Version 11 Revision 2
May 2002
SNVT Master List

LONMARK®
SNVT Master List

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Contents

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 11 of the LONMARK resource files. New SNVTs are added in numerical order. The following table shows the number of SNVTs defined in this and earlier versions of the resource files.

Resource File Version	***SNVT IDs Defined***
7	1 – 114
8	1 – 122
9	1 – 135
10	1 – 145
11	1 – 166

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	
Raw Range	**Scale Factors**	**File Name**	**Default Value**
16,384 .. 64,767 (0 .. 0xFFFE)	1, 0, 0 $S = a*10^{b}*(R+c)$	N/A	N/A

SNVT_alarm (88)

Alarm Status

This is used as an output network variable within a Node Object to report alarm status.

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	
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

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	
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

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	
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	
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	
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	
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	
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	
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	
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	
Raw Range	**Scale Factors**	**File Name**	**Default Value**
0 .. 999 (0 .. 0x03E7)	1, 0, 0 $S = a*10^b*(R+c)$	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 $S = a*10^{b}*(R+c)$	N/A	N/A

```
typedef struct {
   char;
   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_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	
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_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 .. 0xFFFE)	1, 0, 0 $S = a*10^{b}*(R+c)$	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	
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	
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_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 $S = a*10^{b}*(R+c)$	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	
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 .. 0xFFFE)	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	
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_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	
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_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 $S = a*10^{b}*(R+c)$	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;
       unsigned  run_enabled      :1;
       unsigned  local            :1;
       unsigned  limited          :1;
       unsigned  chw_flow         :1;
       unsigned  condw_flow       :1;
   } 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	
Raw Range	**Scale Factors**	**File Name**	**Default Value**
0 .. 1	1, 0, 0 $S = a*10^{b}*(R+c)$	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	
Raw Range	**Scale Factors**	**File Name**	**Default Value**
0 .. 1	1, 0, 0 $S = a*10^{b}*(R+c)$	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	
Raw Range	**Scale Factors**	**File Name**	**Default Value**
0 .. 1	1, 0, 0 $S = a*10^{b}*(R+c)$	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	
Raw Range	**Scale Factors**	**File Name**	**Default Value**
0 .. 1	1, 0, 0 $S = a*10^{b}*(R+c)$	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	
Raw Range	**Scale Factors**	**File Name**	**Default Value**
0 .. 1	1, 0, 0 $S = a*10^{b}*(R+c)$	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	
Raw Range	**Scale Factors**	**File Name**	**Default Value**
0 .. 1	1, 0, 0 $S = a*10^{b}*(R+c)$	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*	
Raw Range	**Scale Factors**	**File Name**	**Default Value**
0 .. 1000 (0 .. 0x03E8)	1, -1, 0 $S = a*10^{b}*(R+c)$	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*	
Raw Range	**Scale Factors**	**File Name**	**Default Value**
-2000 .. 2000 (0xF830 .. 0x07D0)	1, -1, 0 $S = a*10^{b}*(R+c)$	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*	
Raw Range	**Scale Factors**	**File Name**	**Default Value**
-2000 .. 2000 (0xF830 .. 0x07D0)	1, -1, 0 $S = a*10^{b}*(R+c)$	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	
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	
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 $S = a*10^b*(R+c)$	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 $S = a*10^b*(R+c)$	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	
Raw Range	**Scale Factors**	**File Name**	**Default Value**
0; 1 .. 50; 51 .. 200 (0, 1 .. 0x32, 0x33 .. 0xC8)	1, 0, 0 $S = a*10^b*(R+c)$	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 (129)

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 contoller_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 .. 0xFFFE)	1, 0, 0 $S = a*10^b*(R+c)$	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 .. 0xFFFE)	1, 0, 0 $S = a*10^b*(R+c)$	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 .. 0xFFFE)	1, 0, 0 $S = a*10^b*(R+c)$	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 .. 0xFFFE)	1, 0, 0 $S = a*10^b*(R+c)$	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	
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

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	
Raw Range	**Scale Factors**	**File Name**	**Default Value**
-2,147,483,648 .. 2,147,483,647 (0x80000000 .. 0x7FFFFFFF)	1, 0, 0 $S = a*10^b*(R+c)$	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_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/m³: kilograms per cubic meter	
Raw Range	**Scale Factors**	**File Name**	**Default Value**
0 .. 65,535 (0 .. 0xFFFF)	5, -1, 0 $S = a*10^{b}*(R+c)$	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/m³)	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_earth_pos (87)

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	
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	
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	1 byte
Valid Type Range	**Type Resolution**	**Units**	**Invalid Value**
1 .. 59.999	0.001	Minutes	255 (0xFF)
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 $S = a*10^b*(R+c)$	N/A	N/A

longitude_min: Longitude minutes

Field	Measurement	Field Type Category	Field Size
longitude_min	Longitude Minutes	Unsigned Long	1 byte
Valid Type Range	**Type Resolution**	**Units**	**Invalid Value**
1 .. 59.999	0.001	Minutes	255 (0xFF)
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

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 $S = a*10^{b}*(R+c)$	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	Hours	
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	
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	
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	
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_l 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	
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_l (146)

Electricity

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

For new designs, SNVT_elec_kwh_l 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	0x7FFFFFFF (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	
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_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_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)	0x7FFF (32767)
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	
Raw Range	**Scale Factors**	**File Name**	**Default Value**
0 .. 256 (0 .. 0xFF)	1, 0, 0 $S = a*10^b*(R+c)$	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	
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	
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	
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	
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	
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 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	
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

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	
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	
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	
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	
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	
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	
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	
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	
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	
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	
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	
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	
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	
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	
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	
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	
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

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	
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	
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	
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	
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	
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	
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	
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	
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	
Raw Range	**Scale Factors**	**File Name**	**Default Value**
0 .. 127 (0 .. 0x7F)	1, 0, 0 $S = a*10^{b}*(R+c)$	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 .. 0xFFFE)	1, 0, 0 $S = a*10^{b}*(R+c)$	N/A	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)	
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_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 (m³/h)	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_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	
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_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	
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	
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_GFI.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/m²)	
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_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/ m²)	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_overrid;
```

