

Report

PR09016

Client: Hans Turck GmbH & Co. KG

Address: Witzlebenstr. 7, 45472 Mülheim a.d. Ruhr

Test description: Functionality and electromagnetic compatibility (EMC acc. to NE21) of the FF power supply DPC49 with the fieldbus diagnostic module ADU and diagnostic DTM.

Functionality and communicability of the following control systems:
 ABB Freelance, Honeywell Experion PKS, Emerson DeltaV, Yokogawa Centum CS3000.

Device type: Module racks: DPC49-4RMB / DPC-49-4RMB/SY / DPC-49-4RMB/YO
 HSE field device: DPC-49-HSEFD/24VDC
 Revision: V2.0a / FW 2.1.0.3
 Power supply: DPC-49-IPS1
 Revision: N1.3a / FW 1.04
 Diagnostic module: DPC-49-ADU
 Revision: V1.0a / FW 1.06

Diagnostic DTM: V 1.10, tested with Pactware 3.6

Examiner



R. Becker

Test laboratory

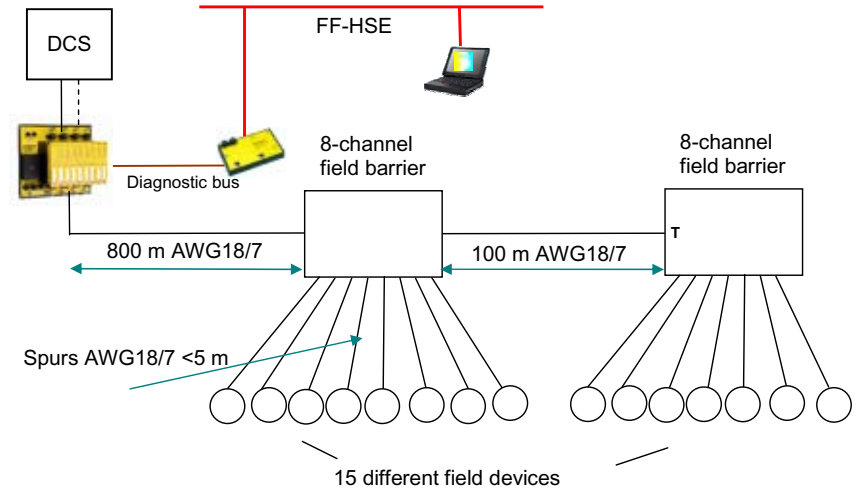


S. Seintsch

Test setup:

General scheme:

Figure 1



15 field devices of different manufacturers were mounted to the field barriers, the last channel of the second field barrier was left unassigned. The type of module rack used for the DPC-49 depends on the type of connection to the DCS. The DPC-49-4RMB/SY was used with redundant connection, whereas the DPC-49-4RMB was used with simple connection. The total current consumption of the segment was ~240 mA.

Implementation:

Communication tests:

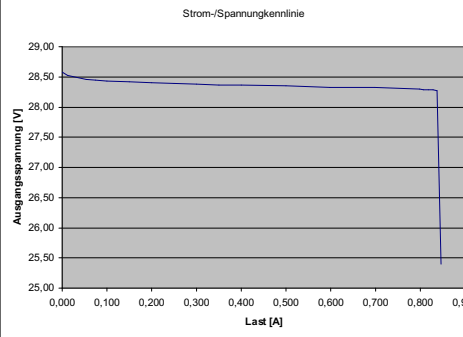
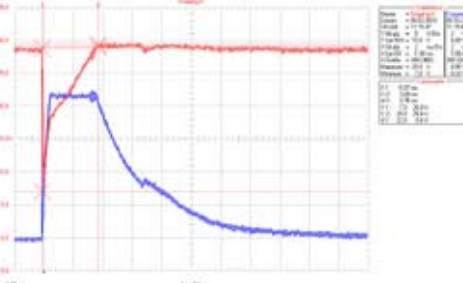
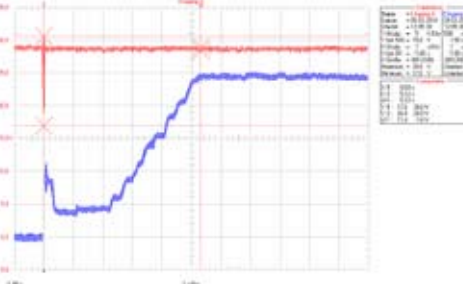
Tested control systems:
 Emerson DeltaV, V9.3
 ABB Freelance, V9.1, redundant connection
 Honeywell Experion PKS, Release 310.1-65.28
 Yokogawa CS3000, R3.08.50, redundant connection

