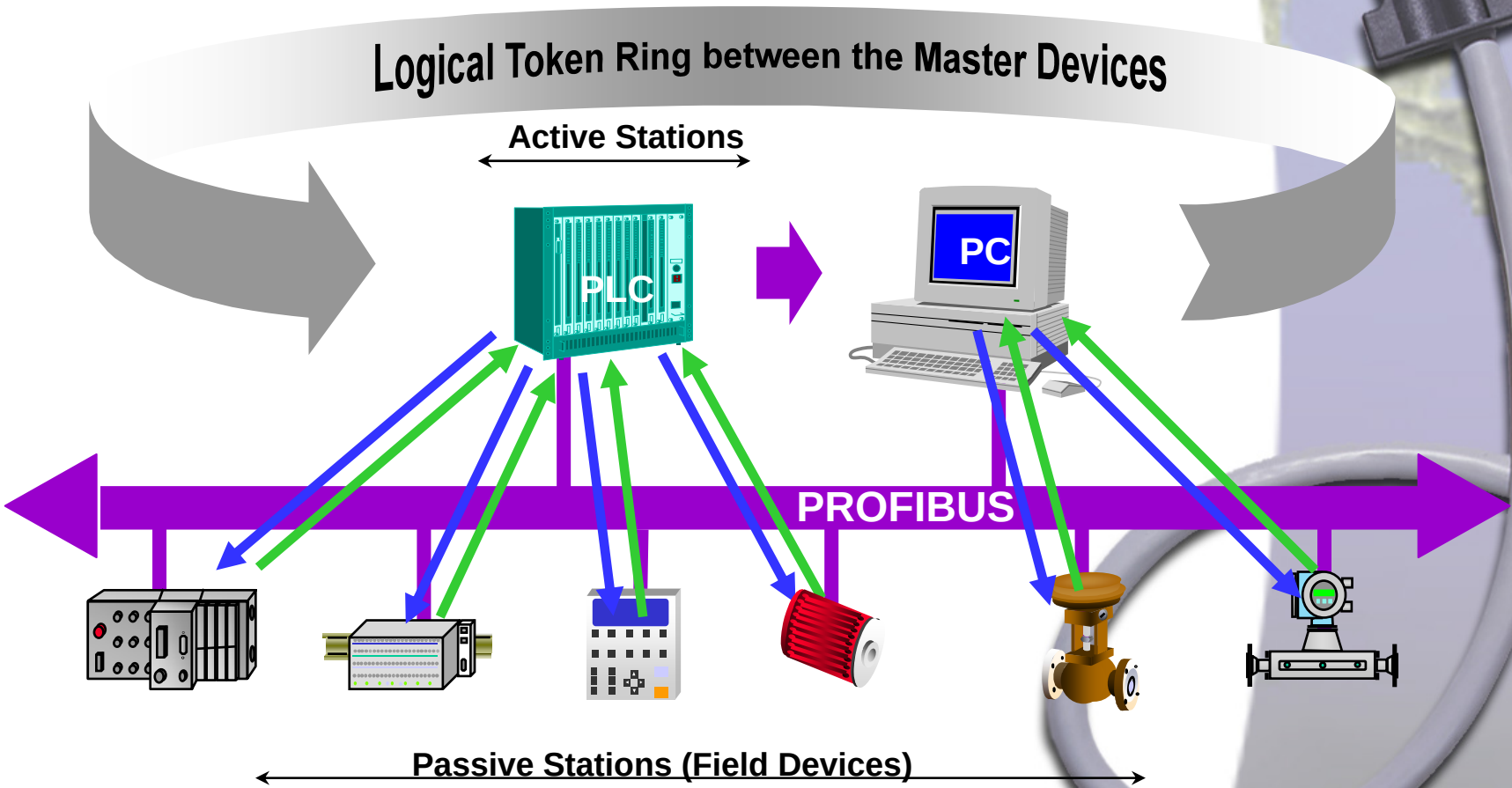
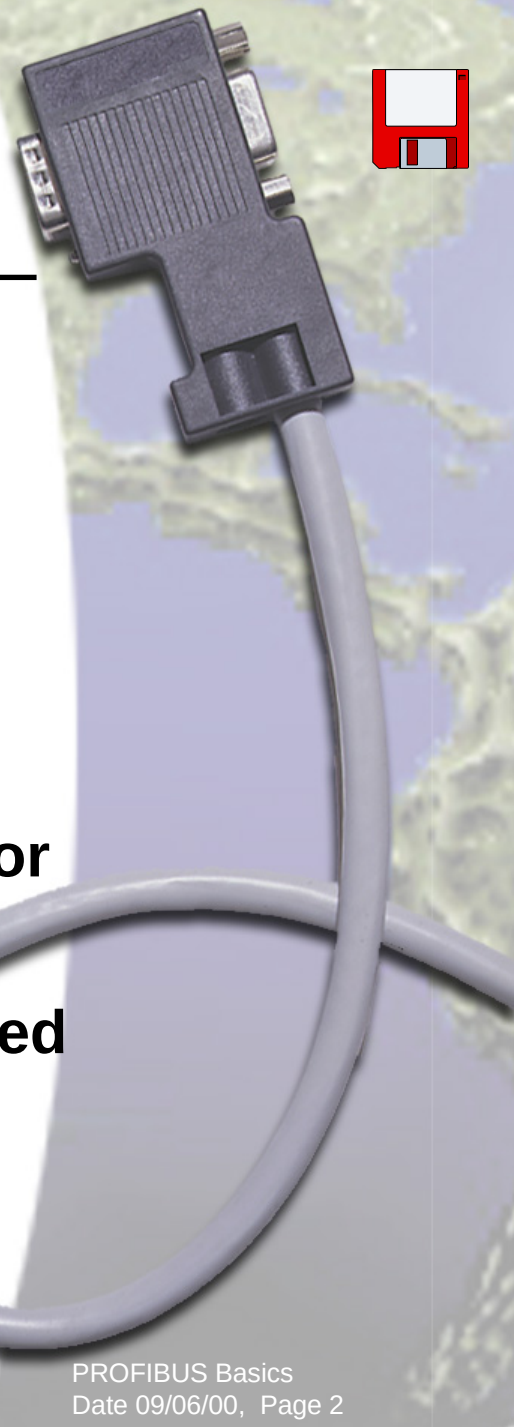
PROFIBUS Basics



