	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 23 (0 .. 0x17)	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

minute: Minutes

Field	Measurement	Field Type Category	Field Size
minute	Minutes	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 59	1	Minute of Hour	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 59 (0 .. 0x3B)	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

second: Seconds

Field	Measurement	Field Type Category	Field Size
second	Second	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 59	1	Second of Minute	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 59 (0 .. 0x3B)	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

SNVT_time_zone (134)

Time Zone Descriptor

Time Zone with Daylight-Savings Time (DST).

SNVT Index	Measurement	Type Category	Type Size
134	Time Zone	Structure	15 bytes

```
typedef struct {
    s32_type      second_time_offset;
    calendar_type_t  type_of_description;
    unsigned short  hour_of_start_DST;
    unsigned short  minute_of_start_DST;
    unsigned short  second_of_start_DST;
    union {
```

```

    unsigned long      G_day_of_start_DST;
    unsigned long      J_day_of_start_DST;
    struct {
        unsigned      month_of_start_DST   :4;
        unsigned      week_of_start_DST    :3;
        days_of_week_t dateday_of_start_DST;
    } M_start_DST;
} start_DST;

unsigned short        hour_of_end_DST;
unsigned short        minute_of_end_DST;
unsigned short        second_of_end_DST;
union {
    unsigned long      G_day_of_end_DST;
    unsigned long      J_day_of_end_DST;
    struct {
        unsigned      month_of_end_DST     :4;
        unsigned      week_of_end_DST      :3;
        days_of_week_t dateday_of_end_DST;
    } M_end_DST;
} end_DST;
} SNVT_time_zone;

```

second_time_offset: Time zones in the west direction from GMT have negative offset. Local time = GMT +second_time_offset.

Field	Measurement	Type Category	Type Size in Bits
second_time_offset	Offset from GMT	Signed Quad	4 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-2,147,483,648 .. 2,147,483,647	1	Seconds	N/A
Raw Range	Scale Factors	File Name	Default Value
-2,147,483,648 .. 2,147,483,647 (0x80000000 .. 0x7FFFFFFF)	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

type_of_description: Type of description of time zone

Field	Measurement	Field Type Category	Field Size
type_of_description	calendar_type_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
calendar_type_t	1	N/A	CAL_NUL
Raw Range	Scale Factors	File Name	Default Value
calendar_type_t	N/A	SNVT_CAL.H	N/A

hour_of_start_DST: Define trice of starting summer time—DST

Field	Measurement	Field Type Category	Field Size
hour	DST Start Hour	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 23	1	Hour of Day	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 23 (0 .. 0x17)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

minute_of_start_DST: DST start minute

Field	Measurement	Field Type Category	Field Size
minute	DST Start Minute	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 59	1	Minute of Hour	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 59 (0 .. 0x3B)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

second_of_start_DST: DST start second

Field	Measurement	Field Type Category	Field Size
second	DST Start Second	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 59	1	Second of Minute	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 59 (0 .. 0x3B)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

hour_of_end_DST: Define trice of ending summer time—DST

Field	Measurement	Field Type Category	Field Size
hour	DST End Hour	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 23	1	Hour of Day	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 23 (0 .. 0x17)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

minute_of_end_DST: DST end minute

Field	Measurement	Field Type Category	Field Size
minute	DST End Minute	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 59	1	Minute of Hour	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 59 (0 .. 0x3B)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

second_of_end_DST: DST end second

Field	Measurement	Field Type Category	Field Size
second	DST End Second	Unsigned Short	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 59	1	Second of Minute	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 59 (0 .. 0x3B)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

G_day_of_start_DST: The day-number of the start of summer time – DST.
1-January has number 0. 31-December, in a non-leap year, has number 364.
31-December in a leap year has number 365.

Field	Measurement	Field Type Category	Field Size
G_day_of_start_DST	Gregorian Calendar Day of Start DST	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 365	1	Day	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 365 (0 .. 0x016D)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

J_day_of_start_DST: The day number of the start of summer time – DST.
1-January has number 1. 31-December has always number 365. 29-February is
always skipped, such that 1-March is always day-number 60.

Field	Measurement	Field Type Category	Field Size
J_day_of_start_DST	Julian Calendar Day of Start DST	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
1 .. 365	1	Day	N/A
Raw Range	Scale Factors	File Name	Default Value
1 .. 365 (1 .. 0x016D)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

G_day_of_end_DST: The day number of the end of summer time – DST.
 1-January has number 0. 31-December, in a non-leap year, has number 364.
 31-December in a leap year has number 365.

