Technical Information

FLXA402　4 線式液分析計

HART 通信

TI 12A01F01-61JA

目次

YOKOGAWA
横河電機株式会社

TI 12A01F01-61JA
2018.11　初版（YK）
2019.07　2 版（YK）

本書では、FLXA402 4線式液分析計のHART通信について解説しています。パラメータの詳細については、FLXA402 4線式液分析計の取扱説明書　変換器操作編（IM 12A01A03-01JA）に記載されている内容を理解のうえ、HART通信を行ってください。

FLXA402 の最新版の電子マニュアルは、次のサイトからダウンロードできます。
http://www.yokogawa.co.jp/an/flxa402/download/

1. 概要

HART 通信は、4-20 mA DC のアナログ信号に重畳された HART 通信波形を使用し、稼動状態（オンライン）の FLXA402 と設定ツール（※）との相互通信を遠隔で行うものです。
※： 設定ツールには、FieldMate、PRM、HHT 携帯型通信ターミナルなどを用いることができます。
注： HART 通信を行うツールに、FieldMate を使用する場合は、下記に示す Version より新しいものをご使用ください。
【FieldMate】
FieldMate R3.04.00 + Device Files R3.09.00
HART は FIELD COMM GROUP（https://www.fieldcommgroup.org/）の登録商標です。

1.1 DDファイルのダウンロードとインストール

FLXA402 と設定ツール間で HART 通信を行うには、DD（Device Description）ファイルを設定ツールにインストールする必要があります。DD ファイルは、HART 通信の内容や FLXA402 固有のメニュー構成を含んだファイルです。FieldMate には、FieldMate 販売時点における最新の DD ファイルが提供されています。最新の DD ファイルは、以下の URL からダウンロードすることができます（※）。
横河電機 HP : http://www.yokogawa.com/an/download/an-dl-fieldbus-001en.htm
※： URL は予告無く変更されることがあります。上記 URL にアクセスできない場合は、当社各営業拠点またはご購入の代理店にお問い合わせください。

■ FieldMateを使用するには

FieldMate を使用する場合は、Device Files のレビジョンに注意が必要です。

FLXA402とFieldMate、DDのレビジョン対応表

HOUSING ASSY		FieldMate
ソフトウェアレビジョン	機器レビジョン	Device Filesレビジョン
1.01.01 以降	1	R3.09 以降

ソフトウェアレビジョンは、FLXA402 表示器のメイン画面もしくはホーム画面の変換器メニューボタンををタップし、詳細画面（）をタップすると表示し、図 1 の画面で確認することができます。

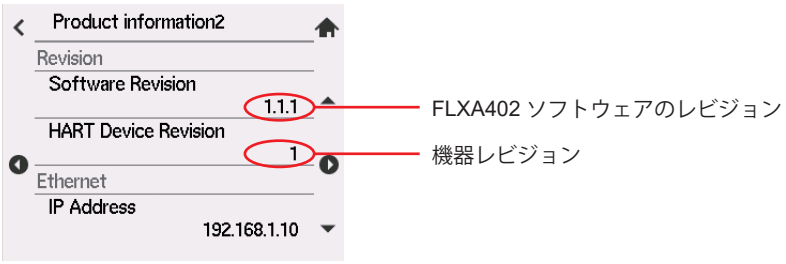


図1　ソフトウェアレビジョンの表示画面

■ DDファイルのインストール

DD ファイルのインストール方法については、お手持ちの設定ツール（FieldMate 等) の取扱説明書を参照してください。
FieldMate R3.04.00+Device Files R3.09.00 をご使用の場合は、DD のインストールは不要です。

■ 接続方法

設定ツールの接続端子と mA1 に設置した 250 Ω以上の負荷抵抗の両端に HART モデムを接続してください。計器室、機器端子箱、伝送ループ内のどの中継端子に対しても接続して使用することができます。

1.2　HART通信の機能

FLXA402 の HART 通信は、エラー（4.7 節）、電流出力（4.3 節）、接点入力（4.2 節）、HART 機能（4.6.2 項）の設定が可能です。センサの設定情報や校正情報は参照のみ可能です。（　）内は、変換器操作編（IM 12A01F01-03JA）の参照項目です。

【メニュー構造と本体側画面との対応】

+– Converter Menu ……本体の Slot 1 の検出器情報を表示
　+– HOLD ……手動 HOLD が可能
　+– WASH ……操作不可
　+– Detail ……参照のみ可能
　+– Trend ……参照不可
　+– Other ……参照不可
　+– Reset ……参照不可
　+– Setting ……ma Output、ma Input、HART 機能の設定変更が可能
　+– Lang ……参照不可
　+– Alarm ……参照可能
+– sensor Menu ……本体の Slot 1 の検出器情報を表示
　+– Detail ……参照のみ可能
　+– Calibration ……実行不可
　+– Reset Wellness ……実行不可
　+– Reset ……実行不可
　+– Setting ……参照のみ可能

1.2.1 マルチドロップモード

マルチドロップモードに設定した機器は、1 本の通信伝送ライン上に複数の HART 通信機器を接続することができます。マルチドロップ通信を有効にするには、機器アドレスを 1 ～ 63 のいずれかに設定してください。

注記

マルチドロップモードで HART 通信を行うには、HART 通信機器に設定する機器アドレスにはユニーク（固有）なポーリングアドレスを設定する必要があります。同じポーリングアドレスを 2 台以上に設定した場合は、正常に通信できません。

マルチドロップモードの解除

マルチドロップモードに設定された機器をマルチドロップモードから解除するには、ポーリングアドレスを 0 に設定してください。

1.2.2 設定の保護機能

スライドスイッチを ON にすると、HART 通信による設定ができなくなります。
出荷時は OFF になっています。
画面で「設定」のパスワードを設定した場合は、HART も設定禁止状態にできます。変換器操作編（IM 12A01F01-03JA）の 1.3 節を参照してください。

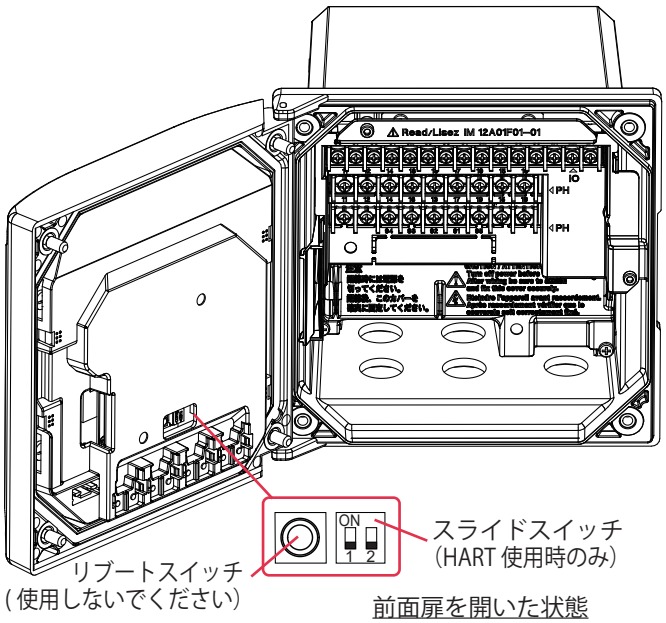


図2 FLXA402 各部の名称

注意

スライドスイッチの 1 が HART 用です。スライドスイッチの 2 は ON にしないでください。

注意

スライドスイッチの設定 / 解除のときに、隣にあるスイッチ（押しボタン）を押さないよう、ご注意ください。

1.2.3 Device Variable Code

FLXA402 の Device Variable Code は、SV から QV の設定または Command 9 で測定値を Read する際に使用します（下表参照）。

Code	Name	PV	SV	TV	QV	
0	AO1 current*1	-	X	X	X	
1	AI	X	X	X	X	
2	Differential pH	X	X	X	X	
3	Differential ORP	X	X	X	X	
4	Differential Conduct	X	X	X	X	
5	Differential Resist	X	X	X	X	
6	Differential DO	X	X	X	X	
7	Average pH	X	X	X	X	
8	Average ORP	X	X	X	X	
9	Average Conduct	X	X	X	X	
10	Average Resist	X	X	X	X	
11	Average DO	X	X	X	X	
12	Ratio	X	X	X	X	
13	Passage	X	X	X	X	
14	Rejection	X	X	X	X	
15	Deviation	X	X	X	X	
16	pH calc	X	X	X	X	
17	Script 1	X	X	X	X	*
18	Script 2	X	X	X	X	*
19	Script 3	X	X	X	X	*
20	Script 4	X	X	X	X	*
21	Script 5	X	X	X	X	*
22	Script 6	X	X	X	X	*
23	Script 7	X	X	X	X	*
24	Script 8	X	X	X	X	*

Code	Name	PV	SV	TV	QV
25	Temp 1-1	X	X	X	X
26	pH 1-1	X	X	X	X
27	ORP 1-1	X	X	X	X
28	rH 1-1	X	X	X	X
29	Sensor mV1 1-1	-	X	X	X
30	Sensor mV2 1-1	-	X	X	X
31	Sensor mV3 1-1	-	X	X	X
32	Conduct1 1-1	X	X	X	X
33	Conduct2 1-1	X	X	X	X
34	Resist1 1-1	X	X	X	X
35	Resist2 1-1	X	X	X	X
36	Concent1 1-1	X	X	X	X
37	Concent2 1-1	X	X	X	X
38	USP 1-1	-	X	X	X
39	Sensor Ohms 1-1	-	X	X	X
40	Oxygen 1-1	X	X	X	X
41	Sensor current 1-1	-	X	X	X

42	Temp 2-1	X	X	X	X
43	pH 2-1	X	X	X	X
44	ORP 2-1	X	X	X	X
45	rH 2-1	X	X	X	X
46	Sensor mV1 2-1	-	X	X	X
47	Sensor mV2 2-1	-	X	X	X
48	Sensor mV3 2-1	-	X	X	X
49	Conduct1 2-1	X	X	X	X
50	Conduct2 2-1	X	X	X	X
51	Resist1 2-1	X	X	X	X
52	Resist2 2-1	X	X	X	X
53	Concent1 2-1	X	X	X	X
54	Concent2 2-1	X	X	X	X
55	USP 2-1	-	X	X	X
56	Sensor Ohms 2-1	-	X	X	X
57	Oxygen 2-1	X	X	X	X
58	Sensor current 2-1	-	X	X	X

59	Temp 1-2	X	X	X	X
60	pH 1-2	X	X	X	X
61	ORP 1-2	X	X	X	X
62	rH 1-2	X	X	X	X
63	Sensor mV1 1-2	-	X	X	X
64	Sensor mV2 1-2	-	X	X	X
65	Sensor mV3 1-2	-	X	X	X
66	Conduct1 1-2	X	X	X	X
67	Conduct2 1-2	X	X	X	X
68	Resist1 1-2	X	X	X	X
69	Resist2 1-2	X	X	X	X
70	Concent1 1-2	X	X	X	X
71	Concent2 1-2	X	X	X	X
72	USP 1-2	-	X	X	X
73	Sensor Ohms 1-2	-	X	X	X
74	Oxygen 1-2	X	X	X	X
75	Sensor current 1-2	-	X	X	X