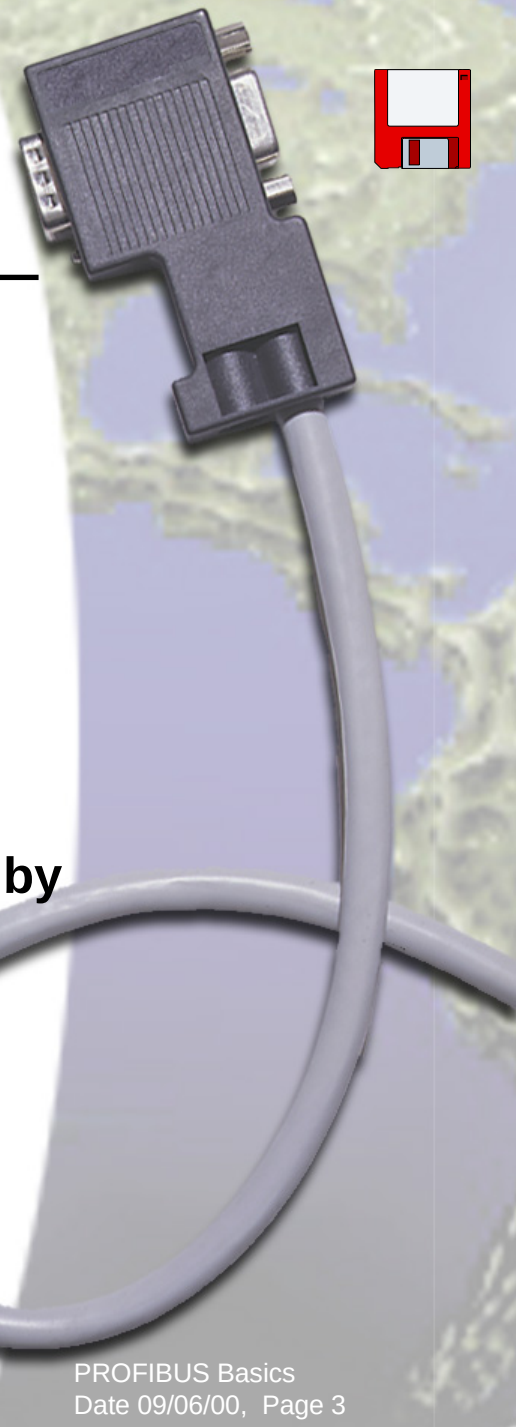
PROFIBUS Basics



- **All PROFIBUS services**
  - ✓ **High Speed Data Exchange**
  - ✓ **Peer to Peer**
  - ✓ **Hazardous Area**

  can be used together in one network
- **Therefore Communication is Transparent for the User**
- **Same Cable and Components for High Speed Data Exchange and Peer to Peer**