Field	Measurement	Field Type Category	Field Size
G_day_of_end_DST	Gregorian Calendar Day of End DST	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 365	1	Day	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 365 (0 .. 0x016D)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

J_day_of_end_DST: The day number of the start of summer time – DST.
 1-January has number 1. 31-December has always number 365. 29-February is
 always skipped, such that 1-March is always day-number 60.

Field	Measurement	Field Type Category	Field Size
J_day_of_end_DST	Julian Calendar Day of End DST	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
1 .. 365	1	Day	N/A
Raw Range	Scale Factors	File Name	Default Value
1 .. 365 (1 .. 0x016D)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

month_of_start_DST: Month of start DST.

Field	Measurement	Type Category	Type Size
month_of_start_DST	Month of Start DST	Unsigned Bitfield	4 bits (offset 0)
Valid Type Range	Type Resolution	Units	Invalid Value
1 .. 12	1	Month Number	N/A
Raw Range	Scale Factors	File Name	Default Value
1 .. 12 (1 .. 0xC)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

week_of_start_DST: 5 means the last week in the month.

Field	Measurement	Type Category	Type Size
week_of_start_DST	Week of Start DST	Unsigned Bitfield	3 bits (offset 4)
Valid Type Range	Type Resolution	Units	Invalid Value
1 .. 5	1	Week Number	N/A
Raw Range	Scale Factors	File Name	Default Value
1 .. 5	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

dateday_of_start_DST: Day of week.

Field	Measurement	Field Type Category	Field Size
dateday_of_start_DST	days_of_week_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
days_of_week_t	1	N/A	DAY_NUL
Raw Range	Scale Factors	File Name	Default Value
days_of_week_t	N/A	SNVT_DT.H	N/A

month_of_end_DST: Month of end DST.

Field	Measurement	Type Category	Type Size
month_of_end_DST	Month of End DST	Unsigned Bitfield	4 bits (offset 0)
Valid Type Range	Type Resolution	Units	Invalid Value
1 .. 12	1	Month Number	N/A
Raw Range	Scale Factors	File Name	Default Value
1 .. 12 (1 .. 0xC)	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

week_of_end_DST: 5 means the last week in the month.

Field	Measurement	Type Category	Type Size
week_of_end_DST	Week of End DST	Unsigned Bitfield	3 bits (offset 4)
Valid Type Range	Type Resolution	Units	Invalid Value
1 .. 5	1	Week Number	N/A
Raw Range	Scale Factors	File Name	Default Value
1 .. 5	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

dateday_of_end_DST: Day of week.

Field	Measurement	Field Type Category	Field Size
dateday_of_end_DST	days_of_week_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
days_of_week_t	1	N/A	DAY_NUL
Raw Range	Scale Factors	File Name	Default Value
days_of_week_t	N/A	SNVT_DT.H	N/A

Example 1:

```
SNVT_time_zone           TimeZone;

// Definition of time zone for Prague, Czech Republic,
local time = GMT + TimeZone.second_time_offset
```

```

s32_from_ascii("3600",
&(TimeZone.second_time_offset));

// Definition of type of description of time zone
TimeZone.type_of_description = CAL_MEU;

// Definition of time of start and end of DST -> 02:00:00
TimeZone.hour_of_start_DST = 2;
TimeZone.minute_of_start_DST = 0;
TimeZone.second_of_start_DST = 0;
TimeZone.hour_of_end_DST = 2;
TimeZone.minute_of_end_DST = 0;
TimeZone.second_of_end_DST = 0;

// Definition of date of start DST - Sunday of 4 week
in March
TimeZone.start_DST.M_start_DST.month_of_start_DST = 3;
TimeZone.start_DST.M_start_DST.week_of_start_DST = 4;
TimeZone.start_DST.M_start_DST.dateday_of_start_DST =
0;

// Definition of date of end DST - Sunday of 4 week in
September
TimeZone.end_DST.M_end_DST.month_of_end_DST = 9;
TimeZone.end_DST.M_end_DST.week_of_end_DST = 4;
TimeZone.end_DST.M_end_DST.dateday_of_end_DST = 0;

