

# HSC303

# smar

USER'S MANUAL

## HIGH SPEED COUPLER PROFIBUS DP/PA



MAY / 13

HSC303





Specifications and information are subject to change without notice.  
Up-to-date address information is available on our website.

[web: www.smar.com/contactus.asp](http://www.smar.com/contactus.asp)

## AVOIDING ELECTRICAL DISCHARGES



### ATTENTION

Electrostatic discharges may damage semiconductor electronic components in printed circuit boards. They usually occur when touching components or connector pins from modules and racks, without wearing the appropriate equipment to prevent discharges. It is recommended to take the following precautions:

- Before handling modules and racks, remove the electrostatic charge from your body by wearing a proper wristband or touching grounded devices;
- Avoid touching electronic components or connector pins from racks and modules.

# TABLE OF CONTENTS

AVOIDING ELECTRICAL DISCHARGES.....	3
HSC303 – HIGH SPEED COUPLER PROFIBUS DP/PA .....	5
DESCRIPTION .....	5
CHARACTERISTICS AND MODULE LIMITS .....	5
ORDERING CODE .....	5
TECHNICAL SPECIFICATIONS .....	6
INDICATION LEDS.....	7
INSTALLATION .....	8
INSTALLING MODULES IN THE RACK.....	8
DIMENSIONAL DRAWING.....	9
USING THE HSC303-2 COUPLER .....	9
USING THE HSC303-4 COUPLER .....	11
APPLICATION SCENARIOS.....	14
SCENARIO 1 – DF50/HSC303/DF52/DF53 – UP TO 4 CHANNELS OF 340 MA/CHANNEL.....	14
SCENARIO 2 – DF50/HSC303/DF52/DF98 – 2 CHANNELS OF UP TO 500 MA/CHANNEL.....	15
SCENARIO 3 – DF50/HSC303/DF52/DF98/DF52/DF98 – UP TO 4 CHANNELS OF 500 MA/CHANNEL .....	16
SCENARIO 4 – DF50/HSC303/DF52/DF47 – WITH INTRINSIC SAFETY BARRIER AND 1 PA CHANNEL.....	17
SCENARIO 5 – DF50/HSC303/DF52/DF47/DF52/DF47 – WITH INTRINSIC SAFETY BARRIER AND UP TO 4 PA CHANNELS.....	18
SCENARIO 6 – DF50/HSC303/DF52/DF53 – WITH LM153 (SIEMENS DP/PA LINK) .....	19
APPENDIX A - SRF – SERVICE REQUEST FORM .....	A.1

# HSC303 – HIGH SPEED COUPLER PROFIBUS DP/PA

## Description

The Profibus DP/PA high speed coupler of Smar, HSC303, is a module whose function is to allow access to Profibus PA devices via Profibus DP network.

Operating with baud rates from 9600 bps to 12 Mbps on Profibus DP network, the HSC303 works seamlessly, requiring no additional configuration. It allows access of multiple masters to Profibus PA devices, in addition to the separate use of one master for control and the other for asset management or parameterization, when desired.

It does not have limit of devices per Profibus PA channel, being limited by the power supply and impedance used to power the channel.

It accepts versions of Profibus DPV1 and DPV0 protocols.

## Characteristics and Module Limits

- One Profibus DP channel supporting up to 12 Mbps;
- Two (HSC303-2) or four (HSC303-4) Profibus PA ports without logic limit of devices, being limited by the power supply and impedance of the channel;
- It supports up to 125 devices, using the 0-125 address range;
- Automatically detects the baud rate.

## Ordering Code

**HSC303-2** – High speed coupler with 2 Profibus PA channels for connection to Profibus DP channel

**HSC303-4** – High speed coupler with 4 Profibus PA channels for connection to Profibus DP channel

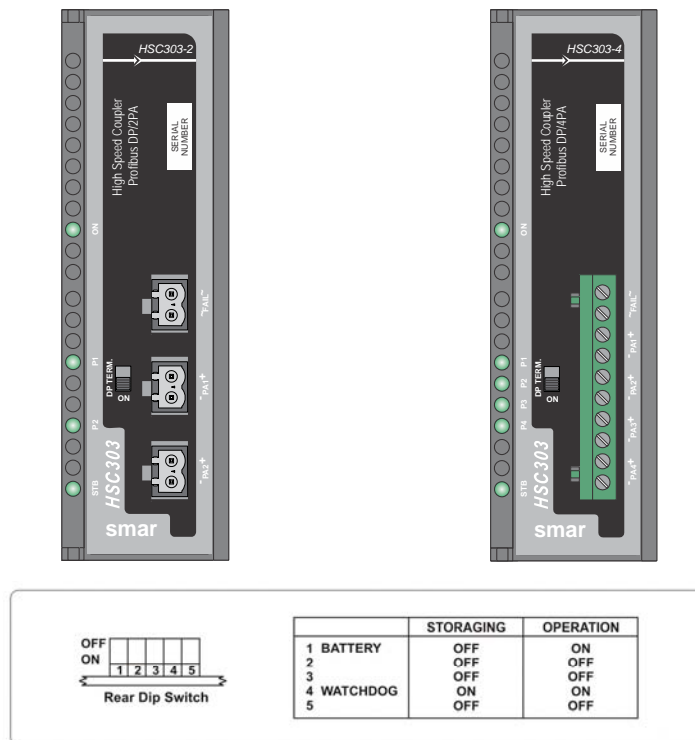


Figure 1 – HSC303-2 and HSC303-4

## Technical Specifications

PROFIBUS DP CHANNEL	
Baud Rate	From 9.6 Kbit/s up to 12 Mbits/s
Standard	EN 50170 and EN 50254
Physical layer	EIA RS-485
Connector	M12

PROFIBUS PA CHANNELS	
Number of channels	HSC303-2: 2 channels HSC303-4: 4 channels
Communication rate	31.25 kbps
Standard	EN 61158-2, EN 50170
Physical layer	ISA-S50.02-1992
MAU Type	Passive (not powered bus)
Insulation	500 Vac

FAILURE RELAY	
Output Type	Solid state relay, normally closed (NC), isolated
Maximum voltage	30 Vdc
Maximum current	200 mA
Overload protection	Does not have. It must be provided externally
Normal operation	Opened contacts
Failure condition	Closed contacts
Maximum cable length connected to the relay	30 m

The power supply for the load activated by the failure relay must not come from an external network (outside the panel).