PROFIBUS Basics

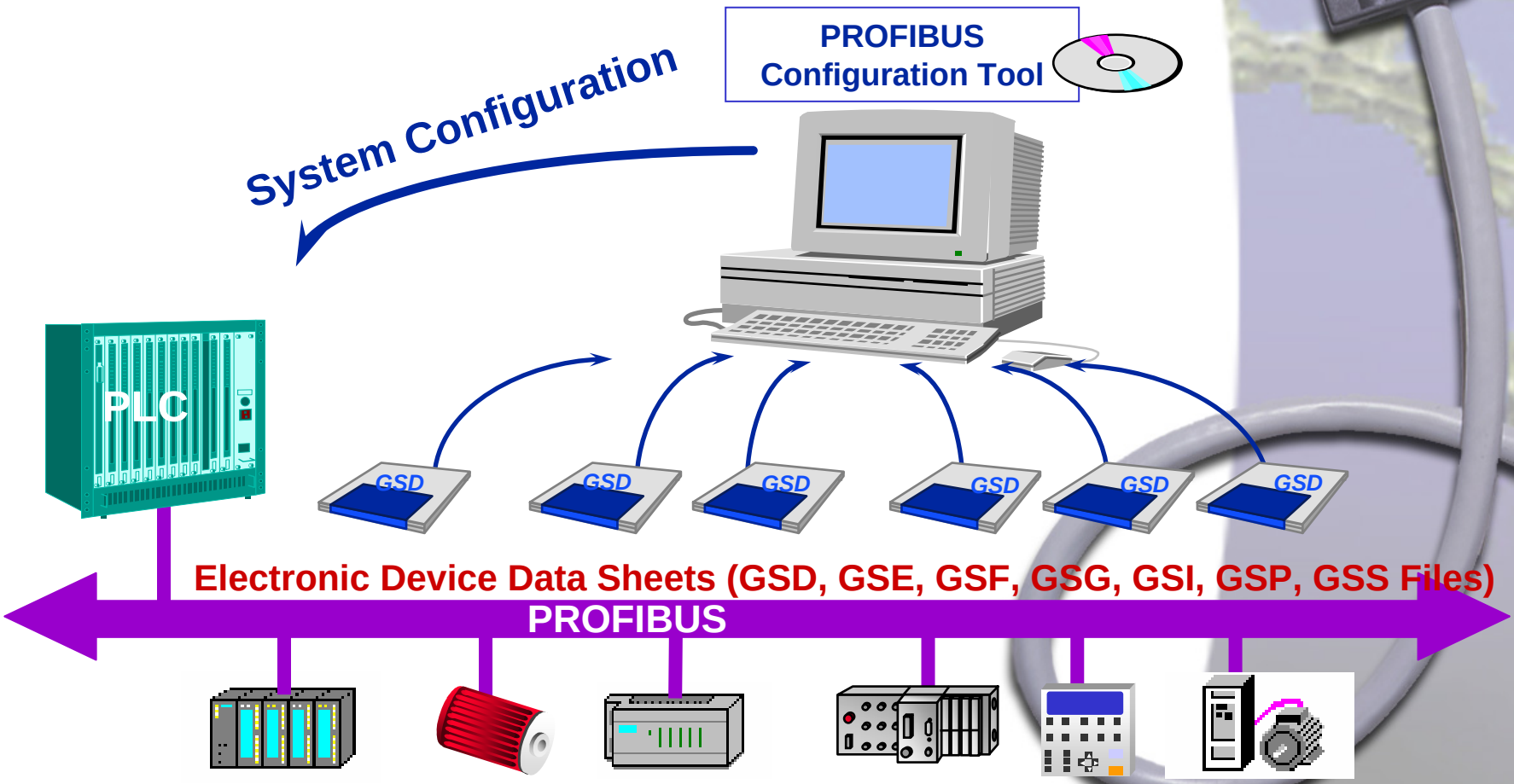


High-Speed Data Exchange Features

- ✓ Same priority for all field devices
- ✓ Communication is permanent & cyclic
- ✓ Amount of data specified during configuration
- ✓ Only one master can write to outputs (safety aspect)
- ✓ Acyclic communication to field devices possible by using extended functions (DP Extended/DPV1)
- ✓ Alarm acknowledgment
- ✓ Up to 244 bytes input AND 244 bytes output data per field device
- ✓ Fastest fieldbus system (up to 12Mbaud)

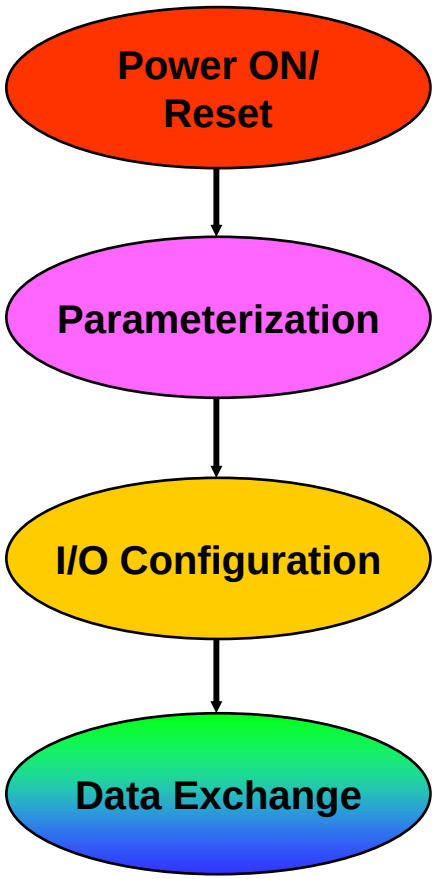
PROFIBUS Basics

Plug & Play With Electronic Device Data Sheets



PROFIBUS Basics

High-Speed Data Exchange - Startup Sequence



Power ON/Reset of Master or Slave

Download of Parameters into the Field Device (selected during Configuration by the User)

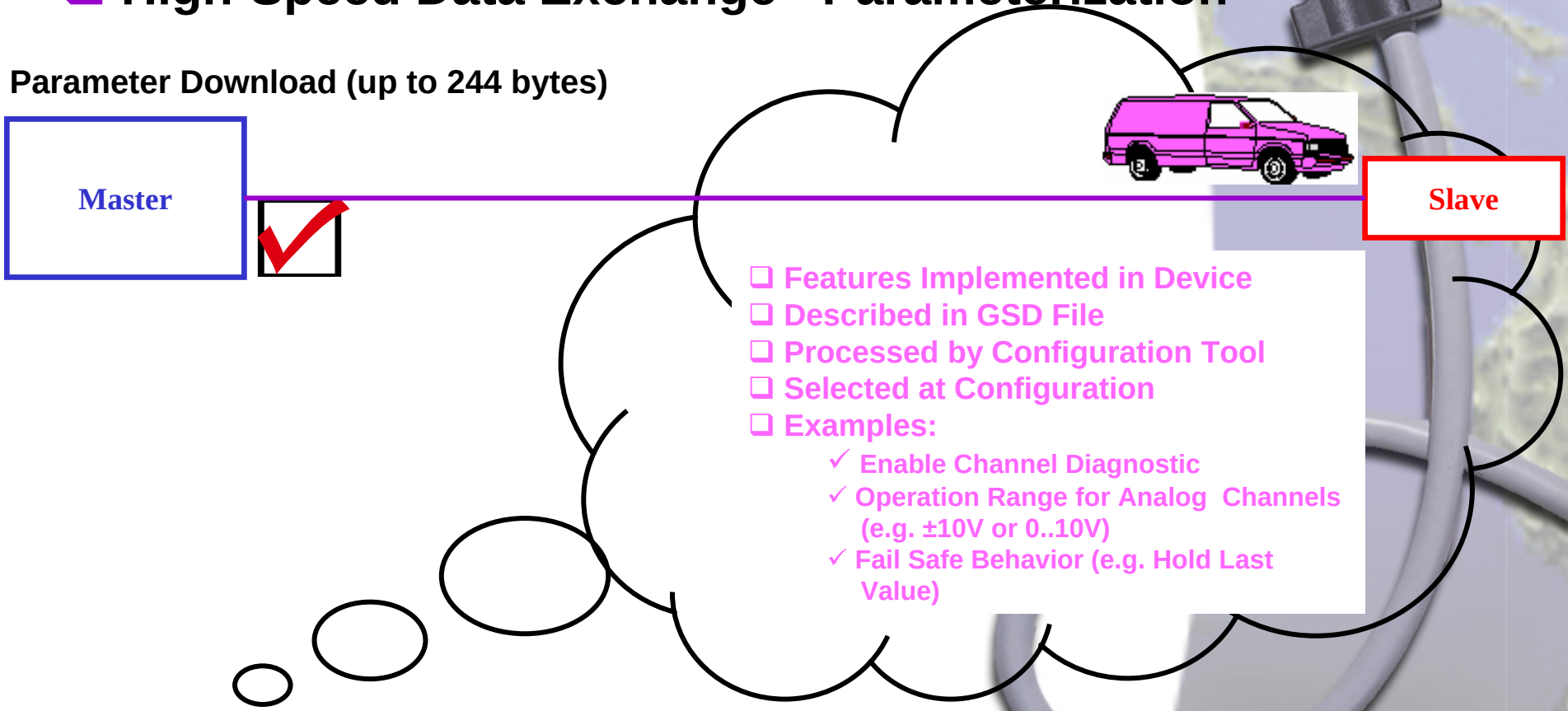
Download of I/O Configuration into the Field Device (selected during Configuration by the User)

