

## Multi-parameter M400 4-Wire FF Foundation Fieldbus Program Guide



**METTLER TOLEDO**

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# 1

## Mettler Toledo Parameters

The following tables list the manufacturer-specific instrument parameters for the Resource Block, the Transducer Block and the Analog Input Blocks.

### 1-1 General explanatory remarks

#### Data type

- DS: data structure, contains data types such as Unsigned16, Octet String etc.
- Float: IEEE 754 format
- Visible String: ASCII coded
- Unsigned:
  - Unsigned16: value range = 0 to 255
  - Unsigned16: value range = 0 to 65535
  - Unsigned32: value range = 0 to 429496729

#### Storage class

- C: constant parameter
- D: dynamic parameter
- N: nonvolatile parameter
- S: static parameter

The MODE\_BLK column indicates the block mode in which the parameter can be written if the parameter is a write parameter. Some parameters can only be written in the OOS block mode. The "Reset codes" column indicates which reset codes reset the parameter.

## 2

### General Specifications

Model:	M400 FF Multi-parameters Fieldbus Transmitter
Device ITK Profile:	6
MANUFAC_ID:	0x465255
Device Type:	0x420
Device Revision:	0x01
Physical Layer Profiles:	113, 115
Linkmaster:	Yes
Mandatory Features:	<ul style="list-style-type: none"><li>• Resource Block</li><li>• Alarms and Events</li><li>• Function Block Linking</li><li>• Trending</li><li>• Multi-Bit Alert Reporting</li><li>• Field Diagnostics</li></ul>
Function Blocks:	<ul style="list-style-type: none"><li>• 4 * Analog Input</li><li>• 1 * Analog Output (Pressure Compensation)</li><li>• 2 * Discrete Input (Alarm\Hold\Clean Status)</li><li>• 2 * Discrete Output(System Hold, O2 Optical LED Control)</li><li>• 1 * PID</li></ul>

## 3

## AI Function Blocks

4 Analog Input Function Blocks provide for cyclic transmission of measured values. You can assign individual process variables from each AI channel parameter.

Example: AI1 is set to pH value, AI2 is set to temperature degC, AI3 is set to DLI, AI4 is set to TTM

### Setting in AI 1:

Parameter	Value	Comments
CHANNEL	6	Ref section 3-1 for detail information
XD_SCALE, UNITS_INDEX	PH	
OUT_SCALE, UNITS_INDEX	PH	
L_TYPE	Direct	
MODE_BLK, ACTUAL	Auto	

### Setting in AI 2:

Parameter	Value	Comments
CHANNEL	200	Ref section 3-1 for detail information
XD_SCALE, UNITS_INDEX	°C	
OUT_SCALE, UNITS_INDEX	°C	
L_TYPE	Direct	
MODE_BLK, ACTUAL	Auto	

### Setting in AI 3:

Parameter	Value	Comments
CHANNEL	3	Ref section 3-1 for detail information
XD_SCALE, UNITS_INDEX	days	
OUT_SCALE, UNITS_INDEX	days	
L_TYPE	Direct	
MODE_BLK, ACTUAL	Auto	

### Setting in AI 4:

Parameter	Value	Comments
CHANNEL	4	Ref section 3-1 for detail information
XD_SCALE, UNITS_INDEX	days	
OUT_SCALE, UNITS_INDEX	days	
L_TYPE	Direct	
MODE_BLK, ACTUAL	Auto	

**Note:** For parameter changes, you must set MODE\_BLK/TARGET to OOS (Out of Service) since otherwise the error message NIF\_ERR\_WRONG\_MODE\_FOR\_REQUEST would appear for [Write Changes].

### 3-1 Channel definition

Common units	CHANNEL	Function (Description)	Display	Unit Value
	200	Temperature	°C	1001
	1	Temperature	°F	1002
	2	None	no units	1588

pH/ORP sensor	CHANNEL	Function	Unit	Unit Value
	6	pH	pH	1422
	7	mV pH	mV	1243
	8	mV ORP(ISM only)	mV ORP	40003
	9	Rglass	Mohm	1283
	10	RpNa(pH/pNa only)	Mohm	1283
	11	Rref (pH only)	Kohm	1284
	3	DLI(ISM Only)	d DLI	40000
	4	TTM(ISM Only)	d TTM	40001
	5	ACT(ISM Only)	d ACT	40002