IMB BUS	
Voltage	5 Vdc
Hot swap	Yes

### Module Characteristics

PROCESSOR	
FPGA	Changes CycloneIII
Storage Memory	4KB
Processor	NiosII
Running Memory	1MB
Clock	85 MHz
Operation Voltage	3.3 V for I/O, 2.5V for PLL, 1.2V for core and 5V for communication channels.

CARD	
Power supply voltage	5 V ( $\pm 5\%$ of tolerance)
Typical current	750 mA
Real consumption	2.75 W
Environment air temperature for operation	0 to 60 °C according to the IEC 1131 standard
Storage temperature	-20 to 80 °C according to the IEC 1131 standard
Relative air humidity for operation	5% to 95% non-condensing
Cooling mode	Air convection
Weight	0.318 kg
Dimensions (H x W x D) in mm	149 x 40 x 138 (without package)

## Indication LEDs

The LED names, colors, descriptions and behaviors are showed in the table below.

LED	COLOR	DESCRIPTION	BEHAVIOR
+5V DC (ON)	Green	Indicates when the module is ON.	Solid green LED when the module is powered.
FAIL (FAIL)	Red	Indicates hardware failure.	Solid red LED when in failure.
P1* P2* P3 P4	Green	Indicates Profibus PA channel activity.	ON: Indicates that there is some device communicating in the PA channel.  OFF - Indicates that there is no communication in the Profibus PA channel.
STANDBY (STB)	Green	Indicates if the module is operating or standby in redundant scenario.	OFF: module in communication with the Profibus DP and PA network.  ON: Stand-by module in the redundant scenario.

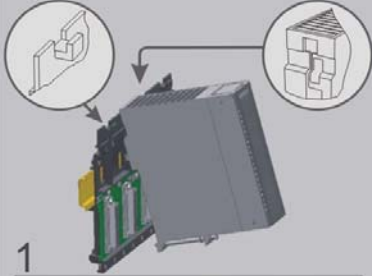

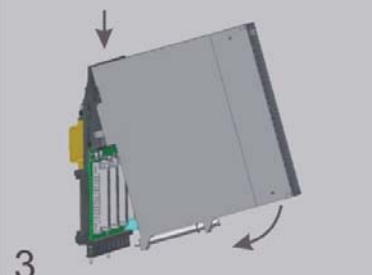
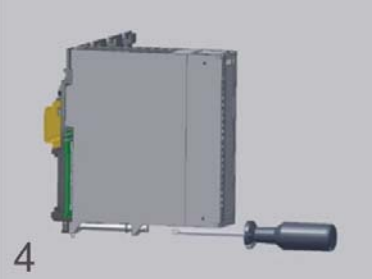
\*The HSC303-2 has only P1 and P2 LEDs representing the respective PA channels.

## Installation

The HSC303 must be installed in DF1A or DF93 racks as the other DF1302 line modules. Information on installing the system base using these racks, cables, terminators and other accessories should be obtained from the DF1302 manual.

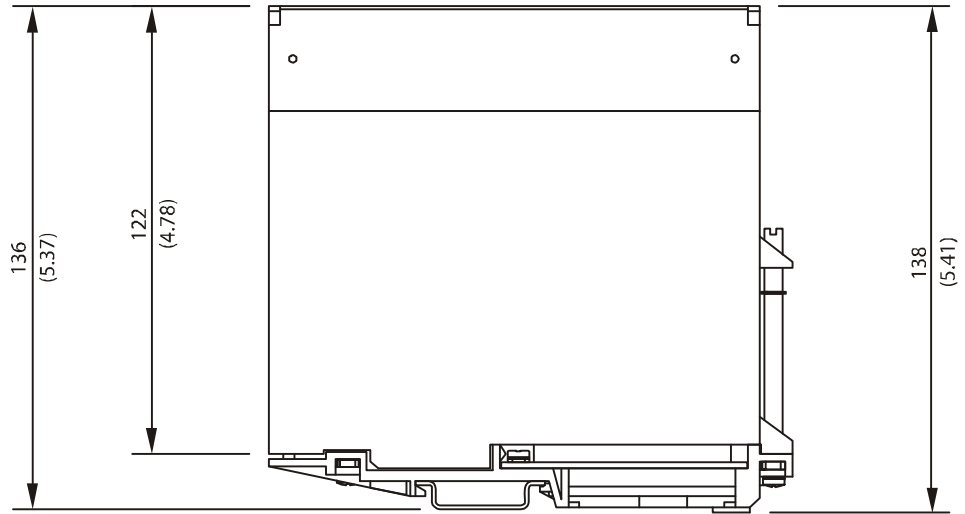
### Installing Modules in the Rack

Follow the steps below to install a module in the rack.

 <p>1</p>	<p>Attach the top of the module (with a 45° inclination) to the module support located on the upper part of the rack.</p>
 <p>2</p>	<p>Mounting detail.</p>
 <p>3</p>	<p>Push the module fixing it to the module connector.</p>
 <p>4</p>	<p>Next, fix the module to the rack using a screwdriver, and fasten the fixation screw at the bottom of the module.</p>



### Dimensional drawing



### Using the HSC303-2 coupler

- A typical system using the HSC303-2 can be composed of:
- DF1A or DF93 – Rack with 4 slots
  - DF50 –AC Power Supply
  - HSC303-2 – Profibus DP/2PA coupler;
  - DF52 – 24 Vdc power supply for Profibus PA devices
  - DF53 –Impedance for FOUNDATION fieldbus power supply

**NOTE**

If the DF52 and DF53 modules are not used to power Profibus PA devices, the DF0 or I/O modules must be inserted in the empty slots.