Cyclic Data Exchange (I/O Data) and Field Device reports Diagnostics

PROFIBUS Basics

❑ High-Speed Data Exchange - Parameterization

Parameter Download (up to 244 bytes)



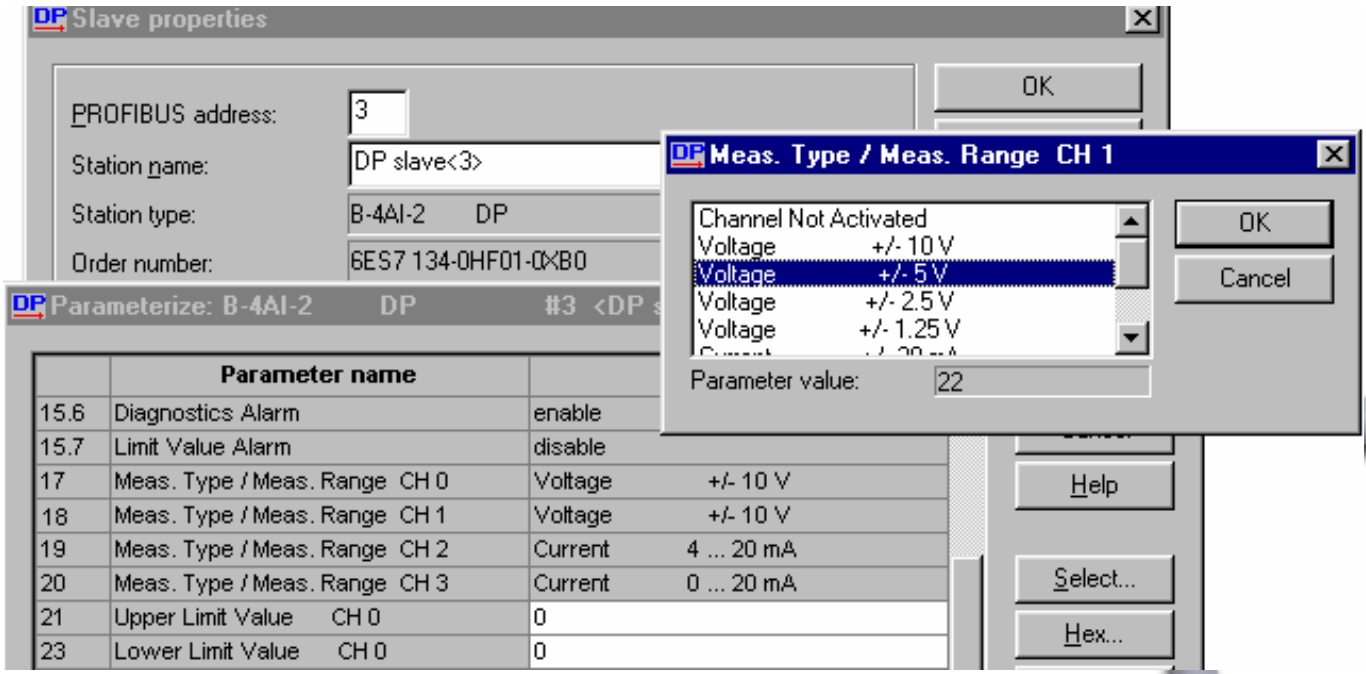
= Parameterization Data

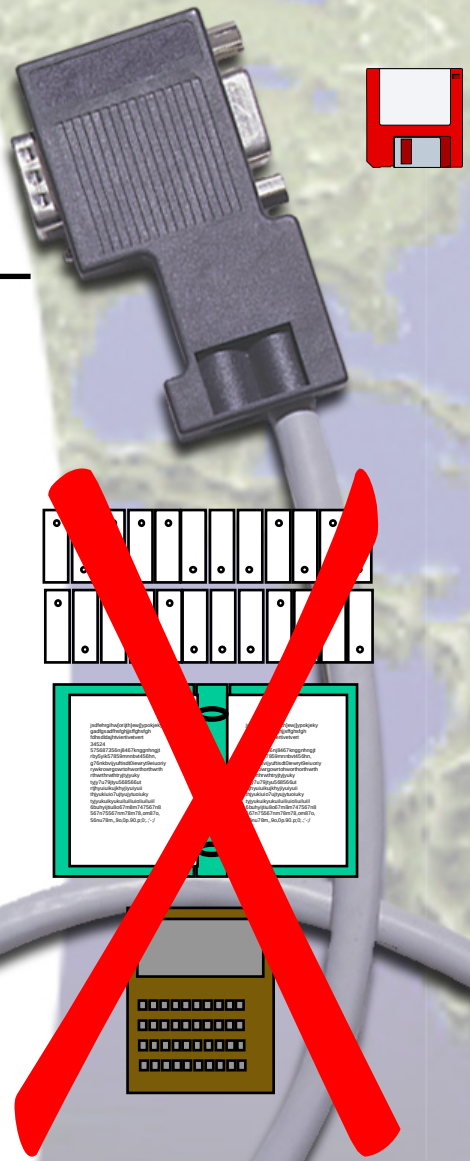
= Confirmation (Data Received)

PROFIBUS Basics

❑ Parameterization (continued)

