Parameters (Profibus PA)

Device parameter, parameter, menu identification	Description	Factory Setting	Setting Possibilities
4.4.1.3: Level param. or 4.4.1.3: Volume param.	= [4.2.4]		
	= [4.2.5]		
4.4.1.4: Line 2 local	Display in line 2	S/N ratio	Level Volume Temperature Validity S/N ratio Amplitude Digital output Analog output
4.4.1.5: Level param. or 4.4.1.5: Volume param.	= [4.2.4]		
	= [4.2.5]		
4.4.2: Language local	= [1.1]		
4.4.3: LCD backlight	Background illumination of the LCD	off	on off
4.5: Device info			
4.5.1: Power supply	Voltage range of the built-in power supply unit	according to customer specifications	non-editable
4.5.2: Flange temperature	Temperature range of the flange in °C	according to customer specifications	non-editable
4.5.4: Electrical connection		according to customer specifications	non-editable
4.5.5: Antenna&flange			
4.5.5.1: Flange size	Rated width of the flange	according to customer specifications	DN 50, 2 in DN 80, 3 in DN 100, 4 in DN 150, 6 in Special design
4.5.5.2: Flange type	Type of flange	according to customer specifications	DIN ANSI JIS Special design
4.5.5.3: Pressure range	Pressure range of the process connection	according to customer specifications	non-editable

Parameters (Profibus PA)

Device parameter, parameter, menu identification	Description	Factory Setting	Setting Possibilities
4.5.5.4: Antenna type		according to customer specifications	Horn type long Horn type short Special design
4.5.5.6: Flange material		according to customer specifications	315/316L Special design
4.5.5.7: Seal material	Sealing material	according to customer specifications	Teflon Kalrez Viton Perbunan Special design
4.5.6: Tag	Device identification	according to customer specifications	up to any eight characters
4.5.7: Descriptor	Measuring point description	according to customer specifications	up to any 16 characters
4.5.8: Message	Measuring point message, e.g. the date of last check or clean	according to customer specifications	up to any 32 characters
4.5.9: Manufacturer identification			
4.5.9.1: Serial no.	Factory serial number	unique number	non-editable
4.5.9.2: Order no.	Delivery order no. (delivery state)	according to customer specifications	non-editable
4.5.9.3: Device revision	Device version	Number	non-editable
4.5.9.4: Software revision		Number	non-editable
4.5.9.5: Hardware revision		Number	non-editable
4.5.9.6: Antenna offset	Distance sensor/flange	approx. 0.5 m (calibration value)	non-editable
4.5.9.7: Reference distance	Internal reference distance	approx. 106 m (calibration value)	non-editable
5: Options			

Parameters (Profibus PA)

Device parameter, parameter, menu identification	Description	Factory Setting	Setting Possibilities
5.1: Enter code	Input of customer code to enable programmability		Customer code
5.2: Customer code	Determination of customer code	0	up to 4 digit code
5.3: Factory reset	Reset all parameters to factory setting	no	yes no

Troubleshooting

The SITRANS LR 400 has left the factory in a fully tested condition. Carefully selected components and compliance with prescribed quality standards guarantee the high reliability of the SITRANS LR 400. In the unlikely event of a fault, please consult the instructions in this chapter before contacting the responsible customer services.

Classification of faults

Faults occurring in the SITRANS LR 400 can be classified in the following groups:

- faults caused by ambient influences: over and undertemperature, moisture, contamination by the measuring medium and other substances, mains faults, vibration
- faults in the device: display, electronics, mechanics, connections

Please try to determine the fault and localize it as accurately as possible..

If the fault cannot be eliminated with the measures described, follow the instructions in "Maintenance and repairs" on page 65.

Self-test

Note: The device performs a self-test every time it is switched on. It is ready for operation when the LCD displays the multi-display and the control elements can be operated.

If you get fault messages after the self-test, please proceed according to "Fault messages" on page 64.

If there is a malfunction in the device, you can also activate the self-test manually with Parameter 3.2.1.