76	Temp 1-3	X	X	X	X
77	pH 1-3	X	X	X	X
78	ORP 1-3	X	X	X	X
79	rH 1-3	X	X	X	X
80	Sensor mV1 1-3	-	X	X	X
81	Sensor mV2 1-3	-	X	X	X
82	Sensor mV3 1-3	-	X	X	X
83	Conduct1 1-3	X	X	X	X
84	Conduct2 1-3	X	X	X	X
85	Resist1 1-3	X	X	X	X
86	Resist2 1-3	X	X	X	X
87	Concent1 1-3	X	X	X	X
88	Concent2 1-3	X	X	X	X
89	USP 1-3	-	X	X	X
90	Sensor Ohms 1-3	-	X	X	X
91	Oxygen 1-3	X	X	X	X
92	Sensor current 1-3	-	X	X	X

93	Temp 1-4	X	X	X	X
94	pH 1-4	X	X	X	X
95	ORP 1-4	X	X	X	X
96	rH 1-4	X	X	X	X
97	Sensor mV1 1-4	-	X	X	X
98	Sensor mV2 1-4	-	X	X	X
99	Sensor mV3 1-4	-	X	X	X
100	Conduct1 1-4	X	X	X	X
101	Conduct2 1-4	X	X	X	X
102	Resist1 1-4	X	X	X	X
103	Resist2 1-4	X	X	X	X
104	Concent1 1-4	X	X	X	X
105	Concent2 1-4	X	X	X	X
106	USP 1-4	-	X	X	X
107	Sensor Ohms 1-4	-	X	X	X
108	Oxygen 1-4	X	X	X	X
109	Sensor current 1-4	-	X	X	X

X：設定可　　-：設定不可
*：現在は非数 (NaN) しか表示しません。

FLXA402 は、以下の単位コードを独自で拡張してます。

Unit	Units Code
rH	240
S/m	241
µS/m	242
S/cm	243
Ohm*m	244
MOhm*m	245
%SAT	247

1.2.4 Diagnostics Command (Command 48)

HART Status Group	CMD48 byte	bit	HART Alarm Name	Alarm Number	NE107
Device Status	-	0	PV Out of Limit	-	S
		1	Non-PV Out of Limit	-	S
		2	Loop Current Saturated	-	S
		3	Loop Current Fixed	-	N
		4	More Status Available	-	N
		5	Cold Start	-	N
		6	Configuration Changed	-	N
		7	Device Malfunction	-	N
Device Specific Status 0	0	0	Hardware failure	001	F
		1	Internal com. error	002	F
		2	IO mod. param. read error	003	F
		3	Com. mod. param. read error	004	F
		4	CPU param. read error	005	F
		5	Reserved	006	N
		6	Reserved	007	N
		7	Reserved	008	N
Device Specific Status 1	1	0	VGB calc. error	009	F
		1	Ratio calc. error	010	F
		2	Passage calc. error	011	F
		3	Rejection calc. error	012	F
		4	Deviation calc. error	013	F
		5	Script error	014	N
		6	Reserved	015	N
		7	Reserved	016	N
Device Specific Status 2	2	0	mA1 output burn out	017	F
		1	mA2 output burn out	018	F
		2	mA3 output burn out	019	F
		3	mA4 output burn out	020	F
		4	mA1 saturation	021	S
		5	mA2 saturation	022	S
		6	mA3 saturation	023	S
		7	mA4 saturation	024	S
Device Specific Status 3	3	0	AI exceeds limit	025	S
		1	AI out of range	026	F
		2	Expiry time exceeded	027	M
		3	Reserved		N
		4	Wash response failure	029	M
		5	Reserved		N
		6	Converter Error Simulation	031	C
		7	Fail safe occur	032	F

HART Status Group	CMD48 byte	bit	HART Alarm Name	Alarm Number	NE107
Device Specific Status 4	4	0	Simulated mA value 1	033	C
		1	Simulated mA value 2	034	C
		2	Simulated mA value 3	035	C
		3	Simulated mA value 4	036	C
		4	Outputs in HOLD1	037	N
		5	Outputs in HOLD2	038	N
		6	Outputs in HOLD3	039	N
		7	Outputs in HOLD4	040	N
Device Specific Status 5	5	0	Output configuration error	041	F
		1	Other configuration error	042	C
		2	Reserved	043	N
		3	Reserved	044	N
		4	Reserved	045	N
		5	Reserved	046	N
		6	Reserved	047	N
		7	Reserved	048	N
Extended Device Status	6	0	Maintenance Required(NE107：M)	-	N
		1	Device Variable Alert *1	-	S
		2	Critical Poew Failure		F
		3	Failure（NE107：F）	-	N
		4	Out of Specification（NE107：S）	-	N
		5	Function Check（NE107：C）	-	N
		6	Reserved		N
		7	Reserved		N
Device Operationg Mode	7	0	Reserved		N
		1	Reserved		N
		2	Reserved		N
		3	Reserved		N
		4	Reserved		N
		5	Reserved		N
		6	Reserved		N
		7	Reserved		N
Standardized Status0	8	0	Device Variable Simulation Active		C
		1	Non-Volatile Memory Defect		F
		2	Volatile Memory Defect		F
		3	Watchdog Reset Executed		F
		4	Power Supply Conditions Out of Range		S
		5	Environmental Conditions Out of Range		S
		6	Electronic Defect		F
		7	Device Configuration Locked	-	N
Standardized Status1	9	0	Status Simulation Active	-	N
		1	Discrete Variable Simulation Active	-	C
		2	Event Notification Overflow		N
		3	Reserved		N
		4	Reserved		N
		5	Reserved		N
		6	Reserved		N
		7	Reserved		N
Analog Channel Saturated	10	0	Analog Channel 1		N
		1	Analog Channel 2		N
		2	Analog Channel 3		N
		3	Analog Channel 4		N
		4	Reserved		N
		5	Reserved		N
		6	Reserved		N
		7	Reserved		N

HART Status Group	CMD48 byte	bit	HART Alarm Name	Alarm Number	NE107
Standardized Status2	11	0	Sub-Device List Changed		N
		1	Duplicate master Detected.		N
		2	Reserved		N
		3	Reserved		N
		4	Reserved		N
		5	Reserved		N
		6	Reserved		N
		7	Reserved		N
Standardized Status2 for Wireless HART	12	0	Reserved		N
		1	Reserved		N
		2	Reserved		N
		3	Reserved		N
		4	Reserved		N
		5	Reserved		N
		6	Reserved		N
		7	Reserved		N
Analog Channel Fixed	13	0	Analog Channel 1		N
		1	Analog Channel 2		N
		2	Analog Channel 3		N
		3	Analog Channel 4		N
		4	Reserved		N
		5	Reserved		N
		6	Reserved		N
		7	Reserved		N
Device Specific Status 6	14	0	Sensor 1-1 device failure	101	F
		1	Sensor 1-2 device failure	201	F
		2	Sensor 1-3 device failure	301	F
		3	Sensor 1-4 device failure	401	F
		4	Sensor 2-1 device failure	501	F
		5	Reserved	601	N
		6	Reserved	701	N
		7	Reserved	801	N
Device Specific Status 7	15	0	Sensor 1-1 configuration error	102	F
		1	Sensor 1-2 configuration error	202	F
		2	Sensor 1-3 configuration error	302	F
		3	Sensor 1-4 configuration error	402	F
		4	Sensor 2-1 configuration error	502	F
		5	Reserved	602	N
		6	Reserved	702	N
		7	Reserved	802	N
Device Specific Status 8	16	0	Temp. 1-1 exceeds user limit	103	S
		1	Temp. 1-2 exceeds user limit	203	S
		2	Temp. 1-3 exceeds user limit	303	S
		3	Temp. 1-4 exceeds user limit	403	S
		4	Temp. 2-1 exceeds user limit	503	S
		5	Reserved	603	N
		6	Reserved	703	N
		7	Reserved	803	N
Device Specific Status 9	17		Process 1-1 exceeds user limit	104	S
		1	Process 1-2 exceeds user limit	204	S
		2	Process 1-3 exceeds user limit	304	S
		3	Process 1-4 exceeds user limit	404	S
		4	Process 2-1 exceeds user limit	504	S
		5	Reserved	604	N
		6	Reserved	704	N
		7	Reserved	804	N

HART Status Group	CMD48 byte	bit	HART Alarm Name	Alarm Number	NE107
Device Specific Status 10	18	0	Sensor 1-1 measurement warning	105	N
		1	Sensor 1-2 measurement warning	205	N
		2	Sensor 1-3 measurement warning	305	N
		3	Sensor 1-4 measurement warning	405	N
		4	Sensor 2-1 measurement warning	505	N
		5	Reserved	605	N
		6	Reserved	705	N
		7	Reserved	805	N
Device Specific Status 11	19	0	Sensor 1-1 out of spec.	106	S
		1	Sensor 1-2 out of spec.	206	S
		2	Sensor 1-3 out of spec.	306	S
		3	Sensor 1-4 out of spec.	406	S
		4	Sensor 2-1 out of spec.	506	S
		5	Reserved	606	N
		6	Reserved	706	N
		7	Reserved	806	N
Device Specific Status 12	20	0	Sensor 1-1 warning	107	N
		1	Sensor 1-2 warning	207	N
		2	Sensor 1-3 warning	307	N
		3	Sensor 1-4 warning	407	N
		4	Sensor 2-1 warning	507	N
		5	Reserved	607	N
		6	Reserved	707	N
		7	Reserved	807	N
Device Specific Status 13	21	0	Sensor 1-1 disable	108	F
		1	Sensor 1-2 disable	208	F
		2	Sensor 1-3 disable	308	F
		3	Sensor 1-4 disable	408	F
		4	Sensor 2-1 disable	508	F
		5	Reserved	608	N
		6	Reserved	708	N
		7	Reserved	808	N
Device Specific Status 14	22	0	Reserved		N
		1	Reserved		N
		2	Reserved		N
		3	Reserved		N
		4	Reserved		N
		5	Reserved		N
		6	Reserved		N
		7	Reserved		N
Device Specific Status 15	23	0	Reserved		N
		1	Reserved		N
		2	Reserved		N
		3	Reserved		N
		4	Reserved		N
		5	Reserved		N
		6	Reserved		N
		7	Reserved		N
Device Specific Status 16	24	0	Reserved		N
		1	Reserved		N
		2	Reserved		N
		3	Reserved		N
		4	Reserved		N
		5	Reserved		N
		6	Reserved		N
		7	Reserved		N

*： Reserved is fixed 0.