✓ Parameter selection with Configuration Tool



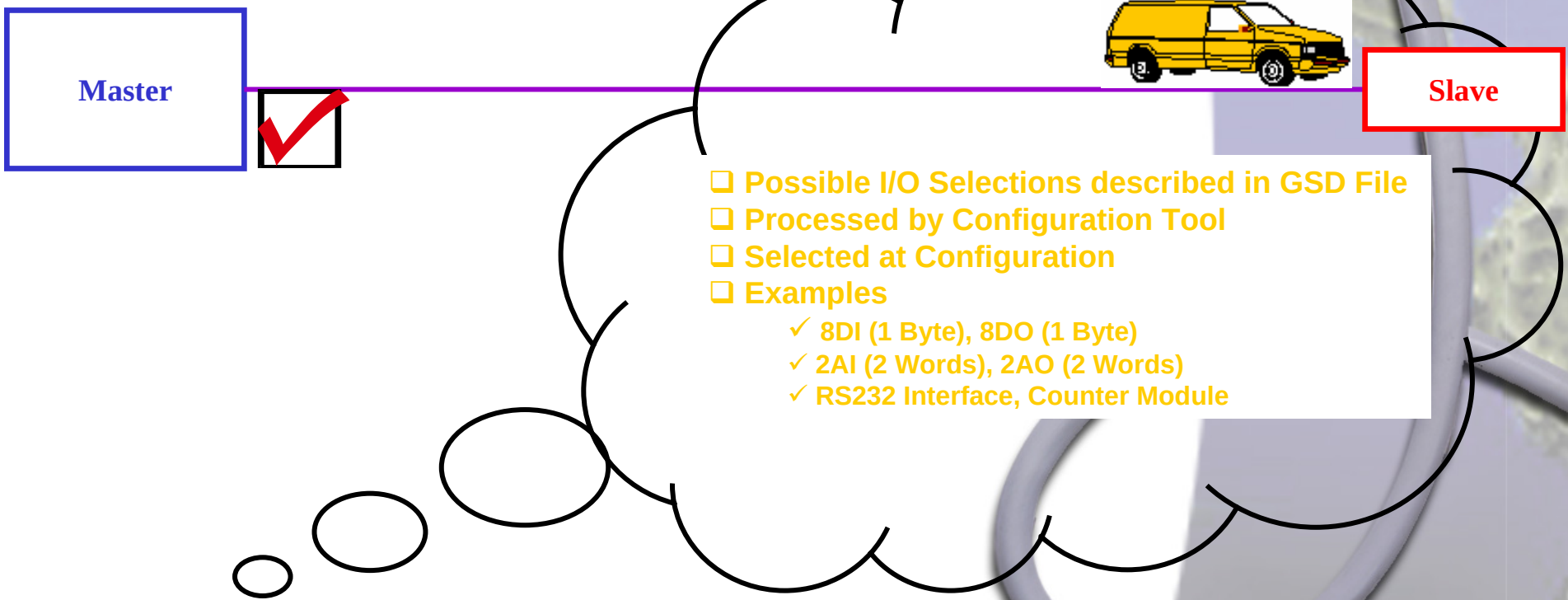


Fewer DIP Switches - NO Handheld - NO Extensive Additional Documentation
User defines every Function in ONE Tool.

PROFIBUS Basics

❑ High-Speed Data Exchange - Configuration

Configuration Download (up to 244 bytes)



= Configuration Data

= Confirmation (Data Received)

PROFIBUS Basics

Configuration Tool (continued)

- ✓ I/O selection with Configure: ET 200M (IM153-1) #4 <DP slave<4>>

	Identifier	Module	Comment	I address	O address
1	004	Config for Slot1			
2	004	Config for Slot2			
3	004	Config for Slot3			
4	067,003	6ES7 321-1BL00-0AA0 32DI			
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					

OK
Cancel
Help
Module...
Parameters...
Delete
Auto addr.
Addr. space...

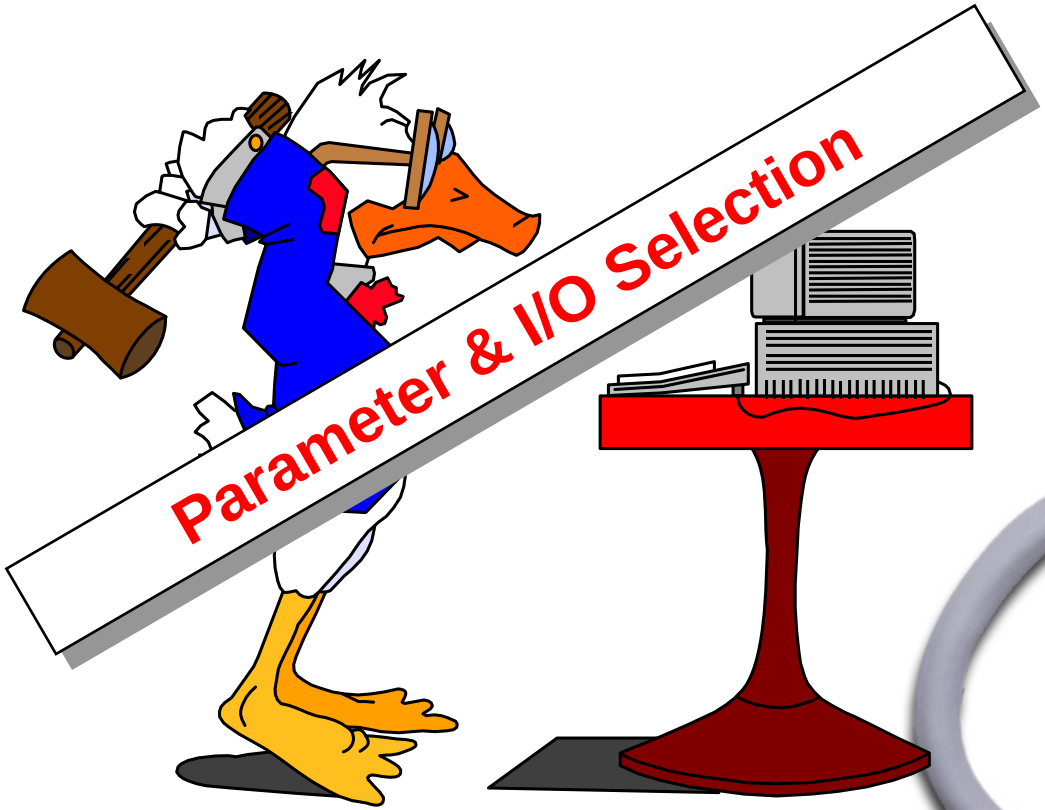
Module selection for position 5

6ES7 321-7RD00-0AB0 4DI
6ES7 321-1FF0*-0AA0 8DI
6ES7 321-1BH0*-0AA0 16DI
6ES7 321-1EH0*-0AA0 16DI
6ES7 321-1BH5*-0AA0 16DI
6ES7 321-1FF00-0AA0 8DI
6ES7 321-1FF01-0AA0 8DI
6ES7 321-1BH00-0AA0 16DI
6ES7 321-1BH*1-0AA0 16DI
6ES7 321-1EH00-0AA0 16DI
6ES7 321-1EH01-0AA0 16DI
6ES7 321-1BH50-0AA0 16DI
6ES7 321-7BH00-0AB0 16DI
6ES7 321-1BL00-0AA0 32DI
6ES7 321-1EL00-0AA0 32DI