```

Example 2:

```

// Definition of time zone for country X, that has
start DST in every year 30. March and end of DST 1.
September
s32_from_ascii("-36000",
&(TimeZone.second_time_offset));

// Definition of type of description of time zone
TimeZone.type_of_description =CAL_JUL ;

// Definition of time of start and end of DST -> 02:00:00
TimeZone.hour_of_start_DST = 2;
TimeZone.minute_of_start_DST = 0;
TimeZone.second_of_start_DST = 0;
TimeZone.hour_of_end_DST = 2;
TimeZone.minute_of_end_DST = 0;
TimeZone.second_of_end_DST = 0;

// Definition of day of start DST - 30. March
TimeZone.start_DST.J_day_of_start_DST = 89;

// Definition of day of end DST - 1. September
TimeZone.end_DST.J_day_of_end_DST =244;

```

Example 3:

```

// Definition of time zone for country Y, that has
start DST in the not leap year 20. February and end of
DST 1. September.

```

```

// In the leap year has start DST 20. February and end
of DST 31. August
s32_from_ascii("-56000",
&(TimeZone.second_time_offset));

// Definition of type of description of time zone
TimeZone.type_of_description =CAL_GREG ;

// Definition of time of start and end of DST -> 02:00:00
TimeZone.hour_of_start_DST = 2;
TimeZone.minute_of_start_DST = 0;
TimeZone.second_of_start_DST = 0;
TimeZone.hour_of_end_DST = 2;
TimeZone.minute_of_end_DST = 0;
TimeZone.second_of_end_DST = 0;

// Definition of day of start DST - 20. February
TimeZone.start_DST.G_day_of_start_DST = 50;

// Definition of day of end DST - 1. September - not leap year,
leap year 31. August
TimeZone.end_DST.G_day_of_end_DST = 243;

```

SNVT_tod_event (128)

Occupancy Scheduling Event

SNVT Index	Measurement	Type Category	Type Size
128	Time of day event	Structure	4 bytes

```

typedef struct {
    occup_t          current_state;
    occup_t          next_state;
    unsigned long    time_to_next_state;
}SNVT_tod_event

```

current_state: Occupancy, current

Field	Measurement	Field Type Category	Field Size
current_state	occup_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
occup_t	1	N/A	OC_NUL
Raw Range	Scale Factors	File Name	Default Value
occup_t	N/A	SNVT_OC.H	N/A

next_state: Occupancy, next

Field	Measurement	Field Type Category	Field Size
next_state	occup_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
occup_t	1	N/A	OC_NUL
Raw Range	Scale Factors	File Name	Default Value
occup_t	N/A	SNVT_OC.H	N/A

time_to_next_state: Time to next state

Field	Measurement	Field Type Category	Field Size
time_to_next_state	Time to Next State	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 65,535	1	Minute of Hour	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,535 (0 .. 0xFFFF)	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

SNVT_trans_table (96)

Translation

A translation table is defined by two of sets network variables of type SNVT_trans_table; one for the X axis, and one for the Y axis.

The point seven-element array contains a single axis of translation values, represented as IEEE754 single-precision floating-point values (compatible with the Neuron C Extended Arithmetic float_type type). The point values in the network variable for the X axis must be monotonically increasing. The interp_pts_m_to_n fields specify the type of interpolation to be used between the indicated pair of point elements. The values in these fields are defined with the interp_t enumeration type, and may be IP_LINEAR or IP_CUBIC_SPLINE.

If more than one pair of network variables of type SNVT_trans_table are present in a functional block, the interp_pts_6_to_0 field specifies the type of interpolation to be used between point 6 of this table, and point 0 of the subsequent table (in order of X point value).

A SNVT_IP.H header file is available for Neuron C applications. There are no direct enumeration references to this file by any SNVT, including SNVT_trans_table. The interp_pts_m_to_n fields are bitfields, and therefore do not reference interp_t, though their interpretation is the same as of the values defined by interp_t.

SNVT Index	Measurement	Type Category	Type Size
96	Translation Table	Structure	30 bytes

```
typedef struct {
    float_type    point[7];
    unsigned      interp_pts_0_to_1  : 2;  // offset 0
    unsigned      interp_pts_1_to_2  : 2;  // offset 2
    unsigned      interp_pts_2_to_3  : 2;  // offset 4
    unsigned      interp_pts_3_to_4  : 2;  // offset 6
    unsigned      interp_pts_4_to_5  : 2;  // offset 0
    unsigned      interp_pts_5_to_6  : 2;  // offset 2
    unsigned      interp_pts_6_to_0  : 2;  // offset 4
    /* The last two bits (offset 6) are not defined
    */
} SNVT_trans_table;
```

point[7]: Points

Field	Measurement	Field Type Category	Field Size
point[7]	Axis-points Array	Floating Point Array	28 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-3.40282E38 .. 3.40282E38	N/A	N/A	NaN
Raw Range	Scale Factors	File Name	Default Value
IEEE 754	N/A	N/A	N/A

interp_pts_0_to_1: Interpolation method for point 0 to point 1. 0 means Linear.
1 means Cubic Spline.