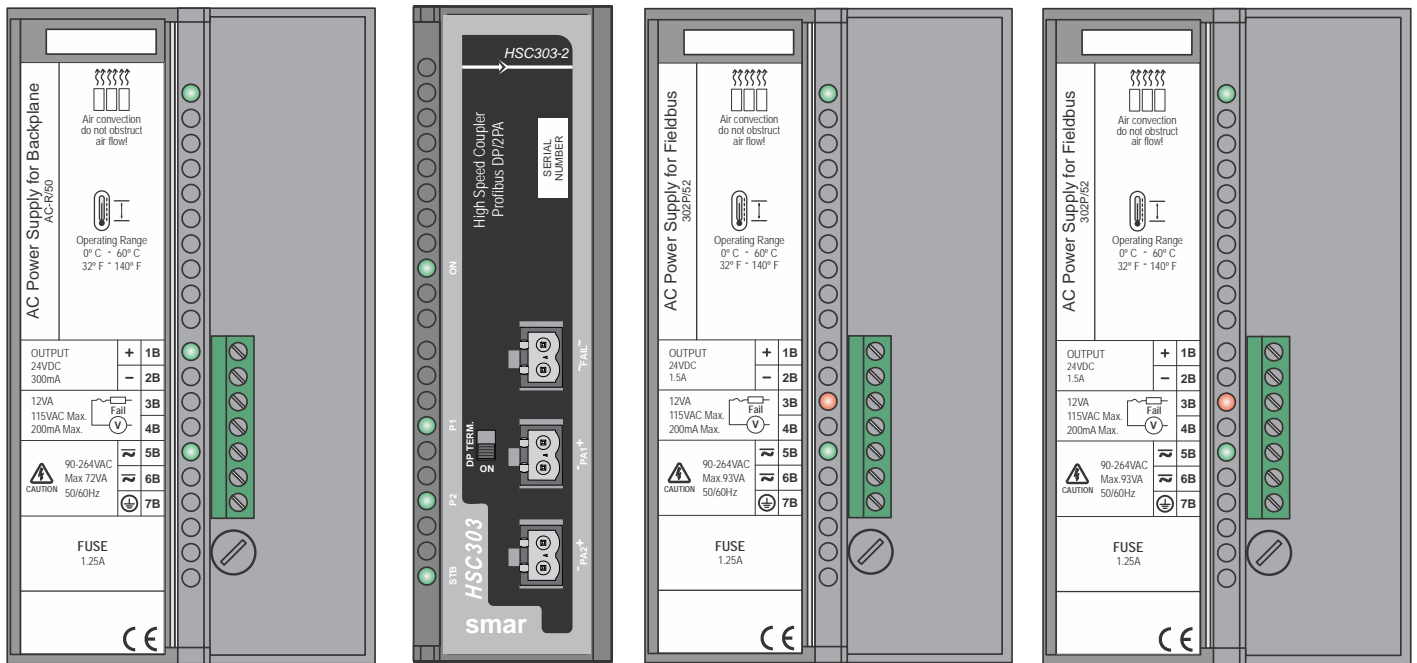


Figure 2 – DFI302 system using the HSC303-2

**IMPORTANT**

If the controller is positioned at the beginning or the end of the Profibus DP network, the terminator (DP TERM.) must be put on the ON position.

