LONMARK®
Functional Profile:
Clothes Washer, Domestic

SFPTclothesWasherDomestic

Overview

This document describes the Functional Profile of a Whitegoods' Home Clothes Washer (drum & pulsator type) functional block.

This functional block is to fit both drum type & pulsator type washer, which is widely used in the marketplace.

Before start, we should understand networked whitegoods (including washer):

First, whitegoods are mostly part of a home control network, and powerline channel is used as the communication media.

Second, it requires a lot of information together to manage these appliances. For example, the washer needs to know all the options regarding Wash, Rinse, Spin, & Dry processes before starting to operate. The complete set of commands is necessary to properly manage the washer.

To deliver enough information through the narrow-bandwidth channel, data should be well optimized. This profile has been written to achieve this goal.

In the real world, complete commands for a washer will come mostly from a home gateway or home server. Therefore, putting all of the information into one NV is practical.

Implementer's notes:

This profile does not follow conventions of CECED. AHAM specifications were considered in the creation of this profile in terms of expressly required data but not the format established by AHAM.

This profile is based on the drum-type washer but also accommodates the pulsator-type washer.
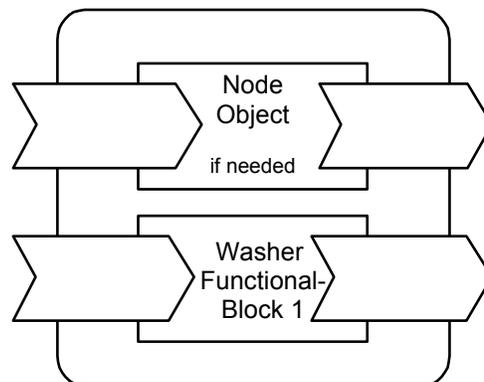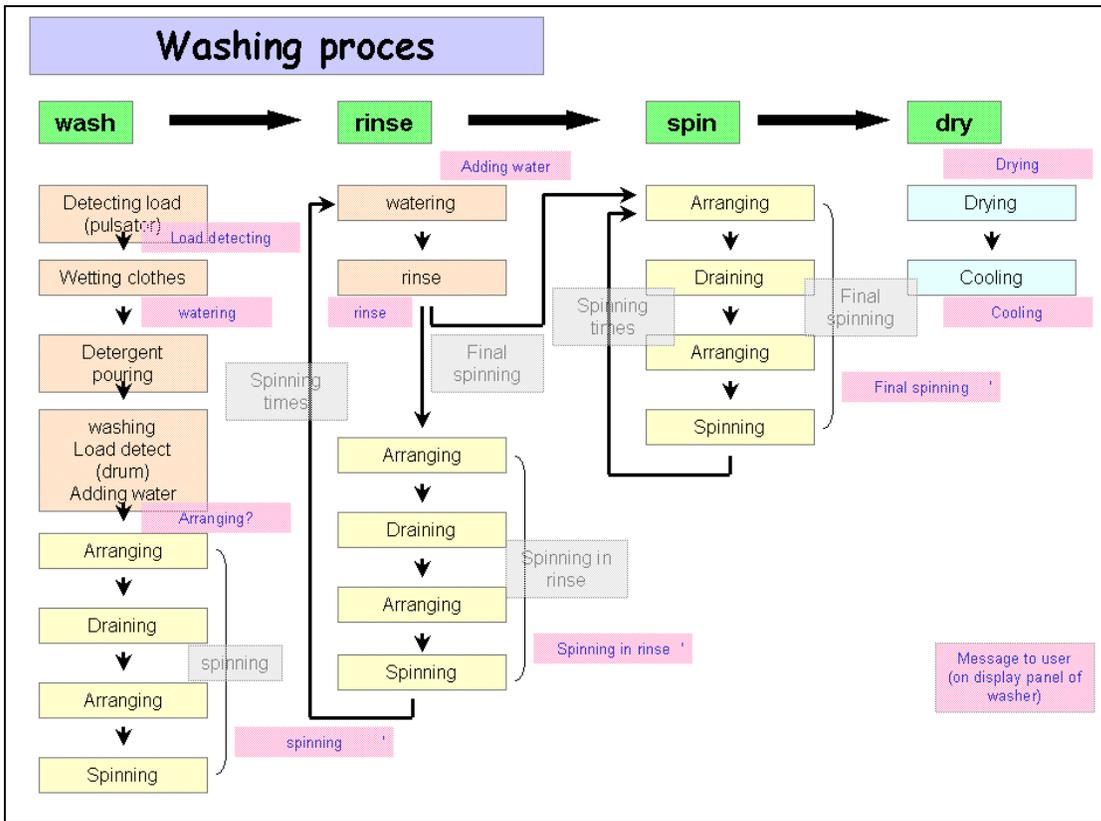

