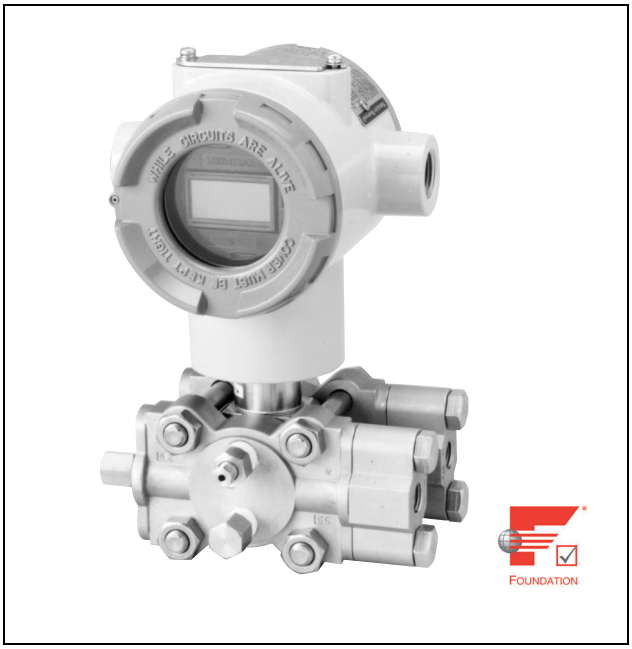
Device Description and Capability File for ST3000 series 900

Smart Pressure Transmitter with FOUNDATION™ fieldbus

OVERVIEW

The ST 3000 Series 900 is an accurate, stable, and reliable Pressure / Differential Pressure Transmitter.
The S900 fully complies with 31.25kbps voltage mode Fieldbus defined by the Fieldbus Foundation™. Its built in AI function block provides a process variable to control elements on the Fieldbus. The S900 is a Fieldbus Foundation™ registered, smart pressure/differential pressure transmitter. As such, it can cooperate seamlessly with other registered field devices as well as host systems in a wide range of control applications. This document includes the DD and CF of ST3000 Series 900.



DD and CF

DD (Device Description)

- A critical characteristic required of fieldbus device is interoperability.
- For interoperability, DD technology is used in addition to standard function block parameter and behavior definitions.
- DD provides information needed for a control system or host to understand the meaning of the data in the VFD (Virtual Field Device) including the human interface for functions such as calibration and diagnostics. DD can be thought of as a driver for the device, which are similar to printer drivers for your computer.

DD is written in a standardized programming language and could not be read then the table of parameter is provided for the definition.

CF (Capability File)

- The purpose of a capability file is to hold a human-readable document which contains some or all of the information that can be read from a fieldbus device over the wire.
- It consists of headings that organize the data, and assignment statement lines of the form Parameter (or variable name) = Value, where Value has the format required by Parameter (as defined by the Device Description), and may be expressed as a range of values.

Block structure and parameter descriptions

The S900 consists of the following function blocks;

Block	Reference FF Specifications	Original Parameters
Transducer block	FF-903 “Transducer Block (Part 2)” 2.1 Standard Pressure with Calibration	Contains Yamatake original parameters
AI function block	FF-891 “Function Block Application Part 2" 4.1 Analog Input	No Yamatake original parameters
Resource block	FF-891 “Function Block Application Process Part 2" 3.1 Resource Block	Contains Yamatake original parameters
DIAG function block	Yamatake original block	Contains Yamatake original parameters
PID function block	FF-891 “Function Block Application Part 2" 4.7 PID Control	No Yamatake original parameters

The conventions used in this section to define block parameters are given below;

Item	Description
Parameter	The standard mnemonics of the parameters defined by the Foundation Specifications. For Vendor specific parameters, Yamatake’s own names are used.
Description	A brief description of the parameter. Please refer to the “Integration Manual” or the Foundation Specification FF-891 for detailed explanation.
Sub-parameter	Some of the parameters are structured. If this is the case, each of the sub-parameters are listed here.
Access attributes	The following symbols are used to indicate attributes related to parameter access. S: Static data - Indicates that the parameter value cannot be overwritten during the execution of the block to which it belongs. (Data such as fixed data for individual device types and various configuration data) D: Dynamic data - Indicates that the parameter value can be modified by the block itself or by the user during the execution of the block to which it belongs. These are parameters that are changed occasionally or continuously according to the system state, device, or process that is in progress. These values are erased if a power outage occurs. (Data such as process measurement values and device execution status parameters) N: Nonvolatile data - These parameters, like dynamic data, may change during system operation. However, they are stored in nonvolatile memory and their most recent value is not lost if a power outage occurs. (This includes data such as PID setpoint values that must be restarted from the most recent value after a power outage occurs.) R: Parameters can only be read out. R/W: Parameters can be read out and are configurable.
Size	The size of the parameter in bytes.
Valid Range	If the parameter value has a certain limits, they are specified here. Please note that the entire range of values may not be available.
Initial value	The factory default values of the parameter.
Unit	The unit applied to this parameter. If this column contains a parameter name such as “PV”, the unit corresponding to the PV shall apply.

Resource block

The resource block describes characteristics of the fieldbus device such as the device's name, manufacturer, and serial number.

Resource block parameters (Base index: 1000)

Index	Parameter (FF standard parameter)	Description	Sub-parameter	Access attribute	Size (bytes)	Valid range	Initial value	Units
1	ST_REV	The revision level of the static data associated with a function block.	---	S-R	2	0 to 65535	0	None
2	TAG_DESC	User-specified descriptions of the intended application of the block. The AI FB does not check this parameter.	---	S-R/W	32	None	32 spaces	None
3	STRATEGY	An arbitrary number to identify grouping of blocks. The AI FB does not check this parameter.	---	S-R/W	1	0 to 65535	0	None
4	ALERT_KEY	An arbitrary number to identify the plant unit. The AI FB does not check this parameter.	---	S-R/W	1	1 to 255	0	None
5	MODE_BLK	The actual, target, permitted, and normal modes of a block.	Target	N-R/W				None
			Actual	D-R				
			Permitted	S-R/W		O/S, MAN, AUTO		
			Normal	S-R/W				
6	BLOCK_ERR	An enumeration of error status associated with the hardware or software components of a block.	---	D-R				None
7	RS_STATE	Indicates the device's operating state.	Unsigned 8	D-R	1	0=Undefined 1=Start/Restart (start processing in progress) 2=Initialization (initialization in progress) 3=Online Linking (connection confirmation in progress) 4=Online (operating) 5=Standby (standby state) 6=Failure (failure occurred)		None
8	TEST_RW	Parameter used for applicability testing of communication software. This parameter is not used by users.	---	D-R/W	112			None
9	DD_RESOURCE	(Unused)	---	D-R/W	32			None
10	MANUFAC_ID	Unique identification number for manufacturers registered with Fieldbus Foundation.	---	S-R	4	0 to 0×FFFF	0×000DFC96=YAMATAKE	None
11	DEV_TYPE	Identification number that indicates the model of the device as defined by the manufacturer.	---	S-R	2	0 to 0×FF	0×0103=S900	None

Index	Parameter (FF standard parameter)	Description	Sub-parameter	Access attribute	Size (bytes)	Valid range	Initial value	Units
12	DEV_REV	Revision number of the device as defined by the manufacturer.	---	S-R	2	0 to 0×FF	Depends on the device	None
13	DD_REV							
14	GRANT_DENY	Parameter that enables/disables access to the parameters in this block from human interface or the host. Whether or not this parameter is used depends on settings in the host.	Grant (Enable) Deny (Disable)	D-R/W	1	0 or 1	All bits set to 0	None
15	HAR_TYPES	Indicates the type of the hardware in which this resource block exists.	---	S-R	2	Fixed at 0×8000(scalar input)	0×8000	None
16	RESTART	Restarts the device manually. In the specifications, there are several types of restart which the user can select from.	---	D-R/W	1	1: Run 2: Restart resource 3: Restart with defaults 4: Restart processor		None
17	FEATURES	Indicates the current operating state based on the content set with FEATURE_SEL in the option settings for device usage.	---	S-R	2	0×8000: Unicode0×4000: Reports0×1000: Software write lock	0×F500	None
18	FEATURE_SEL	Sets the device usage options.	---	S-R/W	2	Non-negative	0	None
19	CYCLE_TYPE	Indicates the current operating state based on the content set with CYCLE_SEL for the function block execution method.	---	S-R	2	0×8000: Scheduled (Follows the LAS schedule) 0×4000: Completion of block 0×2000: Manufacturer specific	0×8000	None
20	CYCLE_SEL	Sets the function block execution method.	---	S-R/W	2	As above	0	None
21	MIN_CYCLE_T	Indicates the minimum period for which a function block can be executed.	---	S-R	4	0 to 2^{32}-1	32000 (1 sec.)	1/32 msec
22	MEMORY_SIZE	Indicates a memory capacity that enables the addition of function blocks as a guideline.	---	S-R	2	0 to 65535		Kbytes
23	NV_CYCLE_T	Indicates the minimum required time to write “N-” type parameters to nonvolatile memory.	---	S-R	4	0 to 2^{32}-1	0	1/32 msec
24	FREE_SPACE	Indicates a memory capacity that enables the configuration addition as a guideline.	---	D-R	4	0 to 100.0	0	%
25	FREE_TIME	Indicates the load state as how much available time there is compared with function block execution time (Unused)	---	D-R	4	0 to 100.0	0	%
26	SHED_RCAS	Sets the write timeout time for a setpoint value change (SPC) from the host connected by the RCAS_IN parameter when the function block mode is RCAS. If the setpoint value is not written within the time specified by this parameter, the function block automatically switches to the mode set in advance with the SHED_OPT parameter in the function block.	---	S-R/W	4	0 or a positive value	640000 (20 sec.)	1/32 msec

