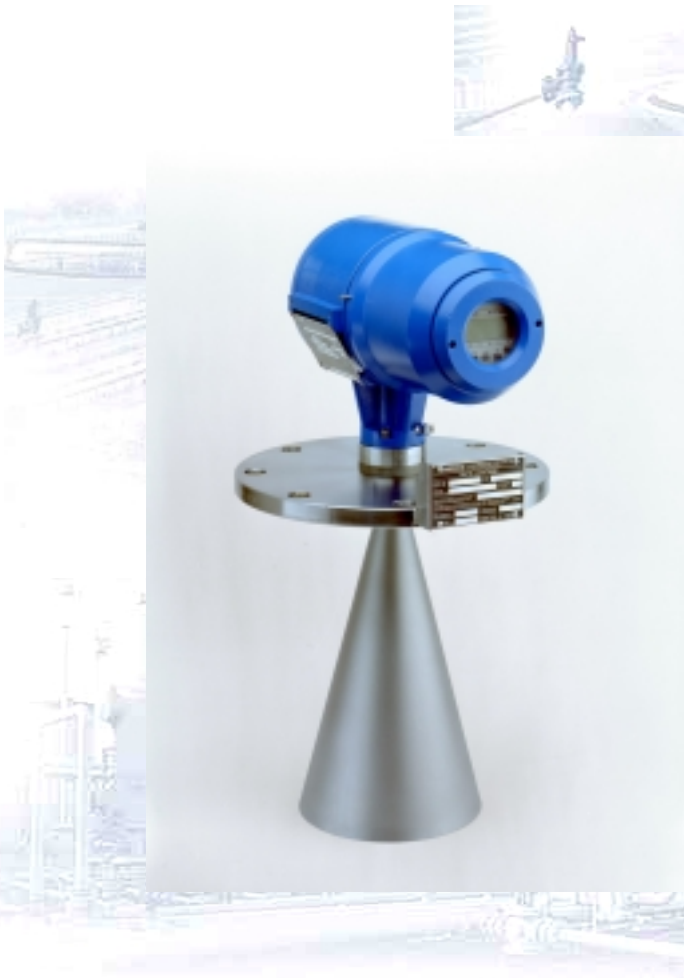


Remote Operation Instructions

HART Communicator 275
Asset Management Solutions (AMS)



BM 70 A/P, BM 700, BM 702



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1 General Information

The BM 70 A/P, BM 700, BM 702 are all the two-wire transmitters with 4..20mA current output and HART® capability.

General characteristics of the BM70 X HART® interface:

- Multidrop Mode is supported.
- Burst Mode is not supported.

Electrical connection (point-to-point or multidrop): refer to sections 4.1 – 4.4 of the „*Installation and Operating Instructions. BM 70 A/P, BM 700, BM 702*“.

1.1 Configuring Instruments for Multidrop

There are differences in configuring instruments for multidrop mode from remote or via device local keypad.

- If the instrument is entering multidrop via HART® interface (any application can be used), i.e. its bus address is changed from '0' to any allowed, then all the necessary operation with the instrument current output are done automatically (by the HART® transmitter).
- If the instrument local keypad is used, the user must manually carry out the three assignments:
 1. Set the desirable bus address (Fct. 3.3.6),
 2. Set the current output range to "4 – 20 mA" (Fct. 3.3.2),
 3. Switch the current output function to "Off" (Fct. 3.3.1) and store configuration.

2 IDs and Revision numbers

The HART Device Descriptions described in this document have the following IDs and revision numbers:

Manufacturer ID:	69 (0x45)
Device Type:	249 (0xF9)
Device Revision:	11 (0x0B)
DD Revision:	2
HART Universal Revision:	5
HC 275 OS Revision:	≥ 4.9
AMS Version:	≥ 5.0

For information about Transmitter Revisions and related Device Descriptions refer to the KROHNE HART Device List.

