AWT210
FOUNDATION FIELDBUS 2-wire transmitter

ABB

Measurement made easy

—
AWT210
2-Wire transmitter

Introduction

This Communications Supplement provides procedures specifically related to the AWT210 FOUNDATION Fieldbus™ 2-wire transmitter. Refer to the AWT210 Operating Instruction (OI/AWT210-EN) for general information on installation, operation and maintenance.

For more information

Further publications for the AWT210 transmitter are available for free download from:
www.abb.com/measurement

or by scanning this code:

	Search for or click on:
AWT210 transmitter – Data Sheet	DS/AWT210-EN
AWT210 transmitter – Commissioning Instruction	CI/AWT210-EN
AWT210 transmitter – Operating Instruction	OI/AWT210-EN

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1   Health & Safety

Document symbols

Symbols that appear in this document are explained below:

DANGER – SERIOUS DAMAGE TO HEALTH
This symbol in conjunction with the signal word 'DANGER' indicates an imminent electrical hazard. Failure to observe this safety information will result in death or severe injury.

WARNING – BODILY INJURY
This symbol in conjunction with the signal word 'WARNING' indicates a potential electrical hazard. Failure to observe this safety information will result in death or severe injury.

CAUTION – MINOR INJURIES
This symbol in conjunction with the signal word 'CAUTION' indicates a potentially dangerous situation. Failure to observe this safety information may result in minor or moderate injury. The symbol may also be used for property damage warnings.

IMPORTANT (NOTE)
This symbol indicates operator tips, particularly useful information or important information about the product or its further uses. The signal word 'IMPORTANT (NOTE)' does not indicate a dangerous or harmful situation.

Safety precautions

Be sure to read, understand and follow the instructions contained within this manual before and during use of the equipment. Failure to do so could result in bodily harm or damage to the equipment.

WARNING – BODILY INJURY
Installation, operation, maintenance and servicing must be performed:
- by suitably trained personnel only
- in accordance with the information provided in this manual
- in accordance with relevant national and local regulations

Potential safety hazards

AWT210 transmitter – electrical

WARNING – BODILY INJURY
To ensure safe use when operating this equipment, the following points must be observed:
- Up to 240 V AC may be present. Be sure to isolate the supply before removing the terminal cover.
- Normal safety precautions must be taken to avoid the possibility of an accident occurring when operating in conditions of high pressure and/or temperature.

Safety advice concerning the use of the equipment described in this manual or any relevant Material Safety Data Sheets (where applicable) can be obtained from the Company, together with servicing and spares information.

Safety standards

This product has been designed to satisfy the requirements of IEC61010-1:2010 3rd edition 'Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use' and complies with US NEC 500, NIST and OSHA.

This equipment complies with the requirements of CEI/IEC 61010-1:2010 'Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use' and complies with US NEC 500 and Occupational Safety & Health Administration. If the equipment is used in a manner NOT specified by the Company, the protection provided by the equipment may be impaired.

...1 Health & Safety

Waste Electrical and Electronic Equipment (WEEE)

WEEE EU Directive 2012/19/EU covers disposal and recycling of electronic equipment at the end of life for reasons of environmental protection.

> For industrial installations, portable equipment is included. This means that when the transmitter is used with a portable sensor, it is included in directive's scope and has the WEEE symbol (left) on its data label. Therefore, at the end of life, contact the supplier for specialist waste recycling. It must not be disposed of as municipal waste.

Permanent Industrial installations are not designated within this directive for recycling. At the point of supply the intended use is not always known, so the WEEE symbol is included on all remote forms of the transmitter.

Product recycling and disposal (Europe only)

> Electrical equipment marked with this symbol may not be disposed of in European public disposal systems after 12 August 2005. To conform to European local and national regulations (EU Directive 2012/19/EU), European electrical equipment users can now return old or end-of-life equipment to the manufacturer for disposal at no charge to the user. ABB is committed to ensuring that the risk of any environmental damage or pollution caused by any of its products is minimized as far as possible.

> **i   IMPORTANT (NOTE)**
> For return for recycling, please contact the equipment manufacturer or supplier for instructions on how to return end-of-life equipment for proper disposal.

Information on ROHS Directive 2011/65/EU (RoHS II)

ABB, Industrial Automation, Measurement & Analytics, UK, fully supports the objectives of the ROHS II directive. All in-scope products placed on the market by IAMA UK on and following the 22nd of July 2017 and without any specific exemption, will be compliant to the ROHS II directive, 2011/65/EU.

Product symbols

Symbols that may appear on this product are shown below:

> Risk of electric shock.

> This symbol, when noted on a product, indicates a potential hazard which could cause serious personal injury and/or death. The user should reference this instruction manual for operation and/or safety information.

> Protective earth (ground) terminal.

> Functional earth (ground) terminal.

> Direct current supply only.

> This symbol, when noted on a product enclosure or barrier, indicates that a risk of electrical shock and/or electrocution exists and indicates that only individuals qualified to work with hazardous voltages should open the enclosure or remove the barrier.

> Recycle separately from general waste under the WEEE directive.

2   Cyber security

The AWT210 FOUNDATION Fieldbus transmitter is designed to be connected to and to communicate information and data via a digital communication interface. It is your sole responsibility to provide and continuously ensure a secure connection between the product and your network or any other network (as the case may be). You shall establish and maintain any appropriate measures (such as but not limited to the application of authentication measures etc.) to protect the product, the network, its system and the interface against any kind of security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information.

ABB Ltd and its affiliates are not liable for damages and/or losses related to such security breaches, any unauthorized access, interference, intrusion, leakage and/or theft of data or information.

3   FOUNDATION Fieldbus communication

FOUNDATION Fieldbus is an all-digital, serial, two-way communication system that serves as a Local Area Network (LAN) for factory/plant instrumentation and control devices.

Information on FOUNDATION Fieldbus can be found from standards IEC 61158, IEC 61784, EN 50170/DIN 19245 and EN 50020 (FISCO model)

For further information on FOUNDATION Fieldbus, refer to: the Fieldbus Foundation organization website
www.fieldbus.org

or the ABB website:
www.abb.com/fieldbus

4   Device overview

Four variants of AWT210 are available for use with pH, ORP, pION, and conductivity sensors.

Supported sensors:
- pH
- 2-electrode conductivity
- 4-electrode conductivity
- toroidal conductivity

The AWT210 FOUNDATION Fieldbus is compliant to the communication Protocol FOUNDATION Fieldbus specification ITK6.3.1.

The AWT210 FOUNDATION Fieldbus version is a compact slave device implementing:
- one Resource Block (RB)
  – the RB describes the necessary parameters and functions of the device or the operation of the device hardware itself.