Index	Parameter (FF standard parameter)	Description	Sub-parameter	Access attribute	Size (bytes)	Valid range	Initial value	Units
27	SHED_ROUT	Sets the write timeout time for a output value change (DDC) from the host connected by the ROUT_IN parameter when the function block mode is ROUT. If the output value is not written within the time specified by this parameter, the function block automatically switches to the mode set in advance with the SHED_OPT parameter in the function block.	---	S-R/W	4	0 or a positive value	640000 (20 sec.)	1/32 msec
28	FAULT_STATE	Indicates the current fault state (the output state when a fault has occurred in the function block) in the AO block. The value of this parameter can be set either in PID block execution or from the SET_FSTATE parameter of the next item.	---	N-R	1	1: clear (normal state) 2: Active (abnormal state)	1	None
29	SET_FSTATE	Forcibly sets the AO block to the fault state. The FAULT_STATE parameter is set to Active.	---	D-R/W	1	1: Off 2: Set	1	None
30	CLR_FSTATE	Clears the FAULT_STATE parameter.The FAULT_STATE parameter is cleared as long as there are no specific conditions for transitioning to the fault state in a SET_FAULT state parameter or function block execution.	---	D-R/W	1	1: Off 2: Set	1	None
31	MAX_NOTIFY	In alert transmission operations due to an alert object, indicates the maximum capacity of the device in terms of the maximum number of alarms that can be sent when confirmations are not performed by the host.	---	S-R	1	0 to 3	3	None
32	LIM_NOTIFY	Limit value for the actual use of the alert transmissions described above as stipulated by user settings.	---	S-R/W	1	0 to 3	3	None
33	CONFIRM_TIME	The maximum wait time for a confirmation for an alert transmission from a device. The alert will be resent if this time is exceeded without receiving a confirmation.	---	S-R/W	4	0 to 2^{32}-1	640000 (20 sec.)	1/32 msec
34	WRITE_LOCK	This parameter disables writes to all parameters within the device other than this parameter itself.	---	S-R/W	1	1: Unlocked (write enabled) 2: Locked (write disabled)	1	None
35	UPDATE_EVT	Alert parameter issued when a change occurs in resource block fixed data (items that have an access attribute of “S-” or “N-”). It has the following structure.· • Unacknowledged: The acknowledgement state • Update state: The update state • Time stamp: The time changed • Static version: The revision number after the update • Relative index: Parameter identification number for the parameter changed.	Unacknowledged	D-R	1	Unacknowledged: 0=Undefined (no change) 1= Acknowledged (acknowledged) 2=Unacknowledged (unacknowledged) Update state: 0=Undefined (no change) 1=Update reported (The update was reported) 2=Update not reported (The update was not reported)		None
			Update state	D-R	1			
			Time stamp	D-R	8			
			Static Revision	D-R	2			
			Relative index	D-R	2			

Index	Parameter (FF standard parameter)	Description	Sub-parameter	Access attribute	Size (bytes)	Valid range	Initial value	Units
36	BLOCK_ALM	Parameter that indicates the configuration of the resource block and error states during execution. It has the following structure;· Unacknowledged: Occurrence verification state • Alarm state: State in which an alarm has occurred • Time stamp: Time of alarm occurrence/recovery • Subcode: Alarm content subcode • Value: Alarm value	Unacknowledged	D-R/W	1			None
			Alarm State	D-R	1			
			Time stamp	D-R	8			
			Subcode	D-R	2			
			Value	D-R	1			
37	ALARM_SUM	Parameter that summarizes the state of the resource block BLOCK_ALM. • Current: The currently occurring state • Unacknowledged: Alarm verification state • Unreported: The state of reporting to the host. • Disabled: Alarm detection disablement state	Current	D-R	2	In the resource block, only the state of the block alarm is the object of this parameter.		None
			Unacknowledged	D-R	2			
			Unreported	D-R	2			
			Disabled	S-R/W	2			
38	ACK_OPTION	Enables or disables automatic confirmation on the occurrence of a block alarm (BLOCK_ALM) for a resource block. Automatic confirmation refers to confirmation over the communication system without any operations, and is seen as equivalent.	---	S-R/W	2	0: Disabled 1: Enabled	0	None
39	WRITE_PRI	Defines the priority of the warning issued when a WRITE_LOCK is set to write enabled (unlocked) state.	---	S-R/W	2	0 to 15	0	None
40	WRITE_ALM	Alarm parameter that is issued when the resource block WIRTE_LOCK parameter is unlocked.	Unacknowledged	D-R/W	1			None
			Alarm state	D-R	1			
			Time stamp	D-R	8			
			Subcode	D-R	2			
			Value	D-R	1			
41	ITK_VER	Version number of the mutual operability test tool.	---	S-R	1		4	None

Index	Parameter (Yamatake original parameter)	Description	Sub-parameter	Access attribute	Size (bytes)	Valid range	Initial value	Units
42	SOFTWARE_REV	Indicates the revision number of the software of the device.	---	S-R	4			None
43	SIM_ACTIVE_SW	Enables or disables simulation function.	---	S-R/W	2	0: SIM_INACTIVE 1: ACTIVE	0	None

Resource Block - FEATURES and FEATURE_SEL Parameters

Bit	Function	Description
0	Unicode strings	Specifies Unicode (2-byte encoding) support for character string parameters such as PD_TAG and TAG_NAME. This bit is set according to which is required by the host system. When configured for alpha numerics only ASCII (that is, a setting of FALSE) can be used.
1	Reports supported	Selects whether or not the alert notification and trend notification functions are used. If this bit is FALSE, report notifications are not performed, regardless of the alert object and trend object settings. This is set according to the requirements of the host system.
2	Fault State supported	It selects whether or not the Fault State function of these function blocks is used. Fault State refers to operation when, for example, the output value is held constant, or the output value is forcibly switched to a present value. This is set according to the requirements of the application.
3	Soft Write lock supported	Selects whether or not the function that disables writes of the various static data within the device with the WRITE_LOCK parameter in the resource block is used. This should be set to the write enabled (FALSE) value.
4	Hard write lock supported	Function that selects whether or not that function is used when the hardware
5	Output readback supported	
6	Direct write to output hardware	
7	Change of BYPASS in an automatic mode	

Transducer block parameters (Base index: 1100)

Index	Parameter (FF standard parameter)	Description	Sub-parameter	Access attribute	Size (bytes)	Valid range	Initial value	Units
1	ST_REV	The revision level of the static data associated with a function block.	-	S-R	2	0 to 65536	0	None
2	TAG_DESC	User-specified descriptions of the intended application of the block. The RB does not check this parameter.	-	S-R/W	32	-	spaces	None
3	STRATEGY	An arbitrary number to identify grouping of blocks. The TB does not check this parameter.	-	S-R/W	2	0 to 65536	0	None
4	ALERT_KEY	An arbitrary number to identify the plant unit. The TB does not check this parameter.	-	S-R/W	1	1 to 255	1	None
5	MODE_BLK	The actual, target, permitted, and normal mode of the block: Target: The mode to "go to" Actual: The mode the "block is currently in" Permitted: Allowed modes that target may take on Normal: The mode to which the block should be set to during normal operating conditions.	Target	N-R/W	1	O/S, AUTO	O/S	None
			Actual	D-R	1	O/S, AUTO	O/S	None
			Permitted	S-R/W	1	O/S, AUTO	O/S, AUTO	None
			Normal	S-R/W	1	O/S, AUTO	AUTO	None
6	BLOCK_ERR	An enumeration of error status associated with the hardware or software components of the block.	-	D-R	2	-	0×0000	None
7	UPDATE_EVT	An alert generated by the TB to report any changes to its static data. The alert contains its acknowledged status, time stamp, a new static revision number, and a relative index of an updated static data.	Unacknowledged	D-R	1	0, 1, 2	0	None
			Update State	D-R	1	0, 1, 2	0	None
			Time Stamp	D-R	8	-	0×0000000000000000	None
			Static Revision	D-R	2	-	0×0000	None
			Relative Index	D-R	2	-	0	None
8	BLOCK_ALM	An alarm generated by the TB to report any configuration, hardware failures, communication disconnection, or system failures.	Unacknowledged	D-R	1	0, 1, 2	0	None
			Alarm State	D-R	1	0, 1, 2, 3, 4	0	None
			Time Stamp	D-R	8	-	0×0000000000000000	None
			Subcode	D-R	2	-	0	None
			Value	D-R	1	-	0	None
9	TRANSDUCER_DIRECTORY	The directory of the number and starting indices of the transducers in the TB. The S900 does not use this parameter.	Number of Transducers	N-R	2	0 to 2	1	None
			Index of 1st Transducer	N-R	2	-	1110	None
10	TRANSDUCER_TYPE	The type of the Transducer Block.The TRANSDUCER_TYPE for S900 = 100 (Standard Pressure with Calibration).	-	N-R	2	100 = Standard Pressure with Calibration	100	None
11	XD_ERROR	Error codes generated by the TB.	-	D-R	1	20 = Electronics failure 22 = I/O failure 23 = Data Integrity error	0	None