1.3 操作注意事項

本項は操作上注意していただきたいことを説明したものです。

● 設定ツールとFLXA402での操作

FLXA402 の設定変更は、HART 通信、画面設定、MODBUS 通信経由で同時変更することはできません。画面による設定変更中や MODBUS 通信による設定変更中は、HART 通信から設定を行うとエラーとなります。
設定変更時は、電流出力設定を手動ホールド状態にして変更することを推奨します（変換器操作編（IM 12A01F01-03JA）の 3.7 節参照）。

● パラメータの印刷やアップロード、ダウンロードなどの操作

FLXA402 は大変多くのパラメータを保持しています。多くのパラメータにアクセスする動作では、数分かかることがあります。

● 表示上の注意

FLXA402 の設定を変更したら、メニュー表示を更新してください。

2. DDメニュー構造（機器レビジョン1、DDレビジョン1）

2.1 オンラインメニュー

- process_variables_root_menu
- device_root_menu
- diagnostic_root_menu
- maintenance_root_menu

2.1.1 process_variables_root_menu

- Process variables root menu
  - Dynamic variables
    - PV
    - PV % rnge
    - SV
    - TV
    - QV
    - PV is
    - SV is
    - TV is
    - QV is
  - Device variables
    - CH1-1
      - Sensor type
      - PH sensor
        - pH 1-1
        - ORP 1-1
        - rH 1-1
        - Temp 1-1
        - Sensor mV1 1-1
        - Sensor mV2 1-1
        - Sensor mV3 1-1
      - SC sensor
        - Conduct1 1-1
        - Conduct2 1-1
        - Resist1 1-1
        - Resist2 1-1
        - Temp1-1
        - Concent1 1-1
        - Concent2 1-1
        - USP 1-1
        - Sensor ohms 1-1
      - ISC sensor
        - Conduct1 1-1
        - Conduct2 1-1
        - Temp1-1
        - Sensor ohms 1-1
      - DO sensor
        - Oxygen1-1
        - Temp 1-1
        - Sensor current 1-1

- CH1-2 …
- CH1-3 …
- CH1-4 …
- CH2-1 …
- Converter
  - AO1 current
  - AI
  - Differential pH
  - Differential ORP
  - Differential Conduct
  - Differential Resist
  - Differential DO
  - Average pH
  - Average ORP
  - Average Conduct
  - Average Resist
  - Average DO
  - Ratio
  - Passage
  - Rejection
  - Deviation
  - pH calc
  - Script 1
  - Script 2
  - Script 3
  - Script 4
  - Script 5
  - Script 6
  - Script 7
  - Script 8

Dynamic variables status

- PV quality
- PV limit
- SV quality
- SV limit
- TV quality
- TV limit
- QV quality
- QV limit

Device variables status

- CH1-1
  - PH sensor
    - pH 1-1 quality
    - pH 1-1 limit
    - ORP 1-1 quality
    - ORP 1-1 limit
    - rH 1-1 quality
    - rH 1-1 limit
    - Temp 1-1 quality
    - Temp 1-1 limit
    - Sensor mV1 1-1 quality
    - Sensor mV1 1-1 limit
    - Sensor mV2 1-1 quality
    - Sensor mV2 1-1 limit
    - Sensor mV3 1-1 quality
    - Sensor mV3 1-1 limit

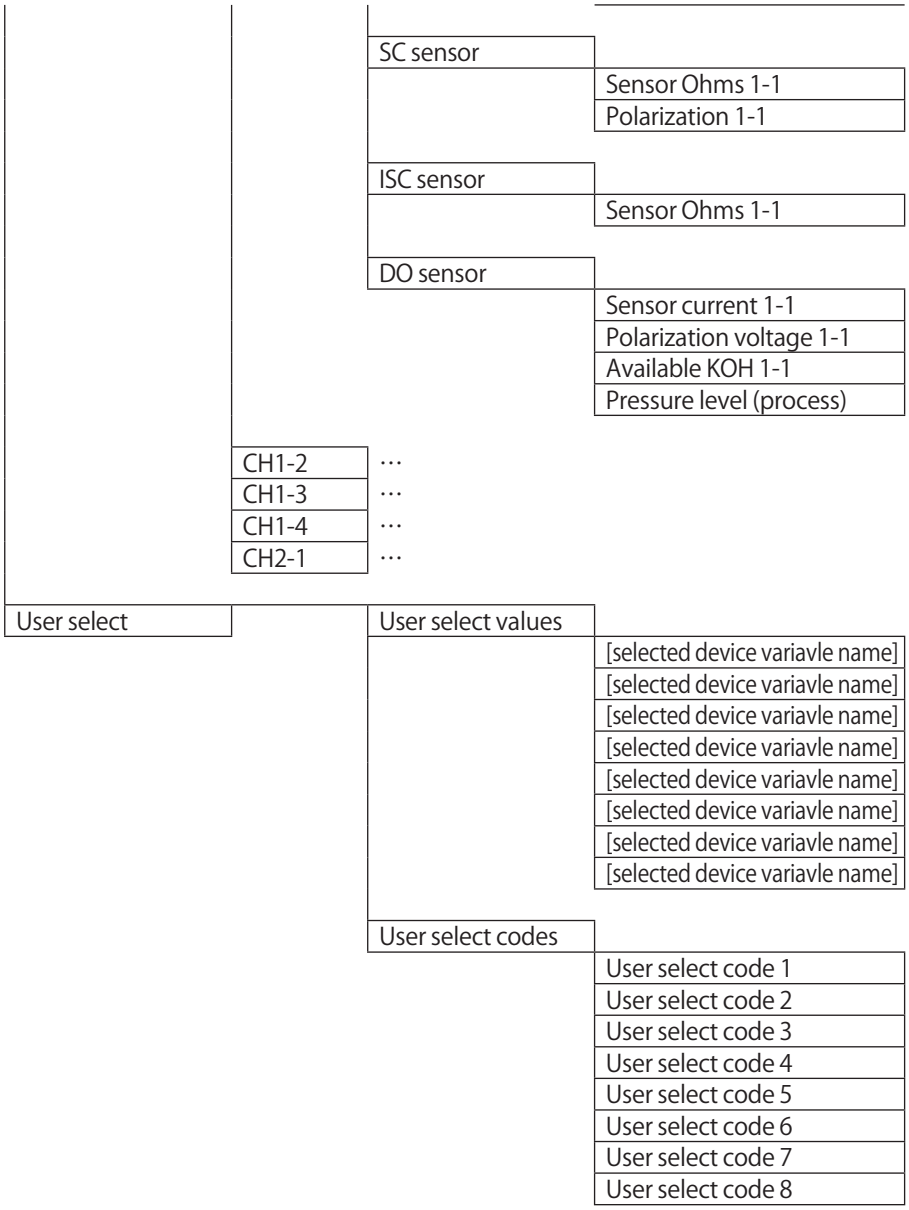
- SC sensor
  - Conduct1 1-1 quality
  - Conduct1 1-1 limit
  - Conduct2 1-1 quality
  - Conduct2 1-1 limit
  - Resist1 1-1 quality
  - Resist1 1-1 limit
  - Resist2 1-1 quality
  - Resist2 1-1 limit
  - Temp 1-1 quality
  - Temp 1-1 limit
  - Concent1 1-1 quality
  - Concent1 1-1 limit
  - Concent2 1-1 quality
  - Concent2 1-1 limit
  - USP 1-1 quality
  - USP 1-1 limit
  - Sensor Ohms 1-1 quality
  - Sensor Ohms 1-1 limit
- ISC sensor
  - Conduct1 1-1 quality
  - Conduct1 1-1 limit
  - Conduct2 1-1 quality
  - Conduct2 1-1 limit
  - Temp 1-1 quality
  - Temp 1-1 limit
  - Sensor Ohms 1-1 quality
  - Sensor Ohms 1-1 limit
- DO sensor
  - Oxygen 1-1 quality
  - Oxygen 1-1 limit
  - Temp 1-1 quality
  - Temp 1-1 limit
  - Sensor current 1-1 quality
  - Sensor current 1-1 limit

CH1-2 …
CH1-3 …
CH1-4 …
CH2-1 …

Converter
- AO1 current quality
- AO1 current limit
- AI quality
- AI limit
- Differential pH quality
- Differential pH limit
- Differential ORP quality
- Differential ORP limit
- Differential Conduct quality
- Differential Conduct limit
- Differential Resist quality

- Differential Resist limit
- Differential DO quality
- Differential DO limit
- Average pH quality
- Average pH limit
- Average ORP quality
- Average ORP limit
- Average Conduct quality
- Average Conduct limit
- Average Resist quality
- Average Resist limit
- Average DO quality
- Average DO limit
- Ratio quality
- Ratio limit
- Passage quality
- Passage limit
- Rejection quality
- Rejection limit
- Deviation quality
- Deviation limit
- pH calc quality
- pH calc limit
- Script 1 quality
- Script 1 limit
- Script 2 quality
- Script 2 limit
- Script 3 quality
- Script 3 limit
- Script 4 quality
- Script 4 limit
- Script 5 quality
- Script 5 limit
- Script 6 quality
- Script 6 limit
- Script 7 quality
- Script 7 limit
- Script 8 quality
- Script 8 limit

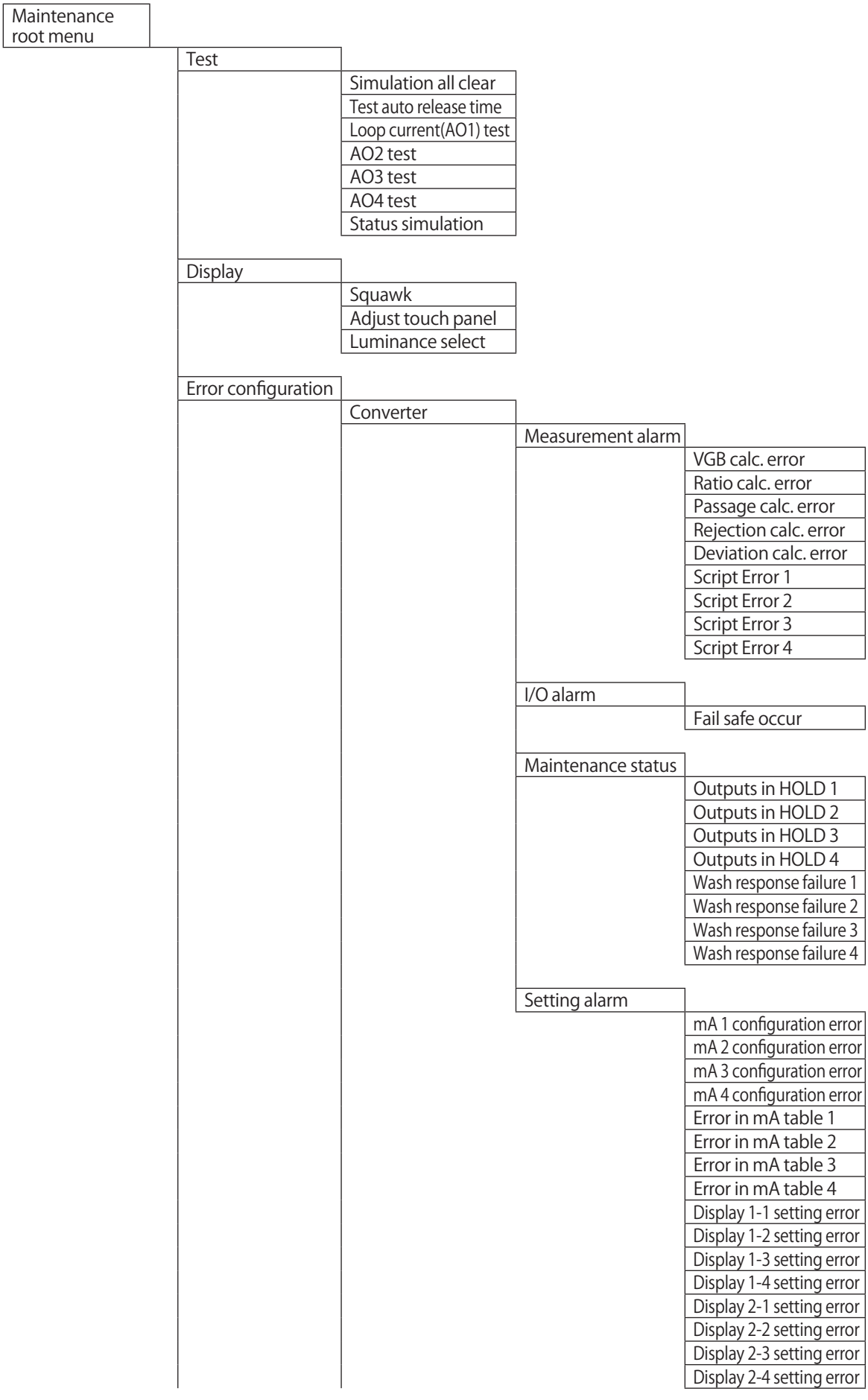
- View input/output
  - AO1 current
  - AO2 current
  - AO3 current
  - AO4 current
  - AI current
  - Contact in/out
- Sensor variables
  - CH1-1
    - PH sensor
      - IMP1 1-1
      - IMP2 1-1
      - Sensor mV1 1-1
      - Sensor mV2 1-1
      - Sensor mV3 1-1