- four Transducer Blocks (TB)
  – the TBs contain the parameters of a device representing the necessary parameters and functions of the connection to the process.
  – Examples are measured process values, the type of sensor and the calibration data.
  – There is one transducer block for each sensor type.

- two Function Blocks (FB)
  – both function blocks are AI blocks.
  – each FB can be connected to one TB at one time.

Registration details

All the Registration details are available from the Fieldbus Foundation organization website:
   www.fieldbus.org

Reference documents

Document ID	Title
DS/AWT210-EN	AWT210 transmitter Data Sheet
OI/AWT210-EN	AWT210 transmitter Operating Instruction
CI/AWT210-EN	AWT210 transmitter Commissioning Instruction

5   Transmitter functionality and operator interface controls

Process interface

Sensor Input Channels
The sensor module provides 8 terminals marked 1 to 8, 1 to 4 for Process Variable (detailed in Commissioning Instruction [CI/AWT210-EN]) and 5 to 8 for temperature sensor (up to 3 wire RTD + shield).

Operating ranges correspond to the capabilities of each sensor type.

Host interface
The AWT210FF is a bus powered device with FOUNDATION Fieldbus communication. The communication module provides 5 terminals for bus power & functional earth connection.
- Terminals 1(A) & 2(B) are for polarity independent bus lines.
- Terminal 3 ($\perp$) provides a functional earth connection
- Terminals 4(A) & 5(B) are a repeat of Terminals 1(A) & 2(B)

Local interfaces, jumpers and switches

Local controls and displays
- The Device has a 75 x 65 mm (3.00 x 2.55 in.) monochromatic dot matrix LCD display and 4 push buttons

Internal jumpers and switches
The device has 2 internal switches, situated on the top righthand side of the communication module – see Figure 2, page 8:
- SW1: Reset to Defaults
  – if the device is powered up with SW1 in the **ON** position it returns device setup to default factory settings.
  – if powered up with SW1 in the **OFF** position the device retains previously saved user settings*.

- SW2: Write Protection
  – If SW2 is in the **ON** position HW write protect shows as enabled and the user is unable to make changes to setup or send Write commands via FOUNDATION Fieldbus.

    With SW2 in **OFF** position the user is able to make changes/send commands providing they are in a sufficient access level and **Software Write Protect** has not been enabled.

*Note: Reset to defaults is not performed if SW2 Write Protection is **ON**.

6   Installation

The Fieldbus furnishes transmitter power and can be configured as a point-to-point, tree, Daisy Chain, or Trunk/ Spurs network similar to that shown in Figure 1.

Modulating the base quiescent current generates the communication signals. The quiescent current value is used as a reference to establish the number of devices that can be installed on a single bus line. The number of transmitters or devices that can be connected to a bus is primarily dependent on the power consumption of the transmitters or devices, the type of cable, the number of spurs, the total cable length of the bus and intrinsic safety requirements.

Each end of a segment must be terminated by an active bus terminating resistor. Both bus terminators must always be powered to ensure fault-free operation, therefore it is strongly recommended that they are connected to a back-up power supply.

Data is transmitted over the bus using digital, bit synchronous Manchester II coding at a baud rate of 31.25 kbit/sec.
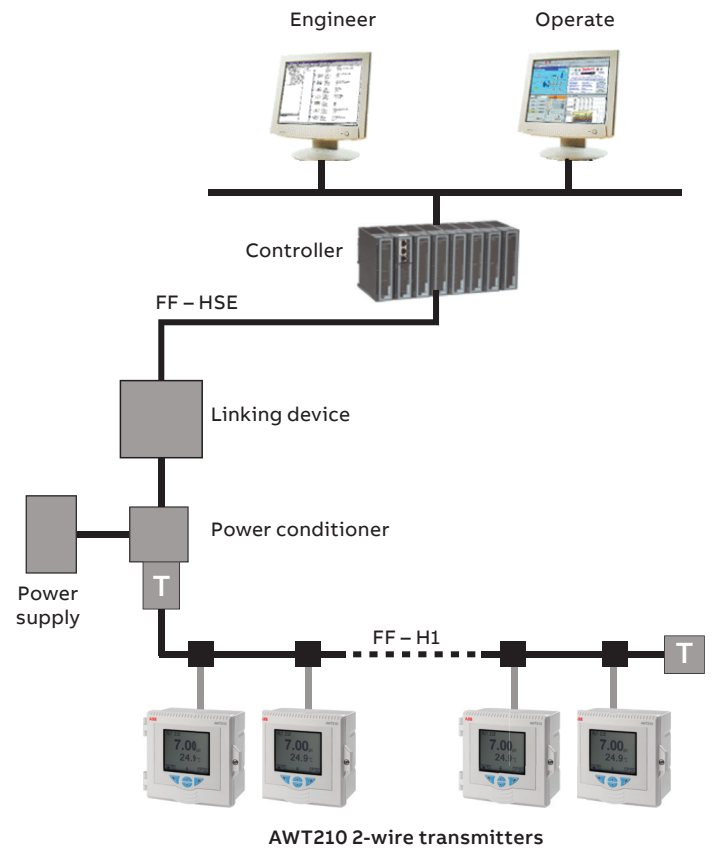

Figure 1   Typical FOUNDATION Fieldbus network

...6   Installation

Cable length

Maximum cable length	1900 m (6233 ft)
Maximum spur length (1 device)	120 m (394 ft)
Maximum spur length (2 devices)	90 m (295 ft)
Maximum spur length (3 devices)	60 m (197 ft)
Maximum spur length (4 devices)	30 m (98 ft)

Cable specification

The cable lengths in Table 1 apply to cable to the following specification:

Impedance	135 to 165 Ω
Capacitance per unit length	<30 pf/m
Loop resistance	110 Ω/km
Core diameter	0.64 mm
Core cross section	>0.34 mm^2

Network connection

FOUNDATION Fieldbus network connections are made to the terminal block on the AWT210 Communication module.

> ⚠️ **WARNING – BODILY INJURY**
> • Refer to the AWT210 Operating Instruction (OI/AWT210-EN) before making electrical connections.