3 Implementation Peculiarities

As for all previous BM 70 X DD revisions there are some implementation peculiarities, caused by either restrictions of the DDL / AMS or introduced deliberately – to restrict the usage/access to some device functionality.

The list of implementation peculiarities/restrictions follows:

- The values in the *Service* menu are generally set by Krohne or possibly by the Service technician, and remain unchanged in operation. The user should not have access to these values. Therefore the service data is made inaccessible for offline device configuration (it is open for live device provided the user is capable to get authorization as specialist).
- The *Conversion Table* is excluded from offline data for HC275 whilst for AMS it is possible to configure it offline.
- The BM 70 A/P /700 /702 HART® transmitter interacts with the instrument mastering SW via special interface functions. Their actual set impose some display-related restrictions: functions *Test Display* (2.1.2 – tests the HW of the display) and *Display Firmware* (2.4.2) are not supported by the HART® interface. Besides, the complete display submenu (3.2) is left out (i.e. is not maintained by the instrument HART® application layer) – the local instrument user might configure the display settings without any impact on the remote HART® bus master. Hence one important consequence must be pointed out: the units for measurements on HC275 screens/AMS faceplates coincide with the ones for configuration parameters (say, for 'Level' measurements – with the units for 'Tank height', 'Block distance', etc.) but not with the ones that are set via display menu (3.2.2, 3.2.3). If the user

due to any reason (say, for testing purposes) wants these units to be same, he can either “equalize” them from remote (*Configuration/Test* ⇄ *Installation* ⇄ *Display* ⇄ *Unit length/Unit conversion* for HC275 or “*Process Input*” configuration tab for AMS) or from the device keypad (functions 3.2.2/3.2.3).

4 HART Communicator 275 (HC275)

4.1 Installation

The HC275 has to be programmed with the BM 70 A/P /700 /702 HART Device Description. Otherwise the HC275 user will work with the instrument as a generic one thus losing opportunity for entire instrument control.

4.2 Operating

Refer to the BM 70 A/P /700 /702 Menu Tree HC275 (Attachment A).

The online help of each parameter contains its function number as a reference to the device’s local display and the “Installation and Operating Instructions”.

Parameter protection via passwords (Entry Code, Service Code) is the same as on local display. Please refer to the online help for valid symbols according to device’s keypad.

The BM 70 X operation via HC275 is made quite close to the manual instrument control via keypad. The differences follows:

- The instrument write protection (parameters “Entry Code 1”, “Code 1”, menu items 3.4.2, 3.4.3 of the „*Installation and Operation Instructions. BM 70 A/P, BM 700, BM 702*”) is changed via invocation of “Entry Code” method (item 3 ⇄ 1 of the HC275 Menu Tree).
- To “open” service functionality the user has to register as specialist. To do this, one should invoke the “Service Code” method (item 3 ⇄ 2 of the HC275 Menu Tree) and enter the correct service password. After the HC275 is switched off (or the same method is invoked with improper service password) specialist authorization is lost, and all service parameters/functions (trim PV current DAC zero/gain) again become inaccessible.
- For additional details refer to the “*HART® Smart Communications Protocol. BM70 A/P /700 /702 Level Radar. Transmitter-Specific Command Specification*”.

While saving “Standard” configuration to HC275 from connected instrument, some crucial service variables (refer to section 3) are also stored. Hence in the offline mode their values cannot be changed (and will not be sent to device), but are shown to HC275 user and control assignments for maintenance data.

In case “Full (for PC)” configuration is stored in Communicator, only the maintenance parameters (refer to section 3) can be edited via HC275 in offline mode. However, when such configuration is changed offline (within the maintenance part) and stored in Communicator, it is possible to transfer it (later on) complete (with service data!) to AMS (excluding conversion table - refer to section 3).