Index	Parameter (FF standard parameter)	Description	Sub-parameter	Access attribute	Size (bytes)	Valid range	Initial value	Units
12	COLLECTION_DIRECTORY	The directory of the number starting indicates, and DD Item IDs of the data collections each transducer within the TB. The S900 does not use this parameter.	Number of Data Collections	N-R	4	0 to 3	1	None
			Index of 1st Data Collections	N-R	4	-	1113	None
			DD item ID of 1st Data Collections	N-R	4	-	0	None
13	PRIMARY_VALUE_TYPE	The type of measurement.	-	S-R	2	107 = differential pressure 108 = gauge pressure 109 = absolute pressure	-	None
14	PRIMARY_VALUE	The sensor value (pressure) and status.	Status	D-R	5	-	-	None
			Value	D-R		-	-	PVR
15	PRIMARY_VALUE_RANGE	Specifies the upper and lower range limit of the sensor, the engineering unit code, and the decimal point position of the Primary Value. S900 does not use a decimal point.	EU_100	N-R	4	Sensor range upper limit	-	PVR
			EU_0	N-R	4	Sensor range lower limit	-	PVR
			Units Index	N-R	2	1130=Pa, 1132=MPa, 1133=kPa, 1136=hPa, 1137=bar, 1138=mbar, 1141=psi, 1144=g/cm^2, 1145=kg/cm^2, 1146=inH_2O, 1149=mmH_2O,1155=inHg	1133	Follows the Units Index of XD_SCALE of AI FB connected to ch1.
			Decimal Point	N-R	1	-	-	None
16	CAL_POINT_HI	The highest calibration value. The S900 does not use this parameter.	-	S-R/W	4	-	+INF	CU
17	CAL_POINT_LO	The lowest calibration value.S900 does not use this parameter.	-	S-R/W	4	-	-INF	CU
18	CAL_MIN_SPAN	The minimum span of the calibration value.S900 does not use this parameter.	-	N-R	4	-	-	CU
19	CAL_UNIT	The unit code for the calibration value.	-	S-R/W	2	1130=Pa, 1132=MPa, 1133=kPa, 1136=hPa, 1137=bar, 1138=mbar, 1141=psi, 1144=g/cm^2, 1145=kg/cm^2, 1146=inH_2O, 1149=mmH_2O,1155=inHg	1133	None
20	SENSOR_TYPE	Defines the type of the sensor.SENSOR_TYPE of S900 is 125 (Piezo resistive).	kPa	S-R	2	125= Piezo resistive	125	None

Index	Parameter (FF standard parameter)	Description	Sub-parameter	Access attribute	Size (bytes)	Valid range	Initial value	Units
21	SENSOR_RANGE	Specifies the upper and lower range limits, the engineering unit code, and the decimal point position of the Sensor value.SENSOR_RANGE of S900 is fixed at 1133 (kPa). S900 does not use a decimal point.	EU_100	N-R	4	Sensor range upper limit	-	kPa
			EU_0	N-R	4	Sensor range lower limit	-	kPa
			Units Index	N-R	2	1133=kPa (fixed)	1133	None
			Decimal Point	N-R	1		2	None
22	SENSOR_SN	Defines the sensor serial number.	-	N-R	32	-	-	None
23	SENSOR_CAL_METHOD	The method of the last sensor calibration.	-	S-R/W	1	100 = volumetric 101 = static weigh 102 = dynamic weigh 103 = factory trim standard calibration 104 = user trim standard calibration 105 = factory trim special calibration 106 = user trim special calibration 255 = other	-	None
24	SENSOR_CAL_LOC	The location of the last sensor calibration.		S-R/W	32	-	NULL	None
25	SENSOR_CAL_DATE	The date of the last sensor calibration.		S-R/W	7	-	0	date
26	SENSOR_CAL_WHO	The name of the person responsible for the last calibration.	-	S-R/W	32	-	NULL	None
27	SENSOR_ISOLATOR_MTL	Type of material of the sensor isolator. S900 does not support this parameter		N-R	2	-	-	None
28	SENSOR_FILL_FLUID	Type of fill fluid used in sensor.		N-R	2	-	-	None
29	SECONDARY_VALUE	The secondary value. SECONDARY_VALUE of S900 is sensor temperature.	Status	D-R	1	-	-	None
			Value	D-R	4	-	-	SVU
30	SECONDARY_VALUE_UNIT	Engineering unit to be used with SECONDARY_VALUE.		S-R	1	100=K 1001=°C 1002=°F 1003=°R	1001	Follows the units index of XD_SCALE of AI FB connected to ch2.

Index	Parameter (Yamatake original parameter)	Description	Sub-parameter	Access attribute	Size (bytes)	Valid range	Initial value	Units
31	MEASUREMENT_STATUS	Indicates S900's self-diagnostics information.		D-R	4	-	0×00000000	None
32	SENSOR_VALUE	The measured pressure value. The unit of this parameter is fixed to kPa.		D-R	4	-	0.0	kPa
33	CAL_CMD	The calibration command.	CAL_ENUM	D-R/W	1	0=NONE 1=CAL_LOWER 2=CAL_UPPER 254=CAL_RESET 255=CAL_INIT	0	None
			CAL_VAL		4	-	0.0	CU
34	CAL_STATUS	Calibration status as a result of CAL_CMD operations.		D-R	1	0=NONE 1=CAL_LOWER Success 2=CAL_UPPER Success 11=CAL_LOWER Failed 12=CAL_UPPER Failed 254=CAL_RESET Executed 255=CAL_INIT Executed	0	None
35	HEIGHT_VALUE	The distance between two flanges of remote diaphragm seals type transmitter to activate the fill fluid ambient temperature correction function.		S-R/W	4	-	0	HVR
36	HEIGHT_VALUE_RANGE	Specifies the upper and lower range limits, the engineering unit code, and the decimal point position of the HEIGHT_VALUE. S900 does not use a decimal point.	EU_100	S-R	4	30 (meter)	30	HVR
			EU_0	S-R	4	-30 (meter)	-30	HVR
			Units Index	S-R/W	2	1010=meter 1018=feet 1019=inch	1010	None
			Decimal Point	S-R	1	-	-	None
37	ELEVATION_CMD	Elevation command.		D-R/W	1	0=NONE 1=SET_ELEV 2=CLEAR_ELEV	0	None
38	ELEVATION_VALUE	Elevation value.		S-R/W	4	-	0.0	PVR
39	ELEVATION_STATUS	Elevation status as a result of ELEVATION_CMD operations.		D-R/W	1	0=NONE 1=SET_ELEV Success 2=CLEAR_ELEV Success 11=SET_ELEV Failed 12=CLEAR_ELEV Failed 255=ELEV_VALUE set directly	0	None

Index	Parameter (Yamatake original parameter)	Description	Sub-parameter	Access attribute	Size (bytes)	Valid range	Initial value	Units
40	DISPLAY_MODE	Selects the value to be displayed on the LCD.		S-R/W	1	0=NONE 1=AI_PV 2=AI_OUT 3=AI_FIELD_VAL 4=XD_PV 5=DISPLAY_RANGE	3	None
41	DISPLAY_RANGE	Specifies the display scale when DISPLAY_RANGE is selected for DISPLAY_MODE.	EU_100	S-R/W	4	-	100	DR
			EU_0	S-R/W	4	-	0	DR
			Units Index	S-R/W	2	-	%	None
			Decimal Point	S-R	1	-	2	None

AI function block parameters (AI 1 Base Index: 1200, AI 2 Base Index: 1300)