> **NOTICE**
>
> **Property damage**
> When connecting an AWT210 to a FOUNDATION Fieldbus network:
> • Use cable that meets FOUNDATION Fieldbus specifications for reliable communications
> • Ensure a FOUNDATION Fieldbus active terminator is fitted to each end of each bus segment.
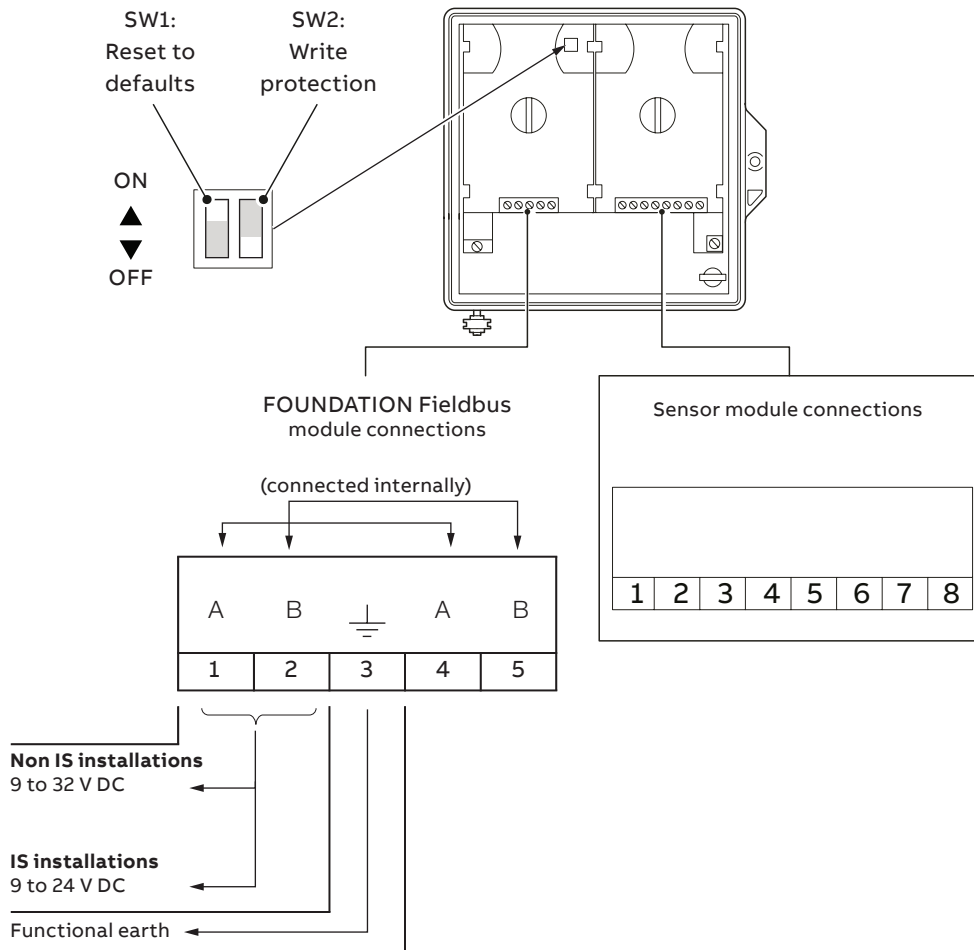> • Route data lines clear of the source of any strong electrical and magnetic fields.

Figure 2   FOUNDATION Fieldbus communication module connection overview

7　Configuration

Local configuration

The configuration of FOUNDATION Fieldbus communications for an AWT210 transmitter can be set locally using the keypad and menus however it is recommended that the configuration is set remotely by a FOUNDATION Fieldbus master.
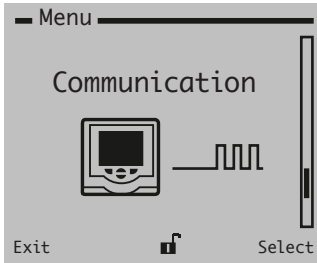
Used to configure the communications.

Menu	Comment	Default
Node Address	Device-specific slave address to identify the transmitter on the network.	126
Device Tag	String to identify the device (displayed at the top of the operator page)	"AWT210"
Manuf ID	Read Only, manufacturer identification number	320h (800) = ABB
Device Type	Read Only, Indicates the Fieldbus Device Type	54h (84) = AWT210
Device Revision	Read Only, Indicates the revision number of the FOUNDATION Fieldbus firmware	
Simulation	Simulation jumper switch	Disabled

Fieldbus application processes

FOUNDATION Fieldbus devices can be divided into two parts under the point of view of technical competence who must take care of its configuration and use.
- The Device Application Process (DAP) is device specific and stays with the device wherever it is used.
- The Control Application Process (CAP) is configured for the specific plant location and may be spread over multiple devices.

Communication between the DAP and CAP takes place using channels. Each I/O function block in the CAP has exclusive use of exactly one channel. A channel may be bi-directional and it may have multiple values.

Device Application Process (DAP)

The DAP is used primarily by the instrumentation technician or maintenance personnel for configuring I/O when the instrument is going to be installed in the plant and/or during maintenance operations and for this reason mainly focused on the Resource Block and Transducer Blocks of the device.

Control Application Process (CAP)

The CAP is used by the control engineer for configuring the plant control strategy and for this reason mainly focused on the Function Blocks of the device.

AWT210 FOUNDATION Fieldbus data sheet

Item	Detail
Device Type	54h (84) = AWT210
Node Address	0 to 255 (default = 30)
Block types	One Resource Block Four Transducer Blocks Two AI Function Blocks
Physical Layer	In compliance with IEC 61158-2
Transmission rate	31.25 kbps

8   Fieldbus slots

This section contains descriptions of the FIELDBUS commands available through the FIELDBUS universal, common practice and device specific command sets.

Device-specific command details such as data bytes and response codes are described in the AWT210 FIELDBUS field device specification (COM/AWT210/FIELDBUS-FDS-EN).

Resource Block (RB)