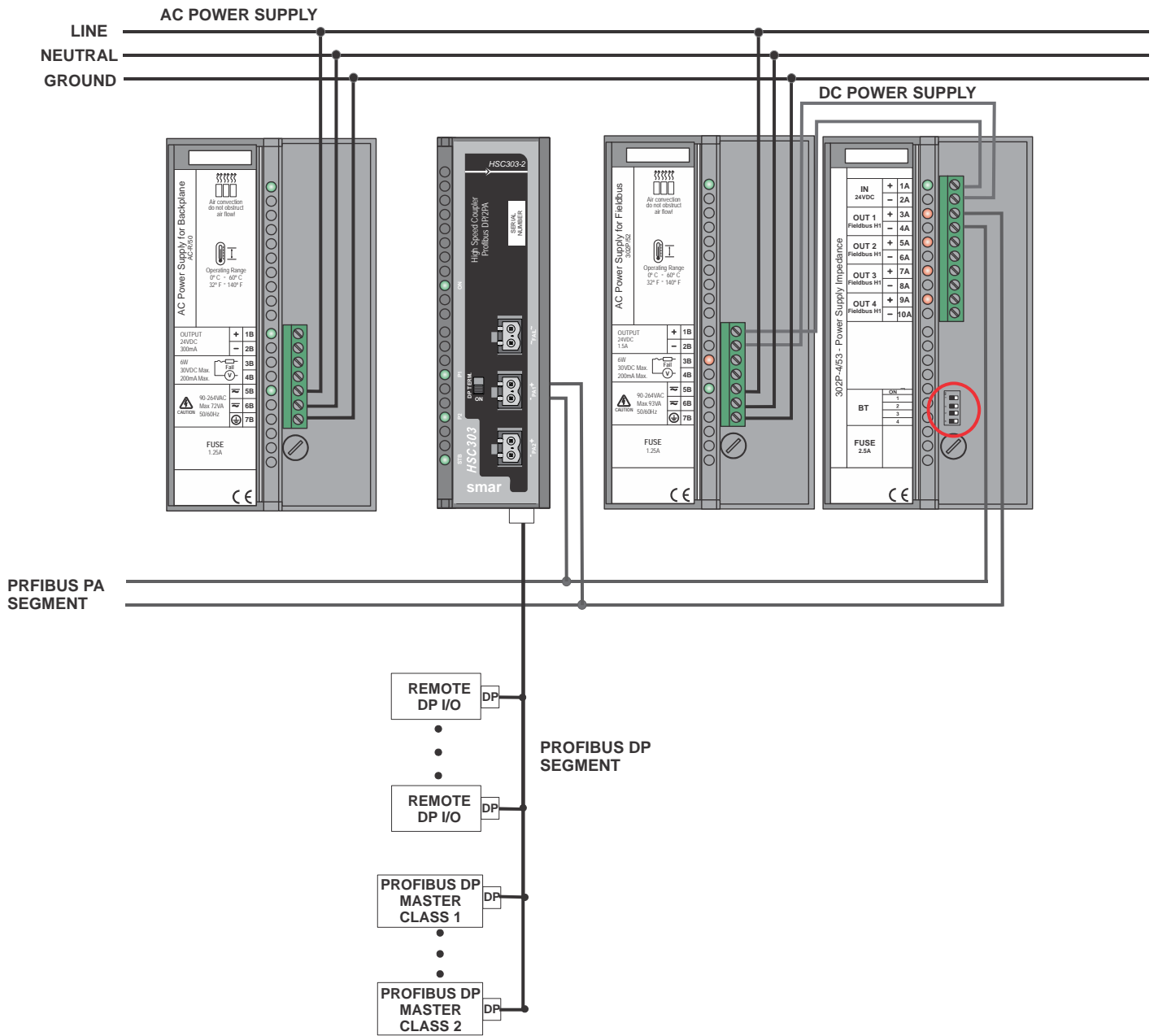


Figure 3 – Wiring diagram for HSC303-2

## Using the HSC303-4 coupler

A typical system using the HSC303-4 can be composed of:

- DF1A or DF93 – Rack with 4 slots
- DF50 –AC Power Supply
- HSC303-4 – Profibus DP/4PA coupler;
- DF52 – 24 Vdc for Profibus PA devices
- DF53 – Impedance for FOUNDATION fieldbus power supply

### NOTA

If the DF52 and DF53 modules are not used to power Profibus PA devices, the DF0 or I/O modules must be inserted in the empty slots.