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 $S = a*10^{b}*(R+c)$	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 $S = a*10^{b}*(R+c)$	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                    mode;
  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: 1 means the unit is in the 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 .. 1	1	Boolean	
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

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)	
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_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)	
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_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)	
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_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)	
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	
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 $S = a*10^{b}*(R+c)$	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	
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_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	
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	
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	
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	
Raw Range	**Scale Factors**	**File Name**	**Default Value**
0 .. 0	1, 0, 0 $S = a*10^{b}*(R+c)$	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	
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_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)	
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_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	
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_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)	
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_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	
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

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 $S = a*10^b*(R+c)$	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	
Raw Range	**Scale Factors**	**File Name**	**Default Value**
0 .. 65,535	5, -4, 0 $S = a*10^b*(R+c)$	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 $S = a*10^{b}*(R+c)$	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 (-1; 0xFFFF)
Raw Range	**Scale Factors**	**File Name**	**Default Value**
nv_type_category_t	N/A	snvt_nvt.h	NVT_CAT_NUL (-1; 0xFFFF)

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	
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

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	
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

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	
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	
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	
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	
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	
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_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	
Raw Range	**Scale Factors**	**File Name**	**Default Value**
0 .. 1	1, 0, 0 $S = a*10^{b}*(R+c)$	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	
Raw Range	**Scale Factors**	**File Name**	**Default Value**
0 .. 1	1, 0, 0 $S = a*10^{b}*(R+c)$	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	
Raw Range	**Scale Factors**	**File Name**	**Default Value**
0 .. 1	1, 0, 0 $S = a*10^{b}*(R+c)$	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	
Raw Range	**Scale Factors**	**File Name**	**Default Value**
0 .. 1	1, 0, 0 $S = a*10^{b}*(R+c)$	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	
Raw Range	**Scale Factors**	**File Name**	**Default Value**
0 .. 1	1, 0, 0 $S = a*10^{b}*(R+c)$	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	
Raw Range	**Scale Factors**	**File Name**	**Default Value**
0 .. 1	1, 0, 0 $S = a*10^{b}*(R+c)$	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	
Raw Range	**Scale Factors**	**File Name**	**Default Value**
0 .. 1	1, 0, 0 $S = a*10^{b}*(R+c)$	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	
Raw Range	**Scale Factors**	**File Name**	**Default Value**
0 .. 1	1, 0, 0 $S = a*10^{b}*(R+c)$	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	
Raw Range	**Scale Factors**	**File Name**	**Default Value**
0 .. 1	1, 0, 0 $S = a*10^{b}*(R+c)$	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	
Raw Range	**Scale Factors**	**File Name**	**Default Value**
0 .. 1	1, 0, 0 $S = a*10^{b}*(R+c)$	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	
Raw Range	**Scale Factors**	**File Name**	**Default Value**
0 .. 1	1, 0, 0 $S = a*10^{b}*(R+c)$	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	
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	
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	
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	
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	
Raw Range	**Scale Factors**	**File Name**	**Default Value**
0 .. 1	1, 0, 0 $S = a*10^b*(R+c)$	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	
Raw Range	**Scale Factors**	**File Name**	**Default Value**
0 .. 1	1, 0, 0 $S = a*10^b*(R+c)$	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	
Raw Range	**Scale Factors**	**File Name**	**Default Value**
0 .. 1	1, 0, 0 $S = a*10^b*(R+c)$	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	
Raw Range	**Scale Factors**	**File Name**	**Default Value**
0 .. 1	1, 0, 0 $S = a*10^b*(R+c)$	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	
Raw Range	**Scale Factors**	**File Name**	**Default Value**
0 .. 0	1, 0, 0 $S = a*10^{b}*(R+c)$	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	
Raw Range	**Scale Factors**	**File Name**	**Default Value**
-32,768 .. 32,766 (0x8000 .. 0x7FFE)	1, -3, 0 $S = a*10^{b}*(R+c)$	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 $S = a*10^b*(R+c)$	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	0xFFFF (65,535)
Raw Range	**Scale Factors**	**File Name**	**Default Value**
1 .. 65,534 (1 .. 0xFFFE)	1, 0, 0 $S = a*10^b*(R+c)$	N/A	N/A