Field	Measurement	Type Category	Type Size
interp_pts_0_to_1	interp_t	Unsigned Bitfield	2 bits (offset 0)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	3
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

interp_pts_1_to_2: Interpolation method for point 1 to point 2. 0 means Linear.
1 means Cubic Spline.

Field	Measurement	Type Category	Type Size
interp_pts_1_to_2	interp_t	Unsigned Bitfield	2 bits (offset 2)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	3
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

interp_pts_2_to_3: Interpolation method for point 2 to point 3. 0 means Linear.
1 means Cubic Spline.

Field	Measurement	Type Category	Type Size
interp_pts_2_to_3	interp_t	Unsigned Bitfield	2 bits (offset 4)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	3
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

interp_pts_3_to_4: Interpolation method for point 3 to point 4. 0 means Linear.
1 means Cubic Spline.

Field	Measurement	Type Category	Type Size
interp_pts_3_to_4	interp_t	Unsigned Bitfield	2 bits (offset 6)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	3
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

interp_pts_4_to_5: Interpolation method for point 4 to point 5. 0 means Linear.
1 means Cubic Spline.

Field	Measurement	Type Category	Type Size
interp_pts_4_to_5	interp_t	Unsigned Bitfield	2 bits (offset 0)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	3
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

interp_pts_5_to_6: Interpolation method for point 5 to point 6. 0 means Linear.
1 means Cubic Spline.

Field	Measurement	Type Category	Type Size
interp_pts_5_to_6	interp_t	Unsigned Bitfield	2 bits (offset 2)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	3
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

interp_pts_6_to_0: Interpolation method for point 6 to point 0 of the next table (if any). 0 means Linear. 1 means Cubic Spline.

Field	Measurement	Type Category	Type Size
interp_pts_6_to_0	interp_t	Unsigned Bitfield	2 bits (offset 4)
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 1	1	N/A	3
Raw Range	Scale Factors	File Name	Default Value
0 .. 1	1, 0, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

SNVT_turbidity (143)

Turbidity

Used to communicate with water-clarity measuring devices (turbidimeters). SNVT_turbidity can be used to represent ranges associated with drinking water. Units of this variable are NTU (Nephelometric Turbidity Units), which are 1-to-1 equivalent to FNU (Formazin Nephelometric Units), and FTU (Formazin Turbidity Units).

SNVT Index	Measurement	Type Category	Type Size
143	Turbidity	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 65,534	0.001	Nephelometric Turbidity Units (NTU)	65,535 (0xFFFF)
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,534 (0 .. 0xFFFF)	1, -3, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

SNVT_turbidity_f (144)

Turbidity

Used to communicate with water-clarity measuring devices (turbidimeters). SNVT_turbidity_f can be used to represent ranges associated with industrial applications (e.g., typical measurements may be from 0 to 10000 NTU). Units of this variable are NTU (Nephelometric Turbidity Units), which are 1-to-1 equivalent to FNU (Formazin Nephelometric Units), and FTU (Formazin Turbidity Units).

SNVT Index	Measurement	Type Category	Type Size
144	Turbidity	Floating Point	4 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 3.40282E38	N/A	Nephelometric Turbidity Units (NTU)	NaN
Raw Range	Scale Factors	File Name	Default Value
IEEE 754	N/A	N/A	N/A

SNVT_valve_mode (163)

Valve Mode

Used for heating, ventilation, and air-conditioning applications. This network variable type defines and indicates the working mode of valves.

