
ST98 PROFIBUS DP PROFILE 3 Communication User's Guide

INTRODUCTION

This document is intended as a supplement to the ST98 Flowmeter Installation, Operation, and Maintenance Manual. It describes the additional installation information and use of the ST98 when this is equipped with the Profibus Digital Communication option with the DP Profile 3.

FUNCTIONAL OVERVIEW

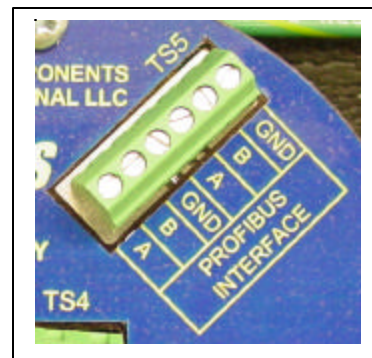
The Profibus-DP digital communication protocol increases the amount of process information available to the user from one process parameter to up two, offering flow, and totalizer. DP Profile 3 is implemented as a Class “B” instrument with all the mandatory parameters for a Thermal Mass Flow Device.

INSTALLATION

The ST98 Profibus data transfer is base on the RS485 standard and EN50170. When planning the installation it is recommended that the physical regulations for PROFIBUS equipment as described in EN50170 be followed.

The Profibus connections are located on the Interconnect Board, located in the read compartment of the ST98, next to other user connections. The Profibus connector is a terminal block with the A and B lines for in and out as well as a cable shield termination.

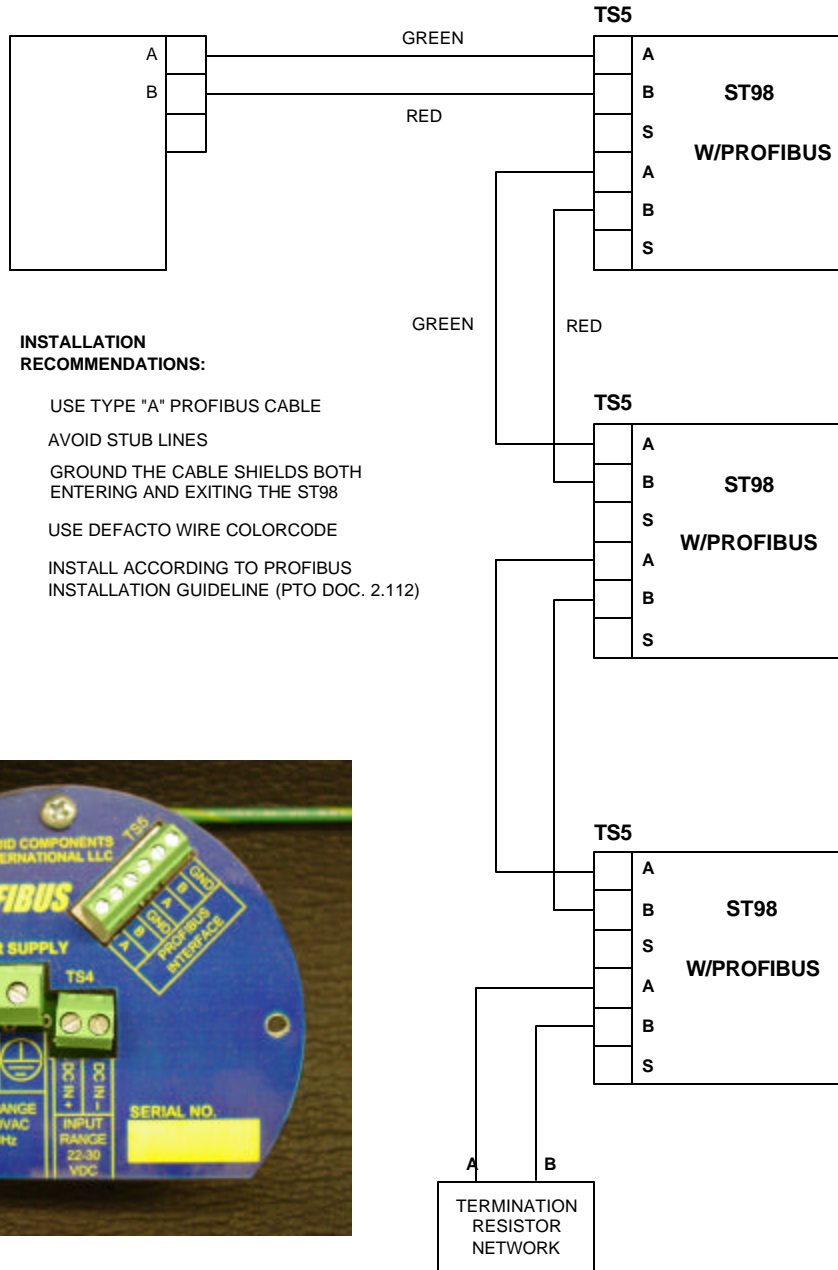
The ST98 has no integrated terminating resistors. An external termination resistor network needs to be added at the end of the segment if the ST98 is the last instrument in the segment.