Apply
Close
Help

PROFIBUS Basics

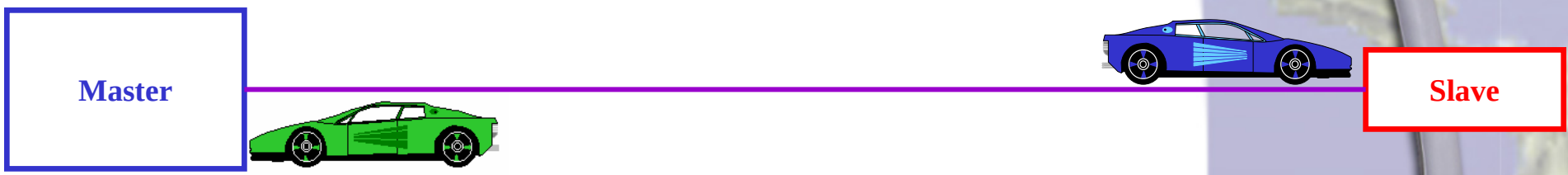
PROFIBUS Demo



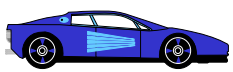
PROFIBUS Basics

High-Speed I/O - Data Exchange & Diagnostics

Data Exchange (up to 244 bytes)



Slave indicates diagnostics to report

 = Output Data

 = Input Data

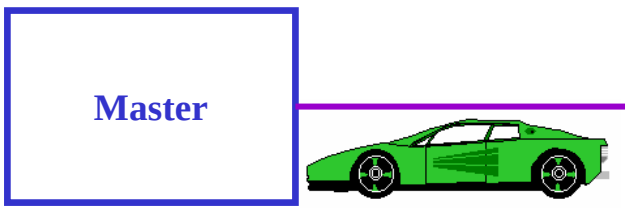
 = Diagnostic Indicator

PROFIBUS Basics

Data Exchange & Diagnostics (continued)

Diagnostic Request and Response (up to 244 bytes)

Data Exchange (up to 244 bytes)

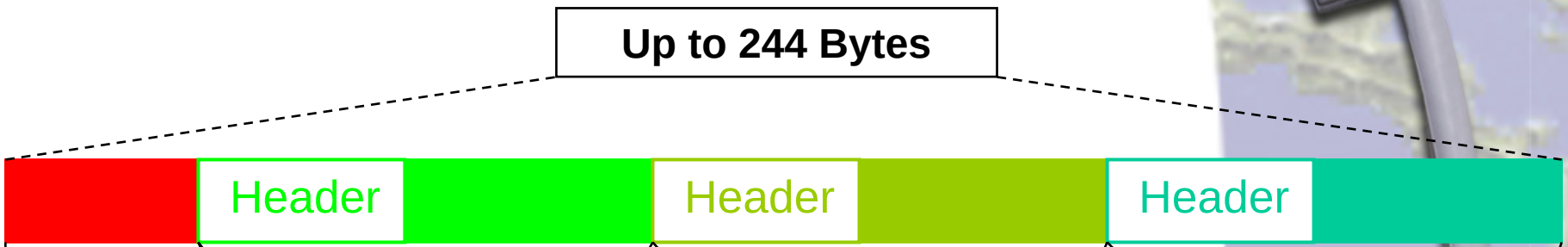


 = Diagnostic Request

 = Diagnostic Response

PROFIBUS Basics

Diagnostic Response (continued)



6 Bytes Mandatory

Device Related (Optional)

Identifier Related (Optional)

Channel Related (Optional)