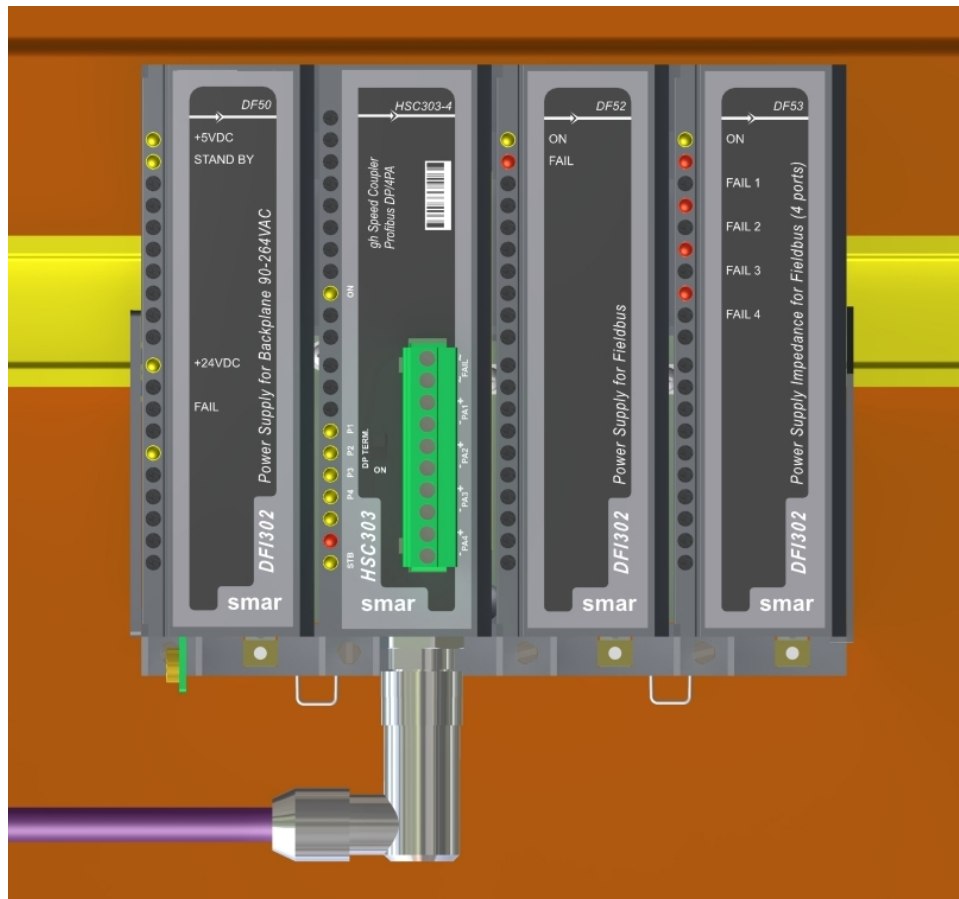


Figure 4 – DF1302 system using the HSC303-4

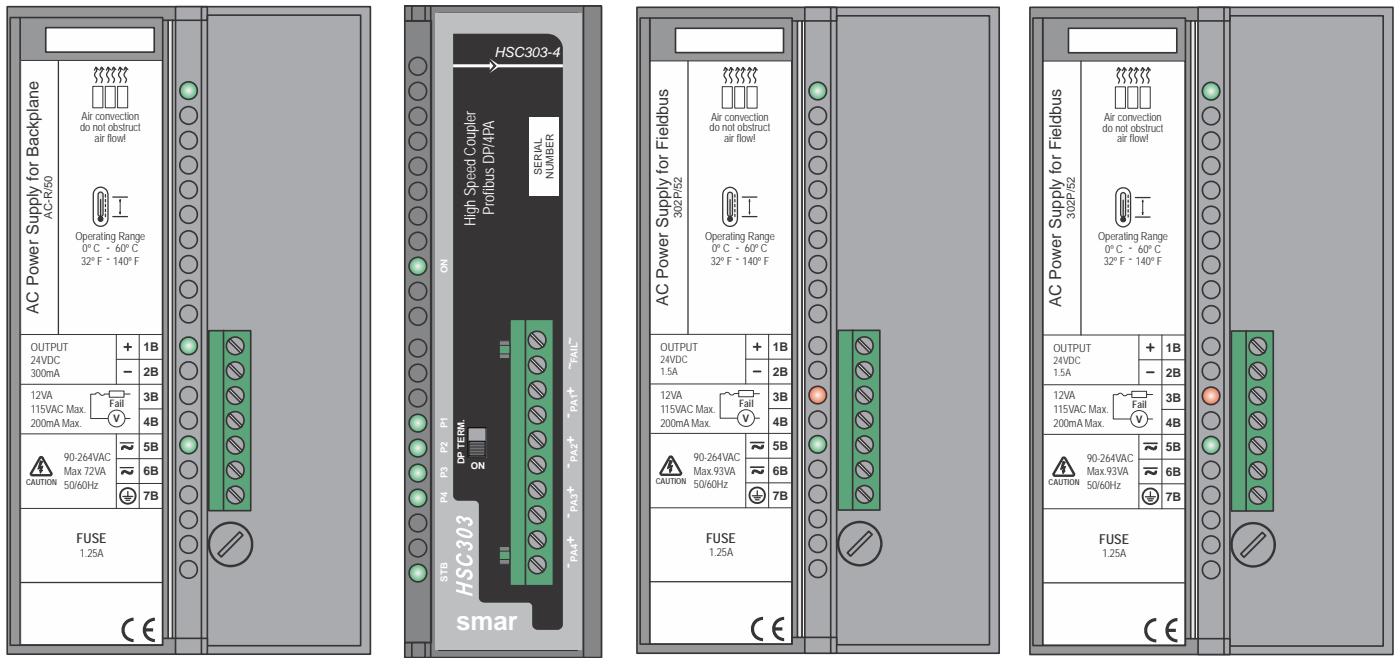


Figure 5 – DFI302 system using the HSC303-4

**IMPORTANT**

If the controller is positioned at the beginning or the end of the Profibus DP network, the terminator (DP TERM.) must be put on the ON position.

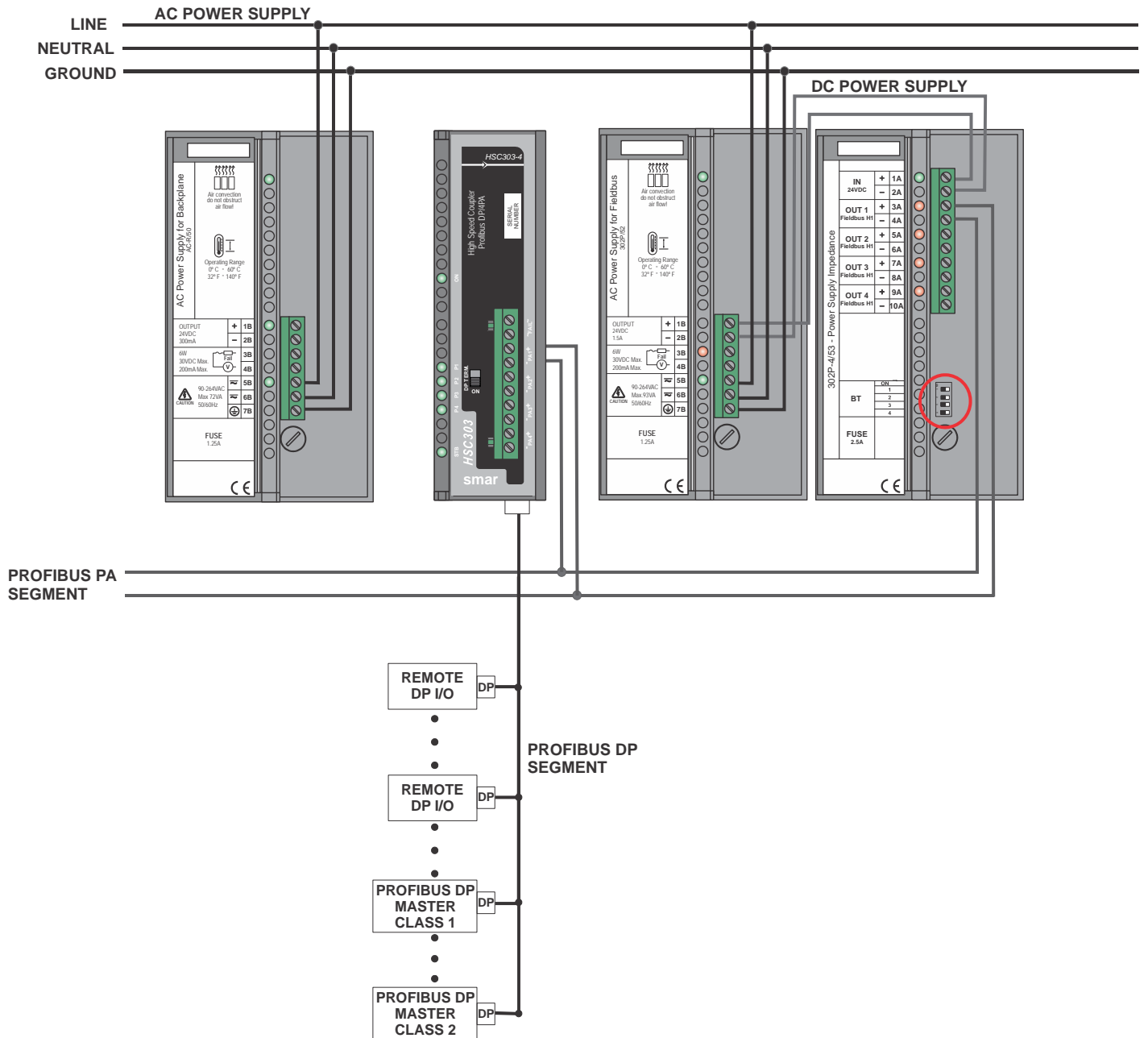


Figure 6 – Wiring diagram for HSC303-4

Six HSC303 application scenarios are shown in the following topics.