SYSTEM INTERCONNECT

See diagram below for the recommended interconnection of the ST98 into a Profibus Fieldbus network.

ST98 W/PROFIBUS TYPICAL WIRING INTERCONNECT



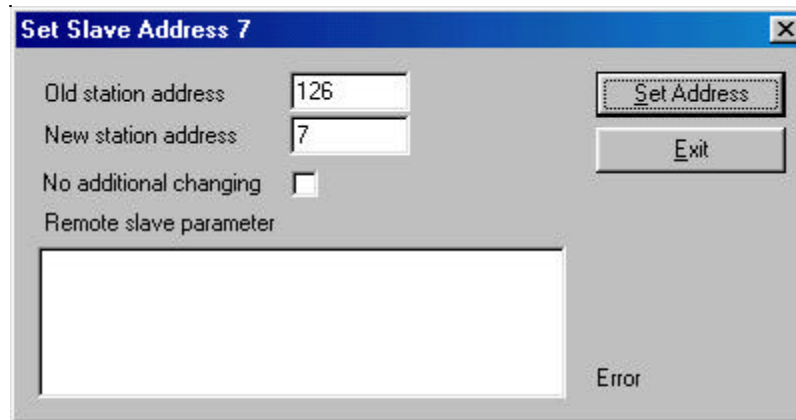
INSTALLATION RECOMMENDATIONS:

- USE TYPE "A" PROFIBUS CABLE
- AVOID STUB LINES
- GROUND THE CABLE SHIELDS BOTH ENTERING AND EXITING THE ST98
- USE DEFACTO WIRE COLORCODE
- INSTALL ACCORDING TO PROFIBUS INSTALLATION GUIDELINE (PTO DOC. 2.112)