Symptoms, causes and their remedy

Symptom	Possible causes	Remedy
No display on the LCD	Defective or missing power supply	Check that the power supply is connected correctly. Replace the device fuse if necessary (see "Changing the device fuse" on page 65).
	LCD is defective	Connect a HART Communicator or a PC/Laptop with SIMATIC PDM software. If the device can be parameterized from there, the LCD is defective.
	Electronics are defective	Measure the analog current output. If the output current is not between 3.6 mA < x < 22 mA, the electronics are defective. Replace the electronics unit as described in "Maintenance and repairs" on page 65.
A fault message is displayed	Internal fault	Call the fault display in Function 3.1. Proceed as described in "Maintenance and repairs" on page 65.
An incorrect measured value appears after Auto-Setup.	The device is not parameterized correctly according to the application	Set the device parameters and functions manually.
No measured value appears after the Auto-Setup (measured value "0" and the fault display flashes)	Internal fault	Call the fault display in Function 3.1. Proceed as described in "Maintenance and repairs" on page 65.

Troubleshooting

Fault messages

The device indicates faults with a flashing letter on the right of the first line of the display. It has the following meaning:

- W: Warning – device is still ready for operation but faults may occur
- F: Fault – sporadic fault, device conditionally ready for operation
- D: continuous fault – device is not ready for operation

Under Parameter 3.1.x, you will find a fault log which indicates the type of the fault(s) which occur. It indicates the device function status in which the fault occurred and outputs an fault message in plain text.

The possible fault messages are as follows:

Function	Message	Possible causes	Remedy
Sensor	MW cable defective	Microwave cable not connected or line break	Contact your Siemens Milltronics representative
	Sensor defective	Overtemperature in device	Contact your Siemens Milltronics representative
	Check antenna	Antenna contaminated, damaged or not mounted	Check the antenna
	Sensor too hot	Sensor temperature exceeds 85 °C	Check the max. permissible ambient and flange temperature
Electronics	all messages	Internal fault	Contact your Siemens Milltronics representative
Software	all messages	Internal fault	Contact your Siemens Milltronics representative
Application	No valid meas. value	fault in fixed target detection, fault in multiple echo detection, poorly reflecting measuring medium	1
	Tank empty detected	vessel is empty (only when sensor parameter "vessel empty detection" active)	Deactivate vessel empty detection if necessary
	false param.	incompatible parameters entered, e. g.: URV = LRV	Correct the parameters listed in the next function
Parameters	<Parameter to be corrected>	False parameterization	Perform the correction as indicated
Service	(various)		For service personnel only

1. Make the following modifications, starting with
   a. Check whether the fault still occurs after every step:
   b. Check the set measuring range and the dead band (Function 4.2.2.3).
   c. Check whether the filling speed has been correctly set (Function 4.2.2.5).
   d. Reduce the reflectivity (Function 4.2.2.6).
   e. Switch off the automatic fixed target detection (Function 4.2.3.6) if necessary.
   f. Switch off the multiple echo detection (Function 4.2.3.2) if necessary.

Troubleshooting

Maintenance and repairs

Changing the device fuse

Warning: The device fuse must only be changed by qualified personnel who are familiar with the installation, commissioning, and operation of the SITRANS LR 400.

The device fuse is located on the power supply unit board.

Position of device fuse and electronics cover locking:

Change a defective fuse as follows:

1. **Disconnect the device from the power supply.**
2. If your device is in a pressure-tight housing, release the cover locking of the electronics cover with an Allen key (see above).
3. Remove the electronics cover from the housing.
4. If your device has an optional operating and monitoring module, pull it out of the front of the housing. Disconnect the plug of its cable from the socket and place the operating and monitoring module on one side.

Caution! Take care not to bend or damage any of the cables.
Touching the electronic circuit boards can damage sensitive parts.

Maintenance

5. Lift the device fuse carefully from its clip with a suitable tool (tweezers, flat-tipped pliers or similar) (see above), and remove it from the housing.
6. Insert a new fuse. Only use original spare fuses! Press it into the clip until it snaps in audibly.
7. Reassemble the device in reverse order.