SC sensor
Sensor Ohms 1-1
Polarization 1-1
ISC sensor
Sensor Ohms 1-1
DO sensor
Sensor current 1-1
Polarization voltage 1-1
Available KOH 1-1
Pressure level (process)
CH1-2 …
CH1-3 …
CH1-4 …
CH2-1 …
User select
User select values
[selected device variavle name]
[selected device variavle name]
[selected device variavle name]
[selected device variavle name]
[selected device variavle name]
[selected device variavle name]
[selected device variavle name]
[selected device variavle name]
User select codes
User select code 1
User select code 2
User select code 3
User select code 4
User select code 5
User select code 6
User select code 7
User select code 8

2.1.2 diagnostic_root_menu

- Diagnostics root menu
  - Device status
    - Device Status
    - Extended Device Status
    - Standardized Status 0
    - Standardized Status 1
    - Device Specific Status 0
    - Device Specific Status 1
    - Device Specific Status 2
    - Device Specific Status 3
    - Device Specific Status 4
    - Device Specific Status 5
    - Device Specific Status 6
    - Device Specific Status 7
    - Device Specific Status 8
    - Device Specific Status 9
    - Device Specific Status 10
    - Device Specific Status 11
    - Device Specific Status 12
    - Device Specific Status 13
    - Config changed count
    - Clear config changed flag
  - Detailed device status
    - CH1-1
      - PH sensor
      - SC sensor
      - ISC sensor
      - DO sensor
    - CH1-2 …
    - CH1-3 …
    - CH1-4 …
    - CH2-1 …
    - Converter

2.1.3 maintenance_root_menu



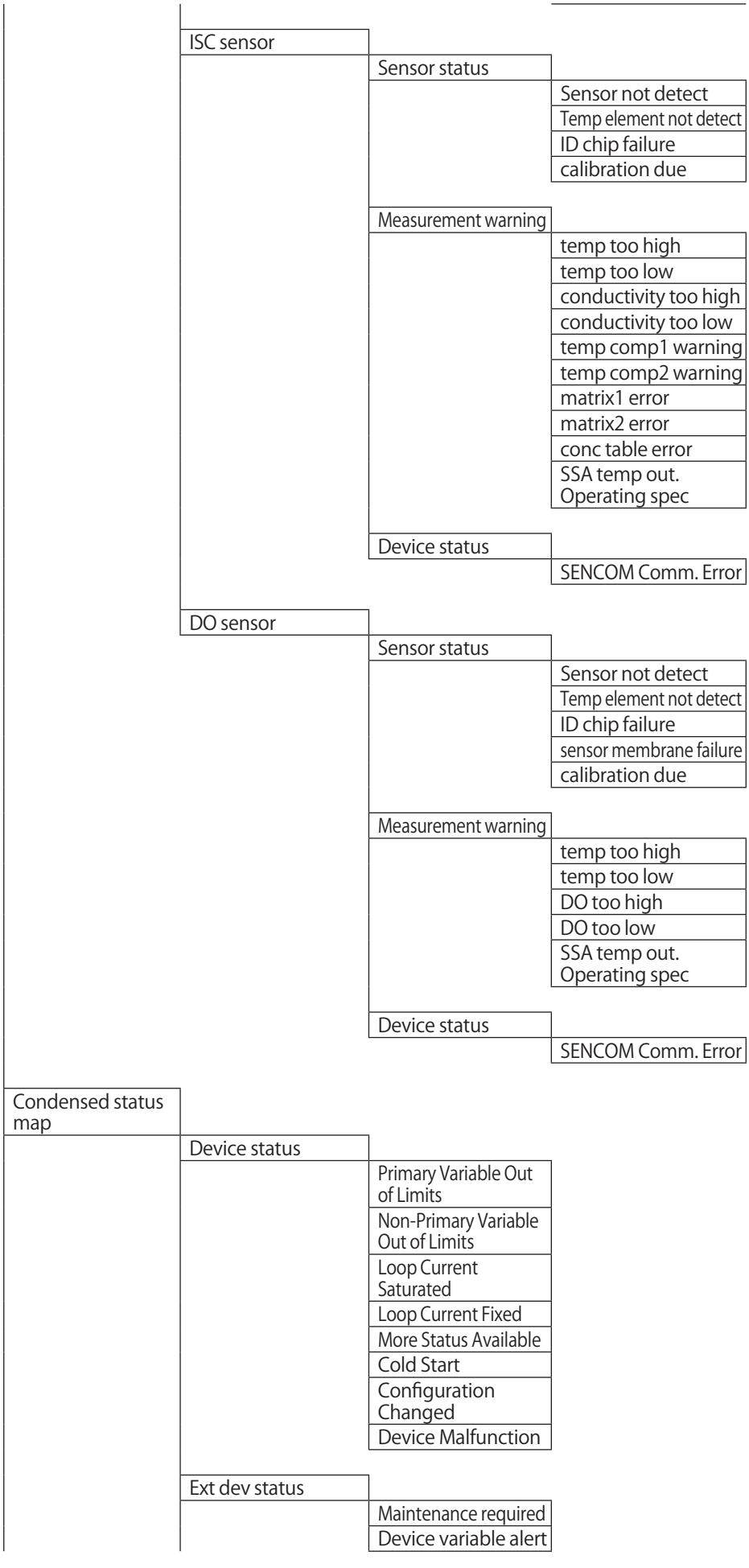
- HART setting error
- Contact config. error 1
- Contact config. error 2
- Contact config. error 3
- Contact config. error 4

PH sensor

- Sensor status
  - Sensor not detect
  - Temp element not detect
  - ID chip failure
  - LE detect
  - calibration due
  - imp1 glasbreak detect
  - imp2 glasbreak detect
- Measurement warning
  - temp too high
  - temp too low
  - pH too high
  - pH too low
  - ORP too high
  - ORP too low
  - rH too high
  - rH too low
  - imp(pH/ORP) too high
  - imp(pH/ORP) too low
  - imp(ref) too high
  - imp(ref) too low
  - pH temp comp warning
  - SSA temp out. Operating spec
- Device status
  - SENCOM Comm. Error

SC sensor

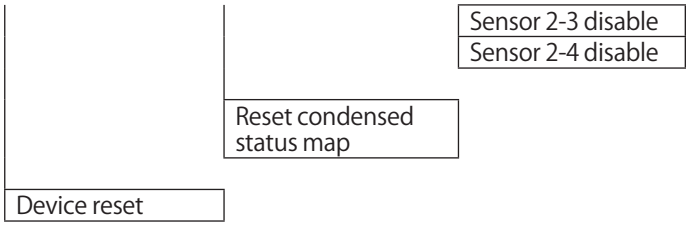
- Sensor status
  - Sensor not detect
  - Temp element not detect
  - ID chip failure
  - calibration due
- Measurement warning
  - temp too high
  - temp too low
  - conductivity too high
  - conductivity too low
  - temp comp1 warning
  - temp comp2 warning
  - USP limit exceeded
  - USP margin exceeded
  - Polarization detected
  - matrix1 error
  - matrix2 error
  - conc table error
  - SSA temp out. Operating spec
- Device status
  - SENCOM Comm. Error


ISC sensor
Sensor status
Sensor not detect
Temp element not detect
ID chip failure
calibration due
Measurement warning
temp too high
temp too low
conductivity too high
conductivity too low
temp comp1 warning
temp comp2 warning
matrix1 error
matrix2 error
conc table error
SSA temp out. Operating spec
Device status
SENCOM Comm. Error
DO sensor
Sensor status
Sensor not detect
Temp element not detect
ID chip failure
sensor membrane failure
calibration due
Measurement warning
temp too high
temp too low
DO too high
DO too low
SSA temp out. Operating spec
Device status
SENCOM Comm. Error
Condensed status map
Device status
Primary Variable Out of Limits
Non-Primary Variable Out of Limits
Loop Current Saturated
Loop Current Fixed
More Status Available
Cold Start
Configuration Changed
Device Malfunction
Ext dev status
Maintenance required
Device variable alert