Index	Parameter (FF standard parameter)	Description	Sub-parameter	Access attribute	Size (bytes)	Range	Initial value	Units
1	ST_REV	The revision level of the static data associated with a function block.	---	S-BS	2	0 to 65535	0	None
2	TAG_DESC	User-specified descriptions of the intended application of the block. The AI FB does not check this parameter.	---	S-UD	32	None	32 spaces	None
3	STRATEGY	An arbitrary number to identify grouping of blocks. The AI FB does not check this parameter.	---	S-UD	1	0 to 65535	0	None
4	ALERT_KEY	An arbitrary number to identify the plant unit. The AI FB does not check this parameter.	---	S-UD	1	1 to 255	0	None
5	MODE_BLK	The actual, target, permitted, and normal modes of a block.	Target					None
			Actual					
			Permitted			O/S, MAN, AUTO		
			Normal					
6	BLOCK_ERR	An enumeration of error status associated with the hardware or software components of a block.	---					None
7	PV	The primary analog value after input processing based on L_TYPE, LOW_CUT and PV_FTIME calculation.	Status					None
8	OUT	The resulted value of the AI FB execution.	Status					OUT
			Value			OUT_SCALE +/- 10%		
9	SIMULATE	Manually supplied input value from the XB to simulate a real input signal.	Simulate Status					None
			Simulate Value			Same as XB		XD
			Transducer Status					None
			Transducer Value			Same as XB		XD
			Enable/Disable			1: disable 2: enable		None
10	XD_SCALE	The high and low scale values, engineering units code, and the decimal point position to be used in displaying the Transducer parameter.	EU_100					XD
			EU_0					XD
			Unit Index					None
			DP					None
11	OUT_SCALE	The high and low scale values, engineering units, and the decimal point position to be used in displaying the OUT parameter.	EU_100					OUT
			EU_0					OUT
			Unit Index					None
			DP					None
12	GRANT_DENY	Semaphores provided for human interfaces and other host devices to restrict access to certain parameters. The AI FB does not check this parameter.	Grant			0 or 1		None
			Deny					

Index	Parameter (FF standard parameter)	Description	Sub-parameter	Access attribute	Size (bytes)	Range	Initial value	Units
13	IO_OPTS	A set of lags to select or activate various I/O options.	---			bit 10: Low-cut 1: Enable 0: Disable		None
14	STATUS_OPTS	Defines optional features for the OUT parameter status.	---			0 or 1		None
15	CHANNEL	The number of the logical hardware channel that is currently connected to the AI FB.	---			1		None
16	L_TYPE	Defines calculation type for the value passed from transducer block.				1: Direct 2: Indirect 3: Square root		None
17	LOW_CUT	Low limit value used in input processing to eliminate noise near zero for flow sensor.				Non-negative		OUT
18	PV_FTIME	Time constant of a single exponential filter for the PV.				Non-negative		Sec.
19	FIELD_VAL	The raw value in percent of XD_SCALE before L_TYPE, LOW_CUT and PV_FTIME calculation.	Status					None
			Value			Not specified		%
20	UPDATE_EVT	An alert generated by the AI FB to report any changes in its static data. The alert contains its acknowledged status, time stamp, a new static revision number, and a relative index of an updated static data.	Unacknowledged					None
			Update State					
			Time Stamp					
			Static Revision					
			Relative Index					
21	BLOCK_ALM	An alarm generated by the AI FB to report any configuration, hardware failures, communication disconnection, or system failures.	Unacknowledged					None
			Alarm State					
			Time Stamp					
			Subcode					
			Value					
22	ALARAM_SUM	A summary of alarms generated by the AI FB, whether they were generated, reported, acknowledged, or disabled.	Current					None
			Unacknowledged					
			Unreported					
			Disabled					
23	ACK_OPTION	Enables or disables automatic acknowledgements of the alarms.				0: Disabled 1: Enabled		None
24	ALARAM_HYS	Hysteresis value for the PV to clear its alarm conditions after it returns to within limits.				0 to 50%		%
25	HI_HI_PRI	An alarm priority of high-high, high, low, low-low alarms, respectively.All the parameters have the same format and range.				0 to 15		None
26	HI_HI_LIM	An alarm setpoint in the engineering unit in use for the high-high, high, low, low-low alarms, respectively.				PV_SCALE, +INF		PV

Index	Parameter (FF standard parameter)	Description	Sub-parameter	Access attribute	Size (bytes)	Range	Initial value	Units
27	HI_PRI	An alarm priority of high-high, high, low, low-low alarms, respectively.All the parameters have the same format and range.				0 to 15		None
28	HI_LIM	An alarm setpoint in the engineering unit being used for the high-high, high, low, low-low alarms, respectively.						
29	LO_PRI	An alarm priority of high-high, high, low, low-low alarms, respectively.All the parameters have the same format and range.				0 to 15		None
30	LO_LIM	An alarm setpoint in the engineering unit being used for the high-high, high, low, low-low alarms, respectively.				-INF, PV_SCALE		PV
31	LO_LO_PRI	An alarm priority of high-high, high, low, low-low alarms, respectively.All the parameters have the same format and range.				0 to 15		None
32	LO_LO_LIM	An alarm setpoint in the engineering unit being used for the high-high, high, low, low-low alarms, respectively.				-INF, PV_SCALE		PV
33	HI_HI_ALM	A set of alarm data including the alarm state and time stamp for the high-high, high, low, low-low alarms, respectively.All the alarms have the same set of parameters.	Unacknowledged					None
			Alarm State					None
			Time Stamp					None
			Subcode					None
			Value					PV
34	HI_ALM	A set of alarm data including the alarm state and time stamp for the high-high, high, low, low-low alarms, respectively.All the alarms have the same set of parameters.	Unacknowledged					None
			Alarm State					None
			Time Stamp					None
			Subcode					None
			Value					PV
35	LO_ALM	A set of alarm data including the alarm state and time stamp for the high-high, high, low, low-low alarms, respectively.All the alarms have the same set of parameters.	Unacknowledged					None
			Alarm State					None
			Time Stamp					None
			Subcode					None
			Value					PV
36	LO_LO_ALM	A set of alarm data including the alarm state and time stamp for the high-high, high, low, low-low alarms, respectively.All the alarms have the same set of parameters.	Unacknowledged					None
			Alarm State					None
			Time Stamp					None
			Subcode					None
			Value					PV

PID function block

The PID function block is an algorithm that produces an output signal in response to the measured variable and the setpoint.

The output has three terms: proportional, integral and derivative. The output is adjusted by tuning constants. There are three tuning constants in the PID equation.

1. GAIN is the tuning constant of the Proportional term.
2. RESET is the tuning constant of the Integral.
3. RATE is the tuning constant of the Derivative.

The ST3000 employs only FF standard parameters of the PID Function block. Refer to FF specifications, FF-891 “Function Block Application Process Part 2" for details.

PID function block parameters (Base index:1400)

Index	Parameter (FF standard parameter)	Description	Sub-parameter	Access attribute	Size (bytes)	Valid range	Initial value	Units
1	ST_REV	Refers to the revision number of the static data that belongs to the block. If a parameter for which the access attribute is “S-” is modified, it changed by an increment of 1 each modification.	---	S-BS	2	0 to 65535	0	None
2	TAG_DESC	Tag name for the user-defined transducer block. This is used for reference by the host, and is unrelated to the operation or execution of the function block itself.	---	S-UD	32		32 spaces	na
3	STRATEGY	An arbitrary group number for the transducer block. (This parameter is unrelated to block operation. It is provided so that the different types of blocks can be grouped arbitrarily so that they can be identified more easily in later database search operations.)	---	S-UD	2	0 to 65535	0	None
4	ALERT_KEY	Identification number for the related plant-internal devices. (This parameter is unrelated to block operation. It is provided so that the different types of blocks can be grouped arbitrarily so that they can be identified more easily in later database search operations.	---	S-UD	1	1 to 255	0	None
5	MODE_BLK	Transducer block mode parameter set. MODE_BLK has the following structure: • Target: Parameter for the mode set from the host. • Actual: Refers to the value of the mode used by the function block. • Permitted: Refers to the value of the mode used by the function block. • Normal: Refers to the value of the mode that should be the normal state.	---	S-UD	1	1 to 255	0	None
6	BLOCK_ERR	Refers to the error status fro the transducer block.	---	D-BD	2			None
7	PV	Either the primary analog value for use in executing the function, or a process value associated with it.	Status	D-BD	1	Good: Good value Uncertain: Unknown Bad: Unusable		na
			Value	D-BD	4			PV