> **Caution!** The device contains a second fuse that is not accessible via the front side. This fuse is only to be replaced by the manufacturer (following a complete safety check of the device).

Disconnecting the electronics part from the mechanical part

For maintenance it is possible to separate the electronic enclosure of the device from the mechanical part (flange) without endangering the pressure tightness of the vessel. Release the threaded ring of the electronics part from the mechanical part with a hook key 68/75 and remove the electronics part. Place the enclosed plastic cap on the mechanical part to prevent from soiling.

Cleaning the antenna

Depending on the type of measuring material, it may be necessary to clean the antenna at certain intervals to remove soiling which could affect the measuring result. You can clean it without removing the flange from the vessel. Proceed as follows:

1. Disconnect and remove the electronics part as described above.

> **Caution!** As soon as you remove the pressure window from the mechanical part the vessel is no longer pressure-tight and explosion protected!

2. Unscrew the pressure window which becomes accessible after removing the threaded ring with an M36 open-ended wrench and lift it off the mechanical part together with the white PTFE stopper.

3. Clean the inside of the antenna with compressed air and/or a brush. Make especially sure that the pressure window thread is clean. Apply fresh grease to the thread as required. Check the O-rings for damage and replace them if necessary.
4. If the PTFE stopper has come loose when removing from the pressure window, reinsert it long end first in the mechanical part. Push it into the guide up to its thickened stop.
5. Place the pressure window and screw it tight.
6. Reattach the electronics part to the mechanical part. You can align the rotatable housing head before tightening the threaded ring.
7. Check the pressure tightness of the vessel.

Maintenance

Certificates

The necessary certificates are enclosed separately.

Glossary

Term	Explanation
Antenna offset	Propagation time of the signal in the sensor, expressed as a distance
Current limit	The maximum possible value of the output signal in fault-free operation in mA. The value of the fail signal may be above the current limit with 24 mA.
Customer code	User-defined code which protects the device against accidental programming.
Dead band	Value range below the device flange declared unmeasureable.
Echo movement	Sensor parameter for a fuzzy rule which takes into account dynamic procedures in the measuring medium for example and therefore rules out fixed targets.
Fixed target	Permanently installed objects inside the vessel which may cause reflective interference, e.g. struts, agitators, feed pipes etc.
FMCW method	Frequency Modulated Continuous Wave method
Frequency deviation	Changing the transmission frequency in the *FMCW method.
Level	Distance from the *LRV to the surface of the *measuring medium.
LRV	Lower limit of the valid measuring range as a distance from the bottom inside of the vessel.
Measuring medium	The (solid or liquid) contents of the vessel.
Multiple echo evaluation	Sensor parameter for a fuzzy rule which detects and suppresses multiple reflections of the measuring signal at the vessel walls.
Nozzle height	Distance from the top of the inside of the vessel to the bottom of the device flange.
PELV	Protected Extra Low Voltage
PTFE	Polytetrafluorethylene (Teflon)
SELV	Safety Extra Low Voltage
Signal-to-noise ratio	Measure of the strength of reflection of the *measuring medium in the current measuring situation in dB.
vessel height	Distance between the floor and top of the vessel.
Triple reflector	Metal instrument formed as a cubic segment with right angles.
URV	Upper limit of the valid measuring range as a distance from the bottom inside of the vessel.
Validity	Measure of the certainty of the current measured value in %.