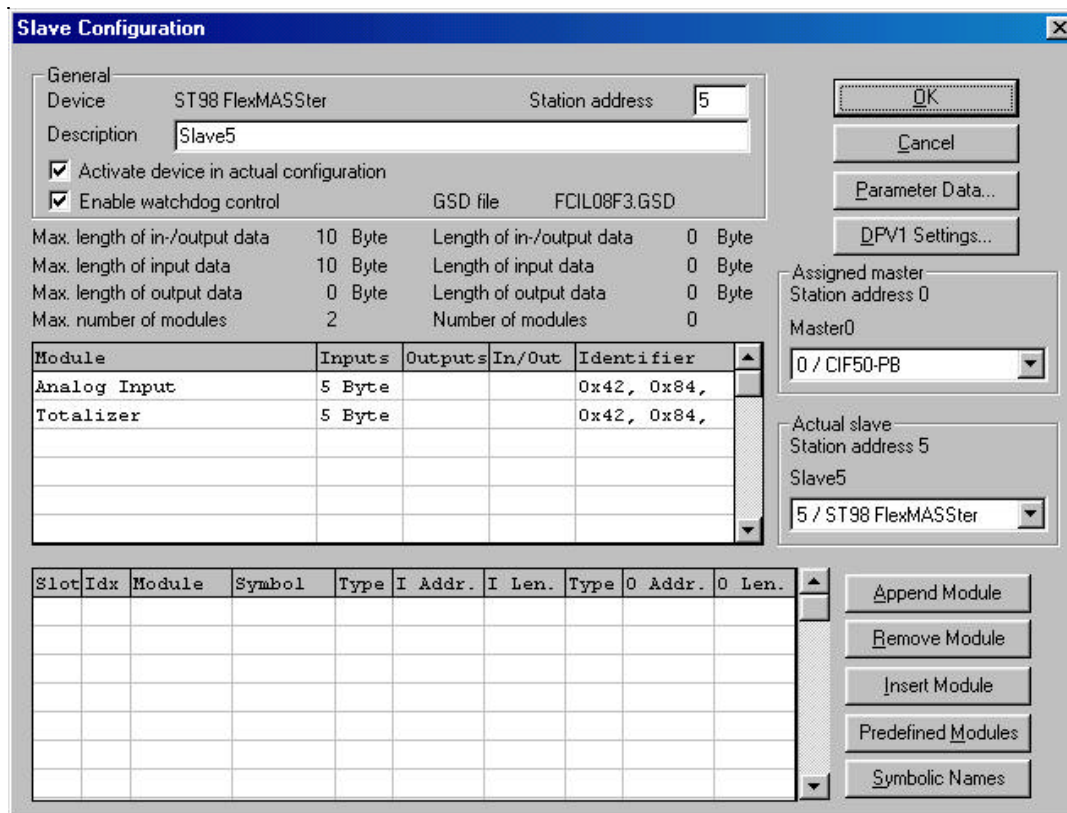
ADDRESS SETUP

The ST98 Profibus address is set with the Profibus Configurator.



PROFIBUS CONFIGURATOR

There are 2 modules from which to select, a Flow Module and a Totalizer Module.



The Flow and totalizer units as well as the Plenum dimensions are factory preset.

ST98 PROFIBUS DP PROFILE 3 OPERATION

Cyclic Data Description (Inputs)

The ST98 is a Profibus slave that transmits cyclic data (INPUT) to the master in prescribed DP format. For flow and Totalizer the DS-33 data structure is used.

Flow

DS-33: 5 bytes input

Flow (Floating Point) 4 Bytes	Status 1Byte
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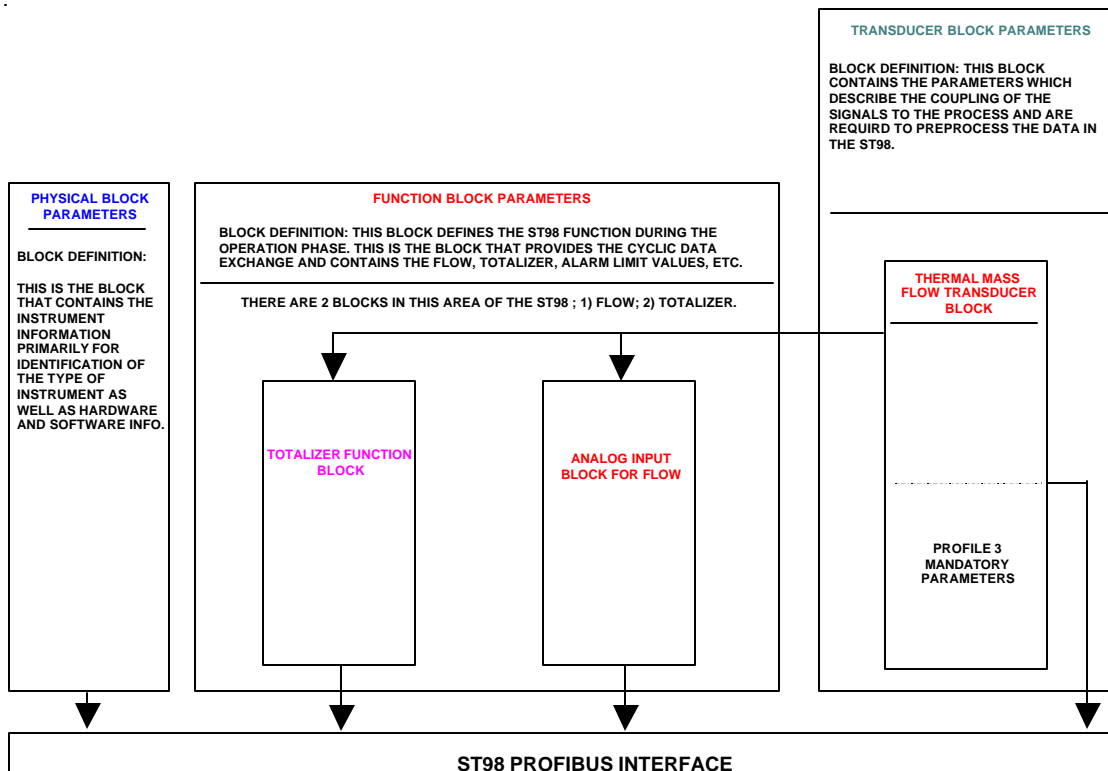
Totalizer