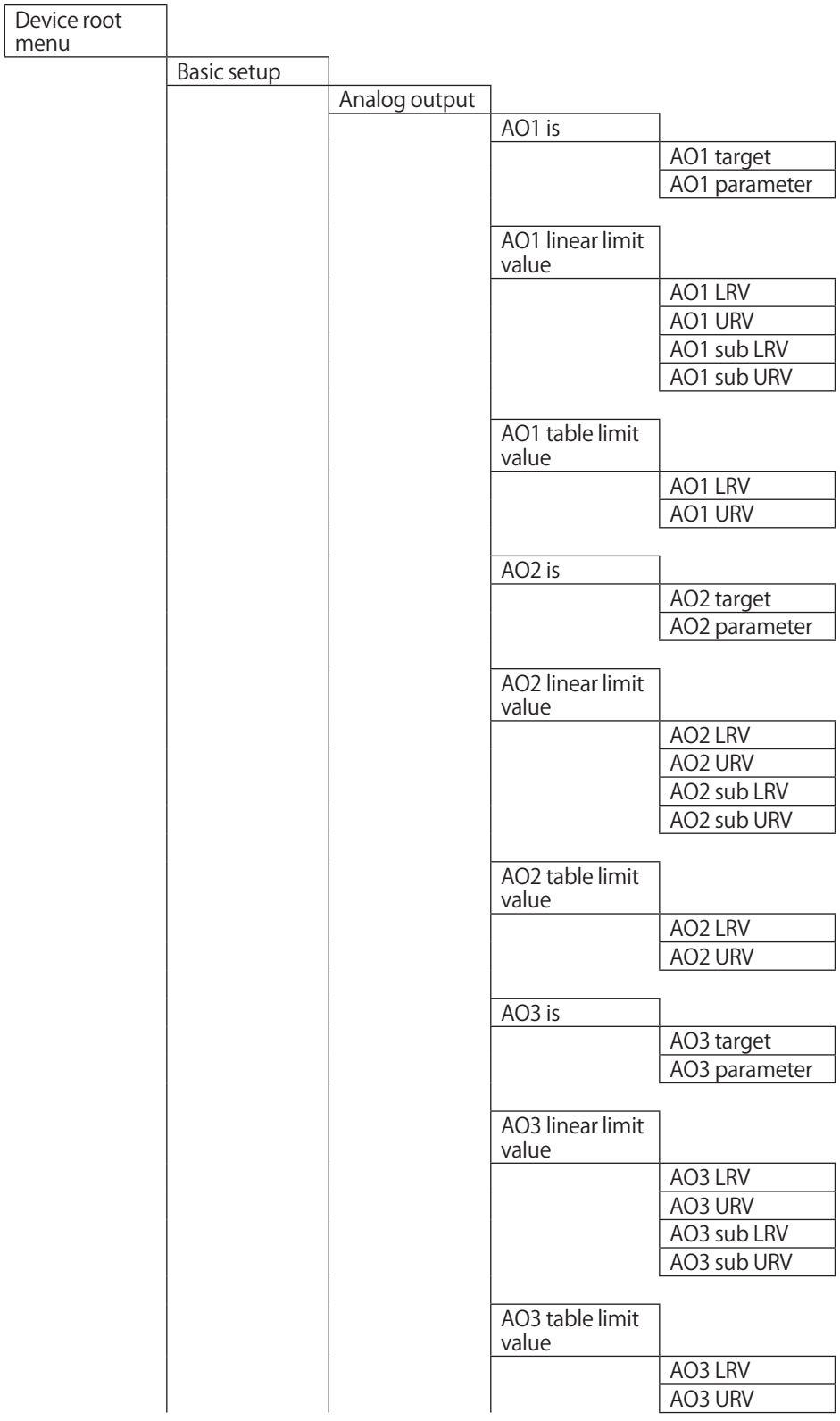
	Failure
	Out of Specification
	Function Check
Device diagnostic status 0	
	Device configuration locked
Device diagnostic status 1	
	Status simulation active
	Discrete Variable Simulation active
Device Specific Status 0	
	Hardware failure
	Internal com. error
	IO mod. param. read error
	Com. mod. param. read error
	CPU param. read error
Device Specific Status 1	
	VGB calc. error
	Ratio calc. error
	Passage calc. error
	Rejection calc. error
	Deviation calc. error
	Script error
Device Specific Status 2	
	mA 1 output burn out
	mA 2 output burn out
	mA 3 output burn out
	mA 4 output burn out
	mA 1 saturation
	mA 2 saturation
	mA 3 saturation
	mA 4 saturation
Device Specific Status 3	
	AI exceeds limit
	AI out of range
	Expiry time exceeded
	Wash response failure
	Converter Error Simulation
	Fail safe occur
Device Specific Status 4	
	Simulated mA value 1
	Simulated mA value 2
	Simulated mA value 3
	Simulated mA value 4
	Outputs in HOLD1

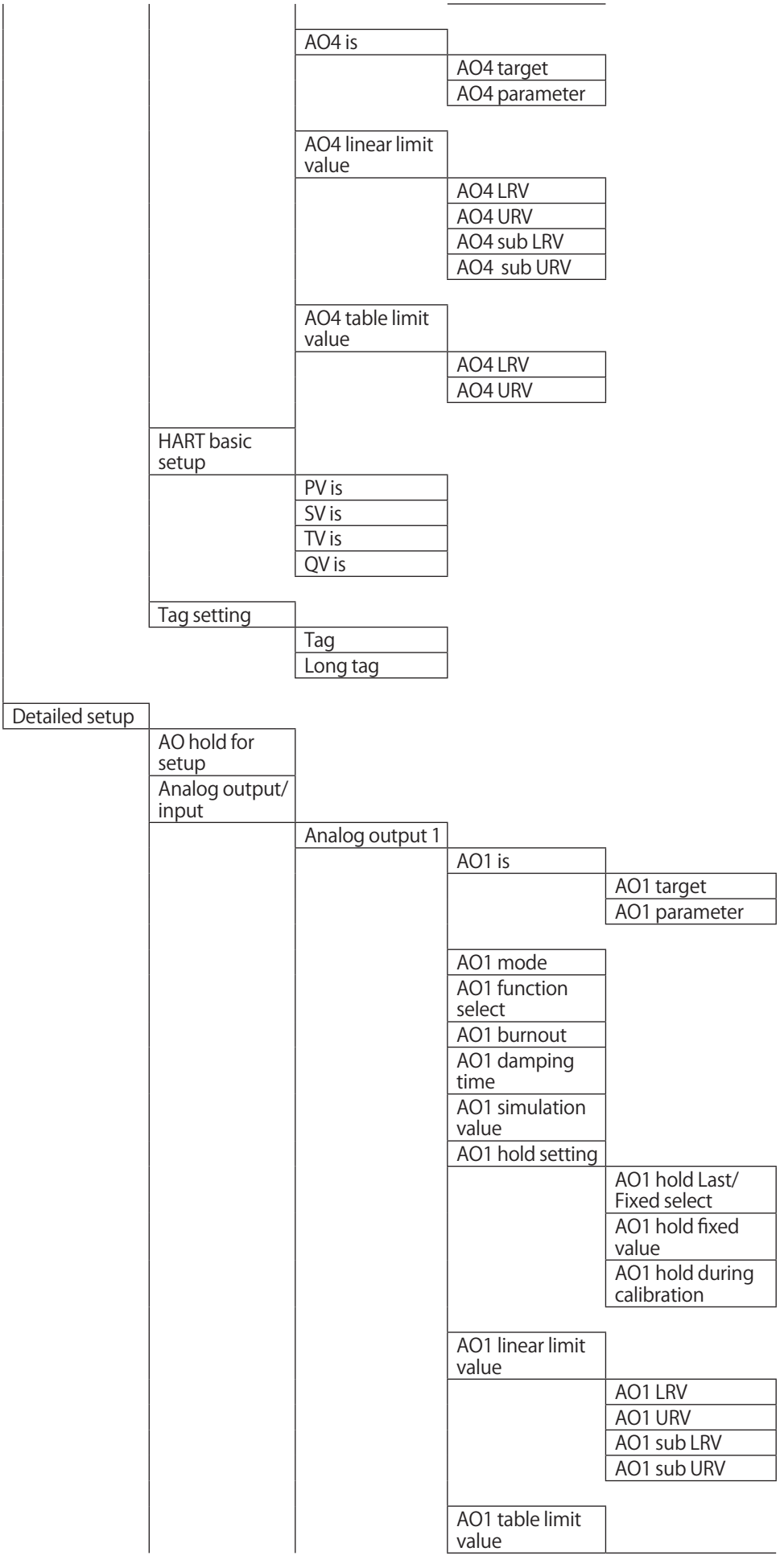
	Outputs in HOLD2
	Outputs in HOLD3
	Outputs in HOLD4
Device Specific Status 5	
	Output configuration error
	Other configuration error
Device Specific Status 6	
	Sensor 1-1 device failure
	Sensor 1-2 device failure
	Sensor 1-3 device failure
	Sensor 1-4 device failure
	Sensor 2-1 device failure
	Sensor 2-2 device failure
	Sensor 2-3 device failure
	Sensor 2-4 device failure
Device Specific Status 7	
	Sensor 1-1 configuration error
	Sensor 1-2 configuration error
	Sensor 1-3 configuration error
	Sensor 1-4 configuration error
	Sensor 2-1 configuration error
	Sensor 2-2 configuration error
	Sensor 2-3 configuration error
	Sensor 2-4 configuration error
Device Specific Status 8	
	Temp. 1-1 exceeds user limit
	Temp. 1-2 exceeds user limit
	Temp. 1-3 exceeds user limit
	Temp. 1-4 exceeds user limit
	Temp. 2-1 exceeds user limit
	Temp. 2-2 exceeds user limit
	Temp. 2-3 exceeds user limit
	Temp. 2-4 exceeds user limit
Device Specific Status 9	
	Process 1-1 exceeds user limit

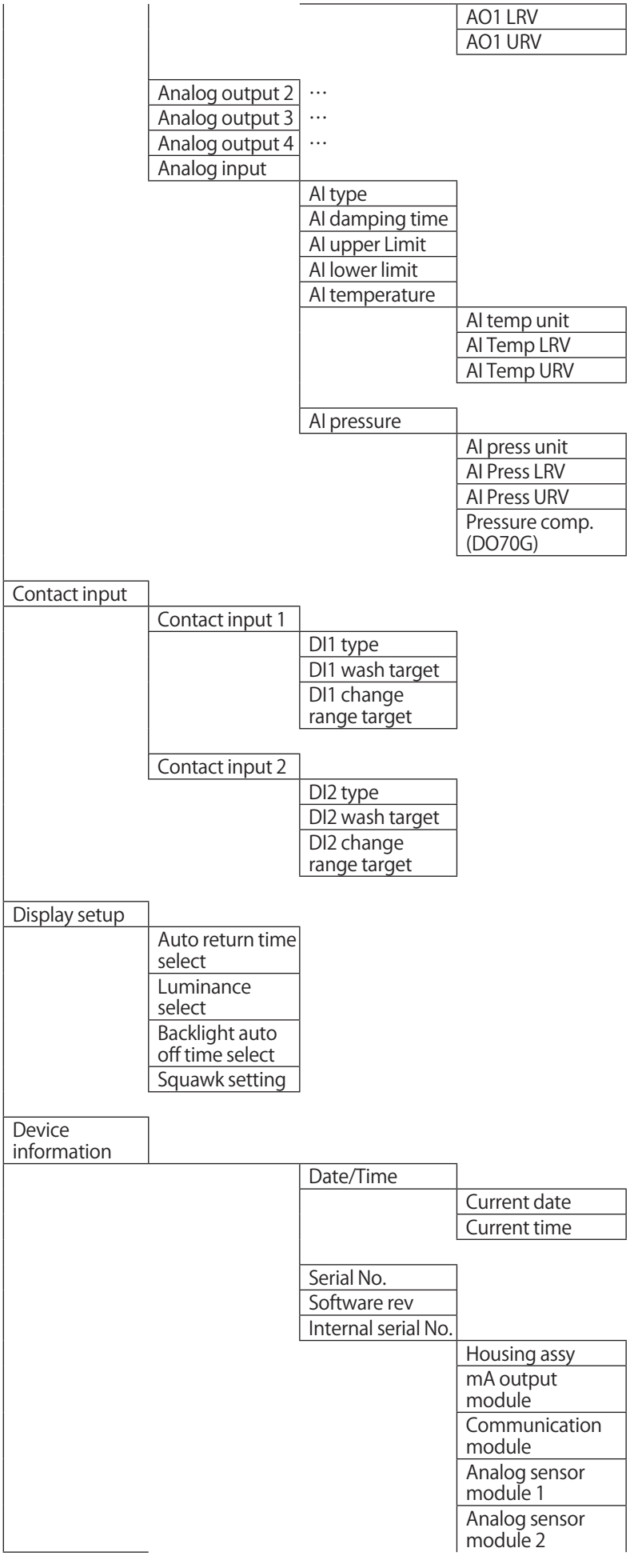
		Process 1-2 exceeds user limit
		Process 1-3 exceeds user limit
		Process 1-4 exceeds user limit
		Process 2-1 exceeds user limit
		Process 2-2 exceeds user limit
		Process 2-3 exceeds user limit
		Process 2-4 exceeds user limit
	Device Specific Status 10	
		Sensor 1-1 measurement warning
		Sensor 1-2 measurement warning
		Sensor 1-3 measurement warning
		Sensor 1-4 measurement warning
		Sensor 2-1 measurement warning
		Sensor 2-2 measurement warning
		Sensor 2-3 measurement warning
		Sensor 2-4 measurement warning
	Device Specific Status 11	
		Sensor 1-1 out of spec.
		Sensor 1-2 out of spec.
		Sensor 1-3 out of spec.
		Sensor 1-4 out of spec.
		Sensor 2-1 out of spec.
		Sensor 2-2 out of spec.
		Sensor 2-3 out of spec.
		Sensor 2-4 out of spec.
	Device Specific Status 12	
		Sensor 1-1 warning
		Sensor 1-2 warning
		Sensor 1-3 warning
		Sensor 1-4 warning
		Sensor 2-1 warning
		Sensor 2-2 warning
		Sensor 2-3 warning
		Sensor 2-4 warning
	Device Specific Status 13	
		Sensor 1-1 disable
		Sensor 1-2 disable
		Sensor 1-3 disable
		Sensor 1-4 disable
		Sensor 2-1 disable
		Sensor 2-2 disable