Figure 1 Device Concept

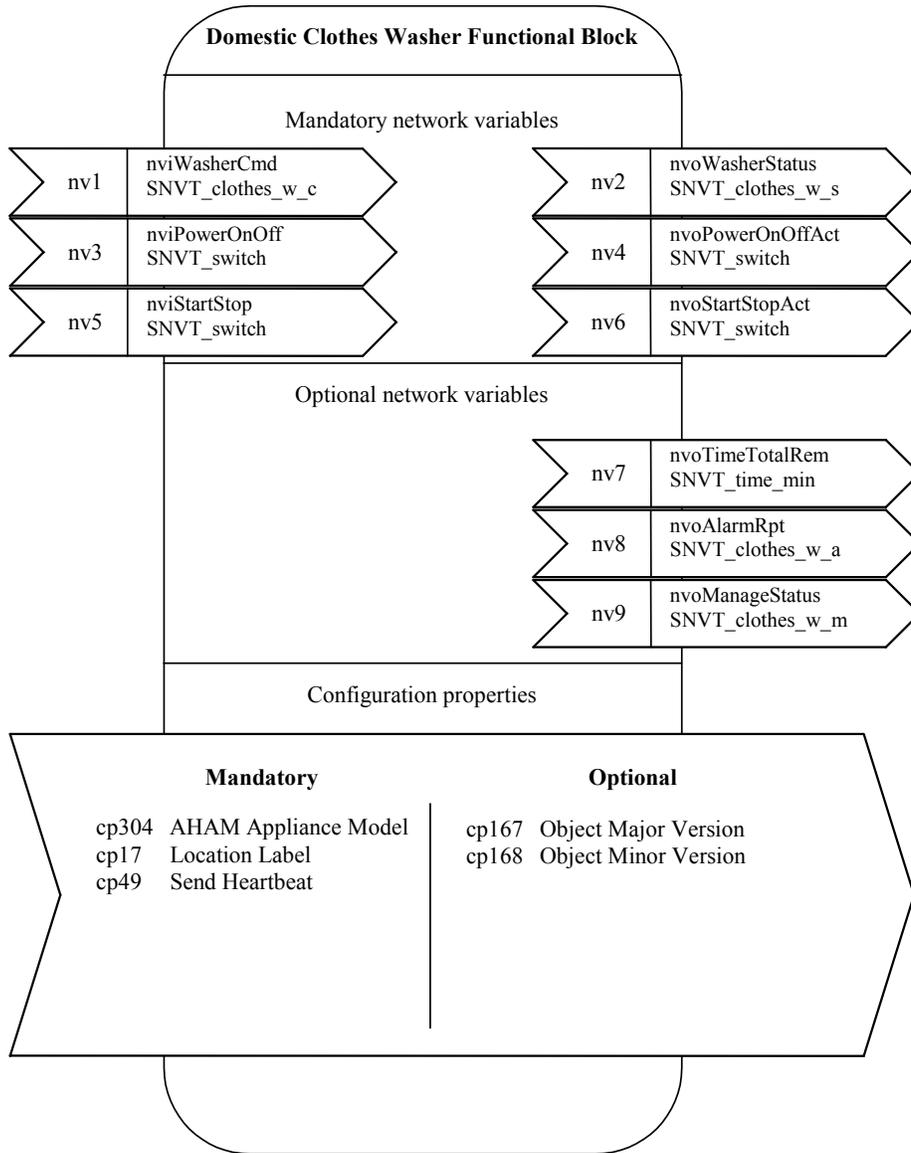**Figure 2** Washing Process

Functional-Block Details

Figure 3 Functional-Block Details

Table 1 SNVT Details

NV # (M/O)*	Variable Name	SNVT Name	SNVT Index	Description
1 (M)	nviWasherCmd	SNVT_clothes_w_c	184	Washer Command Input
2 (M)	nvoWasherStatus	SNVT_clothes_w_s	186	Washer Status Output
3 (M)	nviPowerOnOff	SNVT_switch	95	Power On/Off Input
4 (M)	nvoPowerOnOffAct	SNVT_switch	95	Power On/Off Report Output
5 (M)	nviStartStop	SNVT_switch	95	Washing Start/Stop Input
6 (M)	nvoStartStopAct	SNVT_switch	95	Washing Start/Stop Report Output
7 (O)	nvoTimeTotalRem	SNVT_time_min	123	Total Time Remaining Output
8 (O)	nvoAlarmRpt	SNVT_clothes_w_a	187	Alarm-Status Report Output
9 (O)	nvoManageStatus	SNVT_clothes_w_m	185	Washer-Management Status Output

* M = mandatory, O = optional

Table 2 SCPT Details

Man Opt *	SCPT Name NV Name Type or SNVT	SCPT Index	Associated NVs **	Description
Man	SCPTahamApplianceModel nciApplianceMod aham_appl_t	304	Entire Functional Block	Used to provide the AHAM-specified appliance model information of a device
Man	SCPTlocation nciLocation SNVT_str_asc (36)	17	Entire Functional Block	Used to provide physical location of the functional block, or of the device
Man	SCPTmaxSendTime nciMaxSendTime SNVT_time_sec (107)	49	Entire Functional Block	Maximum period of time that expires before the NVs will automatically update their values
Opt	SCPTobjMajVer nciObjMajVer unsigned short	167	Entire Functional Block	Defines the major version number of the functional block
Opt	SCPTobjMinVer nciObjMinVer unsigned short	168	Entire Functional Block	Defines the minor version number of the functional block

*   "Man" = mandatory, "Opt" = optional.
     It should be Mandatory for CPs that are Mandatory for an NV that is also Mandatory. This is also valuable for CPs that apply to the Entire Functional Block.