4.3 Known HC275 (4.9) Shortcomings

- When the “Save” operation is activated with the “Full (for PC)” data type chosen, HC275 loops forever attempting to retrieve instrument Service Data. The loop can be avoided if the user has registered as specialist in advance. With alternative data type (“Standard”) such preliminary registration is not necessary.
- The same is true when the “Send” option is selected for “Full (for PC)” configuration. After such data “transfer” is cancelled by disconnection of Communicator (no other way is possible), the preserved configuration might be damaged (then the HC275 user is prompted ‘No configurations stored’ in case ‘twas the sole configuration in Communicator).

5 Asset Management Solutions (AMS)

5.1 Installation

If the BM 70 A/P /700 /702 Device Description is not already installed on the AMS System a so called *Installation Kit BM 70 A/P /700 /702 HART AMS* is needed (available on floppy disk from KROHNE or as download from KROHNE Internet page).

For installing the DD with the Installation Kit refer to the “AMS User's Guide” section 3: “Managing HART Devices” / “Adding new Device Types to AMS” / “Install Device Types Manually”.

5.2 Operating

Refer to the BM70 A/P /700 /702 Menu Tree AMS (Attachment B).

Due to AMS requirements and conventions the BM 70 X operation differs a little from operation with HC275 and via local keypad.

The online help of each parameter contains its function number as a reference to the device's local display and the “Installation and Operating Instructions”.

Parameter protection via passwords (Entry Code, Service Code) is the same as on local display. Please refer to the online help for valid symbols according to device's keypad.

Some additional comments follow:

- To “open” service functionality the user has to register as specialist. To do this, one should invoke the “Service Code” method from the *Device Context Menu* and enter the correct service password. Note, that after the *Device Connection View* is reopen (or the same method is invoked with improper service password) specialist authorization is lost, and all service parameters/functions (trim PV current DAC zero/gain) again become inaccessible.
- Opposed to the HC275, handling of Conversion Table via AMS is carried out directly from the three configuration displays. Due to transmitter implementation peculiarities some steps should be sequentially undertaken to create or change the table. The matter is that all the changes in table elements are initially accumulated in instrument RAM. The trigger event that launches the table's burning into EEPROM, is Command #141 (Write Conversion Table Point Number) that deals with a single parameter, being the ‘Number of points’ variable (configuration display “Strap Table, 1-20”). Just this command initiates the check of complete table and in case ‘twas successful – activates the burning procedure. Worth noting that as soon as every table point depends on the ‘Number of points’ variable (in terms of VALIDITY clause), the latter is always written to instrument before the points’ set. Hence while augmenting table the user can be prompted “Error ‘Table not monotonous’ happened writing ‘Number of points’”. Only after this response the table (changed elements) is copied to the instrument RAM. To burn it into EEPROM one have to “change” again the number (say, 10 to 10, or 4 to 4) and press ‘Apply’ again. All the commentaries above can be summarized as follows:
 1. If the number of points is changed (with or without changes of the table contents), the user should ignore the first possible error response after pressing ‘Apply’ (‘Table not monotonous’ happened writing ‘Number of points’), “change” the number of points again to desirable one (i.e. reenter exactly the same value) and again press ‘Apply’.
 2. If the number of points is preserved but some table items are changed, the user should press ‘Apply’ (thus transferring changed items to device), then reenter the number of points (as above) and press ‘Apply’ again - otherwise the updated point(s) will be “in play” until the first power reset.
- While transferring configurations (various transfer types are possible here - between live instruments; some stored configuration and live device; two offline configurations – say, between HC275 and AMS; etc.) one should bear in mind that the ‘Transfer the device configuration’ buttons on the reconcile views (the “<<”, “>>” buttons to the left of “OK”-button) are available only in case the devices/configurations are in one and the same transmitter mode (refer to Attachment C). Otherwise the buttons are grayed and display the mode of corresponding configuration (say, “/0”, “/6” will imply that the left-hand configuration was stored (or corresponds to connected instrument) when device was in ‘0’ mode whilst the right-hand – in ‘6’th. In case of different configurations’ modes only partial transfer is possible when the accessible (not grayed) parameters are transferred individually. Worth noting that “relocatable” parameter set depends on how severe corresponding modes differ. Moreover – the mode-driven restrictions might have some intermediate/secondary effect: say, transfer of enumerator of some “wide” configuration (e.g. any corresponding to BM 70 A) to a “narrow” one (e.g. any of BM 702) can lead to a so-called ‘Unknown enumerator’ situation (when transferred value is replaced with ‘*****’ in configuration-“receiver” due to restrictions of any kind – e.g. “Agitator” setting for ‘Tank type’ is possible only for BM 70 A but not for any other device type/modes). Such wrong enumerators will be (for sure) rejected being applied to a live instrument (i.e. when configuration-receiver is connected device), but are accepted by some preserved configuration (in *User Configurations* view, etc.). Hence it is recommended for the user to use the online help for every transferred parameter in case the two configurations represent different transmitter modes!
- The Dynamic Variables mapping (to the sole/primary current output and the three logical slots) can be controlled for this revision from the “Device/HART” configuration tab. One note should be mentioned here: when the