O <sub>2</sub> and O <sub>2</sub> Optical sensor	CHANNEL	Function	Unit	Unit Value
	17	Saturation(air)	%air	40005
	16	Saturation(O <sub>2</sub> )	%O <sub>2</sub>	40004
	12	Concentration	mg/l	1608
	13	Concentration	ug/l	1689
	14	Concentration	ppm	1423
	15	Concentration	ppb	1424
	18	Volume Concentration	%O <sub>2</sub> G	40006
	19	Volume Concentration	ppmO <sub>2</sub> G	40007
	20	Current(Amperometric only)	nA	1213
	21	Process pressure	hPa	40008
	22	OptoCap(O <sub>2</sub> Opt Only)	tooCap	40009
	100	O <sub>2</sub> partial pressure	hPa	1136
	101	O <sub>2</sub> partial pressure	mbar	1138
	102	O <sub>2</sub> partial pressure	mmHg	1157
	3	DLI(ISM Only)	d DLI	40000
	4	TTM(ISM Only)	d TTM	40001
	5	ACT(ISM Only)	d ACT	40002

<b>Cond sensor</b>	<b>CHANNEL</b>	<b>Function</b>	<b>Unit</b>	<b>Unit Value</b>
	23	Conductivity	S/cm	1680
	25	Conductivity	mS/cm	1302
	26	Conductivity	uS/cm	1586
	27	Resistivity	MOhm-cm	1587
	28	Resistivity	KOhm-cm	1604
	29	Resistivity	Ohm-cm	1295
	30	TDS NaCl	ppm	1423
	31	TDS NaCl	ppb	1424
	32	TDS NaCl	ppk	1425(ppt)
	33	TDS CaCO3	ppm	1423
	34	TDS CaCO3	ppb	1424
	35	TDS CaCO3	ppk	1425(ppt)
	36	Concentration	%NaOH	33000
	37	Concentration	%NaCl	33001
	38	Concentration	%H2SO4	33002
	39	Concentration	%H3PO4	33003
	40	Concentration	%HNO3	33004
	41	Concentration	%HCl	33005
	24	Concentration	%Conc	33006

<b>CO<sub>2</sub> Pharma sensor</b>	<b>CHANNEL</b>	<b>Function</b>	<b>Unit</b>	<b>Unit Value</b>
	48	%CO2	%CO2	1342
	100	hPa	hPa	1136
	101	mbar	mbar	1138
	102	mmHg	mmHg	1157
	49	mg/l	mg/l	1608
	50	CO2 mV	CO2 mV	1243
	3	DLI(ISM Only)	d DLI	40000
	4	TTM(ISM Only)	d TTM	40001
	5	ACT(ISM Only)	d ACT	40002

<b>O<sub>3</sub> sensor</b>	<b>CHANNEL</b>	<b>Function</b>	<b>Unit</b>	<b>Unit Value</b>
	12	Concentration	mg/l	1608
	13	Concentration	ug/l	1689
	14	Concentration	ppm	1423
	15	Concentration	ppb	1424
	20	Current(Amperometric only)	nA	1213
	3	DLI(ISM Only)	d DLI	40000
	4	TTM(ISM Only)	d TTM	40001
	5	ACT(ISM Only)	d ACT	40002

## 4

### AO Function Blocks

Cyclic transmission of an external pressure value to transmitter for compensation.  
This only apply for oxygen sensor.

Please set parameter "PROC\_PRESSURE\_SOURCE" of Sensor Transducer Block to option "From FF Bus".

**Note:** AO block only accept the value with unit mbar or hPa.

Please set the UNITS\_INDEX of OUT\_SCALE to mbar or hPa.



# 5

## DI Function Blocks

DI	Bit	Meaning
DI1	0	Relay1 status
	1	Relay2 status
	2	Relay3 status
	3	Relay4 status
	4–7	reserve

DI	Bit	Meaning
DI2	0	HOLD status
	1	Clean status
	2	Alarm status
	3–7	reserve

## 6

### DO Function Blocks

DO	Bit	Meaning
DO1	0	System Hold (1 - HOLD Active, 0 - Hold Inactive)
	1 – 7	reserve

DO	Bit	Meaning
DO2	0	O2 Opt LED Control (1 - LED OFF, 0 - LED ON)
	1 – 7	reserve

**Note:** DO2 only apply for sensor is O2 Optical sensor and LED mode is configured to "Auto".

# 7

## Standard parameter for each block

Index	Parameter	Data type	Store	Size Byte	RW	Range	Default
1	ST_REV	Unsigned16	N	2	RO	0-65535	0
2	TAG_DESC	Octedstring	S	32	R/W	32 ASCII characters	""
3	STRATEGY	Unsigned16	S	2	R/W	0-65535	0
4	ALERT_KEY	Unsigned16	S	1	R/W	1 to 255	0
5	MODE_BLK 1 Target 2 Actual 3 Permitted 4 Normal	DS-37 Unsigned16 Unsigned16 Unsigned16 Unsigned16	D	4	R	OOS, MAN and Auto	Depend block
6	BLOCK_ERR		D		R	0 - Inactive 1 - Active	
7	UPDATE_EVT						
8	BLOCK_ALARM	DS-42	D	8	R		
9	TRANSDUCER_ DIRECTORY						
10	TRANSDUCER_ TYPE						
11	XD_ERROR						
12	COLLECTION_ DIRECTORY						

\* Only function blocks carry this parameters!