controller_id: 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	
Raw Range	**Scale Factors**	**File Name**	**Default Value**
0; 1 .. 50; 51 .. 200 (0, 1 .. 0x32, 0x33 .. 0xC8)	1, 0, 0 $S = a*10^b*(R+c)$	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 $S = a*10^{b}*(R+c)$	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	(0x7FFF) 32,767
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

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	(0x7FFF) 32,767
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

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 $S = a*10^{b}*(R+c)$	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)	
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_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	
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)	
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	
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 .. 0xFFFE)	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	
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	
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	
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	
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	
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**
-32768 .. 32,766	1	Pascals	32,767 (0x7FFF)
Raw Range	**Scale Factors**	**File Name**	**Default Value**
-32,768 .. 32,766 (0x8000 .. 0x7FFE)	1, 0, 0 $S = a*10^{b}*(R+c)$	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 of 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	
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

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	
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	
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 {
   unsigned long  rotational_speed;       //SNVT_freq_hz
   unsigned long  body_temperature;       //SNVT_temp
   unsigned long  motor_external_temperature;
                                          //SNVT_temp
   unsigned long  motor_internal_temperature;
                                          //SNVT_temp
   boolean_t      motor_overloaded;
   boolean_t      oil_level_low;
   boolean_t      phase_imbalance_detected;
   signed long    current_usage;          //SNVT_amp
   unsigned long  power_usage;
                                          //SNVT_power_kilo
   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	65,535 (0xFFFF)
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	65,535 (0xFFFF)
Raw Range	**Scale Factors**	**File Name**	**Default Value**
0 .. 65,534 (0 .. 0xFFFE)	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	65,535 (0xFFFF)
Raw Range	**Scale Factors**	**File Name**	**Default Value**
0 .. 65,534 (0 .. 0xFFFE)	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_tempe rature	Temperature	Unsigned Long	2 bytes
Valid Type Range	**Type Resolution**	**Units**	**Invalid Value**
-274.0 .. 6279.4	0.1	Degrees Celsius	65,535 (0xFFFF)
Raw Range	**Scale Factors**	**File Name**	**Default Value**
0 .. 65,534 (0 .. 0xFFFE)	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	32,767 (0x7FFF)
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	65,535 (0xFFFF)
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

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	2 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)	65,535 (0xFFFF)
Raw Range	**Scale Factors**	**File Name**	**Default Value**
0 .. 65,534 (0 .. 0xFFFE)	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	65,535 (0xFFFF)
Raw Range	**Scale Factors**	**File Name**	**Default Value**
0 .. 65,534 (0 .. 0xFFFE)	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	32,767 (0x7FFF)
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	32,767 (0x7FFF)
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	32,767 (0xFFFF)
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