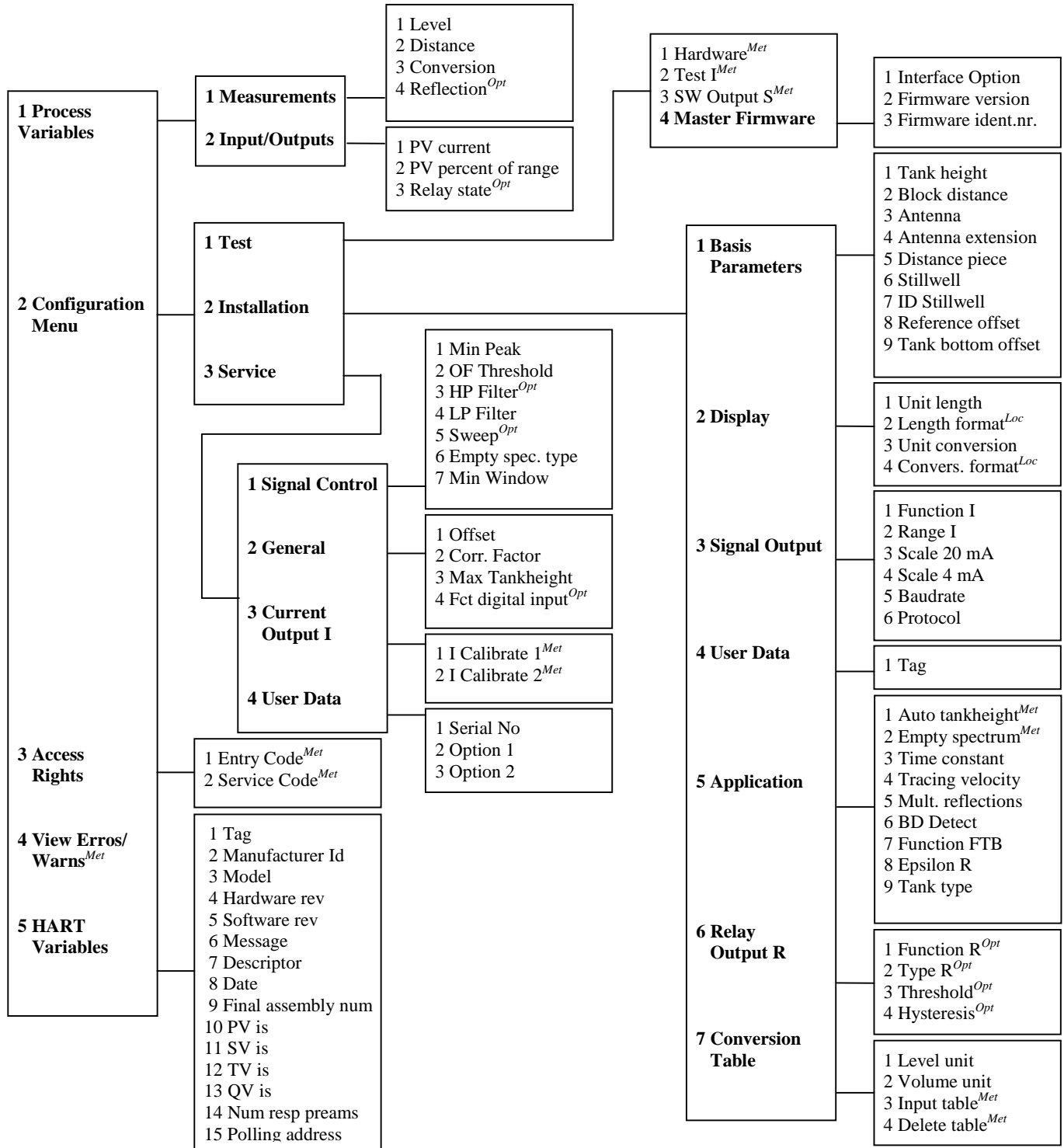
instrument is in multidrop, changing of the 'PV is' value (Primary Variable code) affects only Primary Variable digital value (and corresponding settings) whilst the current output function ('Function I' on the "Analog Output" tab) remains switched "Off". Otherwise - when the instrument has the '0' bus address – changes in Primary Variable assignment are traced at analog output and its function. And vice versa – when the 'Function I' parameter is changed, Primary Variable code is correspondingly changed. The only exclusion here is when the 'Function I' is set to "Off" – then the last meaningful assignment for PV (process variable or status data) is retained.