## 8 General Transducer Block (BLOCK\_INDEX:600)

Index	Parameter	Data type	Store	Size Byte	RW	Writable Range	Default
1-12	FF Standard parameter						
<b>Manufacturer-specific extensions: Measured values</b>							
13	PRIMARY_VALUE	DS-65	D	5	R		
14	SECONDARY_VALUE	DS-65	D	5	R		
15	THIRD_VALUE	DS-65	D	5	R		
16	FOURTH_VALUE	DS-65	D	5	R		
17	DI1_value	DS-65	D	5	R		
18	DI2_value	DS-65	D	5	R		
19	Final_value_AO	DS-65	D	5	R		
20	Local_final_value_AO	DS-65	D	5	R		
21	Final_value_DO1	DS-65	D	5	R		
22	Local_final_value_DO1	DS-65	D	5	R		
23	Final_value_DO2						
24	Local_final_value_DO2						

Index	Parameter		Data type	Store	Size Byte	RW	Writable Range	Default
Manufacturer-specific extensions: Parameter and calibration values								
17	Channel Setup Parameter							
	1	Channel Descriptor	Octedstring	N	6	RW		
	2	Sensor channel	Unsigned16	D	2	R	0 – Analog channel 1 – ISM channel	
	3	Sensor type	Unsigned16	D	2	R	0xFC - Auto 0 - pH/ORP 14 - pH/pNa 12 - O2 Optical 1 - O2 Hi 2 - O2 Lo 3 - O2 Trace 5 - UniCond 7- Cond2e 8 - Cond4e 16 - CO2 Pharma 13 - O3	
	4	Auto_Recognize	Unsigned16	N	2	RW	0 – Yes 1 – No	1 (only valid when sensor type is ISM)
	5	PV unit channel	Unsigned16	N	2	RW		See section 3-1
	6	SV unit channel	Unsigned16	N	2	RW		See section 3-1
	7	TV unit channel	Unsigned16	N	2	RW		See section 3-1
	8	QV unit channel	Unsigned16	N	2	RW		See section 3-1
	9	PV filter	Unsigned16	N	2	RW	0 - None 1 - Low 2 - Medium 3 - High 4 - Special 5 - Custom	
	10	SV filter	Unsigned16	N	2	RW	Same as PV filter	
	11	TV filter	Unsigned16	N	2	RW	Same as PV filter	
	12	QV filter	Unsigned16	N	2	RW	Same as PV filter	
	13	PV customer filter number	Unsigned16	N	2	RW	1 – 180	
	14	SV customer filter number	Unsigned16	N	2	RW	Same as PV customer filter	
	15	TV customer filter number	Unsigned16	N	2	RW	Same as PV customer filter	
	16	QV customer filter number	Unsigned16	N	2	RW	Same as PV customer filter	
	17	PV resolution	Unsigned16	N	2	RW	0 – 1 1 – 0.1 2 – 0.01 3 – 0.001	
	18	SV resolution	Unsigned16	N	2	RW	Same as PV resolution	
	19	TV resolution	Unsigned16	N	2	RW	Same as PV resolution	
	20	QV resolution	Unsigned16	N	2	RW	Same as PV resolution	

Index	Parameter		Data type	Store	Size Byte	RW	Writable Range	Default
Manufacturer-specific extensions: Parameter and calibration values (continued)								
18	PH Parameters							
	1	PH BUFFER	Unsigned16	N	2	RW	00 - None 01 - MT-9 02 - MT-10 03 - NIST-Tech 04 - NIST-Std 05 - Hach 06 - Ciba 07 - Merck 08 - WTW 09 - JIS Z 8802 10 - Na+3.9M	
	2	IP [pH]	Float	N	4	RW	0 to 14	7
	3	STC value [pH/°C]	Float	N	4	RW	−9.99 to 9.99	0
	4	STC Ref.Temp[°C]	Float	N	4	RW	0 ~ 100	25
	5	Stability	Unsigned16	N	2	RW	00 - Manual 01 - Low 02 - Medium (Default) 03 - Strict	
19	Temperature Setup Parameter							
	1	Temp.source	Unsigned16	N	2	RW	00 - Auto 01 - Pt100 02 - Pt1000 03 - NTC22K 04 - Fixed	
	2	Fixed Meas. Temp[°C]	Float	N	4	RW	−40 ~ 200	25