e.g. wrong configuration

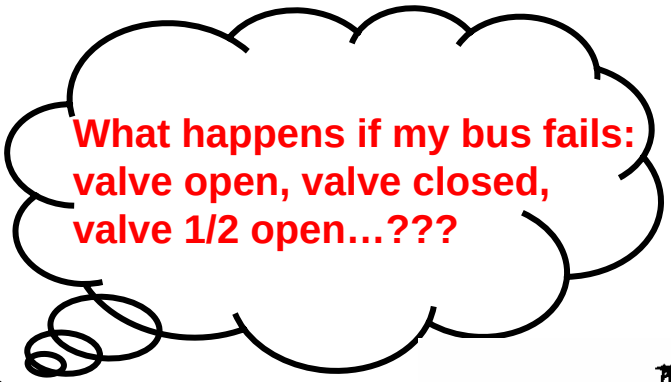
e.g. no load power

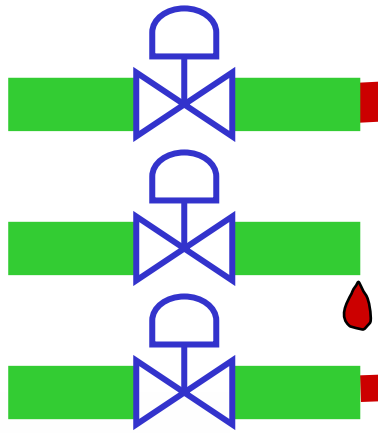
e.g. module #4 has diagnostic

e.g. wire break or short circuit

PROFIBUS Basics

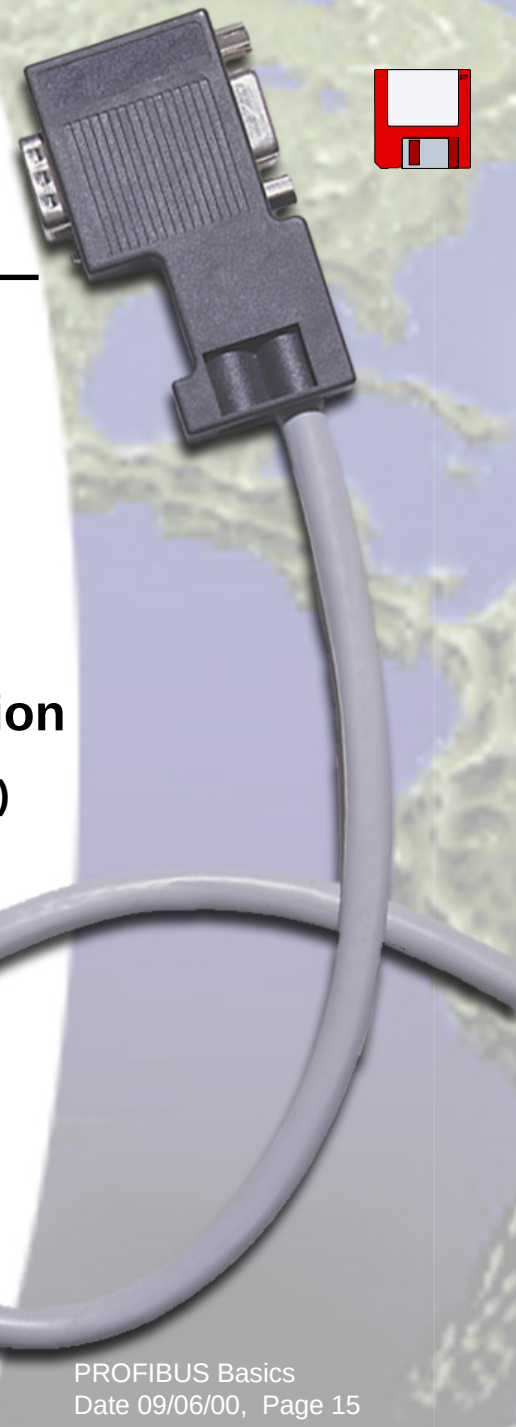
High-Speed Data Exchange - Fail Safe





Optional feature Fail Safe specifies behavior of Outputs in case of Communication Loss

PROFIBUS Basics

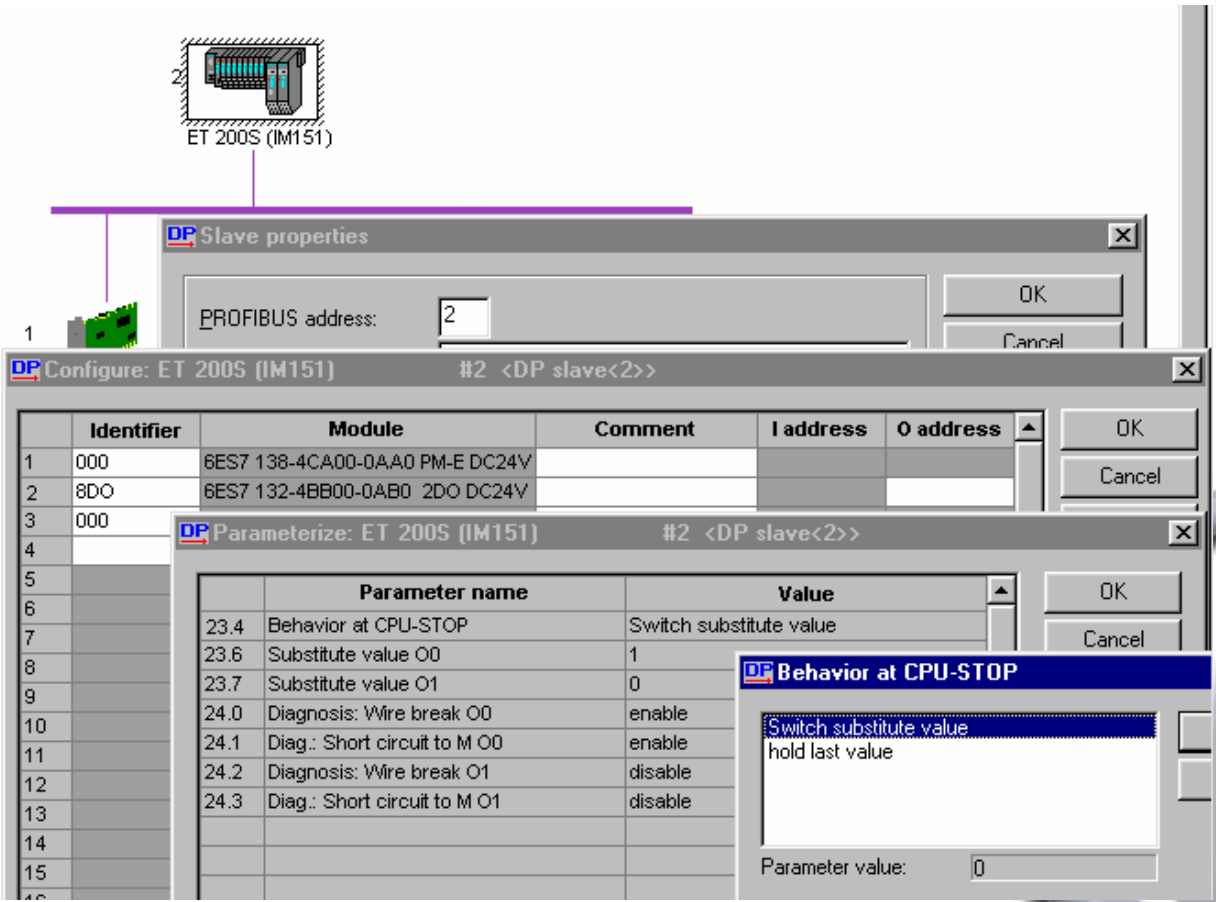


Fail Safe (continued)

- ✓ Optional Feature for Field Devices
- ✓ Defined in Electronic Device Data Sheet
- ✓ Manufacturer has the capability to allow the End User to specify the action on loss of communication
  - × Hold outputs at the last value received (e.g. valve 1/2 open)
  - × Set outputs to a specified value (e.g. open or close valve completely)
- ✓ User defines action during Parameterization