SNVT Index	Measurement	Type Category	Type Size
163	valve_mode_t	Enumeration	1 byte
Valid Type Range	Type Resolution	Units	Invalid Value
valve_mode_t	1	N/A	VALVE_NUL
Raw Range	Scale Factors	File Name	Default Value
valve_mode_t	N/A	SNVT_VAL.H	N/A

SNVT_vol (41)

Volume

SNVT Index	Measurement	Type Category	Type Size
41	Volume	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 6553.5	0.1	Liters (l)	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,535 (0 .. 0xFFFF)	1, -1, 0 $S = a \cdot 10^{b \cdot (R+c)}$	N/A	N/A

SNVT_vol_f (65)

Volume

SNVT Index	Measurement	Type Category	Type Size
65	Volume	Floating Point	4 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 3.40282E38	N/A	Liters (l)	NaN
Raw Range	Scale Factors	File Name	Default Value
IEEE 754	N/A	N/A	N/A

SNVT_vol_kilo (42)

Volume

SNVT Index	Measurement	Type Category	Type Size
42	Volume	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 6553.5	0.1	Kiloliters (kl)	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,535 (0 .. 0xFFFF)	1, -1, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

SNVT_vol_mil (43)

Volume

SNVT Index	Measurement	Type Category	Type Size
43	Volume	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 6553.5	0.1	Milliliters (ml)	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,535 (0 .. 0xFFFF)	1, -1, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

SNVT_volt (44)

Electric Voltage

SNVT Index	Measurement	Type Category	Type Size
44	Electric Voltage	Signed Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-3276.8 .. 3276.7	0.1	Volts (V)	N/A
Raw Range	Scale Factors	File Name	Default Value
-32,768 .. 32,767 (0x8000 .. 0x7FFF)	1, -1, 0 $S = a * 10^b * (R+c)$	N/A	N/A

SNVT_volt_ac (138)

Voltage in Alternating Current

Used to represent voltages (absolute or differential) that need a large range, rather than a fine resolution.

SNVT Index	Measurement	Type Category	Type Size
138	Electric Voltage	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 65,534	1	Volts, Alternating Current (VAC)	65,535 (0xFFFF)
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,534 (0x8000 .. 0xFFFE)	1, 0, 0 $S = a * 10^b * (R+c)$	N/A	N/A

SNVT_volt_dbmv (45)

Electric Voltage

SNVT Index	Measurement	Type Category	Type Size
45	Electric Voltage	Signed Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-3276.8 .. 3276.7	0.1	Decibels-milliVolts, Direct Current (dBmV)	N/A
Raw Range	Scale Factors	File Name	Default Value
-32,768 .. 32,767 (0x8000 .. 0x7FFF)	1, -1, 0 $S = a * 10^b * (R+c)$	N/A	N/A

SNVT_volt_f (66)

Electric Voltage

SNVT Index	Measurement	Type Category	Type Size
66	Electric Voltage	Floating Point	4 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-3.40282E38 .. 3.40282E38	N/A	Volts (V)	NaN
Raw Range	Scale Factors	File Name	Default Value
IEEE 754	N/A	N/A	N/A

SNVT_volt_kilo (46)

Electric Voltage

SNVT Index	Measurement	Type Category	Type Size
46	Electric Voltage	Signed Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-3276.8 .. 3276.7	0.1	Kilovolts (kV)	N/A
Raw Range	Scale Factors	File Name	Default Value
-32,768 .. 32,767 (0x8000 .. 0x7FFF)	1, -1, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

SNVT_volt_mil (47)

Electric Voltage

SNVT Index	Measurement	Type Category	Type Size
47	Electric Voltage	Signed Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-3276.8 .. 3276.7	0.1	Millivolts (mV)	N/A
Raw Range	Scale Factors	File Name	Default Value
-32,768 .. 32,767 (0x8000 .. 0x7FFF)	1, -1, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

SNVT_zerospan (85)

Zero and Span

Used to represent a linear transformation on fixed-point data. Linear transformation parameters: multiply by the span-factor, then add the zero-term..

SNVT Index	Measurement	Type Category	Type Size
85	Zero and Span	Structure	4 bytes

```
typedef struct {
    signed long          zero;
    unsigned long       span;
} SNVT_zerospan;
```

zero: Zero-term

Field	Measurement	Field Type Category	Field Size
zero	Zero-term	Signed Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
-163.840 .. 163.835	0.005	Percent (%) or Parts-per-Million (ppm)	N/A
Raw Range	Scale Factors	File Name	Default Value
-32,768 .. 32,767 (0x8000 .. 0x7FFF)	5, -3, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A

span: Span-factor

Field	Measurement	Field Type Category	Field Size
span	Span-factor	Unsigned Long	2 bytes
Valid Type Range	Type Resolution	Units	Invalid Value
0 .. 32.7675	0.0005	Percent (%) or Parts-per-Million (ppm)	N/A
Raw Range	Scale Factors	File Name	Default Value
0 .. 65,535 (0 .. 0xFFFF)	5, -4, 0 $S = a \cdot 10^b \cdot (R+c)$	N/A	N/A