## Application scenarios

### Scenario 1 – DF50/HSC303/DF52/DF53 – Up to 4 channels of 340 mA/channel

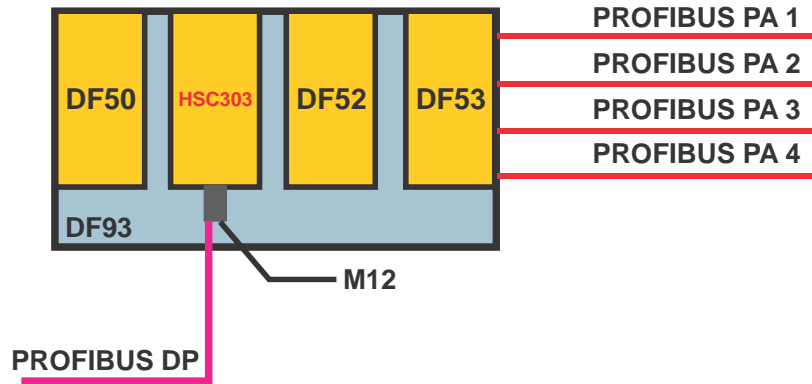
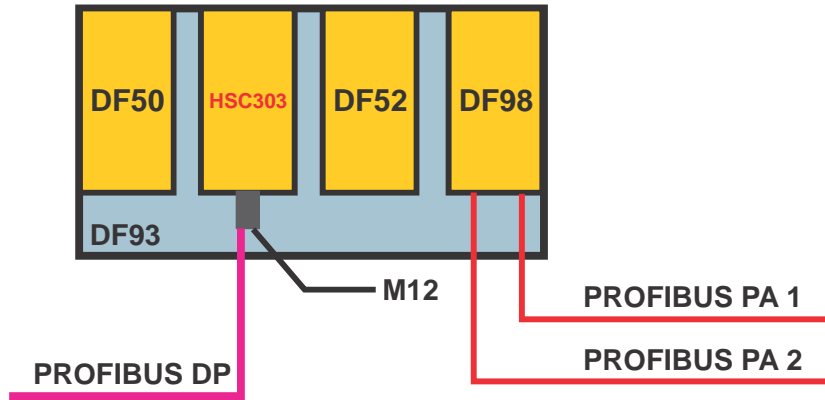


Figure 7 - HSC303-4 providing up to 340 mA per channel

PRODUCT	DESCRIPTION	FUNCTION	QUANTITY
DF1A/DF93	Rack with 4 slots	Fixation and conduction of power to the HSC303-4.	1
DF50/56	Power supply for backplane	Power the HSC303-4	1
HSC303-4	High speed coupler Profibus DP/PA	DP/PA coupling	1
DF52/60	Power supply for H1 FOUNDATION fieldbus & Profibus PA	Power the Profibus PA channel <ul style="list-style-type: none"> <li>• 4 channels</li> <li>• Sum of all channels</li> <li>• Maximum 1500 mA for DF52 and 850 mA for DF60</li> </ul>	1
DF53	Power supply impedance for fieldbus	Power the Profibus PA channel <ul style="list-style-type: none"> <li>• 4 channels, maximum 340 mA per channel</li> </ul>	1
M12	M12 male connector	Connection of Profibus DP channel to HSC303-4	1

**Scenario 2 – DF50/HSC303/DF52/DF98 – 2 channels of up to 500 mA/channel**



*Figure 8 - HSC303-2 providing up to 500 mA per channel*

PRODUCT	DESCRIPTION	FUNCTION	QUANTITY
DF1A/DF93	Rack with 4 slots	Fixation and conduction of power to the HSC303-2.	1
DF50/56	Power supply for backplane	Power the HSC303-2	1
HSC303-2	High speed coupler Profibus DP/PA	DP/PA coupling	1
DF52/60	Power supply for H1 FOUNDATION fieldbus & Profibus PA	Power the Profibus PA channel <ul style="list-style-type: none"> <li>• 2 channels</li> <li>• Sum of all channels</li> <li>• Maximum 1500 mA for DF52 and 850 mA for DF60</li> </ul>	1
DF98	Power supply impedance for fieldbus	Power the Profibus PA channel <ul style="list-style-type: none"> <li>• 2 channels, maximum 500 mA per channel</li> </ul>	1
M12	M12 male connector	Connection of Profibus DP channel to HSC303-2	1