Index	Parameter (FF standard parameter)	Description	Sub-parameter	Access attribute	Size (bytes)	Valid range	Initial value	Units
8	SP	The analog setpoint of this block.	Status	N-PD	1	Good: Good value Uncertain: Unknown Bad: Unusable		na
			Value	N-PD	4	PV_SCALE +/- 10%		PV
9	OUT	The primary analog value calculated as a result of executing the function.	Status	N-PD	1	Good: Good value Uncertain: Unknown Bad: Unusable		na
			Value	N-PD	4	OUT_SCALE +/- 10%		OUT
10	PV_SCALE	The high and low scale values, engineering units code, and number of digits to the right of the decimal point to be used in displaying the PV parameter and parameters which have the same scaling as PV.	EU_100	S-UD	4		100	PV
			EU_0	S-UD	4		0	PV
			Unit Index	S-UD	2	See CONTROL_OPTS parameter	%	na
			DP	S-UD	1	0 to 255	0	na
11	OUT_SCALE	The high and low scale values, engineering units code, and number of digits to the right of the decimal point to be used in displaying the OUT parameter and parameters which have the same scaling as OUT.	EU_100	S-UD	4		100	OUT
			EU_0	S-UD	4		0	OUT
			Unit Index	S-UD	2	See CONTROL_OPTS parameter	%	na
			DP	S-UD	1	0 to 255	0	None
12	GRANT_DENY	Options for controlling access of host computer and local control panels to operating, tuning and alarm parameters of the block.	Grant	D-UD	1	0 or 1	0	None
			Deny	D-UD	1	0 or 1	0	None
13	CONTROL_OPTS	Options which the user may select to alter the calculations done in a control block.	---	S-UD	2	0: Invalid1: Valid	0	None
14	STATUS_OPTS	Options which the user may select in the block processing of status.	---	S-UD	2	0: Invalid1: Valid	0	None
15	IN	The primary input value of the block, required for blocks that filter the input to acquire the PV.	Status	D-BD	1	Good: Good value Uncertain: Unknown Bad: Unusable		None
			Value	D-BD	4	---		PV
16	PV_FTIME	Time constant of a single exponential filter for the PV, in seconds.	---	S-UD	4	0 or positive value	0	sec.
17	BYPASS	The normal control algorithm may be bypassed through this parameter. When set to bypass (in percentage), the setpoint value will be directly transferred to the output. To prevent a bump on transfer to/from bypass, the setpoint will automatically be initialized to the output value or process variable, respectively, and the path broken flag will be set for one execution.	---	S-UD	1	1: Off 2: On	0	None
18	CAS_IN	This parameter is the remote setpoint value, which must come from another Fieldbus block, or a DCS block through a defined link.	Status	N-PD	1	Good: Good value Uncertain: Unknown Bad: Unusable		None
			Value	N-PD	4	---		PV
19	SP_RATE_DN	Ramp rate at which downward setpoint changes are acted on in Auto mode, in PV units per second. If the ramp rate is set to zero, then the setpoint will be used immediately.For control blocks, rate limiting will apply only in Auto. For output blocks, rate limiting will apply in Auto, Cas, and RCas modes.	---	S-UD	4	0 or positive value	+ 8	PV/sec.

Index	Parameter (FF standard parameter)	Description	Sub-parameter	Access attribute	Size (bytes)	Valid range	Initial value	Units
20	SP_RATE_UP	Ramp rate at which upward setpoint changes are acted on in Auto mode, in PV units per second. If the ramp rate is set to zero, then the setpoint will be used immediately.For control blocks, rate limiting will apply only in Auto. For output blocks, rate limiting will apply in Auto, Cas, and RCas modes.	---	S-UD	4	0 or positive value	+ 8	PV/sec.
21	SP_HI_LIM	The setpoint high limit is the highest setpoint operator entry that can be used for the block.	---	S-UD	4	PV_SCALE (EU_100) +10%	100	PV
22	SP_LO_LIM	The setpoint low limit is the lowest setpoint operator entry that can be used for the block.	---	S-UD	4	PV_SCALE (EU_0) -10%	0	PV/sec.
23	GAIN	A dimensionless value used by the block algorithm in calculating the block output.	---	S-UD	4	0 or positive value		None
24	RESET	The integral time constant, in seconds, per repeat.	---	S-UD	4	0 or positive value		sec.
25	BAL_TIME	This specifies the time for the internal working value of bias or ratio to return to the operator set bias or ratio, in seconds. In the PID block, it may be used to specify the time constant at which the integral term will move to obtain balance when the output is limited and the mode is Auto, Cas, or RCas.	---	S-UD	4	Positive value	0	sec.
26	RATE	Defines the derivative time constant, in seconds.	---	S-UD	4	0 or positive value		sec.
27	BKCAL_IN	The value and status from a lower block's BKCAL_OUT that is used to prevent reset windup and to initialize the control loop.	Status	D-BD	1	Good: Good value Uncertain: Unknown Bad: Unusable		na
			Value	D-VD	4	---		OUT
28	OUT_HI_LIM	Limits the maximum output value.	---	S-UD	4	OUT_SCALE (EU_100) +10%	100	OUT
29	OUT_LO_LIM	Limits the minimum output value.	---	S-UD	4	OUT_SCALE (EU_0) -10%	0	OUT
30	BKCAL_HYS	The amount that the output must change away from its output limit before the limit status is turned off, expressed as a percent of the span of the output.	---	S-UD	4	0 to 50%		%
31	BKCAL_OUT	The value and status required by an upper block's BKCAL_IN so that the upper block may prevent reset windup and provide bumpless transfer to closed loop control.	Status	D-BD	1	Good: Good value Uncertain: Unknown Bad: Unusable		na
			Value	D-BD	4	---		PV
32	RCAS_IN	Target setpoint and status provided by a supervisory Host to a analog control or output block.	Status	N-UD	1	Good: Good value Uncertain: Unknown Bad: Unusable		na
			Value	N-UD	4	---		PV
33	ROUT_IN	Target output and status provided by a Host to the control block for use as the output (ROut mode).	Status	N-UD	1	Good: Good value Uncertain: Unknown Bad: Unusable		na
			Value	N-UD	4	---		PV
34	SHED_OPT	Defines the action to be taken on remote control device timeout.	---	S-UD	1		0	
35	RCAS_OUT	Block setpoint and status after ramping - provided to a supervisory Host for back calculation and to allow action to be taken under limiting conditions or mode change.	Status	N-UD	1	Good: Good value Uncertain: Unknown Bad: Unusable		na
			Value	N-UD	4	---		PV

Index	Parameter (FF standard parameter)	Description	Sub-parameter	Access attribute	Size (bytes)	Valid range	Initial value	Units
36	ROUT_OUT	Block output and status - provided to a Host for back calculation in ROut mode and to allow action to be taken under limited conditions or mode change.	Status	D-BD	1	Good: Good value Uncertain: Unknown Bad: Unusable		na
			Value	D-BD	4	---		OUT
37	TRK_SCALE	The high and low scale values, engineering units code, and number of digits to the right of the decimal point, associated with TRK_VAL.	EU_100	S-UD	4		100	OUT
			EU_0	S-UD	4		0	OUT
			Unit Index	S-UD	2	See CONTROL_OPTS parameter	%	na
			DP	S-UD	1	0 to 255	0	None
38	TRK_IN_D	This discrete input is used to initiate external tracking of the block output to the value specified by TRK_VAL.	Status	N-UD	1	Good: Good value Uncertain: Unknown Bad: Unusable		na
			Value	N-UD	1	0: Feedback off 1: Feedback on		na
39	TRK_VAL	This input is used as the track value when external tracking is enabled by TRK_IN_D.	Status	N-UD	1	Good: Good value Uncertain: Unknown Bad: Unusable		na
			Value	N-UD	4	---		TRK
40	FF_VAL	The feed forward value and status.	Status	N-UD	1	Good: Good value Uncertain: Unknown Bad: Unusable		na
			Value	N-UD	4	---		FF
41	FF_SCALE	The feed forward input high and low scale values, engineering units code, and number of digits to the right of the decimal point.	EU_100	S-UD	4		100	FF
			EU_0	S-UD	4		0	FF
			Unit Index	S-UD	2		%	na
			DP	S-UD	1	0 to 255	0	None
42	FF_GAIN	The gain that the feed forward input is multiplied by before it is added to the calculated control output.	---	S-UD	4		0	None
43	UPDATE_EVT	This alert is generated in the event of any change to the static data.	Unacknowledged	D-BD	1	"Unacknowledged": 0=Undefined (no change) 1=Acknowledged 2=Unacknowledged "Update state": 0=Undefined (no change) 1=Update reported 2=Update not reported		None
			Update state	D-BD	1			
			Time stamp	D-BD	8			
			Static Revision	D-BD	2			
			Relative Index	D-BD	2			
44	BLOCK_ALM	The block alarm is used for all configuration, hardware, connection failure or system problems in the block. The cause of the alert is entered in the subcode field. The first alert to become active will set the Active status in the Status attribute. As soon as the Unreported status is cleared by the alert reporting task, another block alert may be reported without clearing the Active status, if the subcode has changed.	Unacknowledged	D-BD	1			None
			Alarm State	D-BD	1			
			Time Stamp	D-BD	8			
			Subcode	D-BD	2			
			Value	D-BD	1			