Index	Parameter	Access	Data	Type	Size (bytes)	Range
0	RESOURCE_BLOCK_2	SRW	Record	BLOCK	62	
1	ST_REV	SR	Simple	Unsigned16	2	
2	TAG_DESC	SRW	Simple	OctetString	32	
3	STRATEGY	SRW	Simple	Unsigned16	2	
4	ALERT_KEY	SRW	Simple	Unsigned8	1	
5	MODE_BLK	RSW	Record	MODE	4	
6	BLOCK_ERR	R	Simple	BitString	2	
7	RS_STATE	R	Simple	Unsigned8	1	
8	TEST_RW	WR	Record	TEST	112	
9	DD_RESOURCE	R	Simple	VisibleString	32	
10	MANUFAC_ID	SR	Simple	Unsigned32	4	
11	DEV_TYPE	SR	Simple	Unsigned16	2	
12	DEV_REV	SR	Simple	Unsigned8	1	
13	DD_REV	SR	Simple	Unsigned8	1	
14	GRANT_DENY	RW	Record	AccessPerm	2	
15	HARD_TYPES	SR	Simple	BitString	2	
16	RESTART	RW	Simple	Unsigned8	1	
17	FEATURES	SR	Simple	BitString	2	
18	FEATURE_SEL	SRW	Simple	BitString	2	
19	CYCLE_TYPE	R	Simple	BitString	2	
20	CYCLE_SEL	SRW	Simple	BitString	2	
21	MIN_CYCLE_T	SR	Simple	Unsigned32	4	
22	MEMORY_SIZE	R	Simple	Unsigned16	2	
23	NV_CYCLE_T	R	Simple	Unsigned32	4	
24	FREE_SPACE	R	Simple	Float	4	
25	FREE_TIME	R	Simple	Float	4	
26	SHED_RCAS	SRW	Simple	Unsigned32	4	
27	SHED_ROUT	SRW	Simple	Unsigned32	4	
28	FAULT_STATE	R	Simple	Unsigned8	1	
29	SET_FSTATE	RW	Simple	Unsigned8	1	
30	CLR_FSTATE	RW	Simple	Unsigned8	1	
31	MAX_NOTIFY	SR	Simple	Unsigned8	1	
32	LIM_NOTIFY	SRW	Simple	Unsigned8	1	
33	CONFIRM_TIME	SRW	Simple	Unsigned32	4	
34	WRITE_LOCK	SRW	Simple	Unsigned8	1	
35	UPDATE_EVT	RW	Record	AlarmEvent	16	
36	BLOCK_ALM	RW	Record	AlarmDisc	18	
37	ALARM_SUM	SRW	Record	AlarmSummary	8	
38	ACK_OPTION	SRW	Simple	BitString	2	
39	WRITE_PRI	SRW	Simple	Unsigned8	1	
40	WRITE_ALM	RW	Record	AlarmDisc	18	
41	ITK_VER	NR	Simple	Unsigned16	2	
42	SOFTWARE_REV	RX	Simple	VisibleString	32	
43	HARDWARE_REV	RX	Simple	VisibleString	32	
44	CAPABILITY_LEV	RX	Simple	Unsigned8	1	
45	COMPATIBILITY_REV	RX	Simple	Unsigned8	1	

Index	Parameter	Access	Data	Type	Size (bytes)	Range
46	FD_VER	SR	Simple	Unsigned16	2	
47	FD_FAIL_ACTIVE	R	Simple	BitString	4	
48	FD_OFFSPEC_ACTIVE	R	Simple	BitString	4	
49	FD_MAINT_ACTIVE	R	Simple	BitString	4	
50	FD_CHECK_ACTIVE	R	Simple	BitString	4	
51	FD_FAIL_MAP	SRW	Simple	BitString	4	
52	FD_OFFSPEC_MAP	SRW	Simple	BitString	4	
53	FD_MAINT_MAP	SRW	Simple	BitString	4	
54	FD_CHECK_MAP	SRW	Simple	BitString	4	
55	FD_FAIL_MASK	SRW	Simple	BitString	4	
56	FD_OFFSPEC_MASK	SRW	Simple	BitString	4	
57	FD_MAINT_MASK	SRW	Simple	BitString	4	
58	FD_CHECK_MASK	SRW	Simple	BitString	4	
59	FD_FAIL_ALM	RW	Record	AlarmFDDiagnostic	20	
60	FD_OFFSPEC_ALM	RW	Record	AlarmFDDiagnostic	20	
61	FD_MAINT_ALM	RW	Record	AlarmFDDiagnostic	20	
62	FD_CHECK_ALM	RW	Record	AlarmFDDiagnostic	20	
63	FD_FAIL_PRI	SRW	Simple	Unsigned8	1	
64	FD_OFFSPEC_PRI	SRW	Simple	Unsigned8	1	
65	FD_MAINT_PRI	SRW	Simple	Unsigned8	1	
66	FD_CHECK_PRI	SRW	Simple	Unsigned8	1	
67	FD_SIMULATE	RW	Record	SimulateFD	9	
68	FD_RECOMMEN_ACT	R	Simple	Unsigned16	2	
	RESOURCE BLOCK PARAMETERS					
69	SPECIAL_RESTART	RWB	Simple	BitString	2	
70	SPECIAL_OPERATION	RWB	Simple	Unsigned8	1	
71	FD_HISTORY	AR	Simple	BitString	4	
72	FD_CONDITION_IDX	XRW	Simple	Unsigned8	1	
73	FD_CONDITION_DETAILS	XRW	Record	DiagDetStruct	14	
74	MESSAGE	RW	Simple	VisibleString	32	
75	DESCRIPTOR	RW	Simple	VisibleString	32	
76	INSTALLATION_DATE	RW	Simple	Date	7	
77	SERVICE_PASSWORD	XRW	Simple	VisibleString	20	
78	OBJECT_ADDRESS	ABXRW	Record	PrivateObjectAddress	8	
79	OBJECT_DATA	ABXRW	Record	PrivateData	33	
80	MEMORY_ADDRESS	ABXRW	Record	PrivateMemoryAddress	7	
81	MEMORY_DATA	ABXRW	Record	PrivateData	33	
82	TEST_RESULT	RWX	Simple	Unsigned8	1	
83	DEVICE_SERIAL_NUMBER	RX	Simple	VisibleString	14	
84	FRONTENDBOARD_TYPE	RX	Simple	Unsigned8	1	Table 2, page 18
85	CHANNEL_MAP	RWS	Array	Unsigned16	8	
86	LANGUAGE	RWX	Simple	Unsigned8	1	Table 3, page 18

...8   Fieldbus slots

Analog Input function blocks (AI1) (AI2)