**Scenario 3 – DF50/HSC303/DF52/DF98/DF52/DF98 – Up to 4 channels of 500 mA/channel**

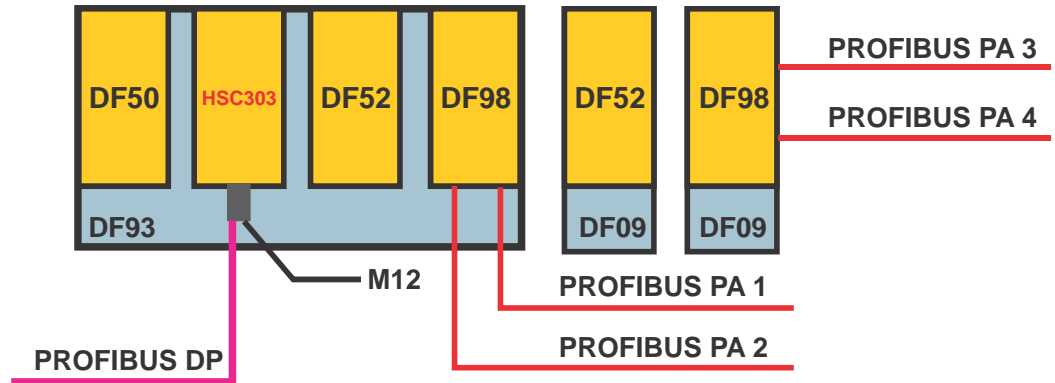


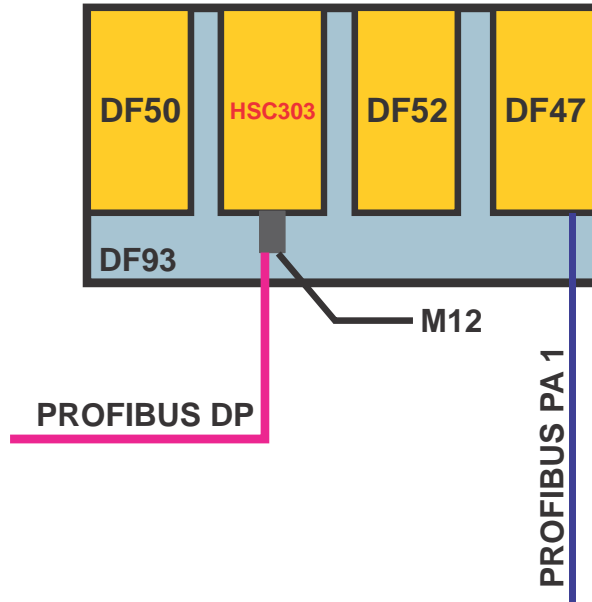
Figure 9 - HSC303-4 providing up to 500 mA per channel

PRODUCT	DESCRIPTION	FUNCTION	QUANTITY
DF1A/DF93	Rack with 4 slots	Fixation and conduction of power to the HSC303-4.	1
DF50/56	Power supply for backplane	Power the HSC303-4	1
HSC303-4	High speed coupler Profibus DP/PA	DP/PA coupling	1
DF52/60	Power supply for H1 FOUNDATION fieldbus & Profibus PA	Power the Profibus PA channel <ul style="list-style-type: none"> <li>• 4 channels</li> <li>• Sum of all channels</li> <li>• Maximum 1500 mA for DF52 and 850 mA for DF60</li> </ul>	2
DF98	Power supply impedance for fieldbus	Power the Profibus PA channel <ul style="list-style-type: none"> <li>• 2 channels, maximum 500 mA per channel</li> </ul>	2
DF09*	Individual support for modules	Support for additional DF52 and DF98	2
M12	M12 male connector	Connection of Profibus DP channel to HSC303-4	1

(\*) The DF09 can be replaced by a DF93 type rack. However, the DF52/DF98 modules do not connect with the rack. The rack function would be only a panel rail support.



**Scenario 4 – DF50/HSC303/DF52/DF47 – With intrinsic safety barrier and 1 PA channel**



*Figure 10 - HSC303-2 with 1 channel with intrinsic safety barrier*

PRODUCT	DESCRIPTION	FUNCTION	QUANTITY
DF1A/DF93	Rack with 4 slots	Fixation and conduction of power to the HSC303-2.	1
DF50/56	Power supply for backplane	Power the HSC303-2	1
HSC303-2	High speed coupler Profibus DP/PA	DP/PA coupling	1
DF52	Power supply for H1 FOUNDATION fieldbus & Profibus PA	Power the Profibus PA channel <ul style="list-style-type: none"> <li>• 2 channels - maximum sum of 1500 mA for DF52</li> </ul>	1
DF47	Intrinsic safety barrier	Power the Profibus PA channel and current limitation	1
M12	M12 male connector	Connection of Profibus DP channel to HSC303-2	1

**Scenario 5 – DF50/HSC303/DF52/DF47/DF52/DF47 – With intrinsic safety barrier and up to 4 PA channels**

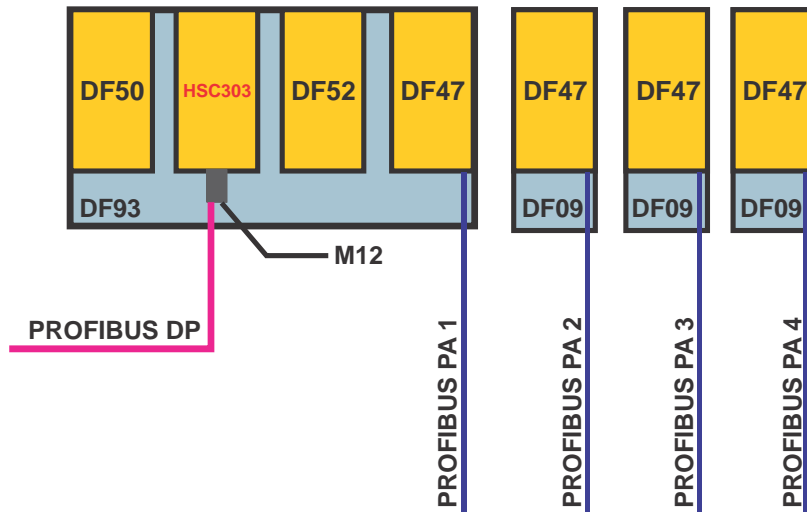
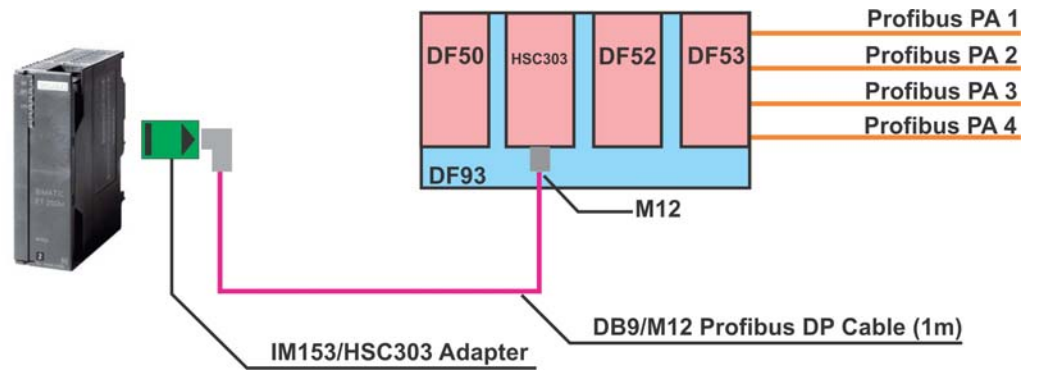