DS-33: 5 bytes input

Totalizer (Floating Point) 4 Bytes	Status 1 Byte
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Acyclic data Description

Using the data (Parameter Blocks) block model of profile 3 the ST98 has the following parameter Blocks; Physical Block, Flow Transducer Block, and 2 Function Blocks; the analog input block for Flow, and the analog input block for Totalizer. There are 2 manufacturer specific items; the Diagnostic Extension in the Physical Block that add the instrument specific alarms described at the end of this user’s guide, and the “Copy Data” parameter in the physical block, that is use to manage the ST98 Calibration and temperature compensation parameters, and has the ability to restore the factory calibration should that become necessary. The “Copy Data” parameter should be changed only under the direction of FCI’s Technical support personnel.



Physical Block

Block Index	Parameter Name	Slot	Index	Data Type /Structure	Size	Read	Write
8	Software Revision	0	24	V_STRING	16	Yes	No
9	Hardware Revision	0	25	V_STRING	16	Yes	No
10	Device Manufacturer ID	0	26	UNSIGNED16	2	Yes	No
11	Device ID	0	27	V_STRING	16	Yes	No
12	Device Serial No.	0	28	V_STRING	16	Yes	No
13	Diagnosis	0	29	Octetstring	4	Yes	No
14	Diagnosis_Extension	0	30	Octetstring	6	Yes	No
24	Indent Number Selector	0	40	UNSIGNED8	1	Yes	Yes
	CopyData(ST98 Memory)	0	49	V_STRING	2	Yes	Yes

**DIAGNOSTICS
OCTET #1**

BIT	FAULT
0	Hardware failure of the electronic
1	Hardware failure mechanics
3	Motor- temperature too high
4	Electronic temperature too high
5	Memory error
6	Failure in measurement
7	Device not initialized (No self calibration)
8	Self calibration failed

**DIAGNOSTICS
OCTET # 2**

BIT	FAULT
0	Zero point error (limit position)
1	Power supply failed (electrical, pneumatic)
2	Configuration not valid
3	New-start-up (warmstart up) carried out.
4	Re-start-up (coldstart up) carried out.
5	Maintenance required
6	Characterization invalid
7	Ident number violation

Octets 3 and 4 are reserved by the PNO and are not used.