Index	Parameter		Data type	Store	Size Byte	RW	Writable Range	Default
Manufacturer-specific extensions: Parameter and calibration values (continued)								
20	O2 Amperometric Parameters							
	1	Cal.Pressure Unit	Unsigned16	N	2	RW	1157 mmHg 1138 mbar(Default) 1136 hPa 1133 kPa 1141 psi	
	2	Cal.Pressure	Float	N	4	RW	0–9999 mbar	1013
	3	Process Pressure Source	Unsigned16	N	2	RW	0 - Entered(Default) 1 - Ain 2 - Bus	
	4	Process Pressure Unit	Unsigned16	N	2	RW	Same as Cal.Pressure Unit	
	5	Process Pressure	Float	N	4	RW	0 to 16000 mbar	1013
	9	Ain Process Pressure Unit	Unsigned16	N	2	RW	Same as Cal.Pressure Unit	
	10	Ain 4mA Process Pressure	Float	N	4	RW	0 to 16000 mbar	0
	11	Reserve						
	12	Ain 20mA Process Pressure	Float	N	4	RW	0 to 16000 mbar	2000 mbar
	13	Salinity [g/Kg]	Float	N	4	RW	0 to 99	
	14	Relative Humidity Value [%]	Float	N	4	RW	0–100	
	15	UpolMeas [mV]	Float	N	4	RW	–1652 to 1669	
	16	UpolCal [mV]	Float	N	4	RW	–1652 to 1669	
	17	O2 Stability	Unsigned16	N	2	RW	0 - Manual 1 - Auto(Default)	
	18	Process Cal Pressure Source	Unsigned16	N	2	RW	0 - Cal Presssure 1 - Process Pressure	

Index	Parameter		Data type	Store	Size Byte	RW	Writable Range	Default
Manufacturer-specific extensions: Parameter and calibration values (continued)								
21	02 Optical Parameters							
	1	Cal.Pressure Unit	Unsigned16	N	2	RW	1157 mmHg 1138 mbar(Default) 1136 hPa 1133 kPa 1141 psi	
	2	Cal.Pressure	Float	N	4	RW	0–9999 mbar	1013
	3	Process Pressure Source	Unsigned16	N	2	RW	0 - Entered(Default) 1 - Ain 2 - Bus	
	4	Process Pressure Unit	Unsigned16	N	2	RW	Same as Cal. Pressure Unit	
	5	Process Pressure	Float	N	4	RW	0 to 16000 mbar	1013
	9	Ain Process Pressure Unit	Unsigned16	N	2	RW	Same as Cal. Pressure Unit	
	10	Ain 4mA Process Pressure	Float	N	4	RW	0 to 16000 mbar	0
	11	Reserve						
	12	Ain 20mA Process Pressure	Float	N	4	RW	0 to 16000 mbar	2000 mbar
	13	Salinity [g/Kg]	Float	N	4	RW	0 to 99	
	14	Relative Humidity Value [%]	Float	N	4	RW	0–100	
	15	O2 Stability	Unsigned16	N	2	RW	0 - Manual 1 - Auto(Default)	
	16	Process Cal Pressure Source	Unsigned16	N	2	RW	0 - Cal Presssure 1 - Process Pressure	
	17	ProcCalScaling	Unsigned16	N	2	RW	0 - Calibration 1 - Scaling(Default)	
	18	LED Mode	Unsigned16	N	2	RW	0 - Auto(Default) 1 - Off 2 - On	
	19	SamplingRate	Unsigned16	N	2	RW	1 to 60	
	20	Toff	Float	N	4	RW	Default:60; range: 10–85DegC for DD Below is the range for transmitter: a) 10°C <=Toff <=50°C for low level (InPro6970i and Thornton ODO) b) 10°C <=Toff <=85°C for high level (InPro6870i, 6880i) c) 10°C <=Toff <=40°C for special high level (InPro6960i)	



Index	Parameter		Data type	Store	Size Byte	RW	Writable Range	Default
Manufacturer-specific extensions: Parameter and calibration values (continued)								
22	Cond Parameters							
	1	PV compensation	Unsigned16	N	2	RW	00 - None (uncompensation) 01 - Standard 02 - Light 84 03 - Std 75°C 04 - Lin25°C 05 - Lin20°C 06 - Glycol 0.5 07 - Glycol 1.0 08 - Cation 09 - Alcohol 10 - Ammonia 11 - Nat H2O	
	2	PV Linear 25degC value	Float	N	4	RW	0–9.99 %/°C	
	3	PV Linear 20degC value	Float	N	4	RW	0–9.99 %/°C	
	4	SV compensation	Unsigned16	N	2	RW	Same as PV compensation	
	5	SV Linear 25degC value	Float	N	4	RW	0–9.99 %/°C	
	6	SV Linear 20degC value	Float	N	4	RW	0–9.99 %/°C	
	7	TV compensation	Unsigned16	N	2	RW	Same as PV compensation	
	8	TV Linear 25degC value	Float	N	4	RW	0–9.99 %/°C	
	9	TV Linear 20degC value	Float	N	4	RW	0–9.99 %/°C	
	10	QV compensation	Unsigned16	N	2	RW	Same as PV compensation	
	11	QV Linear 25degC value	Float	N	4	RW	0–9.99 %/°C	
	12	QV Linear 20degC value	Float	N	4	RW	0–9.99 %/°C	

