PROFIBUS-FMS BA profile

1. INTRODUCTION

This document describes the new functionality needed for the PCD to run the building automation (BA) profile, version 2.0, through a PROFIBUS network.

The document contains a description of the technique and application for

2.	**Use of the BA profile**
3.	**Definition of objects (object register)**
4.	**Record**
5.	**Unsolicited Status**
6.	**Event Notification**
7.	**Output negative responses**

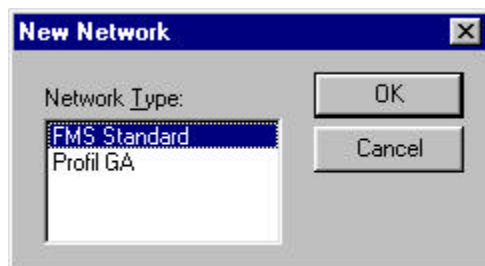The following versions are required for use with the PROFIBUS-FMS BA profile.

PROFIBUS configurator	Included in PG4 V2.0
PCD2.Mxx	FW V007
PCD4.M445	FW V00D
PCD6.M300	FW V002

2. USE OF THE BA PROFILE

When a new PROFIBUS-FMS network is defined for the first time, a choice is offered between:

- Standard PROFIBUS-FMS and
- Profibus-FMS BA profile

The difference between PROFIBUS FMS Standard and PROFIBUS FMS BA profile is as follows:

Objects	FMS Standard	FMS BA profile
Standard	Boolean, Integer8, Integer 16, Integer 32, Unsigned 8, Unsigned 16, Unsigned 32, Floating-Point, Octet-String, Octet-String(4), Bit String	Boolean, Integer8, Integer 16, Integer 32, Unsigned 8, Unsigned 16, Unsigned 32, Floating-Point, Octet-String, Octet-String(4), Bit String
Message		DP-A, DP-ED, DP-ED with clock, DP-M
Switch command		DP-A, DP-ED, DP-ED with clock, DP-M, DP-S, DP-N
Switch command/ setpoint		DP-A, DP-ED, DP-ED with clock, DP-M, DP-S, DP-N
Measurement with fixed limits		DP-A, DP-ED, DP-ED with clock, DP-M,
Count value		DP-A, DP-ED, DP-ED with clock, DP-M, DP-S, DP-N
PID controller		DP-A, DP-ED, DP-ED with clock, DP-M, DP-S, DP-N
Transport ack		DP-T

3. DEFINITION OF OBJECTS (object register)

Aim

Until now, the index range available for objects of the PCD2 was 100 to 199 and that of the PCD4/PCD6.M3 was 100 to 499. These ranges are at variance with the requirements of the BA profile, where object indexes from 1 to 999 are already assigned for the description of data types and communications objects are only possible from index 1000. Moreover, the total of 400 objects is considered much too small. It is estimated that proper use of the BA profile requires 1250 objects for the PCD2 and 2500 objects for the PCD4/PCD6.M3, addressable in the range 1000 to 16383.

The following now applies for PCD2, PCD4 and PCD6.M3..:

Object address range: 100 .. 16383
Number of objects: depending on space in memory, approx. 1250 .. 2500

4. RECORD

Aim

All objects used in the BA profile are "Record"-type. It is important to be able to exchange objects of this type.

All objects specific to the PROFIBUS FMS BA profile are mapped to DB-type media.

Since finding a record takes place via a DB, data is represented in a very simple form, i.e. byte-to-byte without manipulation, starting from the byte that has the highest priority with element 0 of the DB.

Example:

Object	Index:		1034	
	Object code		9	
	Record type index		224 (05/1, 08/4)	→ Length 5 bytes
	PCD media		DB 3513 [2]	→ Length 2 x 4 bytes
after	Write.ind	dest.index	1034	
		data	[0x01][0x23, 0x45, 0x67, 0x89]	
in a	DB 3513	[0]	01234567H	
		[1]	89yyyyyy H	where y is not modified.

A record-type variable is always transferred as a whole unit. Individual elements of the record can only be accessed within the DB.