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)	65,535 (0xFFFF)
Raw Range	**Scale Factors**	**File Name**	**Default Value**
0 .. 65,534 (0 .. 0xFFFE)	1, 0, 0 $S = a*10^b*(R+c)$	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_activ e	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	
Raw Range	**Scale Factors**	**File Name**	**Default Value**
-20,000 .. 20,000 (0XB1E0 .. 0x4E20)	5, -5, 0 $S = a*10^{b}*(R+c)$	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	
Raw Range	**Scale Factors**	**File Name**	**Default Value**
-2,147,483,648 .. 2,147,483,647 (0x80000000 .. 0x7FFFFFFF)	1, 0, 0 $S = a*10^{b}*(R+c)$	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	
Raw Range	**Scale Factors**	**File Name**	**Default Value**
0 .. 7	1, 0, 0 $S = a*10^{b}*(R+c)$	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

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:

Singular, enumerated	*Mask, bitmapped*	*Description*
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 $S = a*10^{b}*(R+c)$	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	
Raw Range	**Scale Factors**	**File Name**	**Default Value**
0 .. 7	1, 0, 0 $S = a*10^{b}*(R+c)$	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	
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

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	
Raw Range	**Scale Factors**	**File Name**	**Default Value**
0 .. 1	1, 0, 0 $S = a*10^{b}*(R+c)$	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)	
Raw Value	**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_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 (kΩ)	
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_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 $S = a*10^{b}*(R+c)$	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	
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

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	
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	
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 .. 0xFFFE)	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 .. 0xFFFE)	1, -1, 0 $S = a*10^{b}*(R+c)$	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	
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

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	
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: 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 $S = a*10^{b}*(R+c)$	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	
Raw Range	**Scale Factors**	**File Name**	**Default Value**
0 .. 5000 (0 .. 0x1388)	1, -3, 0 $S = a*10^{b}*(R+c)$	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)	
Raw Range	**Scale Factors**	**File Name**	**Default Value**
-32768 .. 32767 (0x8000 .. 0x7FFF)	1, -2, 0 $S = a*10^{b}*(R+c)$	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)	
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_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)	
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	
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 bit15	boolean_t	Unsigned Bitfield	1 bit x 64
Valid Type Range	**Type Resolution**	**Units**	**Invalid Value**
0 .. 1	1	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_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	
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

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	
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

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	
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		
value (raw)	***state***	***2-state interpretation***
any	0	off (0; 0)
0	1	off (0; 1)
>0	1	on (200; 1)
any	-1 (0xFF)	invalid (no action)

Output Network Variable		
value (raw)	***state***	***2-state interpretation***
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	
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

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 $S = a*10^{b}*(R+c)$	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 -274ºC. 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	
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 ºC to ºF, if needed. This conversion requires a 32ºF 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 $S = a*10^{b}*(R+c)$	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 $S = a*10^{b}*(R+c)$	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	
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_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	
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	
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	
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	
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	
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 .. 0xFFFE)	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	
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	
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	
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	
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	Second	Unsigned Short	1 byte
Valid Type Range	**Type Resolution**	**Units**	**Invalid Value**
0 .. 59	1	Second of Minute	
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

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	
Raw Range	**Scale Factors**	**File Name**	**Default Value**
-2,147,483,648 .. 2,147,483,647 (0x80000000 .. 0x7FFFFFFF)	1, 0, 0 $S = a*10^{b}*(R+c)$	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	
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	
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	
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	
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	
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	
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	
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	
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	
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	
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	
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	
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	
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_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	
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_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	
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_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;
   unsigned                interp_pts_1_to_2     : 2;
   unsigned                interp_pts_2_to_3     : 2;
   unsigned                interp_pts_3_to_4     : 2;
   unsigned                interp_pts_4_to_5     : 2;
   unsigned                interp_pts_5_to_6     : 2;
   unsigned                interp_pts_6_to_0     : 2;
} 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 $S = a*10^{b}*(R+c)$	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 $S = a*10^{b}*(R+c)$	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 $S = a*10^b*(R+c)$	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 $S = a*10^{b}*(R+c)$	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)	
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_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)	
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_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)	
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_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)	
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)	
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)	
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_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)	
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_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)	
Raw Range	**Scale Factors**	**File Name**	**Default Value**
-32,768 .. 32,767 (0x8000 .. 0x7FFF)	5, -3, 0 $S = a*10^{b}*(R+c)$	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)	
Raw Range	**Scale Factors**	**File Name**	**Default Value**
0 .. 65,535 (0 .. 0xFFFF)	5, -4, 0 $S = a*10^{b}*(R+c)$	N/A	N/A