Index	Parameter		Data type	Store	Size Byte	RW	Writable Range	Default
Manufacturer-specific extensions: parameter and calibration values (continued)								
23	CO2 Pharma Parameters							
	1	CO2 Buffer Tab	Unsigned16	N	2	RW	00 - None 01 - MT-9(Default)	
	2	CO2 Stability	Unsigned16	N	2	RW	00 - Manual 01 - Low 02 - Medium (Default) 03 - Strict	
	3	Salinity	Float	N	4	RW	0 to 60 g/l	
	4	HCO3	Float	N	4	RW	0 to 0.255 Mol/l	
	5	Tot Pressure Unit	Unsigned16	N	2	RW	1157 - mmHg 1138 - mbar (Default) 1136 -hPa 1133 - kPa 1141 - psi	
	6	Tot Pressure	Float	N	4	RW	0 to 9999 mbar	
24		Alarm setup	Unsigned32	N	4	RW	Bit0: Power Failure Bit1: Software Failure Bit2: Sensor Disconnected Bit3: CIP Counter Expired Bit4: SIP Counter Expired Bit5: DLI = 0 Bit6: ACT= 0 Bit7: TTM = 0 Bit8: AutoClave Counter Expired Bit9: Rg Diagnostics Bit10: Rr Diagnostics Bit11: Dry Cond Sensor Bit12: Cond Sensor shorted Bit13: Electrolyte level Error Bit14: Cond cell constant deviation Bit15: Shaft Error Bit16: Signal error Bit17: O2 Optical Hardware error Bit18: Change Spot Bit19: SAN Counter Expired	
25	Verify Parameters							
	1	Primary raw value	Float	D	4	R		
	2	Primary raw unit	Unsigned16		2			
	3	Temperature raw value	Float		4			
	4	Temperature raw unit	Unsigned16		2			
	5	Secondard raw value	Float		4			Only for ISM pH/ORP sensor
	6	Secondard raw unit	Unsigned16		2			

Index	Parameter		Data type	Store	Size Byte	RW	Writable Range	Default
Manufacturer-specific extensions: Parameter and calibration values (continued)								
26	Calibration							
	1	Cal Mode	Unsigned16	S	2	W	0 - Terminal (Default) 1 - pH Process Cal 2 - ORP Process Cal 11 - oDO Process Scaling 5 - oDO Process Cal 6 - CO2 Process Cal 3 - O2 Process Slope Cal 4 - O2 Process Offset Cal 7 - Conductivity Process Cal 8 - Resistivity Process Cal 9 - O3 Process Slope Cal 10 - O3 Process Offset Cal	
	2	O2 Amp cal. unit	Unsigned16	S	2	W		1608 - mg/l 1689 - µg/L 1423 - ppm 1424 - ppb 40004 - %O2 40005 - %air 40006 - %O2G 40007 - ppmO2G 1138 - mbar 1136 - hPa 1157 - mmHg
	3	Lab(sample) value	Float	S	4	W		
	4	Cal.action	Unsigned16	S	2	W	0 - no operation 1 - 1st step capture value	
	5	Cal save type	Unsigned16	S	2	W	0 - adjust 1 - calibration 2 - abort	
	6	O2 Opt Cal Unit	Unsigned16	S	2	W		1608 - mg/l 1689 - µg/L 1423 - ppm 1424 - ppb 40004 - %O2 40005 - %air 40006 - %O2G 40007 - ppmO2G 1138 - mbar 1136 - hPa 1157 - mmHg

Index	Parameter	Data type	Store	Size Byte	RW	Writable Range	Default
<b>Manufacturer-specific extensions: Parameter and calibration values (continued)</b>							
<b>Calibration (continued)</b>							
7	Conductivity Cal Unit	Unsigned16	S	2	W		1302 - ms/cm 1586 - $\mu$ S/cm
8	Resistivity Cal Unit	Unsigned16	S	2	W		1587 - MOhm*cm 1604 - KOhm*cm 1295 - Ohm*cm
9	CO2 Pharma Cal Unit	Unsigned16	S	2	W		1136 hPa 1138 mbar 1157 mmHg 1342 %CO2 1608 CO2 mg/l
10	O3 Cal Unit	Unsigned16	S	2	W		1608 mg/l 1689 $\mu$ g/L 1423 ppm 1424 ppb
11	Cal.Compensation	Unsigned16	S	2	W	Same as PV compensation	
12	Cal Linear 25degC value	Float	S	4	W	0–9.99 %/°C	
13	Cal Linear 20degC value	Float	S	4	W	0–9.99 %/°C	
14	Cal temporary Slope	Float	S	4	R	1585 mV/pH 1342 % 1422 pH 1243 mV 40003 ORP mV 1213 nA(slope) 1213 nA(offset) 1607 cm-1 1295 W-cm 1281 Ohm 1005 Degree 35000 Not Used 1588 None 40010 nA/ppb	
15	Cal temporary Offset	Float	S	4	R		
16	Cal temporary Slope2	Float	S	4	R		Only for pH process cal
17	Cal temporary Offset2	Float	S	4	R		Only for pH process cal
18	Transmitter Cal.Status	Unsigned16	S	2	D	bit1: Cal Value Stable bit2: Buffer Recognized bit3: Cal Timeout bit4: Cal Failure bit5: Cal Succeed(not used) bit6: Cal Saved Succeed bit7: Cal Calculated Succeed bit8: Sensor Connected bit9: Cal Data Out Of Range bit10: Cal Value Out Of Range bit11: Cal Unit Error bit12: Cal Parameter Out of Range	
19	Cal.Value	Float	D	4	R		
20	Cal.Unit	Unsigned16	D	2	R		See section 3-1