Appendix I

Alphabetical Parameter List

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Appendix 1

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Programming Chart

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Appendix II

Appendix III

Ambient/Operating Temperature Specification

Maximum Flange and Process Temperature Versus Allowable Ambient

Maximum Flange and Process Temperature Versus Allowable Ambient (Temperature Extension)
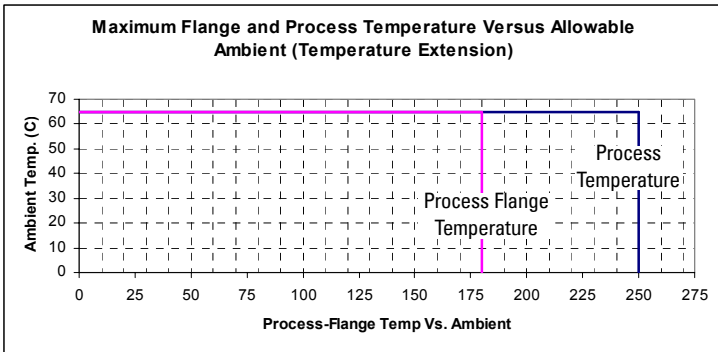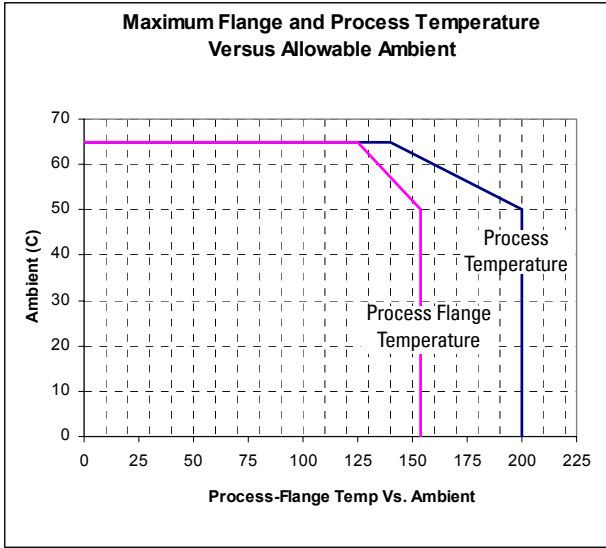
Appendix IV

Process Pressure/Temperature de-Rating
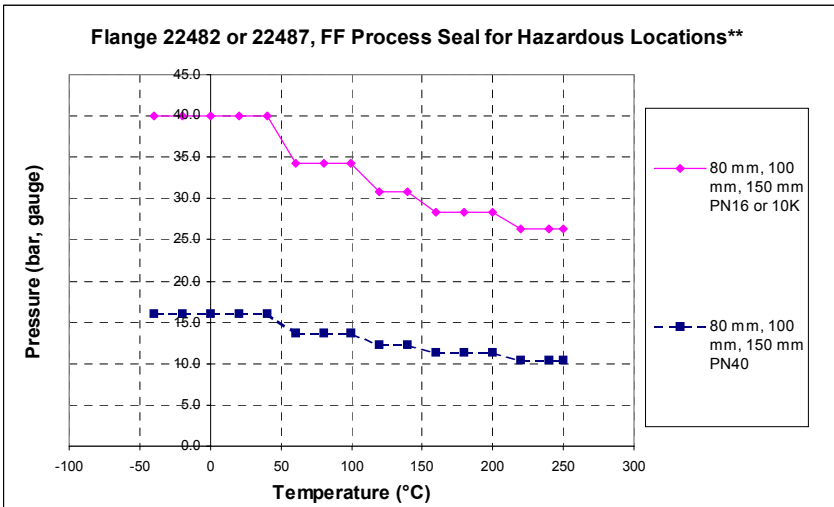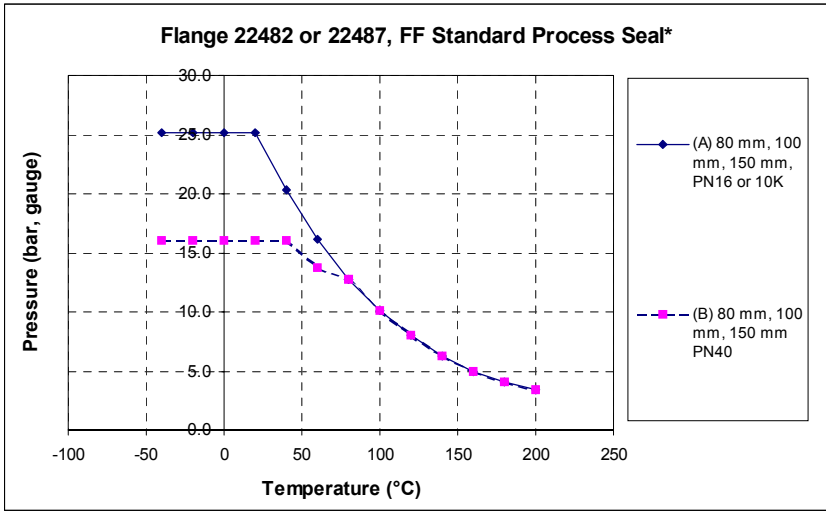
Flange 22482 or 22487, FF Standard Process Seal*