2.1.4 device_root_menu




AO4 is
AO4 target
AO4 parameter
AO4 linear limit value
AO4 LRV
AO4 URV
AO4 sub LRV
AO4 sub URV
AO4 table limit value
AO4 LRV
AO4 URV
HART basic setup
PV is
SV is
TV is
QV is
Tag setting
Tag
Long tag
Detailed setup
AO hold for setup
Analog output/ input
Analog output 1
AO1 is
AO1 target
AO1 parameter
AO1 mode
AO1 function select
AO1 burnout
AO1 damping time
AO1 simulation value
AO1 hold setting
AO1 hold Last/ Fixed select
AO1 hold fixed value
AO1 hold during calibration
AO1 linear limit value
AO1 LRV
AO1 URV
AO1 sub LRV
AO1 sub URV
AO1 table limit value

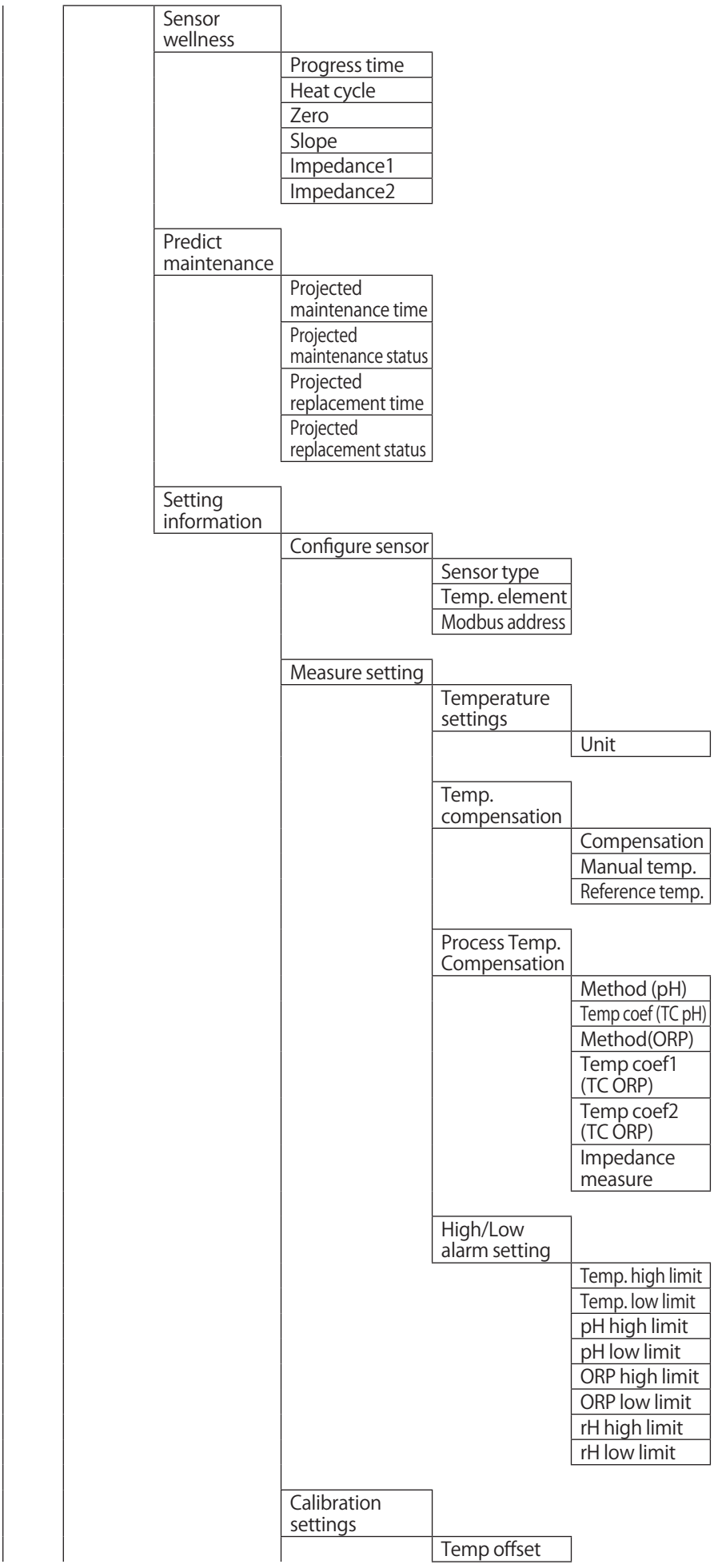

AO1 LRV
AO1 URV
Analog output 2 ···
Analog output 3 ···
Analog output 4 ···
Analog input
AI type
AI damping time
AI upper Limit
AI lower limit
AI temperature
AI temp unit
AI Temp LRV
AI Temp URV
AI pressure
AI press unit
AI Press LRV
AI Press URV
Pressure comp. (DO70G)
Contact input
Contact input 1
DI1 type
DI1 wash target
DI1 change range target
Contact input 2
DI2 type
DI2 wash target
DI2 change range target
Display setup
Auto return time select
Luminance select
Backlight auto off time select
Squawk setting
Device information
Date/Time
Current date
Current time
Serial No.
Software rev
Internal serial No.
Housing assy
mA output module
Communication module
Analog sensor module 1
Analog sensor module 2

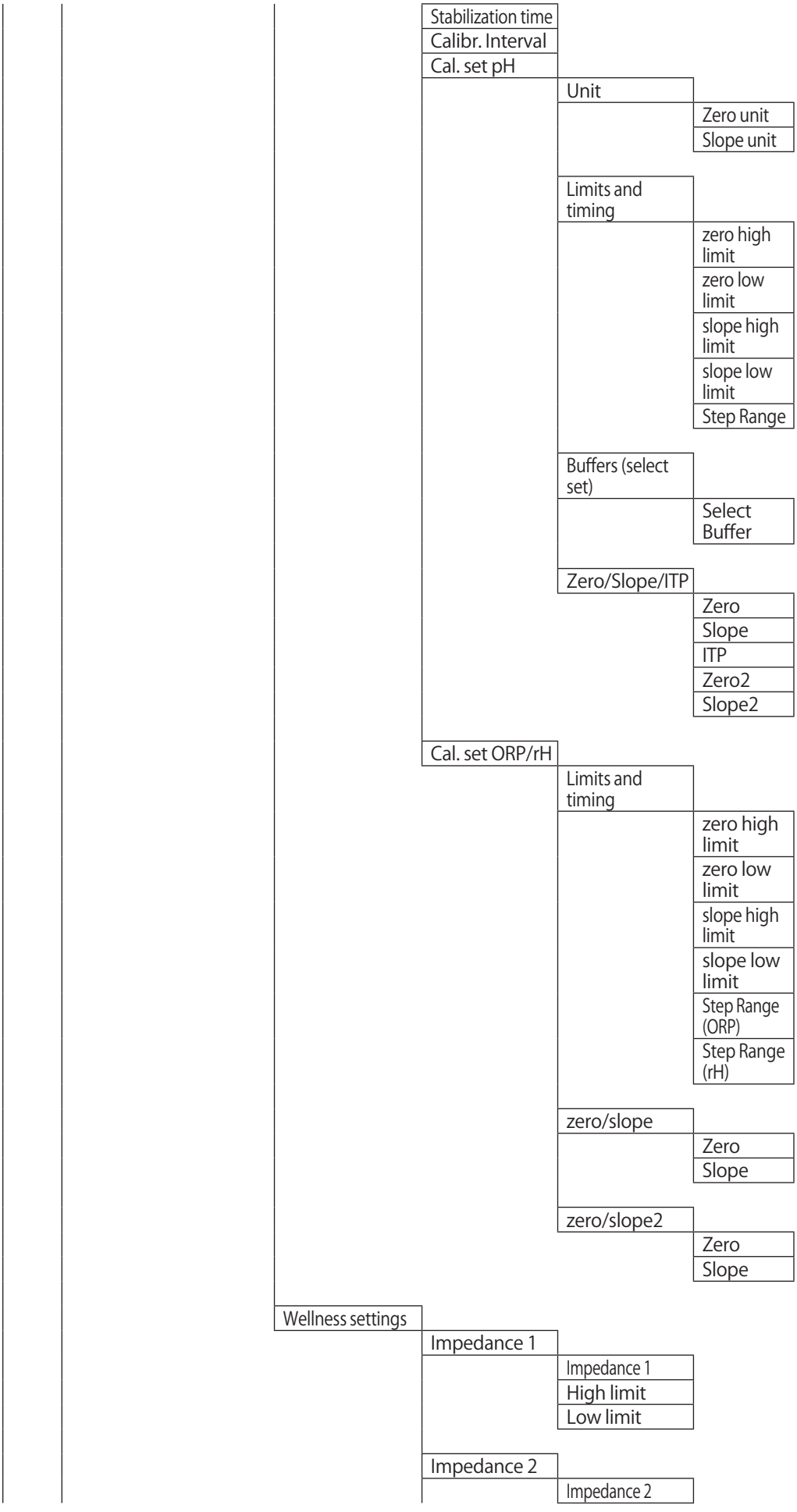
- Sensor information
- HART detailed setup
  - HART output
    - PV is
    - SV is
    - TV is
    - QV is
    - Loop current mode
    - Poll addr
  - HART identification
    - Tag
    - Long tag
    - Num req preams
    - Num resp preams
    - Descriptor
    - Message
    - Date
    - Final asembly num
    - Distributor
    - Model
    - Write protect
    - STX Count
    - ACK Count
  - HART sub unit setup
    - Sub unit select
      - Sensor 1-1 subunit enable
      - Sensor 1-2 subunit enable
      - Sensor 1-3 subunit enable
      - Sensor 1-4 subunit enable
      - Sensor 2-1 subunit enable
      - Sensor 2-2 subunit enable
      - Sensor 2-3 subunit enable
      - Sensor 2-4 subunit enable
  - HART revisions
    - Fld dev rev
    - Dev id
    - Universal rev
    - Software rev
    - Hardware rev