Index	Parameter	Data type	Store	Size Byte	RW	Writable Range	Default
<b>Manufacturer-specific extensions: Parameter and calibration values (continued)</b>							
<b>27</b>	<b>AI Extension Parameters</b> <b>Note:</b> the status of value from transmitter is good, the status of AI blocks can be assigned to other status via specific alarm. Eg:the value of PH is 7 and status is "good" from transmitter. If you want the status become to Bad when DLI < 10 days.Follow steps: 1. Setup M1 to pH, M4 to DLI 2. SP1 assign to DLI, mode is low, value is 10. 3. check bit21(SetPoint Alarm) of AI1 status config, select status config to Uncertain.						
	1	AI1 Status	Unsigned16	N	2	RW	0 - Good(Default) 1 - Bad 2 - Uncertain
	2	AI2 Status	Unsigned16	N	2	RW	Same as AI1 Status
	3	AI3 Status	Unsigned16	N	2	RW	Same as AI1 Status
	4	AI4 Status	Unsigned16	N	2	RW	Same as AI1 Status
	5	AI1_MASK	Unsigned32	N	4	RW	Bit 0 Check (Hold active) 1 Change sensor 2 Calibration required 3 Maint required 4 CIP counter expired 5 SIP counter expired 6 "Autoclave expired (HeldHold) Autoclave counter expired (Other)" 7 Sensor(pH/ORP,CO2, pH/pNa) Warning 8 Sensor(pH/ORP,CO2, pH/pNa) Erroring 9 Error dry sensor 10 Error sensor short 11 "Cell constant deviation(HeldHold) Error cell constant deviation(Other)" 12 Error electrolyte level 13 oDO sensor alarm 14 ISM sensor not connecting 15 "Cal.data warning(HeldHold) Sensor calibration data warning(Other)" 16 "Cal.data error(HeldHold) Sensor calibration data out of range(Other)" 17 – 19 Reserve 20 Process cal. Activated 21 SetPoint Alarm 22 RTD Error(No RTD) 23 SAN counter expired 24 – 31 Reserve
	6	AI2_MASK	Unsigned32	N	4	RW	Same as AI1_MASK
	7	AI3_MASK	Unsigned32	N	4	RW	Same as AI1_MASK
	8	AI4_MASK	Unsigned32	N	4	RW	Same as AI1_MASK

## 9 Sensor Transducer Block (BLOCK\_INDEX:700)

Index	Sub-Index	Parameter	Data type	Store	Size Byte	RW	Writable Range	Default
1-12		Standard parameter						
<b>Mettler-Toledo Specific Parameters</b>								
<b>13</b>	<b>ISM Information</b>							
	1	Sensor_Name	VisString	S	18	R		
	2	Sensor_PN	VisString	S	10	R		
	3	Sensor_SN	VisString	S	18	R		
	4	Sensor_FW	VisString	S	12	R		
	5	Sensor_HW	VisString	S	12	R		