Index	Parameter	Access	Data	Type	Size (bytes)	Range
0	ANALOG_INPUT_BLOCK	SRW	Record	Block	62	
1	ST_REV	SR	Simple	Unsigned16	2	
2	TAG_DESC	SRW	Simple	OctetString	32	
3	STRATEGY	SRW	Simple	Unsigned16	2	
4	ALERT_KEY	SRW	Simple	Unsigned8	1	
5	MODE_BLK	SRW	Record	Mode	4	
6	BLOCK_ERR	R	Simple	BitString	2	
7	PV	R	Record	Float_S	5	
8	OUT	NRW	Record	Float_S	5	
9	SIMULATE	RW	Record	SimFloat	11	
10	XD_SCALE	SRW	Record	Scale	11	
11	OUT_SCALE	SRW	Record	Scale	11	
12	GRANT_DENY	RW	Record	AccessPerm	2	
13	IO_OPTS	SRW	Simple	BitString	2	
14	STATUS_OPTS	SRW	Simple	BitString	2	
15	CHANNEL	SRW	Simple	Unsigned16	2	
16	L_TYPE	SRW	Simple	Unsigned8	1	
17	LOW_CUT	SRW	Simple	Float	4	
18	PV_FTIME	SRW	Simple	Float	4	
19	FIELD_VAL	R	Record	Float_S	5	
20	UPDATE_EVT	RW	Record	AlarmEvent	16	
21	BLOCK_ALM	RW	Record	AlarmDisc	18	
22	ALARM_SUM	SRW	Record	AlarmSummary	8	
23	ACK_OPTION	SRW	Simple	BitString	2	
24	ALARM_HYS	SRW	Simple	Float	4	
25	HI_HI_PRI	SRW	Simple	Unsigned8	1	
26	HI_HI_LIM	SRW	Simple	Float	4	
27	HI_PRI	SRW	Simple	Unsigned8	1	
28	HI_LIM	SRW	Simple	Float	4	
29	LO_PRI	SRW	Simple	Unsigned8	1	
30	LO_LIM	SRW	Simple	Float	4	
31	LO_LO_PRI	SRW	Simple	Unsigned8	1	
32	LO_LO_LIM	SRW	Simple	Float	4	
33	HI_HI_ALM	RW	Record	AlarmFloat	21	
34	HI_ALM	RW	Record	AlarmFloat	21	
35	LO_ALM	RW	Record	AlarmFloat	21	
36	LO_LO_ALM	RW	Record	AlarmFloat	21	
37	BLOCK_ERR_DESC_1	R	Simple	BitString	4	

pH Transducer block (TB0)

Index	Parameter	Access	Data	Type	Size (bytes)	Range
			STANDARD PARAMETERS			
0	PHTB	SRW	Record	Block	62	
1	ST_REV	SR	Simple	Unsigned16	2	
2	TAG_DESC	SRW	Simple	OctetString	32	
3	STRATEGY	SRW	Simple	Unsigned16	2	
4	ALERT_KEY	SRW	Simple	Unsigned8	1	
5	MODE_BLK	SRW	Record	Mode	4	
6	BLOCK_ERR	R	Simple	BitString	2	
7	UPDATE_EVT	RW	Record	AlarmEvent	16	
8	BLOCK_ALM	RW	Record	AlarmDisc	18	
9	TRANSDUCER_DIRECTORY	R	Array	Unsigned16	2	
10	TRANSDUCER_TYPE	RS	Simple	Unsigned16	2	
11	TRANSDUCER_TYPE_VER	RS	Simple	Unsigned16	2	
12	XD_ERROR	R	Simple	Unsigned8	1	
13	COLLECTION_DIRECTORY	R	Array	Unsigned32	4	
		AWT210 pH SPECIFIC TRANSDUCER BLOCK PARAMETERS				
14	PRIMARY_VALUE_TYPE	RWVX	Simple	Unsigned8	1	Table 4, page 18
15	PRIMARY_VALUE	RX	Record	Float_S	5	
16	PRIMARY_VALUE_RANGE	RWSAB	Record	Scale	11	
17	PV_MIN_SPAN	RX	Simple	Float	4	
18	DAMPING_TIME	RWX	Simple	Float	4	0 to 99.9s
19	SECONDARY_VALUE	RX	Record	Float_S	5	
20	SECONDARY_VALUE_UNIT	RWSAB	Simple	Unsigned16	2	Table 1, page 18
21	SECONDARY_VALUE_2	RX	Record	Float_S	5	
22	SECONDARY_VALUE_UNIT_2	RX	Simple	Unsigned16	2	Table 1, page 18
23	SECONDARY_VALUE_3	RX	Record	Float_S	5	
24	SECONDARY_VALUE_UNIT_3	RA	Simple	Unsigned16	2	Table 1, page 18
25	SENSOR_RANGE	RA	Record	Scale	11	
26	PH_SENSOR_TYPE	RWVX	Simple	Unsigned8	1	Table 5, page 18
27	ISOPOTENTIAL_PT	RWVX	Simple	Float	4	−20 to 20 pH
28	ASYMMETRIC_POT	RWVX	Simple	Float	4	−2000 to 2000 mV
29	VALENCE	RWVX	Simple	Unsigned8	1	Table 6, page 18
30	MAGNITUDES	RWVX	Simple	Unsigned8	1	Table 7, page 18
31	ENDMAG	RWVX	Simple	Unsigned8	1	Table 8, page 18
32	ENDMV	RWVX	Simple	Integer16	2	-1500 to 1500 mV
33	TEMP_COMP_TYPE	RWVX	Simple	Unsigned8	1	Table 9, page 18
34	MANUAL_TEMP	RWVX	Simple	Float	4	20 to 150 °C / -4 to 302 °F
35	PH_10C	RWVX	Simple	Float	4	-10 to 10 pH/10 °C
36	MV_10C	RWVX	Simple	Float	4	−20 to 20 mV/10 °C
37	TEMP_SENSOR	RX	Simple	Unsigned8	1	Table 10, page 18
38	TEMP_SENSOR_AR_TRIGGER	WX	Simple	Unsigned8	1	Write 1 to trigger
39	TEMP_SENSOR_AR_STATUS	RX	Simple	Unsigned8	1	Table 11, page 18
40	REF_IMP_LMT	RWVX	Simple	Float	4	1 to 1000 kΩ
41	BUFFERTEMPCAL2PT	RWVX	Simple	Float	4	20 to 150 °C / -4 to 302 °F
42	BUFFERVALUE1CAL2PT	RWVX	Simple	Float	4	-2 to 16 pH
43	BUFFERVALUE2CAL2PT	RWVX	Simple	Float	4	-2 to 16 pH
44	BUFFERTYPE	RWVX	Simple	Unsigned8	1	Table 12, page 18
45	BUFFERVALUE1	RWVX	Simple	Unsigned8	1	Table 13, page 18
46	BUFFERVALUE2	RWVX	Simple	Unsigned8	1	Table 13, page 18

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pH Transducer block (TB0)