Index	Parameter (FF standard parameter)	Description	Sub-parameter	Access attribute	Size (bytes)	Valid range	Initial value	Units
45	ALARM_SUM	The current alert status, unacknowledged states, unreported states, and disabled states of the alarms associated with the function block.	Current	D-BD	2	Bit1: high high alarm Bit2: High alarm Bit3: Low low alarm Bit4: Low alarm Bit5: Deviation high alarm Bit6: Deviation low alarm Bit7: Block alarm		None
			Unacknowledged	D-BD	2			
			Unreported	D-BD	2			
			Disabled	S-UD	2			
46	ACK_OPTION	Selection of whether alarms associated with the block will be automatically acknowledged.	---	S-UD	2	0: Disabled 1: Enabled	0	None
47	ALARM_HYS	Amount the PV must return within the alarm limits before the alarm condition clears. Alarm Hysteresis is expressed as a percentage of the PV span.	---	S-UD	4	0 to 50%	0.5%	%
48	HI_HI_PRI	Priority of the high high alarm.	---	S-UD	1	0 to 15	0	None
49	HI_HI_LIM	The setting for high high alarm in engineering units.	---	S-UD	4	PV_SCALE, +8		PV
50	HI_PRI	Priority of the high alarm.	---	S-UD	1	0 to 15	0	None
51	HI_LIM	The setting for high alarm in engineering units.	---	S-UD	4	PV_SCALE, +8		PV
52	LO_PRI	Priority of the low alarm.	---	S-UD	1	0 to 15	0	None
53	LO_LIM	The setting for the low alarm in engineering units.	---	S-UD	4	-8, PV_SCALE		PV
54	LO_LO_PRI	Priority of the low low alarm.	---	S-UD	1	0 to 15	0	None
55	LO_LO_LIM	The setting of the low low alarm in engineering units.	---	S-UD	4	-8, PV_SCALE		PV
56	DV_HI_PRI	Priority of the high deviation alarm.	---	S-UD	1	0 to 15	0	None
57	DV_HI_LIM	The setting of the high deviation alarm limit in engineering units.	---	S-UD	4	0 to PV span, +8		PV
58	DV_LO_PRI	Priority of the low deviation alarm.	---	S-UD	1	0 to 15	0	None
59	DV_LO_LIM	The setting of the low deviation alarm limit in engineering units.	---	S-UD	4	-8, PV span to 0		PV
60	HI_HI_ALM	The status of high high alarm and its associated time stamp.	Unacknowledged	D-BD	1			None
			Alarm state	D-BD	1			None
			Time stamp	D-BD	8			None
			Subcode	D-BD	2			None
			Value	D-BD	4			PV
61	HI_ALM	The status of high alarm and its associated time stamp.	Unacknowledged	D-BD	1			None
			Alarm state	D-BD	1			None
			Time stamp	D-BD	8			None
			Subcode	D-BD	2			None
			Value	D-BD	4			PV
62	LO_ALM	The status of the low alarm and its associated time stamp.	Unacknowledged	D-BD	1			None
			Alarm state	D-BD	1			None
			Time stamp	D-BD	8			None
			Subcode	D-BD	2			None
			Value	D-BD	4			PV

Index	Parameter (FF standard parameter)	Description	Sub-parameter	Access attribute	Size (bytes)	Valid range	Initial value	Units
63	LO_LO_ALM	The status of the low low alarm and its associated time stamp.	Unacknowledged	D-BD	1			None
			Alarm state	D-BD	1			None
			Time stamp	D-BD	8			None
			Subcode	D-BD	2			None
			Value	D-BD	4			PV
64	DV_HI_ALM	The status and time stamp associated with the high deviation alarm.	Unacknowledged	D-BD	1			None
			Alarm state	D-BD	1			None
			Time stamp	D-BD	8			None
			Subcode	D-BD	2			None
			Value	D-BD	4			PV
65	DV_LO_ALM	The status and time stamp associated with the low deviation alarm.	Unacknowledged	D-BD	1			None
			Alarm state	D-BD	1			None
			Time stamp	D-BD	8			None
			Subcode	D-BD	2			None
			Value	D-BD	4			PV

Diagnostics block

The diagnostics block is a Yamatake original block which provides the results of self-diagnostics of the device.

Diagnostics block parameters (Base index: 1500)

Index	Parameter (FF standard parameter)	Description	Sub-parameter	Access attribute	Size (bytes)	Range	Initial value	Units
1	ST_REV	Refers to the revision number of the static data that belongs to the block. If a parameter for which the access attribute is “S-” is modified, it is changed by an increment of 1.	---	S-BS	2	0 to 65535	0	None
2	TAG_DESC	Tag name for the user-defined transducer block. This is used for reference by the host, and is unrelated to the operation or execution of the function block itself.	---	S-UD	32		32 spaces	None
3	STRATEGY	An arbitrary group number for the transducer block. (This parameter is unrelated to block operation. It is provided so that the different types of blocks can be grouped arbitrarily so that they can be identified more easily in later database search operations.)	---	S-UD	2	0 to 65535	0	None
4	ALERT_KEY	Identification number for the related plant-internal devices. (This parameter is unrelated to block operation. It is provided so that the different types of blocks can be grouped arbitrarily so that they can be identified more easily in later database search operations.)	---	S-UD	1	1 to 255	0	None

Index	Parameter (FF standard parameter)	Description	Sub-parameter	Access attribute	Size (bytes)	Range	Initial value	Units
5	MODE_BLK	Transducer block mode parameter set. MODE_BLK has the following structure: • Target: Parameter for the mode set from the host. • Actual: Refers to the value of the mode used by the function block. • Permitted: Refers to the value of the mode used by the function block. • Normal: Refers to the value of the mode that should be the normal state.	---	S-UD	1	1 to 255	0	None
6	BLOCK_ERR	Refers to the error status fro the transducer block.	---	D-BD	2			None

Index	Parameter (Yamatake original parameter)	Description	Sub-parameter	Access attribute	Size (bytes)	Range	Initial value	Units
7	DEVICE_STATUS	Refers to the results of each item in the device self diagnostics.	---	D-R	4		0×00000000	None
8	MEASUREMENT_STATUS	A mapping parameter that indicates the results of the device self diagnostics executed in the Transducer Function Block	---	D-R	4		0×00000000	None
9	OPERATING_TIME	A parameter indicates the operating hour of the device, in hours.	---	S-R/W	4		0	hour