**   List of NVs to which this configuration property applies.
     An "(M)" means that the CP is Mandatory if the NV (to which it applies) is implemented. An "(O)" means that the CP is Optional if the NV (to which it applies) is implemented.

Mandatory Network Variables

Washer Command — Input

```
network input sd_string("@p|1") SNVT_clothes_w_c
nviWasherCmd;
```

This input network variable contains all required information to control the washer. For example, when starting to wash clothes, the cycle type, plus the wash, rinse, spin, and dry options should be selected before actual starting of the washer. This network variable contains these data.

Valid Range

The range of SNVT_clothes_w_c.

Default Value

None specified.

Configuration Considerations

None specified.

Washer Status — Output

```
network output sd_string("@p|2") bind_info(unackd)
SNVT_clothes_w_s nvoWasherStatus;
```

This input network variable contains the present status of the washer. It then the information contained in SNVT_clothes_w_c, plus cycle/sub-cycle information, alarm conditions, and timing information.

Valid Range

The range of SNVT_clothes_w_s.

Default Value

Default value is APPL_CWC_NUL. This value will be adopted at power-up.

Configuration Considerations

This network variable is subject to the send heartbeat time: nciMaxSendTime.

When Transmitted

The output variable is transmitted:

- ❑ When the value has changed by what the manufacturer considers significant.

- ❑ Regularly at the interval defined by the configuration property nciMaxSendTime.

Default Service Type

The default service type is unacknowledged.

Power On/Off — Input

```
network input sd_string("@p|3") SNVT_switch
nviPowerOnOff;
```

Commands the washer to turn-on or turn-off. The mode of Off is such that the network interface remains active to receive inputs. The extent of the Off mode for the other functions of the washer are manufacturer-specific.

Valid Range

The range and rules of a two-state SNVT_switch.

Default Value

None specified.

Configuration Considerations

None specified.