Index	Parameter	Access	Data	Type	Size (bytes)	Range
47	PV_CAL_SLOPE	RWVX	Simple	Float	4	40 to 150 %
48	PV_CAL_OFFSET	RWVX	Simple	Float	4	–1000 to 1000 mV
49	TEMP_CAL_SLOPE	RWVX	Simple	Float	4	20 to 150 %
50	TEMP_CAL_OFFSET	RWVX	Simple	Float	4	–40 to 40 °C / –72 to 72 °F
51	PV_SLOPE_LO_LIMIT	RWVX	Simple	Float	4	40 to 100 %
52	PV_SLOPE_HI_LIMIT	RWVX	Simple	Float	4	100 to 150 %
53	PV_OFFSET_LIMIT	RWVX	Simple	Float	4	0 to 1000 mV
54	CALIBRATIONSTATUS	RWVX	Simple	Unsigned8	1	
55	CALIBRATION_MODE	RWVX	Simple	Unsigned8	1	
56	CALIBRATIONNEWVALUE	RWVX	Simple	Float	4	
57	CALIBRATIONERRORVALUE	RX	Simple	Unsigned8	1	
58	CALIBRATIONPROGRESSTIMER	RX	Simple	Float	4	
59	CAL_RESET	WX	Simple	Unsigned	1	Write 1 to reset
60	BUFFERTABLE1TEMP	RWVX	Record	Float	20	–20 to 150 °C / –4 to 302 °F
61	BUFFERTABLE1PH	RWVX	Record	Float	20	2 to 16 pH
62	BUFFERTABLE2TEMP	RWVX	Record	Float	20	–20 to 150 °C / –4 to 302 °F
63	BUFFERTABLE2PH	RWVX	Record	Float	20	2 to 16 pH
64	DIAGNOSTICS_ACTIVE	RWVX	Simple	Unsigned8	1	Table 21, page 19

4-electrode conductivity transducer block (TB1)

Index	Parameter	Access	Data	Type	Size (bytes)	Range
			STANDARD PARAMETERS			
0	ECTB	SRW	Record	Block	62	
1	ST_REV	SR	Simple	Unsigned16	2	
2	TAG_DESC	SRW	Simple	OctetString	32	
3	STRATEGY	SRW	Simple	Unsigned16	2	
4	ALERT_KEY	SRW	Simple	Unsigned8	1	
5	MODE_BLK	SRW	Record	Mode	4	
6	BLOCK_ERR	R	Simple	BitString	2	
7	UPDATE_EVT	RW	Record	AlarmEvent	16	
8	BLOCK_ALM	RW	Record	AlarmDisc	18	
9	TRANSDUCER_DIRECTORY	R	Array	Unsigned16	2	
10	TRANSDUCER_TYPE	RS	Simple	Unsigned16	2	
11	TRANSDUCER_TYPE_VER	RS	Simple	Unsigned16	2	
12	XD_ERROR	R	Simple	Unsigned8	1	
13	COLLECTION_DIRECTORY	R	Array	Unsigned32	4	
		AWT210 4-ELECTRODE CONDUCTIVITY SPECIFIC TRANSDUCER BLOCK PARAMETERS				
14	PRIMARY_VALUE_TYPE	RWVX	Simple	Unsigned8	1	Table 14, page 18
15	PRIMARY_VALUE	RX	Record	Float_S	5	
16	PRIMARY_VALUE_RANGE	RWSAB	Record	Scale	11	
17	PV_MIN_SPAN	RX	Simple	Float	4	
18	DAMPING_TIME	RWX	Simple	Float	4	0 to 99.9s
19	SECONDARY_VALUE	RX	Record	Float_S	5	
20	SECONDARY_VALUE_UNIT	RWSAB	Simple	Unsigned16	2	Table 1, page 18
21	SECONDARY_VALUE_2	RX	Record	Float_S	5	
22	SECONDARY_VALUE_UNIT_2	RX	Simple	Unsigned16	2	Table 1, page 18
23	SECONDARY_VALUE_3	RX	Record	Float_S	5	
24	SECONDARY_VALUE_UNIT_3	RA	Simple	Unsigned16	2	Table 1, page 18
25	SENSOR_RANGE	RA	Record	Scale	11	
26	SENSOR_GROUP	RWVX	Simple	Unsigned8	1	Table 15, page 19
27	CONC_SOLUTION	RWVX	Simple	Unsigned8	1	Table 16, page 19
28	CONC_NAME	RWVX	Simple	VisibleString	6	
29	CONC_USR_DEF_TABLEX	RWVX	Record	Float	24	0 to 2000000 µS/cm
30	CONC_USR_DEF_TABLEY	RWVX	Record	Float	24	0 to 2000
31	COND_UNITS_MODE	RWVX	Simple	Unsigned	1	Table 17, page 19
32	TEMP_COMP_TYPE	RWVX	Simple	Unsigned8	1	Table 9, page 18
33	MANUAL_TEMP	RWVX	Simple	Float	4	−20 to 300 °C / −4 to 572 °F
34	TEMP_AUTO_TC_OPTION	RWVX	Simple	Unsigned8	1	Table 18, page 19
35	TEMP_AUTO_USER_CURVEX	RWVX	Record	Float	24	−20 to 300 °C / −4 to 572 °F
36	TEMP_AUTO_USER_CURVEY	RWVX	Record	Float	24	0 to 19.99
37	TEMP_AUTO_TC_COEFF	RWVX	Simple	Float	4	0 to 9.99 %/ °C
38	REF_TEMP	RWVX	Simple	Float	4	−20 to 200 °C / −4 to 392 °F
39	TEMP_SENSOR	RX	Simple	Unsigned8	1	Table 10, page 18
40	TEMP_AR_TRIGGER	WX	Simple	Unsigned8	1	Write 1 to trigger
41	TEMP_AR_STATUS	RWVX	Simple	Unsigned8	1	Table 11, page 18
42	CALIBRATIONSTATUS	RWVX	Simple	Unsigned8	1	
43	CALIBRATION_MODE	RWVX	Simple	Unsigned8	1	
44	CALBRATIONNEWVALUE	RWVX	Simple	Float	4	
45	CALIBRATIONERRORVALUE	RX	Simple	Unsigned8	1	
46	CALIBRATIONPROGRESSTIMER	RX	Simple	Float	4	
47	PV_CAL_SLOPE	RWVX	Simple	Float	4	20 to 500 %
48	PV_CAL_OFFSET	RWVX	Simple	Float	4	−20 to 20µS/cm
49	TEMP_CAL_SLOPE	RWVX	Simple	Float	4	−20 to 150 %
50	TEMP_CAL_OFFSET	RWVX	Simple	Float	4	−40 to 40 °C / −72 to 72 °F
51	CAL_RESET	WX	Simple	Unsigned8	1	Write 1 to reset
52	DIAGNOSTICS_ACTIVE	RWVX	Simple	Unsigned8	1	Table 21, page 19

...8 Fieldbus slots

Toroidal conductivity transducer block (TB2)