Capability File

```
//-------------------------------------------------------------------------//
//    Capabilities File of DSTJ3000                                        //
//                                                                         //
//    History            : Rev.01  02/05/23   initial issue               //
//                                                                         //
//    Copyright 2002 Yamatake Co., Ltd. all rights reserved. //
//-------------------------------------------------------------------------//

//=========================================================================
// File Header
//=========================================================================
[File Header]
Description ="This is a Capabilities File of the DSTJ3000/S900"
FileType    = CapabilitiesFile
FileDate    = 2002,05,23       // 23 May, 2002
CffVersion  = 1,5                    // FF-103-FS1.5
//=========================================================================
// Device Header
//=========================================================================
[Device Header]
DeviceName  = "DST"
DeviceClass = BASIC                  // The device Class: BASIC

// The following 3 parameters describe the Communication Profile
// A device may exist within several classes in the same group.

CommGroup     = 3
CommClass     = Class31
CommSubClass  = Class3Publisher+Class3Subscriber

[Device VFD 1]           // Management VFD
VendorName    = "Yamatake Corporation"
ModelName     = "DSTJ"
Revision      = "Rev.0.01"
//DeviceClass   = BASIC                      // The device Class: BASIC
VersionOD     = 0x01
ProfileNumber = 0x4d47

[Device VFD 2]           // FB VFD
VendorName    = "Yamatake Corporation"
ModelName     = "DSTJ"
Revision      = "Rev.0.01"
VersionOD     = 0x01
ProfileNumber = 0x0000

//=========================================================================
// NM section
//=========================================================================
[NM OD Directory]
```

```
DirectoryRevisionNumber                 = 1
NumberOfDirectoryObjects                = 1
TotalNumberOfDirectoryEntries           = 9
DirectoryIndexOfFirstCompositeListReference = 21
NumberOfCompositeListReferences         = 1
StackMgtOdIndex                         = 1400
NumberOfObjectsInStackManagement        = 1
VcrListOdIndex                          = 1500
NumberOfObjectsInVcrList                = 18
DlmeBasicOdIndex                        = 1900
NumberOfObjectsInDllBasic               = 3
DlmeLinkMasterOdIndex                   = 0
NumberOfObjectsInDllLme                 = 0
LinkScheduleListOdIndex                 = 0
NumberOfObjectsInDllLinkSchedule        = 0
DlmeBridgeOdIndex                       = 0
NumberOfObjectsInDllBridge              = 0
PlmeBasicOdIndex                        = 2200
NumberOfObjectsInPhyLme                 = 3
ListOfMmeReferences                     = 23
NumberOfMmeComposites                   = 1
MmeComposit1                            = 2300
NumberOfObjectsMmeComposite1            = 1

//=========================================================================
// NM Restrictions
//=========================================================================
[NM Restrictions]

//-------------------------------------------------------------------------
// Basic Info
//-------------------------------------------------------------------------
MaximumResponseDelaySlotTime   = 20 // V (MRD) * V (SlotTime)
MinimumInterPduDelay           = 10       // V (MID)
SlotTime  = 5
//-------------------------------------------------------------------------
// Basic Characteristics
//-------------------------------------------------------------------------
Version = 1
BasicStatisticsSupportedFlag = TRUE
DlOperatFunctionalClass      = BASIC
DlDeviceConformance          = 0x00000000
//-------------------------------------------------------------------------
// Stack Capabilities
//-------------------------------------------------------------------------
FasArTypesAndRolesSupported    =
QUB_SERVER+QUU_SOURCE+BNU_PUBLISHER+BNU_SUBSCRIBER
MaxDlsapAddressSupported       = 15
MaxDlcepAddressSupported       = 16
DlcepDeliveryFeaturesSupported =
```

```
S_ORDERED+S_UNORDERED+R_DISORDERED+R_ORDERED+R_UNORDERED
VersionOfNmSpecSupported      = 0x0104
AgentFunctionsSupported       =
LAS_SCHEDULES_SUPPORTED+INDIVIDUAL_VCR_ENTRY_DOWNLOADABLE+LAS_SCHEDUL
E_DOWNLOADABLE+VCR_LIST_DOWNLOADABLE
FmsFeaturesSupported          =
INFO_REPORT+EVENT,GET_OD+UPLOAD+READ+WRITE+INFO_REPORT+ACK_EVENT+GEN_D
OWNLOAD
//---------------------------------------------------------------------
// VCR Capabilities
//---------------------------------------------------------------------

// The number of VCRs in the device including a permanent SM VCR

MaxEntries = 16

// The Number of Totally Permanent and Partially Configurable VCRs
// MaxEntries ? NumPermanentEntries  = Number of Fully Configurable VCRs.

NumPermanentEntries   = 1
DynamicsSupportedFlag = TRUE
StatisticsSupported   = 0x07

MaximumNumberOfClientVcrs     = 0
MaximumNumberOfServerVcrs     = 15
MaximumNumberOfSourceVcrs     = 15
MaximumNumberOfSinkVcrs       = 0
MaximumNumberOfSubscriberVcrs = 15
MaximumNumberOfPublisherVcrs  = 15

//---------------------------------------------------------------------
// Physical Layer
//---------------------------------------------------------------------
PowerRequired              = 20     // in milliamps
ChannelStatisticsSupported  = 0x01
MediumAndDataRatesSupported = 0x4900000000000000 //
WIRE_MEDIUM+VOLTAGE_MODE+SPEED_31KBS
IecVersion                 = 0x0001// 31.25 half duplex
NumberOfChannels           = 1
PowerMode                  = BUS_POWERED
InterfaceMode              = HALF_DUPLEX

//---------------------------------------------------------------------------
// Partially configurable and fully configurable VCRs may be further restricted.
//---------------------------------------------------------------------------
[Server Restrictions]
FmsMaxOutstandingServicesCalling  = 0
FmsMaxOutstandingServicesCalled   = 1

[NM VCR Usage 1]
```

```
// This section describes the actual configuration for the permanent or the not fully configurable VCRs.
// If a VCR Static Entry attribute is not entered, then that attribute is fully configurable using
// the constraints found in Restriction sections.

// For partially configurable VCRs, the host configuration device must remember which attributes of
// the VCR are configurable.

// The fully configurable VCRs are not listed here.

//Permanent Management VCR
FasArTypeAndRole                = NOBYPASS+QUB+SERVER
FasDllLocalAddr                 = 0xF8
FasDllConfiguredRemoteAddr      = FREE
FasDllSDAP                      = NONSCHEDULED+DISORDERED+AUTH_SOURCE+TIMEAVAILABLE
FasDllMaxConfirmDelayOnConnect  = 60000
FasDllMaxConfirmDelayOnData     = 60000
FasDllMaxDlsduSize              = 128
FasDllResidualActivitySupported = RESIDUAL
FasDllTimelinessClass           = NONE+NODUPLICATION+NONE
FasDllPublisherTimeWindowSize   = 0
FasDllPublisherSynchronizingDlcep = 0
FasDllSubscriberTimeWindowSize  = 0
FasDllSubscriberSynchronizingDlcep = 0
FmsVfdID                        = 1
FmsMaxOutstandingServicesCalling = 0
FmsMaxOutstandingServicesCalled = 1
FmsFeaturesSupported            = NONE, GET_OD+UPLOAD+READ+WRITE+GEN_DOWNLOAD

// An example of partially configurable Server VCR
// Missing attributes are fully configurable within the limits of the VCR Restrictions sections.

//[NM VCR Usage 2]
//FasArTypeAndRole  = QUB+SERVER+NOBYPASS
// A partially configurable SOURCE VCR
// Missing attributes are fully configurable within the limits of the VCR Restrictions sections.

//[NM VCR Usage 3]
//FasArTypeAndRole  = QUU+SOURCE+NOBYPASS

// Other VCRs are fully configurable.

//=============================================================================
// SM section
//=============================================================================
[SM OD Directory]
DirectoryRevisionNumber             = 1
NumberOfDirectoryObjects            = 1
TotalNumberOfDirectoryEntries       = 5
DirectoryIndexOfFirstCompositeListReference = 0
NumberOfCompositeListReference      = 0
```

```
SmAgentStartingOdIndex                  = 600
NumberOfSmAgentObjects                  = 4
SyncAndSchedulingStartingOdIndex        = 700
NumberOfSyncAndSchedulingObjects        = 8
AddressAssignmentStartingOdIndex        = 800
NumberOfAddressAssignmentObjects        = 3
VfdListStartingOdIndex                  = 900
NumberOfVfdListObjects                  = 2
FbScheduleStartingOdIndex               = 1000
NumberOfFbScheduleObjects               = 9

[SM VFD 1]
VFD_REF = 0x1
VFD_TAG = "MG_VFD"

[SM VFD 2]
VFD_REF  = 0x2
VFD_TAG  = "FB_VFD"

[SM Capability]
Sm_Support =
SET_PDTAG_AGENT+SET_ADDR_AGENT+CLR_ADDR_AGENT+IDENTIFY_AGENT+\
        LOC_FB_AGENT+FMS_SERVER+TIME_SLAVE+SCHEDULE_FB

//=========================================================================
// Application section
//=========================================================================
[VFD 2 OD Directory]
DirectoryRevisionNumber                 = 1
NumberOfDirectoryObjects                = 1
TotalNumberOfDirectoryEntries           = 14// 8+(number of blocks)
DirectoryIndexOfFirstCompositeListReference    = 17
NumberOfCompositeListReference          = 3
OdIndexForStartingActionObject          = 0
NumberOfActionObjects                   = 0
OdIndexOfTheStartingLinkObjectInTheVfd      = 700
NumberOfLinkObjectsInTheVfd             = 10
OdIndexOfTheStartingAlertObjectInTheVfd     = 800
NumberOfAlertObjectsInTheVfd            = 3
OdIndexOfTheStartingTrendObjectInTheVfd     = 900
NumberOfTrendObjectsInTheVfd            = 3
OdIndexOfTheStartingDomainObjectInTheVfd    = 0
NumberOfDomainObjectsInTheVfd           = 0
DirectoryIndexForTheResourceBlock       = 23
NumberOfResourceBlocksInTheVfd          = 1
DirectoryIndexForTheFirstTransducerBlockPointer = 25
NumberOfTransducerBlocksInTheVfd        = 1
DirectoryIndexForTheFirstFunctionBlockPointer   = 27
NumberOfFunctionBlocksInTheVfd          = 4
MaximumNumberOfLinkagObjects            = 10
```

MaximumNumberOfTrendObjects = 3
MaximumNumberOfDomainObjects = 0

[VFD 2 Channels]
Channel1 = "Pressure"
Channel2 = "Sensor Temperature"

[VFD 2 Resource Block]
Block_Type = RESOURCE
Block_Index = 1000
DD_Item = 0x80020AF0
Profile = 0x0133 // Resource block with ITK_VER
Profile_Revision = 0x0101
Num_Of_Parms = 44
Views_Index = 6001
Number_View_3 = 1
Number_View_4 = 1

[VFD 2 Resource Block Defaults]
ST_REV=0
TAG_DESC=0x2020202020202020202020202020202020202020202020202020202020202020
STRATEGY=0
ALERT_KEY=0
MODE_BLK=0x01,0x01,0x11,0x10
BLOCK_ERR=0x0000
RS_STATE=0
TEST_RW=0,0,0,0,0,0,0,0,"",0x2020202020202020202020202020202020202020202020202020202020202020
20,0x00000000000000,0x000000000000,0x000000000000,0x0000,0x0000000000000000
DD_RESOURCE=""
MANUFAC_ID=0x0dfc96
DEV_TYPE=0x0103 // DST/S900/NewAce
DEV_REV=0x01
DD_REV=0x02
GRANT_DENY=0x00,0x00
HARD_TYPES=0x8000
RESTART=0
FEATURES=0xd100
FEATURE_SEL=0x0000
CYCLE_TYPE=0x8000
CYCLE_SEL=0x0000
MIN_CYCLE_T=4000
MEMORY_SIZE=0
NV_CYCLE_T=0
FREE_SPACE=0
FREE_TIME=0
SHED_RCAS=640000
SHED_ROUT=640000
FAULT_STATE=1
SET_FSTATE=1
CLR_FSTATE=1

MAX_NOTIFY=3
LIN_NOTIFY=3
CONFIRM_TIME=640000
WRITE_LOCK=1
//UPDATE_EVT=0,0,0,0,0
//BLOCK_ALM=0,0,0,0,0
ALARM_SUM=0x0100,0x0000,0x0000,0x0000
ACK_OPTION=0x0000
WRITE_PRI=0
WRITE_ALM=0,0,0x0000000000000000,0,0
ITK_VER=4
//SOFTWARE_REV=0x00000000
SIM_ACTIVE_SW=0

[VFD 2 Function Block 1]
Block_Type = AI
Block_Index = 1200
DD_Item = 0x800201D0
Profile = 0x0101 // standard AI block
Profile_Revision = 0x0001
Execution_Time = 2400
Num_Of_Parms = 37
Views_Index = 6201
Number_View_3 = 1
Number_View_4 = 1