5.3 Known AMS (5.0) Shortcomings

There are several insignificant shortcomings (all having workarounds) found during trials with AMS. Some of them pertained also to the previous AMS versions, one (last mentioned) is new.

- Losing of the "Service Code". If after registration as specialist (refer to section 4.2), the user does not open the "Configuration Properties" or "Process Variables" window, AMS will lose soon access to service functionality (i.e. the correct service code), and the user will have to undertake the same actions (4.2) to re-establish access rights. In case if any window is already open before the "Service Code" method is invoked, such loss doesn't happen.
- Getting/releasing specialist access initiates a re-read process of the Service data package. And if the service access rights are being changed when the "Service" configuration tab is active, the user is get prompted with the "Error reading <parameter label>: Wrong service password" for every service parameter available on the tab (number depends on device implementation and some additional mutual parameters' dependencies). No boring messages are presented to the user, if any other window (except "Service" configuration tab) is active.
- In case the instrument mode is changed (say, *Conversion Table* is removed), the faceplate (in case it was open) does not reflect/trace the new mode (opposed to configuration tabs) and must be closed/reopen.

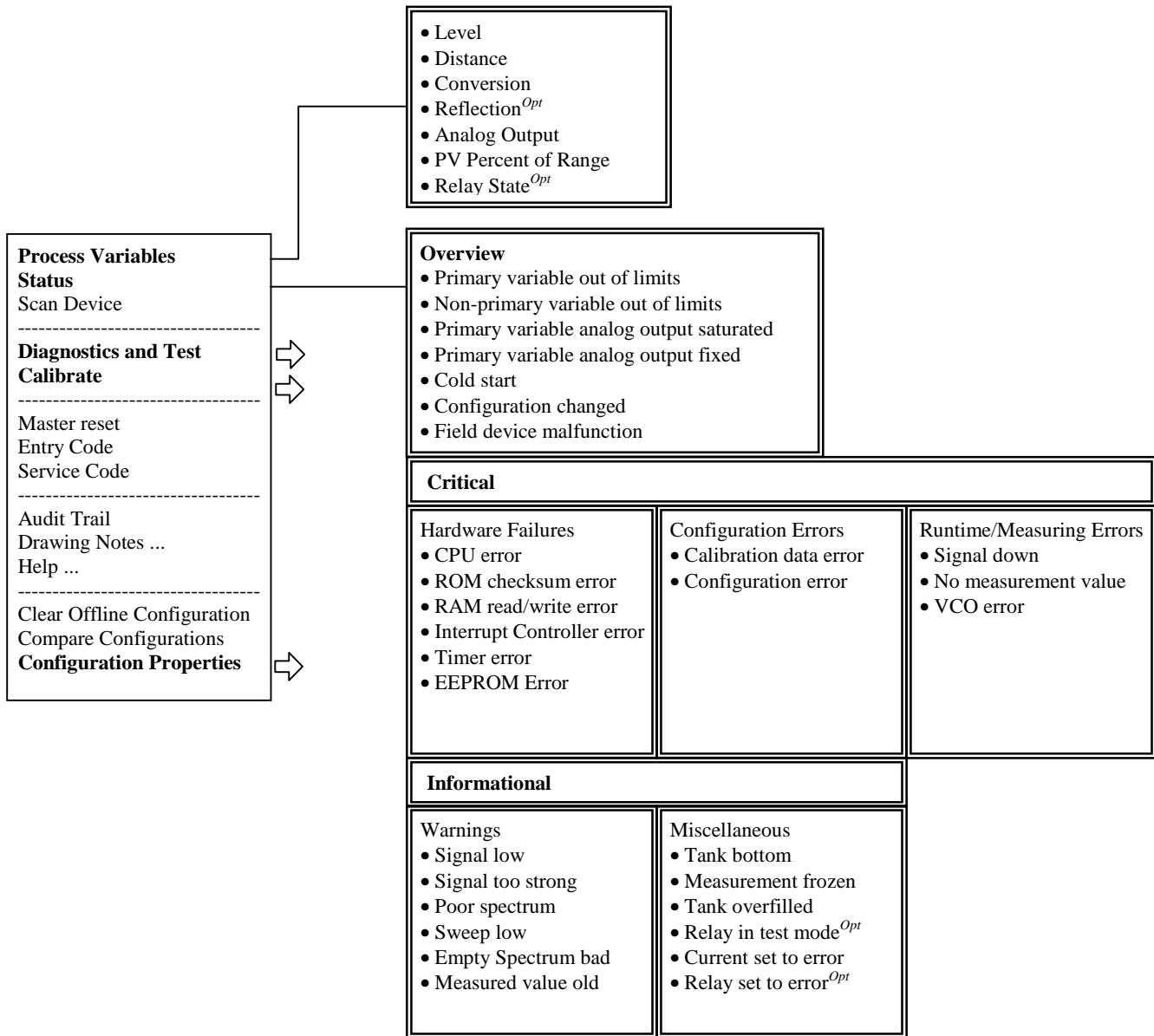
BM 70 A/P /700 /702 Menu Tree HC275



Designations:

- Opt* – Optional item, depends on device implementation;
- Loc* – Local HC275 variable, that is not read/written to instrument;
- Met* – Method is invoked to retrieve/change data.

BM 70 A/P /700 /702 Menu Tree AMS



Designations:

^{Opt} – Optional, depends on device implementation;
 ⇨ – refer to the next page.