Flange 22482 or 22487, FF Process Seal for Hazardous Locations**

* standard process seal is rated to a max. of 200°C of continuous duty.

*process seal for hazardous location is rate for a max of 290°C of continuous duty.
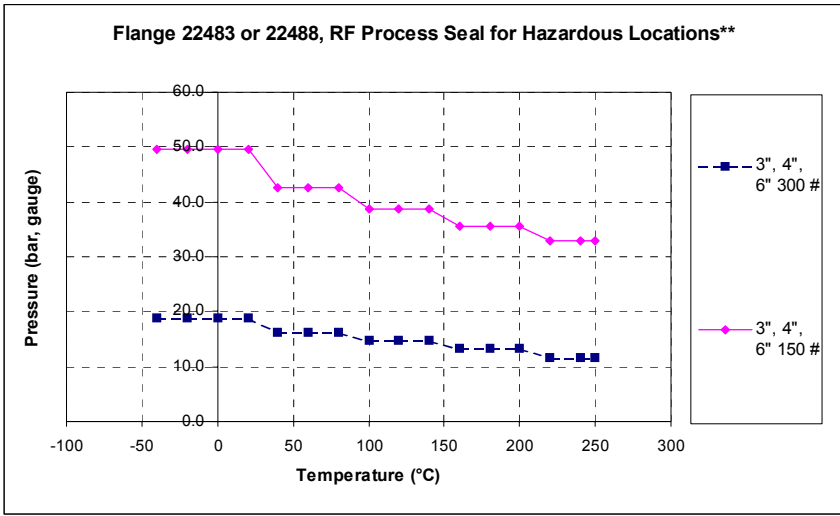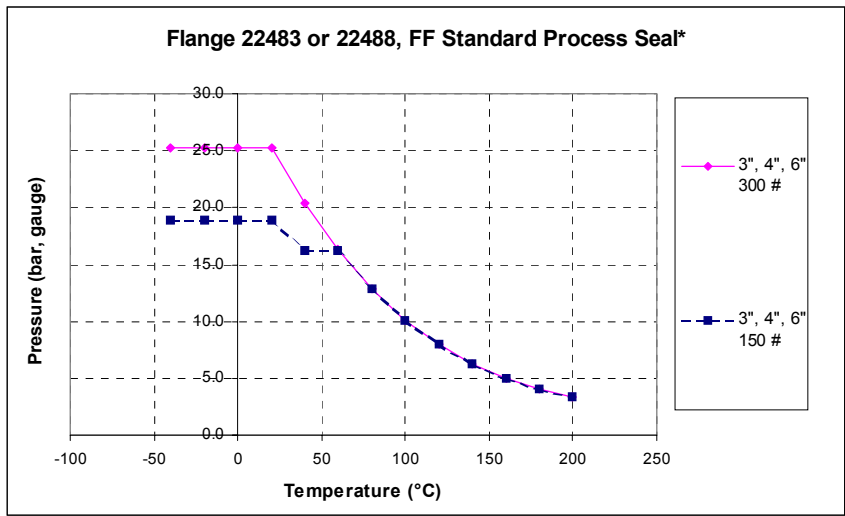
SITRANS LR 400 – INSTRUCTION MANUAL DRAFT 7ML19985FH01

Flange 22483 or 22488, FF Standard Process Seal*

**Flange 22483 or 22488, RF Process Seal for Hazardous Locations****

* standard process seal is rated to a max. of 200°C of continuous duty.

*process seal for hazardous location is rated to a max of 290°C of continuous duty.

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