Power On/Off Report — Output

```
network input sd_string("@p|3") bind_info(unackd)
SNVT_switch nviPowerOnOff;
```

Commands the washer to turn-on or turn-off. The mode of Off is such that the network interface remains active to receive inputs. The extent of the Off mode for the other functions of the washer are manufacturer-specific.

Valid Range

The range and rules of a two-state SNVT_switch.

Default Value

NULL.

Configuration Considerations

This network variable is subject to the send heartbeat time: nciMaxSendTime.

When Transmitted

The output variable is transmitted:

- ❑ When the value has changed by what the manufacturer considers significant.
- ❑ Regularly at the interval defined by the configuration property nciMaxSendTime.

Default Service Type

The default service type is unacknowledged.

Washing Start/Stop — Input

```
network input sd_string("@p|3") SNVT_switch
nviStartStop;
```

Commands the washer to begin or halt the programmed/commanded cycle.

Valid Range

The range and rules of a two-state SNVT_switch, where TRUE is to Start operations and FALSE is to Stop operations.

Default Value

None specified.

Configuration Considerations

None specified.

Washing Start/Stop Report — Output

```
network input sd_string("@p|3") bind_info(unackd)
SNVT_switch nviPowerOnOff;
```

Reports the washer's actual state of operation.

Valid Range

The range and rules of a two-state SNVT_switch, where TRUE is represents that it is presently in use, performing operations. FALSE represents that the washer is presently in a ready state, awaiting commands but not presently performing operations.

Default Value

NULL.

Configuration Considerations

This network variable is subject to the send heartbeat time: nciMaxSendTime.

When Transmitted

The output variable is transmitted:

- ❑ When the value has changed by what the manufacturer considers significant.

- ❑ Regularly at the interval defined by the configuration property nciMaxSendTime.

Default Service Type

The default service type is unacknowledged.

Optional Network Variables

Total Time Remaining — Output

```
network output sd_string("@p|7") bind_info(unackd)
SNVT_time_min nvoTimeTotalRem;
```

This output network variable provides the total remaining time before the entire wash process is complete.

Valid Range

The valid range of SNVT_time_min.

Default Value

Default value is 0x0 (no time remaining). The value will be adopted at power-up.

Configuration Considerations

This network variable is subject to the send heartbeat time: nciMaxSendTime.

When Transmitted

The output variable is transmitted:

- ❑ When the value has changed by what the manufacturer considers significant.

- ❑ Regularly at the interval defined by the configuration property nciMaxSendTime.

Default Service Type

The default service type is unacknowledged.

Alarm-Status Report — Output

```
network output sd_string("@p|8") bind_info(unackd)
SNVT_clothes_w_a nvoAlarmRpt;
```

This output network variable provides duplicate information of the alarm field of nvoWasherStatus.

Valid Range

The valid range of SNVT_clothes_w_a.

Default Value

None specified.

Configuration Considerations

This network variable is subject to the send heartbeat time: nciMaxSendTime.

When Transmitted

The output variable is transmitted:

- ❑ When the value has changed by what the manufacturer considers significant.
- ❑ Regularly at the interval defined by the configuration property nciMaxSendTime.

Default Service Type

The default service type is unacknowledged.

Washer-Management Status — Output

```
network output sd_string("@p|9") bind_info(unackd)
SNVT_clothes_w_m nvoManageStatus;
```

This output network variable provides the status of the door/lid and the drain.

Valid Range

The valid range of SNVT_clothes_w_m.

Default Value

None specified.

Configuration Considerations

This network variable is subject to the send heartbeat time: nciMaxSendTime.

When Transmitted

The output variable is transmitted:

- ❑ When the value has changed by what the manufacturer considers significant.
- ❑ Regularly at the interval defined by the configuration property nciMaxSendTime.

Default Service Type

The default service type is unacknowledged.

Configuration Properties

AHAM Appliance Model (Mandatory)

```
config network input sd_string("&1,p,0\x84,304")
aham_appl_t nciApplianceMod;
```

This configuration property is used to provide the appliance model of the device as specified by the USA-based Association of Home Appliance Manufacturers (AHAM).

Valid Range

The valid range of SCPTahamApplianceModel.

Default Value

The default value is AHAM_CLOTHES_WASHER.