15 field devices were fully operated at the above mentioned control systems and the communication was monitored for several days according to failure. The following cases of redundancy were additionally tested at the redundantly connected system: Failure of controller I/O card, wire-break of H1 cable between I/O card and DPC-49 rack and failure of IPS1 module at DPC-49.

Result: No failures were observed, the DPC system worked properly on all control systems.

Functional test: Output response

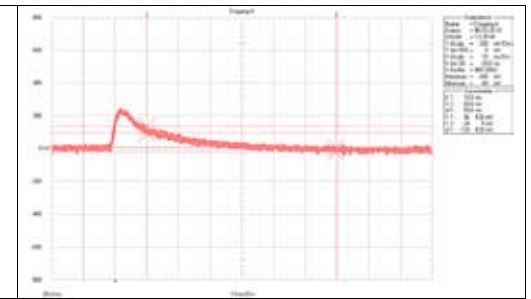
In addition to the communication tests, the electrical values of the IPS1 module were tested according to the manufacturer's specification. Moreover, the system was tested according to unwanted retroactive effects of the adjacent channels and the performance under high inrush currents.

<p>Current/ voltage characteristic:</p> <p>Single IPS1 module with plugged redundant module.</p> <p>Result: Output voltage at 800 mA: 28.3 V DC Current limiting is activated at approx. 850 mA</p>	
<p>Inrush current of single field barrier:</p> <p>Red: Output voltage Blue: Output current (voltage over 10 ohm)</p> <p>Single multibarriers MB48-T415/Ex in neutral, IPS1 module with redundant module.</p> <p>Result: Inrush current limited to max. ~890 mA. Output voltage drops to 7 VDC then increases again to 28.5 V. Duration of process ~4 ms.</p>	
<p>Inrush current entire segment (figure 1):</p> <p>Red: Output voltage Blue: Output current (voltage over 10 ohm)</p> <p>2 x 8-channel field barrier with 11 field devices, IPS1 module with redundant module.</p> <p>Result: Inrush current limited to max. ~80 mA. Output voltage drops to ~20 VDC then increases immediately to 28.5 V.</p>	
<p>Retroactive effect on adjacent channel:</p> <p>2 x 8-channel field barrier with 15 field devices, IPS1 module with redundant module on channel 4; channel 3 short-circuited resp. IPS1 module pulled/plugged.</p>	<p>No measurable retroactive effects</p>

Effects resulting from pulling/plugging the redundant module:

2 x 8-channel field barrier with 15 field devices, IPS1 module output voltage (AC triggered,) redundant module pulled.

Result:
Max. change ~0.2 VDC



Result:
The electrical output values as declared by the manufacturer are observed. High inrush currents are limited by the IPS1 modules, controlled start-up of connected fieldbus segment. No measurable cross-talk between the trunk outputs, single segment failures had no effect on the other segments. Replacing the redundant IPS1 module has only minor physical effects, any influence on the communication was not measurable.

Summary of results

The DPC-49 system showed good results. The rack structure allowing modules to be plugged flexibly is a very good solution. Smooth integration, operation and handling of the DPC system with all tested FF control systems, even in redundant operation mode. The diagnostic DTM delivers good results but still has potential for improvement with regard to operability and display of results. The hardware description and the operating manual of the diagnostic DTM are both very good.

EMC acc. to NE21 was passed.