Index	Sub-Index	Parameter	Data type	Store	Size Byte	RW	Writable Range	Default
<b>Mettler-Toledo Specific Parameters (continued)</b>								
<b>14</b>	<b>ISM Monitor</b>							
	1	ISM Enable_Flag	Unsigned32	S	4	R	bit1: CIP Enable Flag bit2: SIP Enable Flag bit3: AutoClave Enable Flag bit4: TTM Enable Flag bit5: ACT Enable Flag bit6: DLI Enable Flag bit7: CIP Reset Enable Flag bit8: SIP Reset Enable Flag bit9: AutoClave Reset Enable Flag bit10: TTM Reset Enable Flag bit11: Electrolyte bit12: DLI Reset Enable Flag bit13: pH Stress Enable Flag bit14: Operation day Enable Flag bit15: Max Temp Enable Flag bit16: Max.Temp Date Enable Flag Bit17: SAN Enable Flag Bit18: High Temp & High Conductivity & TTCal Bit19: DLI Leaning Bit20: Rg & Rr Bit21: Rg & RgpNa Bit22: Tspot	
	2	SIP_Counter	Unsigned16	D	2	R		
	3	CIP_Counter	Unsigned16	D	2	R		
	4	AutoClave	Unsigned16	D	2	R		
	5	SAN	Unsigned16	D	2	R		
	6	DLI with day	Float	D	4	R	Unit:days	
	7	TTM with day	Float	D	4	R	Unit:days	
	8	ACT with day	Float	D	4	R	Unit:days	
	9	Operationg_hours	Unsigned32	D	4	R		
	10	Max_Temperture	Float	D	4	R	Unit:degC	
	11	Max_Temp Date	DATE	D	7	R		
	12	Rg	Float	D	4	R	Unit:Mohm	
	13	Rr	Float	D	4	R	Unit:KOhm	
	14	pNa Rg	Float	D	4	R	Unit:MOhm	
	15	Tspot	Float	D	4	R	Unit:degC	
	16	Electrolyte Level	Unsigned16	D	2	R	0 - Good 1 - Error	
	17	TTCal	Float	D	4	R	Unit:days	
	18	High Temp Counters	Unsigned16	D	2	R		
	19	Highest Temp	Float	D	4	R	Unit:degC	
	20	High Conductivity Counts	Unsigned16	D	2	R		
	21	Highest Conductivity	Float	D	4	R	Unit:us/cm	

Index	Sub-Index	Parameter	Data type	Store	Size Byte	RW	Writable Range	Default
<b>Mettler-Toledo Specific Parameters (continued)</b>								
<b>15</b>	<b>ISM Setup</b>							
	1	SIP limit	Unsigned16	N	2	RW	0–254	
	2	SIP temperature	Unsigned16	N	2	RW	90 to 130 °C	115°C
	3	CIP limit	Unsigned16	N	2	RW	0–254	
	4	CIP temperature	Unsigned16	N	2	RW	30 to 100 °C	55°C
	5	AutoClave Limit	Unsigned16	N	2	RW	0–254	0
	6	TTM Limit	Unsigned16	N	2	RW	pH: 0–400 day others: 0–10200 day	0
	7	ACT Limit	Unsigned16	N	2	RW	CO2 Hi: 0–175 day Others: 0–170 day	0
	8	Ph DLI stress adjust	Unsigned16	N	2	RW	0 - Low 1 - Medium 2 - High	1
	9	Leaning DLI	Unsigned16	N	2	RW	0 - Off 1 - On	
	10	UniCond Cal Interval	Unsigned16	N	2	RW	0 to 65535	
	11	SAN Max Cycles	Unsigned16	N	2	RW	0 to 1020	
	12	SAN Conc.Max	Unsigned16	N	2	RW	0 to 1020	
	13	SAN Conc.Min	Unsigned16	N	2	RW	0 to 510	
	14	SAN Cycle Time	Unsigned16	N	2	RW		
	15	Reset Cycle counter	Unsigned16	S	2	W	0 - None 1 - DLI reset 2 - TTM reset 4 - SIP reset 5 - CIP reset 6 - Autoclave reset 7 - Reset SAN 8 - Reset High Temp 9 - Reset High Conductivity	
<b>16</b>	<b>Actural Calibration Data</b>							
	1	Cal User ID	OctString	S	8	R		
	2	Calibration Date Code	Date	S	7	R		
	3	Slope1	Float	S	4	R		
	4	Unit Code for Slope1	USIGN16	S	2	R	1585 mV/pH 1342 % 1422 pH 1243 mV 40003 ORP mV 1213 nA(slope) 1213 nA(offset) 1607 cm-1 1295 W-cm 1281 Ohm 1005 Degree 35000 Not Used 1588 None 40010 nA/ppb	