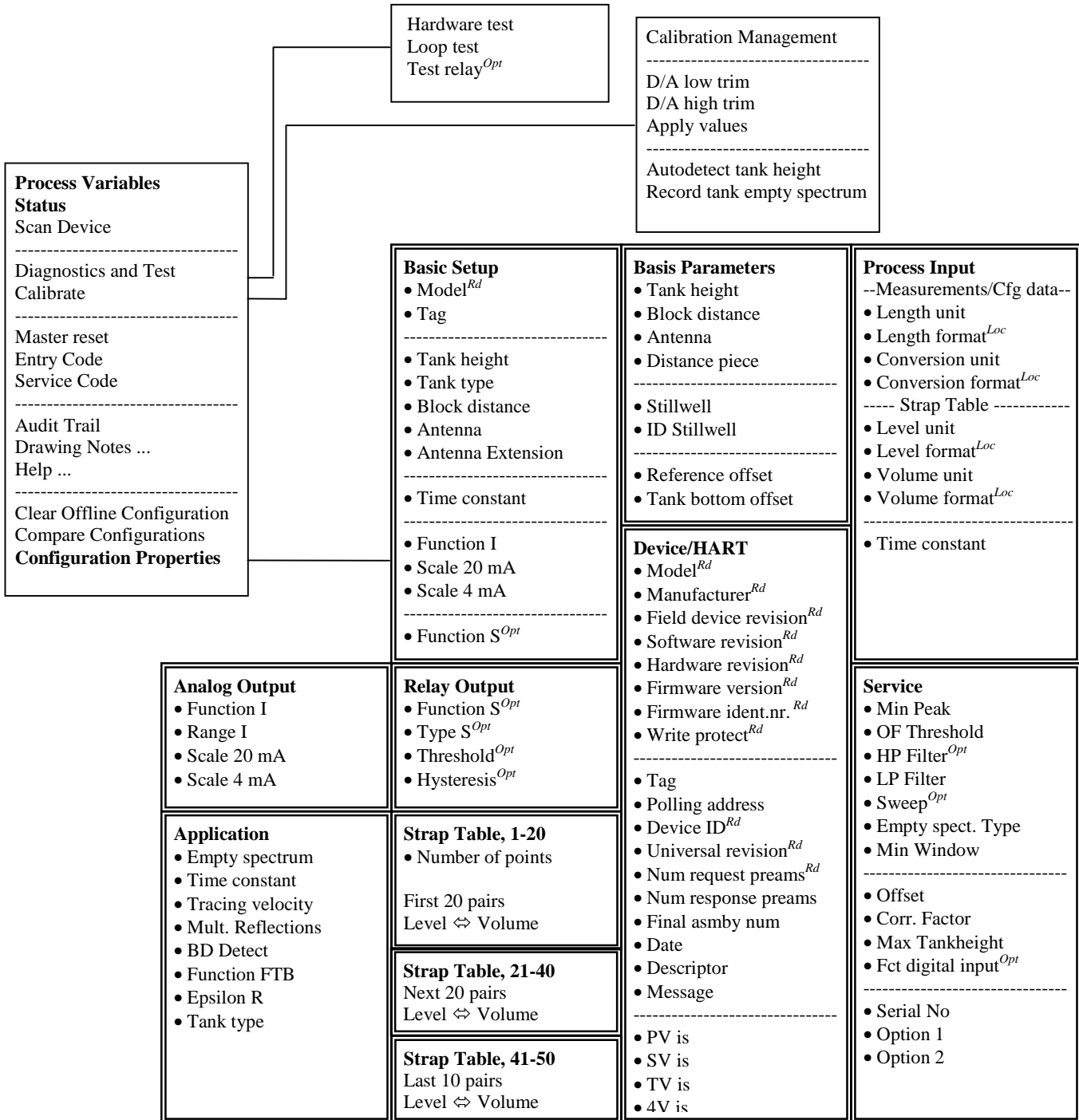
BM 70 A/P /700 /702 Menu Tree AMS

Designations:

Opt – Optional, depends on device implementation;

Rd – Read-only variable;

Loc – Local AMS variable, affects only AMS faceplates and configuration tabs and is not read/written from/to instrument.



Attachment C

AMS Transmitter Modes

AMS device mode number	Hardware	Setting of "PV is" (Primary Variable code)	"Number of Points" (in conversion table)
0	BM70 A, BM70 P	any, except "SW Output S"	> 1
1	BM70 A, BM70 P	only "SW Output S"	> 1
2	BM70 A, BM70 P	any, except "SW Output S"	< 2
3	BM70 A, BM70 P	only "SW Output S"	< 2
4	BM700, BM 702	Any	> 1
6	BM700, BM 702	Any	< 2

NOTE: modes with indices 5 and 7 are never used/invoked for 0x0b02 revision and are therefore excluded from the table.