[VFD 2 Function Block 1 Defaults]
ST_REV=0
TAG_DESC=0x2020202020202020202020202020202020202020202020202020202020202020
STRATEGY=0
ALERT_KEY=0
MODE_BLK=0x01,0x01,0x19,0x10
BLOCK_ERR=0x0000
PV=28,0
OUT=28,0
SIMULATE=0,0,0,0,1
XD_SCALE=100,0,1133,2
OUT_SCALE=100,0,1342,1
GRANT_DENY=0x00,0x00
IO_OPTS=0x0000
STATUS_OPTS=0x0000
CHANNEL=1
L_TYPE=0
LOW_CUT=0
PV_FTIME=0
FIELD_VAL=28,0
//UPDATE_EVT=0,0,0,0,0
//BLOCK_ALM=0,0,0,0,0
ALARM_SUM=0x0100,0x0000,0x0000,0x0000
ACK_OPTION=0x0000

ALARM_HYS=0.5
HI_HI_PRI=0
HI_HI_LIM=+INF
HI_PRI=0
HI_LIM=+INF
LO_PRI=0
LO_LIM=-INF
LO_LO_PRI=0
LO_LO_LIM=-INF
//HI_HI_ALM=0,0,0,0,0
//HI_ALM=0,0,0,0,0
//LO_ALM=0,0,0,0,0
//LO_LO_ALM=0,0,0,0,0

[VFD 2 Function Block 2]
Block_Type = AI
Block_Index = 1300
DD_Item = 0x800201D0
Profile = 0x0101 // standard AI block
Profile_Revision = 0x0001
Execution_Time = 2400
Num_Of_Parms = 37
Views_Index = 6301
Number_View_3 = 1
Number_View_4 = 1

[VFD 2 Function Block 2 Defaults]
ST_REV=0
TAG_DESC=0x2020202020202020202020202020202020202020202020202020202020202020
STRATEGY=0
ALERT_KEY=0
MODE_BLK=0x01,0x01,0x19,0x10
BLOCK_ERR=0x0000
PV=28,0
OUT=28,0
SIMULATE=0,0,0,0,1
XD_SCALE=100,0,1133,2
OUT_SCALE=100,0,1342,1
GRANT_DENY=0x00,0x00
IO_OPTS=0x0000
STATUS_OPTS=0x0000
CHANNEL=1
L_TYPE=0
LOW_CUT=0
PV_FTIME=0
FIELD_VAL=28,0
//UPDATE_EVT=0,0,0,0,0
//BLOCK_ALM=0,0,0,0,0
ALARM_SUM=0x0100,0x0000,0x0000,0x0000
ACK_OPTION=0x0000

ALARM_HYS=0.5
HI_HI_PRI=0
HI_HI_LIM=+INF
HI_PRI=0
HI_LIM=+INF
LO_PRI=0
LO_LIM=-INF
LO_LO_PRI=0
LO_LO_LIM=-INF
//HI_HI_ALM=0,0,0,0,0
//HI_ALM=0,0,0,0,0
//LO_ALM=0,0,0,0,0
//LO_LO_ALM=0,0,0,0,0

[VFD 2 Function Block 3]
Block_Type = PID
Block_Index = 1400
DD_Item = 0x800202B0
Profile = 0x0108 //standard PID block
Profile_Revision = 0x0001
Execution_Time = 4000
Num_Of_Parms = 66
Views_Index = 6401
Number_View_3 = 1
Number_View_4 = 1

[VFD 2 Function Block 3 Defaults]
ST_REV=0
TAG_DESC=0x2020202020202020202020202020202020202020202020202020202020202020
STRATEGY=0
ALERT_KEY=0
MODE_BLK=0x01,0x01,0xF9,0x10
BLOCK_ERR=0x0000
PV=28,0
SP=28,0
OUT=28,0
PV_SCALE=100,0,1342,1
OUT_SCALE=100,0,1342,1
GRANT_DENY=0x00,0x00
CONTROL_OPTS=0x0000
STATUS_OPTS=0x0000
IN=28,0
PV_FTIME=0
BYPASS=0
CAS_IN=28,0
SP_RATE_DN=+INF
SP_RATE_UP=+INF
SP_HI_LIM=100
SP_LO_LIM=0
GAIN=0

```
RESET=+INF
BAL_TIME=0
RATE=0
BKCAL_IN=28,0
OUT_HI_LIM=100
OUT_LO_LIM=0
BKCAL_HYS=0.5
BKCAL_OUT=28,0
RCAS_IN=0,0
ROUT_IN=0,0
SHED_OPT=0
RCAS_OUT=0,0
ROUT_OUT=0,0
TRK_SCALE=100,0,1342,0
TRK_IN_D=28,0
TRK_VAL=28,0
FF_VAL=28,0
FF_SCALE=100,0,1342,0
FF_GAIN=0
//UPDATE_EVT=0,0,0,0,0
//BLOCK_ALM=0,0,0,0,0
ALARM_SUM=0x0100,0x0000,0x0000,0x0000
ACK_OPTION=0x0000
ALARM_HYS=0.5
HI_HI_PRI=0
HI_HI_LIM=+INF
HI_PRI=0
HI_LIM=+INF
LO_PRI=0
LO_LIM=-INF
LO_LO_PRI=0
LO_LO_LIM=-INF
DV_HI_PRI=0
DV_HI_LIM=+INF
DV_LO_PRI=0
DV_LO_LIM=-INF
//HI_HI_ALM=0,0,0,0,0
//HI_ALM=0,0,0,0,0
//LO_ALM=0,0,0,0,0
//LO_LO_ALM=0,0,0,0,0
//DV_HI_ALM=0,0,0,0,0
//DV_LO_ALM=0,0,0,0,0

[VFD 2 Function Block 4]
Block_Type      = DIAG
Block_Index     = 1500
DD_Item         = 0x00020027
Profile         = 0x8001        //custom DIAG block
Profile_Revision = 0x0001
Execution_Time  = 1600          // 50msec(50*32)
```

Num_Of_Parms = 10
Views_Index = 6501
Number_View_3 = 1
Number_View_4 = 1

[VFD 2 Function Block 4 Defaults]
ST_REV=0
TAG_DESC=0x2020202020202020202020202020202020202020202020202020202020202020
STRATEGY=0
ALERT_KEY=0
MODE_BLK=0x01,0x01,0x11,0x10
BLOCK_ERR=0x0000
DEVICE_STATUS=0x00000000
MEASUREMENT_STATUS=0x00000000
OPERATING_TIME=0

// Transducer Block. This is always manufacturer-specific.
[VFD 2 Transducer Block 1]
Block_Type = TRANSDUCER
Block_Index = 1100
DD_Item = 0x00020003
Profile = 0x8002
Profile_Revision = 0x0001
Num_Of_Parms = 42
Views_Index = 6101
Number_View_3 = 2
Number_View_4 = 3

[VFD 2 Transducer Block 1 Defaults]
ST_REV=0
TAG_DESC=0x2020202020202020202020202020202020202020202020202020202020202020
STRATEGY=0
ALERT_KEY=0
MODE_BLK=0x01,0x01,0x11,0x10
BLOCK_ERR=0x0000
//UPDATE_EVT=0,0,0,0,0
//BLOCK_ALM=0,0,0,0,0
TRANSDUCER_DIRECTORY=1,1110
TRANSDUCER_TYPE=100
XD_ERROR=0
CORRECTION_DIRECTORY=1,1113,0
PRIMARY_VALUE_TYPE=107
PRIMARY_VALUE=28,0
PRIMARY_VALUE_RANGE=100,0,1133,2
CAL_POINT_HI=+INF
CAL_POINT_LO=-INF
CAL_MIN_SPAN=0
CAL_UNIT=1133
SENSOR_TYPE=125
SENSOR_RANGE=100,0,1133,2

SENSOR_SN=0x00000000000000000000000000000000000000000000000000000000000000000000
SENSOR_CAL_METHOD=0
SENSOR_CAL_LOC=0x00000000000000000000000000000000000000000000000000000000000000000000
SENSOR_CAL_DATE=0x00000000000000
SENSOR_CAL_WHO=0x00000000000000000000000000000000000000000000000000000000000000000000
SENSOR_ISOLATOR_MTL=0
SENSOR_FILL_FLUID=0
SECONDARY_VALUE=28,0
SECONDARY_VALUE_UNIT=1001
MEASUREMENT_STATUS=0x00000000
SENSOR_VALUE=0
CAL_CMD=0,0
CAL_STATUS=0
HEIGHT_VALUE=0
HEIGHT_VALUE_RANGE=30,-30,1010,2
ELEVATION_CMD=0
ELEVATION_VALUE=0
ELEVATION_STATUS=0
DISPLAY_MODE=0
DISPLAY_RANGE=100,0,1342,2

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Saving through Automation

Yamatake Corporation

Totate international Building
2-12-19 Shibuya
Shibuya-ku, Tokyo 150-8316
Japan
Tel : 81-3-3486-2310
Fax : 81-3-3486-2593

Certificate No. Q17862

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For Shonan Factory

http://www.yamatake.co.jp/