Enclosure: NE21 protocol

Company:	TURCK	Tester:	SEI	BIS Prozesstechnik GmbH
Device:	FF Power supply	Date:	KW 51_2009	Test laboratory
Type:	DPC	Folder:		
Serial-Nr:	ADU 682035 0018, IPS1 690814 0046-	Output:	FF H1	

Test Setup:
 FF H1 on DeltaV, Feldbarrier P+F and PR hat mounted temperature transmitter at one Spur. Supply 24V via Battery. System Test of Power supply and HSE Device. Power supply lines separate applied. Shield grounded at Power supply, Power supply carrier grounded

4.1 Housing
4.1.1 Magnetic field
 tested passed
 not tested 100 A/m no magnetic sensitive parts
 not applicable

4.1.2 Electromagnetic RF field
 tested passed
 not tested 80-3000MHz, 10V/m, 80%AM no influence
 not applicable (1000-1400MHz, 2000-3000MHz: informative)

4.1.4 Electrostatic Discharge
 tested passed
 not tested ±3,0/±6,0kV (C.D.) je 50 Imp's, 1/s no influence
 not applicable ±4,0/±8,0kV (A.D.) je 10 Imp's, 1/10s no influence

4.2 Immunity: Signal, data, process, measurement and control lines
4.2.1 RFI asymmetrical
 tested passed
 not tested 0,15-80MHz, 10V, 80%AM increased noise level (ca.53 to 250kHz), no influence
 not applicable 0,010-0,150MHz, 10V, 80%AM no influence

4.2.2 Fast Transients (Burst)
 tested passed
 not tested ±0,5/±1,0kV (15/300ms, 5kHz) no influence
 not applicable ±0,5/±1,0kV (0,75/300ms, 100kHz) no influence

4.2.3 Surge
 tested passed
 not tested ±0,5/±1,0kV, je 5Imp's, 1/60s light up of all COM LEDs at the power supply modules, no influence
 not applicable

4.3 DC network inputs and outputs **4.4 AC network inputs and outputs**
4.3.1 RFI, asymmetrical **4.4.1**
 tested passed
 not tested 0,15-80MHz, 10V, 80%AM increased noise level (ca.53 to 250kHz), no influence
 not applicable 0,010-0,150MHz, 10V, 80%AM no influence

4.3.2 Fast Transients (Burst) **4.4.2**
 tested passed
 not tested ±0,5/±1,0/±2,0kV (15/300ms, 5kHz) no influence
 not applicable ±0,5/±1,0/±2,0kV (0,75/300ms, 100kHz) no influence

4.3.3 Surge	4.4.3
<input checked="" type="checkbox"/> tested <input checked="" type="checkbox"/> passed	4.3.3 - DC: ±0,5/±1,0kV, je 5Imp'e, 1/60s no influence
<input type="checkbox"/> not tested	4.4.3 - AC: ±0,5/±1,0/±2,0kV, je 5Imp'e, 1/60s
<input type="checkbox"/> not applicable	
4.3.4 Supply voltage tolerances	4.4.4
<input checked="" type="checkbox"/> tested <input checked="" type="checkbox"/> passed	4.3.4 - DC: ±20% v. U _N no influence
<input type="checkbox"/> not tested	4.4.4 - AC: +10/-15% v. U _N
<input type="checkbox"/> not applicable	
4.3.5 Supply voltage variations	4.4.5
<input checked="" type="checkbox"/> tested <input checked="" type="checkbox"/> passed	a) 100-0-100% v U _N Restart, Performance criteria B
<input type="checkbox"/> not tested	b) 100-40-100% v U _N Restart, Performance criteria B
<input type="checkbox"/> not applicable	
4.3.7 Voltage interruption	4.4.6
<input checked="" type="checkbox"/> tested <input checked="" type="checkbox"/> passed	100%-0% v U _N , 20ms no influence
<input type="checkbox"/> not tested	
<input type="checkbox"/> not applicable	
4.5 Inrush current limitation	
<input checked="" type="checkbox"/> tested <input checked="" type="checkbox"/> passed	i _{Ein} ≤ 15 ¹ STAT
<input type="checkbox"/> not tested	
<input type="checkbox"/> not applicable	
4.6 Emissions	
<input type="checkbox"/> tested <input type="checkbox"/> passed	(EN61326) → EN 55011
<input checked="" type="checkbox"/> not tested	
<input type="checkbox"/> not applicable	
Test result:	<input checked="" type="checkbox"/> NAMUR NE21 is passed
(NE 21:2008)	<input type="checkbox"/> NAMUR NE21 is partly passed
	<input type="checkbox"/> NAMUR NE21 is not passed
Remarks	