**DIAGNOSTICS EXTENSION
OCTET # 1**

BIT	FAULT
0	Above Max A/D
1	Below Min A/D
2	Below Min Flow
3	Flow exceeds 120% of full scale
4	(not used)
5	(not used)
6	Above Max Flow
7	A/D Error - A/D conversion error

**DIAGNOSTICS EXTENSION
OCTET # 2**

BIT	FAULT
0	Sensor Error
1	Over Temp
2	Under Temp
3	Heater Shorted
4	Heater Open
5	+20V out of range
6	-8V out of range
7	Board Temp out of range

Flow AI Function Block

Block Index	Parameter Name	Slot	Index	Data Type /Structure	Size	Read	Write
10	Out (Flow)	1	26	DS-33	5	Yes	No
11	PV Scale	1	27	Float	8	Yes	Yes
12	Out Scale	1	28	DS-36	11	Yes	Yes
13	Lin Type	1	29	Unsigned8	1	Yes	Yes
14	Channel	1	30	Unsigned16	2	Yes	Yes
16	PV Ftime	1	32	Float	4	Yes	Yes
19	Alarm Hyst	1	35	Float	4	Yes	Yes
21	HI HI Lim	1	37	Float	4	Yes	Yes
23	HI Lim	1	39	Float	4	Yes	Yes
25	Lo Lim	1	41	Float	4	Yes	Yes
27	LO LO Lim	1	43	Float	4	Yes	Yes

Totalizer AI Function Block

Block Index	Parameter Name	Slot	Index	Data Type /Structure	Size	Read	Write
10	Total	2	26	DS-33	5	Yes	No
11	Unit Tot	2	27	Unsigned16	2	Yes	Yes
12	Channel	2	28	Unsigned16	2	Yes	Yes
13	Set Tot	2	29	Unsigned8	1	Yes	Yes
14	Mode Tot	2	30	Unsigned8	1	Yes	Yes
15	Fail Tot	2	31	Unsigned8	1	Yes	Yes
16	Preset Tot	2	32	Float	4	Yes	Yes
17	Alarm Hyst	2	33	Float	4	Yes	Yes
18	HI HI Lim	2	34	Float	4	Yes	Yes
19	HI Lim	2	35	Float	4	Yes	Yes
20	LO Lim	2	36	Float	4	Yes	Yes
21	LO LO Lim	2	37	Float	4	Yes	Yes

Transducer Block

Block Index	Parameter Name	Slot	Index	Data Type /Structure	Size	Read	Write
8	Calibr factor	1	70	Float	4	Yes	Yes
9	Low Flow Cutoff	1	71	Float	4	Yes	Yes
12	Zero Point	1	74	Float	4	Yes	Yes
13	Zero Point Adjust	1	75	Unsigned8	1	Yes	Yes
14	Zero Point Unit	1	76	Unsigned16	2	Yes	Yes
15	Nominal Size	1	77	Float	4	Yes	Yes
16	Nominal Size Units	1	78	Unsigned16	2	Yes	Yes
21	Mass Flow	1	83	DS-33	5	Yes	No
22	Mass Flow Units	1	84	Unsigned16	2	Yes	Yes
23	Mass Flow Lo Limit	1	85	Float	4	Yes	Yes
24	Mass Flow Hi Limit	1	86	Float	4	Yes	Yes

INSTRUMENT SPECIFIC ALARMS

There are 14 FCI manufacturer specific diagnostic alarms. Seven are “Process” related alarms, and seven are instrument fault alarms.

The alarm messages are the following:

Process Alarms:

- Above Max Flow - Process Flow has exceeded the instrument maximum calibrated flow range.
- Below Min Flow - Process flow has dropped below the instrument calibrated flow range.
- Above Max A/D- The Process flow signal has exceeded the range of the instrument A/D converter maximum setting.
- Below Min A/D - The Process flow signal has dropped below the minimum level of the A/D converter.
- Over Temp - The process temperature has exceeded the sensor temperature range.
- Under Temp - The process temperature has dropped below the calibrated temperature range.
- Over Range - The process flow has exceeded the calibrated range of the instrument.

Instrument Alarms:

- A/D Error - Analog to digital conversion error
- Sensor Error - Generic flow sensor head fault
- Shorted Heater - Sensor head heater shorted
- Open Heater - Sensor head heater open
- +20 Volts out of range - 20 volt supply is out of spec.
- 8 volts out of range - -8 volts supply is out spec.
- Board Temp- Electronics enclosure temperature has exceeded specification.



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