5. UNSOLICITED STATUS

5.1 Aim

At communication start-up, the BA profile defines a precise sequence before data can be exchanged (BA profile, version 2.0, paragraph 7.2: Start-up phase). This sequence is divided into three phases: the first phase opens the channel, the second phase exchanges status information and the last is for data exchange. The services of phases 1 and 3 are already provided by the PCD, however the "Unsolicited Status" service for phase 2 had to be newly introduced.

5.2 Description

The IL command to output "Unsolicited Status" is not available. A firmware mechanism will therefore ensure that this service is always executed automatically on initialization of a channel, provided that this service is actually supported. Consequently, during configuration it is necessary to ensure that, in the "Channel Definition Advanced" menu, the "Unsolicited Status" field has been selected. When this telegram is exchanged, the PCD always transmits the status "Restart".

When such a telegram is received, diagnostic flag 0 (RBSY) is set to 1.

It is left to the user to reset this flag.

Furthermore, the "Unsolicited Status" service is always transmitted:

- with high priority when this is possible (PDU length high prio. > 0)
- otherwise with low priority (PDU length High prio. = 0)

6. EVENT NOTIFICATION

6.1 Aim

All information regarding process data points are transmitted in the PROFIBUS BA network with the "Write" and "Read" services.

To prevent network overload, it is possible for stations to exchange only modified information (values, alarms and faults).

This takes place with "Event Notification"-type telegrams.

6.2 Description

The "Event Notification" service sends information to partner stations in exactly the same way as "Write" and "Information Report".

Introducing the "Event Notification" transmission service requires a special adjustment, since the IL instruction set only provides the STXM command.

The agreement for STXM is as follows:

- If the channel supports the "Event Notification" service, it will output one of these telegrams, assuming that the object for transmission has been defined as an "Event".
- A simple "Write" occurs when this service is supported, but the object for transmission has not been defined as an "Event".
- If the channel allows, an "Information Report" is output when a "Write" is not possible and the object has not been declared as an "Event".
- Moreover, the "Event Notification" and "Inf. Report" services are transmitted:
  - with high priority, if this is possible (PDU length high prio. > 0)
  - otherwise with low priority (PDU length High prio. $= 0$)

Adapting the configurator

As already mentioned, the object must be declared as an event if it is to be sent as an "Event Notification" with the STXM command. For this purpose, the user is provided with a new type for the variables. In the "Event" field of the "Object Definition" menu an additional "Event" switch has been provided:

- "Simple var / Array"
- "Event"

The default setting is "Simple var / Array". The user is free to preselect "Event". If "Event" is selcted, then the register has to be defined.This register is used to define the event number.

Object Definition

Index: 11000   Name: [   ]   OK

Group: Meldung ▼   Cancel

Type:
DP-A
DP-ED
DP-ED with clock
DP-M

Access...

Advanced...

Event

☑ Event   Register Address: 100
Register Name: Ev_11000

Mapped On

Media: DB ▼

Address: 1   Name: OB_11000

Count [1..255]: 1

Advanced Channel Definition

Fms features supported:

Request:
☑ Read   ☐ Unsolicited Status
☐ Info Report   ☑ Write
☑ Event Notification

Response:
☑ Get OV   ☐ Unsolicited Status
☑ Read   ☑ Write
☑ Info Report   ☐ Event Notification

Maximum service counters:

Send confirmed (SCC) [1..15]: 1
Receive confirmed (RCC) [1..15]: 1
Send acknowledged (SAC) [1..15]: 1
Receive acknowledged (RAC) [1..15]: 1

Maximum PDU length:

High priority message:
Received [0,3..242]: 241   Sent: [0,3..242]: 0
Low priority message:
Received [31..242]: 241   Sent [31..242]: 241

Acyclic/Cyclic control interval (ACI/CCI): 0

OK

Cancel

Set Defaults

Access rights...

7. Output negative responses

7.1 Aim

The BA profile defines all reactions when a nominal value is written or when a parameter is sent (see 3.1.3: Set nominal size, 3.1.4: Parameter setting).

In the description, negative responses are provided for irregularities. A proportion of these responses is already handled by the ALI (our FW). Another proportion should be worked out by the application.

7.2 Description

The writing of data into PCD media occurs directly after checking access rights and verifying consistency. This means that it is not possible to return negative responses that have been worked out via the user program.

The solution for getting round this problem lies in the fact that, in case of error, data transmitted with an "Event Notification" telegram are not updated and so the previous values are returned.