Index	Parameter	Access	Data	Type	Size (bytes)	Range
			STANDARD PARAMETERS			
0	TCTB	SRW	Record	Block	62	
1	ST_REV	SR	Simple	Unsigned16	2	
2	TAG_DESC	SRW	Simple	OctetString	32	
3	STRATEGY	SRW	Simple	Unsigned16	2	
4	ALERT_KEY	SRW	Simple	Unsigned8	1	
5	MODE_BLK	SRW	Record	Mode	4	
6	BLOCK_ERR	R	Simple	BitString	2	
7	UPDATE_EVT	RW	Record	AlarmEvent	16	
8	BLOCK_ALM	RW	Record	AlarmDisc	18	
9	TRANSDUCER_DIRECTORY	R	Array	Unsigned16	2	
10	TRANSDUCER_TYPE	RS	Simple	Unsigned16	2	
11	TRANSDUCER_TYPE_VER	RS	Simple	Unsigned16	2	
12	XD_ERROR	R	Simple	Unsigned8	1	
13	COLLECTION_DIRECTORY	R	Array	Unsigned32	4	
		AWT210 TOROIDAL CONDUCTIVITY SPECIFIC TRANSDUCER BLOCK PARAMETERS				
14	PRIMARY_VALUE_TYPE	RWVX	Simple	Unsigned8	1	Table 14, page 18
15	PRIMARY_VALUE	RX	Record	Float_S	5	
16	PRIMARY_VALUE_RANGE	RWSAB	Record	Scale	11	
17	PV_MIN_SPAN	RX	Simple	Float	4	
18	DAMPING_TIME	RWX	Simple	Float	4	0 to 99.9s
19	SECONDARY_VALUE	RX	Record	Float_S	5	
20	SECONDARY_VALUE_UNIT	RWSAB	Simple	Unsigned16	2	Table 1, page 18
21	SECONDARY_VALUE_2	RX	Record	Float_S	5	
22	SECONDARY_VALUE_UNIT_2	RX	Simple	Unsigned16	2	Table 1, page 18
23	SECONDARY_VALUE_3	RX	Record	Float_S	5	
24	SECONDARY_VALUE_UNIT_3	RA	Simple	Unsigned16	2	Table 1, page 18
25	SENSOR_RANGE	RA	Record	Scale	11	
26	CONC_SOLUTION	RWVX	Simple	Unsigned8	1	Table 16, page 19
27	CONC_NAME	RWVX	Simple	VisibleString	6	
28	CONC_USR_DEF_TABLEX	RWVX	Record	Float	24	0 to 2000000 µS/cm
29	CONC_USR_DEF_TABLEY	RWVX	Record	Float	24	0 to 2000
30	COND_UNITS_MODE	RWVX	Simple	Unsigned	1	Table 17, page 19
31	TEMP_COMP_TYPE	RWVX	Simple	Unsigned8	1	Table 9, page 18
32	MANUAL_TEMP	RWVX	Simple	Float	4	−20 to 300 °C / −4 to 572 °F
33	TEMP_AUTO_TC_OPTION	RWVX	Simple	Unsigned8	1	Table 18, page 19
34	TEMP_AUTO_USER_CURVEX	RWVX	Record	Float	24	−20 to 300 °C / −4 to 572 °F
35	TEMP_AUTO_USER_CURVEY	RWVX	Record	Float	24	0 to 19.99
36	TEMP_AUTO_TC_COEFF	RWVX	Simple	Float	4	0 to 9.99 %/ °C
37	REF_TEMP	RWVX	Simple	Float	4	−20 to 200 °C / −4 to 392 °F
38	TEMP_SENSOR	RX	Simple	Unsigned8	1	Table 10 , page 18
39	TEMP_AR_TRIGGER	WX	Simple	Unsigned8	1	Write 1 to trigger
40	TEMP_AR_STATUS	RWVX	Simple	Unsigned8	1	Table 11, page 18
41	CALIBRATIONSTATUS	RWVX	Simple	Unsigned8	1	
42	CALIBRATION_MODE	RWVX	Simple	Unsigned8	1	
43	CALBRATIONNEWVALUE	RWVX	Simple	Float	4	
44	CALIBRATIONERRORVALUE	RX	Simple	Unsigned8	1	
45	CALIBRATIONPROGRESSTIMER	RX	Simple	Float	4	
46	PV_CAL_SLOPE	RWVX	Simple	Float	4	20 to 500 %
47	PV_CAL_OFFSET	RWVX	Simple	Float	4	−20 to 20 µS/cm
48	TEMP_CAL_SLOPE	RWVX	Simple	Float	4	−20 to 150 %
49	TEMP_CAL_OFFSET	RWVX	Simple	Float	4	−40 to 40 °C / −72 to 72 °F
50	CAL_RESET	WX	Simple	Unsigned8	1	Write 1 to reset

2-electrode conductivity transducer block (TB3)