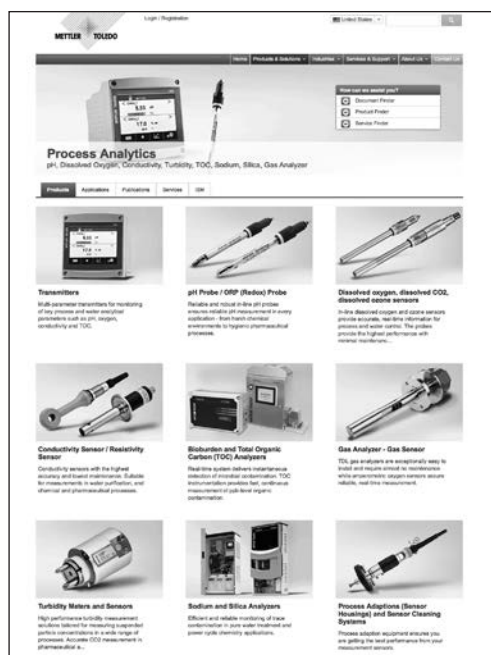
Index	Sub-Index	Parameter	Data type	Store	Size Byte	RW	Writable Range	Default
<b>Actual Calibration Data (continued)</b>								
	5	Resolution for Slope1	USIGN16	S	2	R	0 - 1 1 - 0.1 2 - 0.01 3 - 0.001 4 - 0.0001 5 - 0.00001	
	6	Offset1	Float	S	4	R		
	7	Unit Code for Offset1	USIGN16	S	2	R	Same as Unit Code for Slope1	
	8	Resolution for Offset1	USIGN16	S	2	R	Same as Resolution for Slope1	
	9	Slope2	Float	S	4	R		For pH/ORP only
	10	Unit Code for Slope2	USIGN16	S	2	R	Same as Unit Code for Slope1	For pH/ORP only
	11	Resolution for Slope2	USIGN16	S	2	R	Same as Resolution for Slope1	For pH/ORP only
	12	Offset2	Float	S	4	R		For pH/ORP only
	13	Unit Code for Offset2	USIGN16	S	2	R	Same as Unit Code for Slope1	For pH/ORP only
	14	Resolution for Offset2	USIGN16	S	2	R	Same as Resolution for Slope1	For pH/ORP only
	15	mV offset	Float	S	4	R		For analog pH/ORP sensor
	16	ORP offset	Float	S	4	R		For ISM pH/ORP only
	17	Temp Cal.User ID	OctString	S	8	R		
	18	Temp Cal.Date	Date	S	7	R		
	19	Temp PT Slope	Float	S	4	R		
	20	Temp PT Offset	Float	S	4	R		
	21	Temp NTC22K Offst	Float	S	4	R		
	22	ISM cal.history flag	USIGN16	S	2	R	Bit1: 1.adj Bit2: Cal1 Bit3: Cal2 Bit4: Cal3 Note: Factory Cal. Data is always ture	
	23	Cal.FuncFlag	USIGN16	S	2	R	Bit0: PT Slope&Offset (analog or UnitCond) Bit1: NTC Offset(analog sensor) Bit2: mV Offset(analog pH/ORP) Bit3: ORP Offset(ISM pH/ORP) Bit4: Channel(analog =0; ISM = 1)	

Index	Sub-Index	Parameter	Data type	Store	Size Byte	RW	Writable Range	Default
<b>Mettler-Toledo Specific Parameters (continued)</b>								
<b>17</b>	<b>ISM Calibration History</b>							
	1	Fact Cal User ID	OctString	S	8	R		
	2	Fact Cal.Date	Date	S	7	R		
	3	Fact Slope 1	Float	S	4	R		
	4	Fact Offset 1	Float	S	4	R		
	5	Fact Slope 2	Float	S	4	R		For pH/ORP only
	6	Fact Offset 2	Float	S	4	R		For pH/ORP only
	7	Fact ORP Offset	Float	S	4	R		For ISM pH/ORP only
	8	1.adj Cal User ID	OctString	S	8	R		
	9	1.adj Cal.Date	Date	S	7	R		
	10	1.adj Slope 1	Float	S	4	R		
	11	1.adj Offset 1	Float	S	4	R		
	12	1.adj Slope 2	Float	S	4	R		For pH/ORP only
	13	1.adj Offset 2	Float	S	4	R		For pH/ORP only
	14	1.adj ORP Offset	Float	S	4	R		For ISM pH/ORP only
	15	CAL1 Cal User ID	OctString	S	8	R		
	16	CAL1 Cal.Date	Date	S	7	R		
	17	CAL1 Slope 1	Float	S	4	R		
	18	CAL1 Offset 1	Float	S	4	R		
	19	CAL1 Slope 2	Float	S	4	R		For pH/ORP only
	20	CAL1 Offset 2	Float	S	4	R		For pH/ORP only
	21	CAL1 ORP Offset	Float	S	4	R		For ISM pH/ORP only

Index	Sub-Index	Parameter	Data type	Store	Size Byte	RW	Writable Range	Default
<b>Mettler-Toledo Specific Parameters (continued)</b>								
<b>18</b>	<b>ISM Calibration History</b>							
	1	CAL2 Cal User ID	OctString	S	8	R		
	2	CAL2 Cal.Date	Date	S	7	R		
	3	CAL2 Slope 1	Float	S	4	R		
	4	CAL2 Offset 1	Float	S	4	R		
	5	CAL2 Slope 2	Float	S	4	R		For pH/ORP only
	6	CAL2 Offset 2	Float	S	4	R		For pH/ORP only
	7	CAL2 ORP Offset	Float	S	4	R		For ISM pH/ORP only
	8	CAL3 Cal User ID	OctString	S	8	R		
	9	CAL3 Cal.Date	Date	S	7	R		
	10	CAL3 Slope 1	Float	S	4	R		
	11	CAL3 Offset 1	Float	S	4	R		
	12	CAL3 Slope 2	Float	S	4	R		For pH/ORP only
	13	CAL3 Offset 2	Float	S	4	R		For pH/ORP only
	14	CAL3 ORP Offset	Float	S	4	R		For ISM pH/ORP only

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