Configuration Requirements/Restrictions

This CP is a constant (const_flg). It is not to be modified except that it is allowable to modify the value in a download of new code to the device.

SCPT Reference

SCPTahamApplianceModel (304)

Location Label (Mandatory)

```
config network input sd_string("&1,p,0\x80,17")
SNVT_str_asc nciLocation;
```

This configuration property can be used to provide the location of the functional block (or device), where p is the functional-block index. The above code declaration is for providing the <u>location of the functional block</u>.

If it is preferred, the <u>location of the device</u> can be represented with the following code declaration **only if no Node Object functional block exists on the device**; otherwise, the Location Label from the Node Object should be used to represent the location of the device:

```
config network input sd_string("&0,,0\x80,17")
SNVT_str_asc nciLocation;
```

Valid Range

Any NULL-terminated ASCII string up to 31 bytes of total length (including NULL). The string must be truncated if the length does not allow the 31st character to be the NULL (0x00).

Default Value

The default value is an ASCII string containing 31 NULLs (0x00).

Configuration Requirements/Restrictions

This CP has no modification restrictions (no_restrictions). It can be modified at any time.

SCPT Reference

SCPTlocation (17)

Send Heartbeat (Mandatory)

```
config network input sd_string("&1,p,0\x80,49")
SNVT_time_sec nciMaxSendTime;
```

This input configuration property sets the maximum period of time that can expire before the functional block will automatically update all output network variables.

Whether the CP is associated with any NVs that are not explicitly stated in this profile, can be defined by the manufacturer.

Valid Range

The valid range is 0.0 to 3600.0 seconds.

Values outside this range are invalid and will disable the automatic update mechanism. A value of zero (0) will be used for the internal timer in cases where configured values are above 3600.0 seconds. If a value of 0.0 is used it will disable the automatic update mechanism.

Default Value

The default value is 0.0 (no automatic update).

Configuration Requirements/Restrictions

This CP has no modification restrictions (no_restrictions). It can be modified at any time.

SCPT Reference

SCPTmaxSendTime (49)

Object Major Version (Optional)

```
config network input sd_string("&1,p,0\x84,167")
unsigned short nciObjMajVer;
```

This configuration property can be used to provide the major version number of the functional block when implemented on a device.

Valid Range

Any integer number from 0 to 255. Only 1-byte of information is accepted.

Default Value

The default value is one (1).

Configuration Requirements/Restrictions

This CP is a Constant (const_flg).

The Constant flag means that all devices with the same Standard Program Identifier (SPID) will have the same value, while the Device-Specific flag attribute means that devices with an identical SPID may have different values for this configuration property.

The presence of these configuration properties within the functional block defines the major version and minor version of the functional block. The major version number must be incremented when the network interface for the functional block changes, while the minor version number must be incremented when the network interface remains the same, but the functional block has a different behavior.

SCPT Reference

SCPTobjMajVer (167)

Object Minor Version (Optional)

```
config network input sd_string("&1,p,0\xA4,168")
unsigned short nciObjMinVer;
```

This configuration property can be used to provide the minor version number of the functional block when implemented on a device.

Valid Range

Any integer number from 0 to 255. Only 1-byte of information is accepted.

Default Value

The default value is zero (0).

Configuration Requirements/Restrictions

This CP has modification restrictions of Constant (const_flg) and Device-Specific (device_specific_flg): \xA4. It is not to be modified except that it *is* allowable to modify the value in a download of new code to the device.

The Constant flag means that all devices with the same Standard Program Identifier (SPID) will have the same value, while the Device-Specific flag attribute means that devices with an identical SPID may have different values for this configuration property.

The presence of these configuration properties within the functional block defines the major version and minor version of the functional block. The major version number must be incremented when the network interface for the functional block changes, while the minor version number must be incremented when the network interface remains the same, but the functional block has a different behavior.

SCPT Reference

SCPTobjMinVer (168)

Key for Unresolved References

p is this functional block's index relative to the Device Self-Documentation String (DSDS) declaration, when implemented in the device.

Data Transfer

None specified.

Power-up State

There is no immediate network action on Power-up State.

Boundary and Error Conditions

None specified.

Additional Considerations

None specified.