Index	Parameter	Access	Data	Type	Size (bytes)	Range
			STANDARD PARAMETERS			
0	TETB	SRW	Record	Block	62	
1	ST_REV	SR	Simple	Unsigned16	2	
2	TAG_DESC	SRW	Simple	OctetString	32	
3	STRATEGY	SRW	Simple	Unsigned16	2	
4	ALERT_KEY	SRW	Simple	Unsigned8	1	
5	MODE_BLK	SRW	Record	Mode	4	
6	BLOCK_ERR	R	Simple	BitString	2	
7	UPDATE_EVT	RW	Record	AlarmEvent	16	
8	BLOCK_ALM	RW	Record	AlarmDisc	18	
9	TRANSDUCER_DIRECTORY	R	Array	Unsigned16	2	
10	TRANSDUCER_TYPE	RS	Simple	Unsigned16	2	
11	TRANSDUCER_TYPE_VER	RS	Simple	Unsigned16	2	
12	XD_ERROR	R	Simple	Unsigned8	1	
13	COLLECTION_DIRECTORY	R	Array	Unsigned32	4	
		AWT210 2-ELECTRODE CONDUCTIVITY SPECIFIC TRANSDUCER BLOCK PARAMETERS				
14	PRIMARY_VALUE_TYPE	RWVX	Simple	Unsigned8	1	Table 14 , page 18
15	CELL_CONSTANT	RWX	Simple	Float	4	0.003 to 1.999
16	PRIMARY_VALUE	RX	Record	Float_S	5	
17	PRIMARY_VALUE_RANGE	RWSAB	Record	Scale	11	
18	PV_MIN_SPAN	RX	Simple	Float	4	
19	DAMPING_TIME	RWX	Simple	Float	4	0 to 99.9s
20	SECONDARY_VALUE	RX	Record	Float_S	5	
21	SECONDARY_VALUE_UNIT	RWSAB	Simple	Unsigned16	2	Table 1 , page 18
22	SECONDARY_VALUE_2	RX	Record	Float_S	5	
23	SECONDARY_VALUE_UNIT_2	RX	Simple	Unsigned16	2	Table 1 , page 18
24	SECONDARY_VALUE_3	RX	Record	Float_S	5	
25	SECONDARY_VALUE_UNIT_3	RA	Simple	Unsigned16	2	Table 1 , page 18
26	SENSOR_RANGE	RA	Record	Scale	11	
27	CONC_NAME	RWVX	Simple	VisibleString	6	
28	CONC_USR_DEF_TABLEX	RWVX	Record	Float	24	0 to 20000 µS/cm
29	CONC_USR_DEF_TABLEY	RWVX	Record	Float	24	0 to 2000
30	COND_UNITS_MODE	RWVX	Simple	Unsigned	1	Table 17, page 19
31	TEMP_COMP_TYPE	RWVX	Simple	Unsigned8	1	Table 9 , page 18
32	MANUAL_TEMP	RWVX	Simple	Float	4	−20 to 300 °C / −4 to 572 °F
33	TEMP_AUTO_TC_OPTION	RWVX	Simple	Unsigned8	1	Table 19, page 19
34	TEMP_AUTO_PUREH2O_OPTION	RWVX	Simple	Unsigned8	1	Table 20, page 19
35	TEMP_AUTO_USER_CURVEX	RWVX	Record	Float	24	−20 to 300 °C / −4 to 572 °F
36	TEMP_AUTO_USER_CURVEY	RWVX	Record	Float	24	0 to 19.99
37	TEMP_AUTO_TC_COEFF	RWVX	Simple	Float	4	0 to 9.99 %/ °C
38	REF_TEMP	RWVX	Simple	Float	4	−20 to 200 °C / −4 to 392 °F
39	TEMP_SENSOR	RX	Simple	Unsigned8	1	Table 10, page 18
40	TEMP_AR_TRIGGER	WX	Simple	Unsigned8	1	Write 1 to trigger
41	TEMP_AR_STATUS	RWVX	Simple	Unsigned8	1	Table 11 , page 18
42	CALIBRATIONSTATUS	RWVX	Simple	Unsigned8	1	
43	CALIBRATION_MODE	RWVX	Simple	Unsigned8	1	
44	CALBRATIONNEWVALUE	RWVX	Simple	Float	4	
45	CALIBRATIONERRORVALUE	RX	Simple	Unsigned8	1	
46	CALIBRATIONPROGRESSTIMER	RX	Simple	Float	4	
47	PV_CAL_SLOPE	RWVX	Simple	Float	4	20 to 500 %
48	PV_CAL_OFFSET	RWVX	Simple	Float	4	−20 to 20 µS/cm
49	TEMP_CAL_SLOPE	RWVX	Simple	Float	4	−20 to 150 %
50	TEMP_CAL_OFFSET	RWVX	Simple	Float	4	−40 to 40 °C / −72 to 72 °F
51	CAL_RESET	WX	Simple	Unsigned8	1	Write 1 to reset
52	DIAGNOSTICS_ACTIVE	RWVX	Simple	Unsigned8	1	Table 21, page 19

9 Device tables

Table 1	Unit codes
1001	Degrees Celcius
1002	Degrees Fahrenheit
1586	µS/Cm
1302	mS/Cm
1243	mV
1422	pH
1284	kΩ
1342	%
1423	ppm
1424	ppb
1676	ug/l
1608	mg/l

Table 2	Front end board type
0	Unknown
1	pH
2	4-wire conductivity
4	2-wire conductivity
8	Toroidal conductivity

Table 3	Language table
0	English
1	German
2	French
3	Spanish
4	Italian
14	Portuguese

Table 4	pH sensor measurement type table
111	pH
114	ORP
118	PION

Table 5	pH sensor type table
0	Glass sensor
1	Antimony sensor
2	Custom sensor

Table 6	Valence table
0	−3
1	−2
2	−1
3	1
4	2
5	3

Table 7	Magnitude type
1	1
2	2
3	3

Table 8	End magnitude type
1	10
2	100
3	1000

Table 9	Temperature compensation type table
0	Auto
1	Manual
2	Auto solution

Table 10	Temperature sensor type table
0	Balco 3K 2wire
1	Balco 3K 3wire
2	PT100 2wire
3	PT100 3Wire
4	PT1000 2Wire
5	PT1000 3Wire
6	Temp sensor not connected
6	User-defined temperature compensation

Table 11	Temp sensor detection status table
0	Not recognized
1	Recognized 28

Table 12	AutoCal buffer type
0	User-defined
1	ABB
2	NIST
3	DIN19266
4	MERCK
5	US Tech

Table 13	AutoCal buffer values
0	ABB 4.01 pH
1	ABB 7.00 pH
2	ABB 9.18 pH
3	MERCK 4.00 pH
4	MERCK 7.00 pH
5	MERCK 9.00 pH
6	MERCK 10.00 pH
7	DIN 1.68 pH
8	DIN 4.01 pH
9	DIN 6.86 pH
10	DIN 9.18 pH
11	US Tech 4.01 pH
12	US Tech 7.00 pH
13	US Tech 10.01 pH
14	NIST 4.01 pH
15	NIST 6.86 pH
16	NIST 9.18 pH

Table 14	Conductivity measurement type table
117	Conductivity
118	Concentration

Table 15	4-electrode conductivity sensor group
0	Sensor Group A
1	Sensor Group B

Table 16	Concentration solution
0	NaOH 0 to 15 %
1	NaCl 0 to 20 %
2	HCl 0 to 18 %
3	H2SO4 0 to 20 %
4	User-defined

Table 17	Conducitivity units mode
0	Auto
1	µS/cm
2	mS/cm

Table 18	Toroidal/4-electrode conducitivty auto temperature compensation option
0	Standard KCl
1	Temperature compensation coefficient
2	NaOH
3	NaCl
4	HCl
5	H2SO4
6	User-defined temperature compensation

Table 19	4-electrode conducitivty auto temperature compensation option
0	Standard KCl
1	TC Coefficient
2	Pure H_2O
3	User-defined temperature compensation
6	User-defined temperature compensation

Table 20	Pure H_2O type
0	Neutral
1	Acid
2	Base

Table 21	Enable/Disable table
0	Disabled/OFF
1	Enabled/ON

Acknowledgements