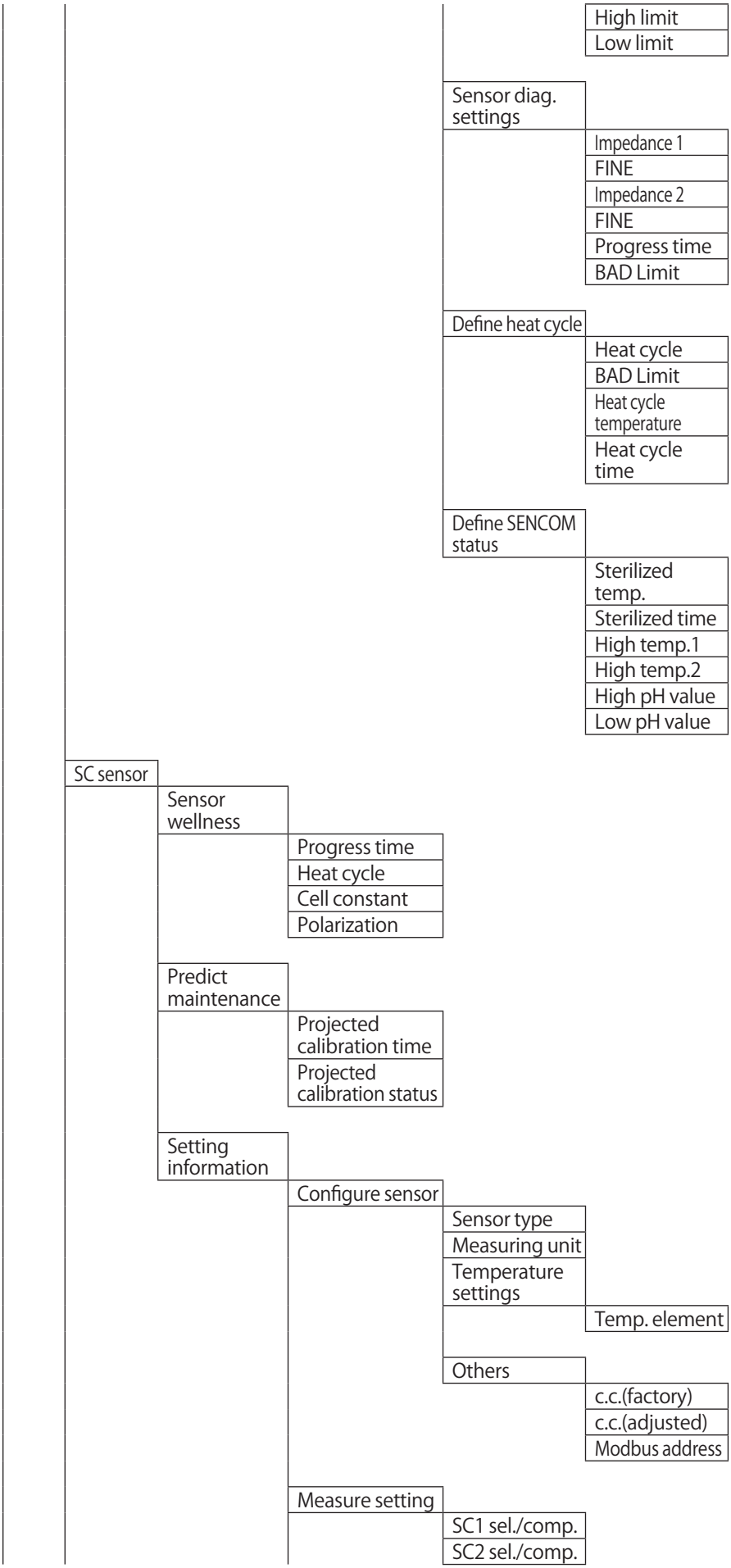
* 続きは別に記載

*** Sensor informationの続き**

- Sensor information
  - CH1-1
    - Sensor type
    - Serial No.
    - PH sensor


Sensor wellness
Progress time
Heat cycle
Zero
Slope
Impedance1
Impedance2
Predict maintenance
Projected maintenance time
Projected maintenance status
Projected replacement time
Projected replacement status
Setting information
Configure sensor
Sensor type
Temp. element
Modbus address
Measure setting
Temperature settings
Unit
Temp. compensation
Compensation
Manual temp.
Reference temp.
Process Temp. Compensation
Method (pH)
Temp coef (TC pH)
Method(ORP)
Temp coef1 (TC ORP)
Temp coef2 (TC ORP)
Impedance measure
High/Low alarm setting
Temp. high limit
Temp. low limit
pH high limit
pH low limit
ORP high limit
ORP low limit
rH high limit
rH low limit
Calibration settings
Temp offset


Stabilization time
Calibr. Interval
Cal. set pH
Unit
Zero unit
Slope unit
Limits and timing
zero high limit
zero low limit
slope high limit
slope low limit
Step Range
Buffers (select set)
Select Buffer
Zero/Slope/ITP
Zero
Slope
ITP
Zero2
Slope2
Cal. set ORP/rH
Limits and timing
zero high limit
zero low limit
slope high limit
slope low limit
Step Range (ORP)
Step Range (rH)
zero/slope
Zero
Slope
zero/slope2
Zero
Slope
Wellness settings
Impedance 1
Impedance 1
High limit
Low limit
Impedance 2
Impedance 2


High limit
Low limit
Sensor diag. settings
Impedance 1
FINE
Impedance 2
FINE
Progress time
BAD Limit
Define heat cycle
Heat cycle
BAD Limit
Heat cycle temperature
Heat cycle time
Define SENCOM status
Sterilized temp.
Sterilized time
High temp.1
High temp.2
High pH value
Low pH value
SC sensor
Sensor wellness
Progress time
Heat cycle
Cell constant
Polarization
Predict maintenance
Projected calibration time
Projected calibration status
Setting information
Configure sensor
Sensor type
Measuring unit
Temperature settings
Temp. element
Others
c.c.(factory)
c.c.(adjusted)
Modbus address
Measure setting
SC1 sel./comp.
SC2 sel./comp.

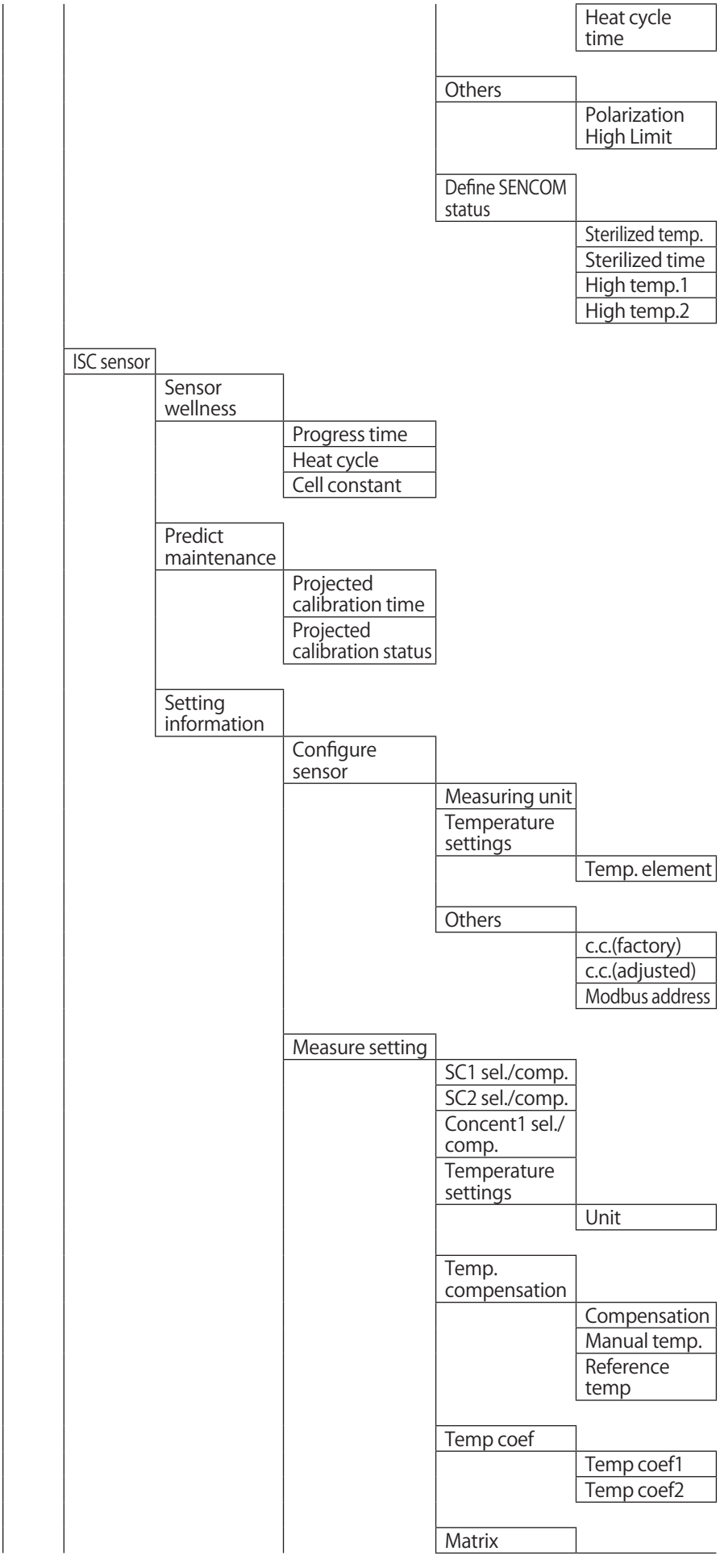
- Concent1 sel./comp.
- Temperature settings
  - Unit
- Temp. compensation
  - Compensation
  - Manual temp.
  - Reference temp
- Temp coef
  - Temp coef1
  - Temp coef2
- Matrix
  - Select matrix1
  - Select matrix2
- High/Low alarm setting
  - Temperature High Limit
  - Temperature Low Limit
  - Conductivity High Limit
  - Conductivity Low Limit
  - Resistance High Limit
  - Resistance Low Limit
  - USP safety margin