Figure 11 - HSC303-4 – Up to 4 channels with intrinsic safety barriers

PRODUCT	DESCRIPTION	FUNCTION	QUANTITY
DF1A/DF93	Rack with 4 slots	Fixation and conduction of power to the HSC303-4.	1
DF50/56	Power supply for backplane	Power the HSC303-4	1
HSC303-4	High speed coupler Profibus DP/PA	DP/PA coupling	1
DF52	Power supply for H1 FOUNDATION fieldbus & Profibus PA	Power the Profibus PA channel <ul style="list-style-type: none"> <li>• 2 channels - maximum sum of 1500 mA for DF52</li> </ul>	1
DF47	Intrinsic safety barrier	Power the Profibus PA channel and current limitation	4
M12	M12 male connector	Connection of Profibus DP channel to HSC303-4	1
DF09*	Individual support for modules	Support for additional DF47	3

(\*) The DF09 can be replaced by a DF93 type rack. However, the DF47 modules do not connect with the rack. The rack function would be only a panel rail support.

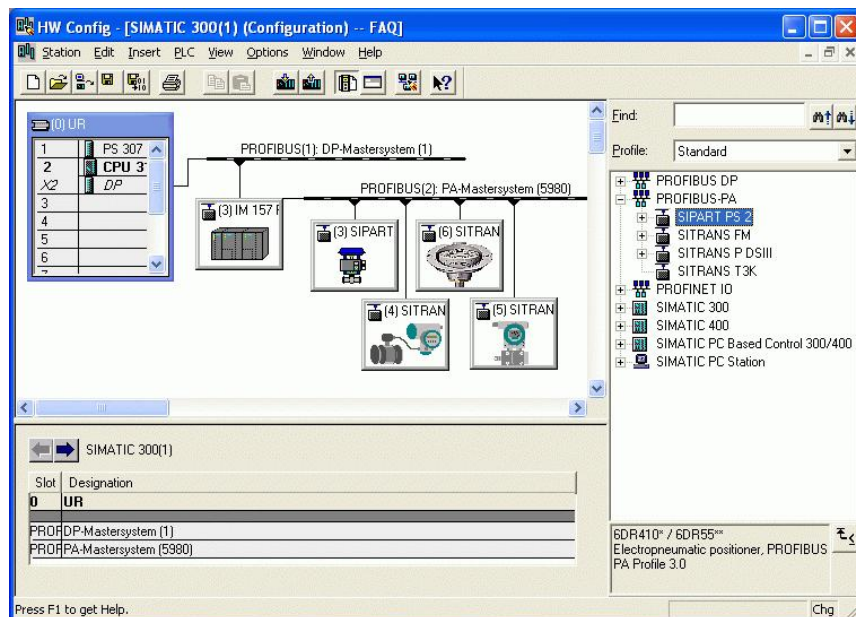
**Scenario 6 – DF50/HSC303/DF52/DF53 – With IM153 (Siemens DP/PA Link)**



**Figure 12 - HSC303 with IM153 Siemens**

Through the IM153/HSC303 adapter and a patch cord cable the HSC303 may be used in systems using the IM153, replacing the DP/PA coupler Siemens.

This can be done in a transparent manner, without needing to change anything in the original configuration, because the HSC303 is transparent to the Profibus DP network. See the figure below



**Figure 13 – Configuration using the IM153**



# Appendix

<b>smar</b>	<b>SRF – SERVICE REQUEST FORM</b>	
	DFI302 – Fieldbus Universal Bridge	Proposal N°:
<b>COMPANY INFORMATION</b>		
Company: _____		
Unit: _____		
Invoice: _____		
<b>COMMERCIAL CONTACT</b>		
Full Name: _____		
Phone: _____		Fax: _____
E-mail: _____		
<b>TECHNICAL CONTACT</b>		
Full Name: _____		
Phone: _____		Extension: _____
E-mail: _____		
<b>EQUIPMENT DATA</b>		
Model: _____		
Serial Number: _____		
<b>PROCESS DATA</b>		
Process Type (Ex. boiler control): _____		
Operation Time: _____		
Failure Date: _____		
<b>FAILURE DESCRIPTON</b>		
(Please, describe the failure. Can the error be reproduced? Is it repetitive?)		
_____		
_____		
_____		
_____		
<b>OBSERVATIONS</b>		
_____		
_____		
_____		
<b>USER INFORMATION</b>		
Company: _____		
Contact: _____		
Section: _____		
Title: _____		Signature: _____
Phone: _____		Extension: _____
E-mail: _____		Date: ____/____/____
For warranty or non-warranty repair, please contact your representative. Further information about address and contacts can be found on <a href="http://www.smar.com/contactus.asp">www.smar.com/contactus.asp</a>		