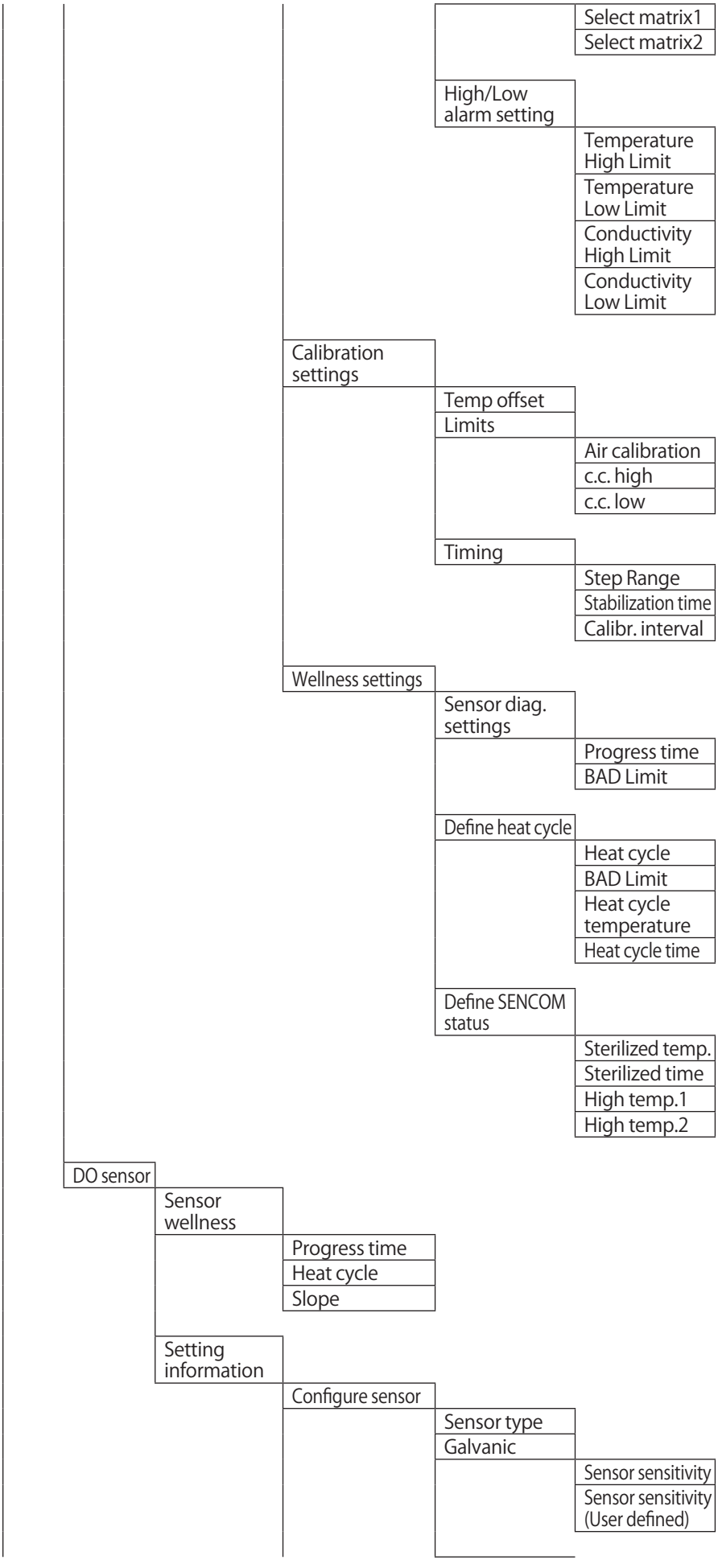
Calibration settings

- Temp offset
- Limits
  - Air calibration
  - c.c. high
  - c.c. low
- Timing
  - Step Range
  - Stabilization time
  - Calibr. interval

Wellness settings

- Sensor diag. settings
  - Progress time
  - BAD Limit
- Define heat cycle
  - Heat cycle
  - BAD Limit
  - Heat cycle temperature

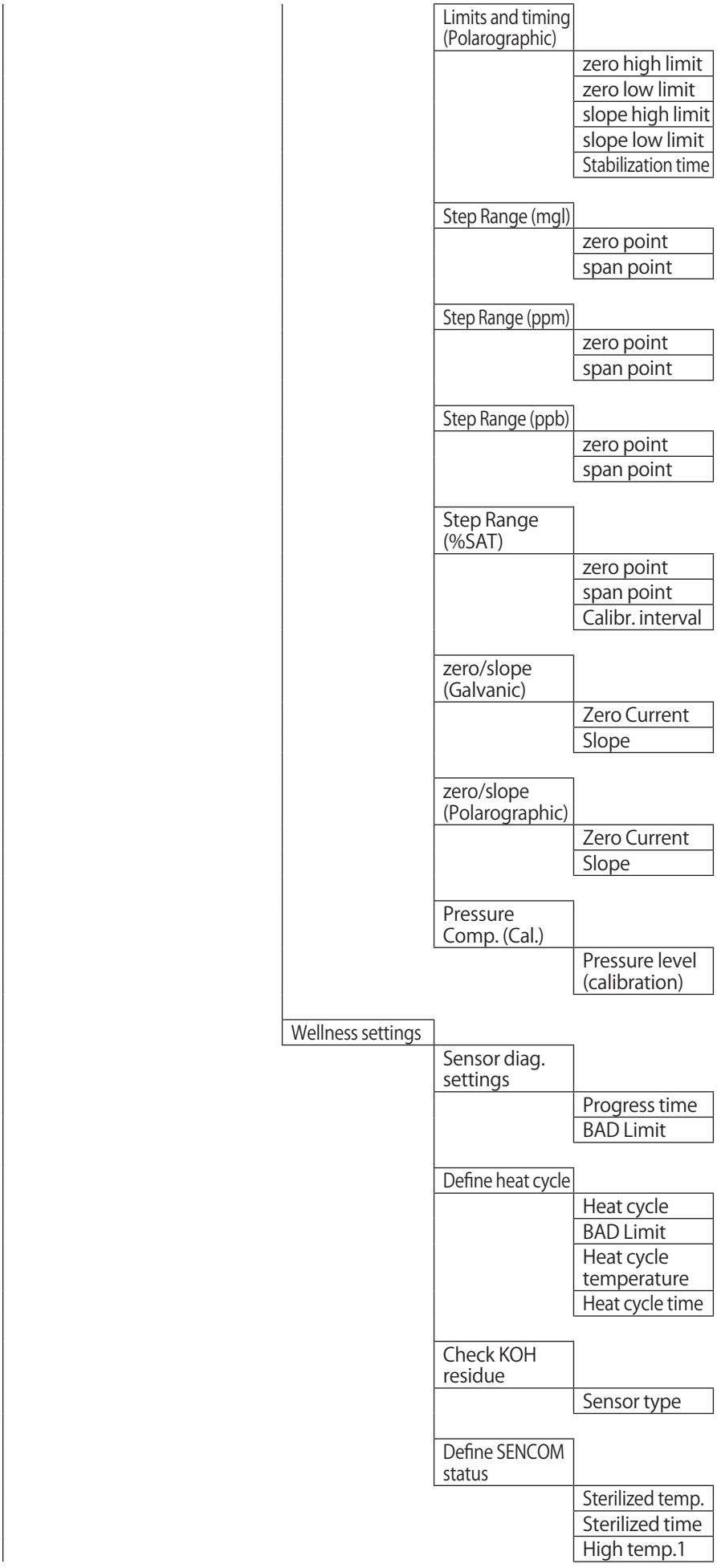

Heat cycle time
Others
Polarization High Limit
Define SENCOM status
Sterilized temp.
Sterilized time
High temp.1
High temp.2
ISC sensor
Sensor wellness
Progress time
Heat cycle
Cell constant
Predict maintenance
Projected calibration time
Projected calibration status
Setting information
Configure sensor
Measuring unit
Temperature settings
Temp. element
Others
c.c.(factory)
c.c.(adjusted)
Modbus address
Measure setting
SC1 sel./comp.
SC2 sel./comp.
Concent1 sel./ comp.
Temperature settings
Unit
Temp. compensation
Compensation
Manual temp.
Reference temp
Temp coef
Temp coef1
Temp coef2
Matrix


Select matrix1
Select matrix2
High/Low alarm setting
Temperature High Limit
Temperature Low Limit
Conductivity High Limit
Conductivity Low Limit
Calibration settings
Temp offset
Limits
Air calibration
c.c. high
c.c. low
Timing
Step Range
Stabilization time
Calibr. interval
Wellness settings
Sensor diag. settings
Progress time
BAD Limit
Define heat cycle
Heat cycle
BAD Limit
Heat cycle temperature
Heat cycle time
Define SENCOM status
Sterilized temp.
Sterilized time
High temp.1
High temp.2
DO sensor
Sensor wellness
Progress time
Heat cycle
Slope
Setting information
Configure sensor
Sensor type
Galvanic
Sensor sensitivity
Sensor sensitivity (User defined)

- Polarographic
  - Sensor sensitivity
  - Polarization Voltage
- Others
  - Temp. element
  - Modbus address

- Measure setting
  - DO settings
    - Unit
  - Temperature settings
    - Unit
  - Temp. compensation
    - Compensation
    - Manual temp.
  - Salinity comp.
    - Compensation
    - Salinity
  - Pressure comp. (Measure)
    - Compensation
    - Pressure level (process)
    - Pressure unit
  - High/Low alarm setting
    - Temp. high limit
    - Temp. low limit
    - DO (mgl) high limit
    - DO (mgl) low limit
    - DO (ppm) high limit
    - DO (ppm) low limit
    - DO (ppb) high limit
    - DO (ppb) low limit
    - DO (%SAT) high limit
    - DO (%SAT) low limit

- Calibration settings
  - Temp offset
  - Limits and timing (Galvanic)
    - zero high limit
    - zero low limit
    - slope high limit
    - slope low limit


Limits and timing (Polarographic)
zero high limit
zero low limit
slope high limit
slope low limit
Stabilization time
Step Range (mgl)
zero point
span point
Step Range (ppm)
zero point
span point
Step Range (ppb)
zero point
span point
Step Range (%SAT)
zero point
span point
Calibr. interval
zero/slope (Galvanic)
Zero Current
Slope
zero/slope (Polarographic)
Zero Current
Slope
Pressure Comp. (Cal.)
Pressure level (calibration)
Wellness settings
Sensor diag. settings
Progress time
BAD Limit
Define heat cycle
Heat cycle
BAD Limit
Heat cycle temperature
Heat cycle time
Check KOH residue
Sensor type
Define SENCOM status
Sterilized temp.
Sterilized time
High temp.1

High temp.2

CH1-2 …
CH1-3 …
CH1-4 …
CH2-1 …

2.2 オフライン

offline_root_menu	
	Tag
	Long tag
	Descriptor
	Message
	Date
	Final asmbly num
	Poll addr
	Loop current mode
	Num resp preams
	Test auto release time
	SV is
	TV is
	QV is
	AO1 target
	AO1 parameter
	AO1 mode
	AO1 function select
	AO1 burnout
	AO1 damping time
	AO1 simulation value
	AO1 hold Last/Fixed select
	AO1 hold fixed value
	AO1 hold during calibration
	AO2 target
	AO2 parameter
	AO2 mode
	AO2 function select
	AO2 burnout
	AO2 damping time
	AO2 simulation value
	AO2 hold Last/Fixed select
	AO2 hold fixed value
	AO2 hold during calibration
	AO3 target
	AO3 parameter
	AO3 mode
	AO3 function select
	AO3 burnout
	AO3 damping time
	AO3 simulation value
	AO3 hold Last/Fixed select
	AO3 hold fixed value
	AO3 hold during calibration
	AO4 target

AO4 parameter
AO4 mode
AO4 function select
AO4 burnout
AO4 damping time
AO4 simulation value
AO4 hold Last/Fixed select
AO4 hold fixed value
AO4 hold during calibration
AI type
AI damping time
AI upper Limit
AI lower limit
AI Temp. LRV
AI Temp. URV
AI Press. LRV
AI Press. URV
Pressure comp.(DO70G)
DI1 type
DI1 wash target
DI1 change range target
DI2 type
DI2 wash target
DI2 change range target
Sub unit select
Auto return time select
Luminance select
Backlight auto off time select

改版履歴

資料名称　　：FLXA402　4 線式液分析計　HART 通信

資料番号　　：TI 12A01F01-61JA

2019年 7月／2版
変更（P. 5、6)
2018年11月／初版
新規作成

横河電機株式会社
〒 180-8750　　東京都武蔵野市中町 2-9-32
http://www.yokogawa.co.jp/an/