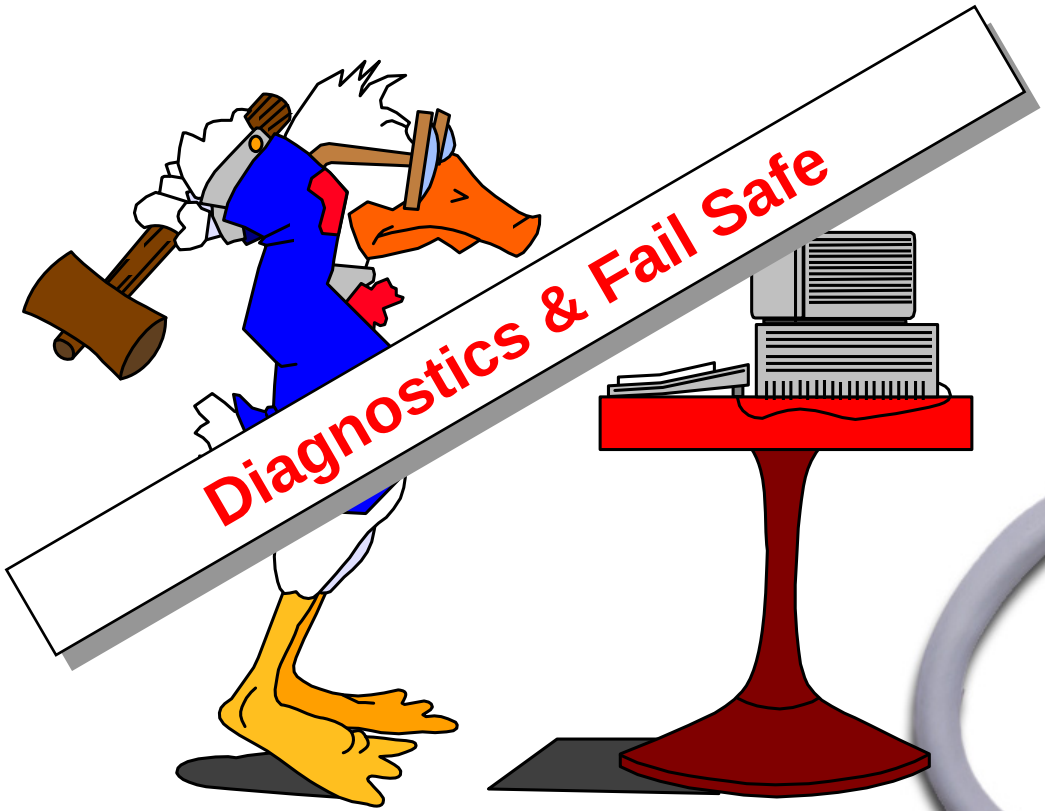
PROFIBUS Basics

Fail Safe (continued)



PROFIBUS Basics

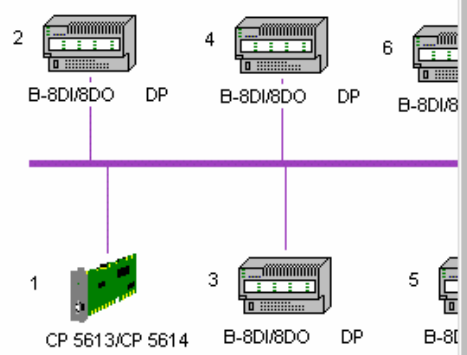
PROFIBUS Demo



PROFIBUS Basics

High-Speed Data Exchange Timing

- ✓ 10 Stations With 2 Byte I/O (160 In/Output Signals)
  - × Bus Cycle Time 0.8ms



Bus Parameter Settings

Bus Mode

Bus Profile:	PROFIBUS DP	Baud Rate:	12000.0
Number of Repeaters:	0	Line Length CU:	0.000 [km]
Number of OLMs/OPTs:	0	Line Length FO:	0.000 [km]

OK | Cancel | Help | Calculate

Input Parameters

T_gui:	9	[t_bit]	Tsdr_min:	11	[t_bit]
T_set:	21	[t_bit]	Tsdr_max:	800	[t_bit]
T_slot_init:	1000	[t_bit]	Gap Factor:	10	
Retry Limit:	4		HSA:	126	
Delta Ttr:	0	[t_bit]	Correction Factor:	1.25	

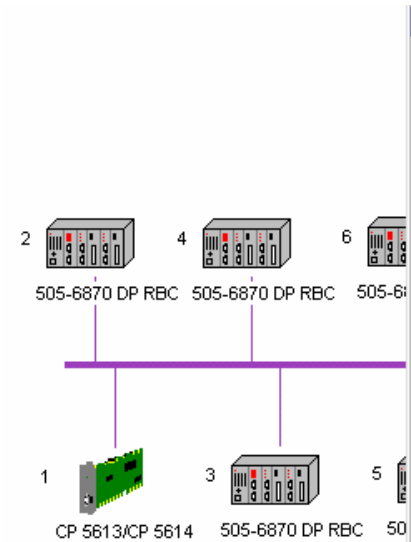
Calculated Parameters and Data Cycle Times

T_td:	99	[t_bit]	Ttr:	88445	
T_rdy:	11	[t_bit]			
T_id1:	240	[t_bit]	Typical Data Cycle Time:	0.0008	[s]
T_id2:	800	[t_bit]	Maximum Data Cycle Time:	0.0074	[s]
T_slot_eff:	1000	[t_bit]	Minimum Response Monitoring:	0.0157	[s]

PROFIBUS Basics

High-Speed Data Exchange Timing

- ✓ 10 Stations With 128 byte I/O (10,240 In/ Output Signals)
  - × Bus Cycle Time 2.0ms



Bus Parameter Settings

Bus Mode

Bus Profile:	PROFIBUS DP	Baud Rate:	12000.0
Number of Repeaters:	0	Line Length CU:	0.000 [km]
Number of OLMs/OPTs:	0	Line Length FO:	0.000 [km]

OK | Cancel | Help | Calculate

Input Parameters

T_gui:	9	[t_bit]	Tsdr_min:	11	[t_bit]
T_set:	21	[t_bit]	Tsdr_max:	800	[t_bit]
T_slot_init:	1000	[t_bit]	Gap Factor:	10	
Retry Limit:	4		HSA:	126	
Delta Ttr:	0	[t_bit]	Correction Factor:	1.25	

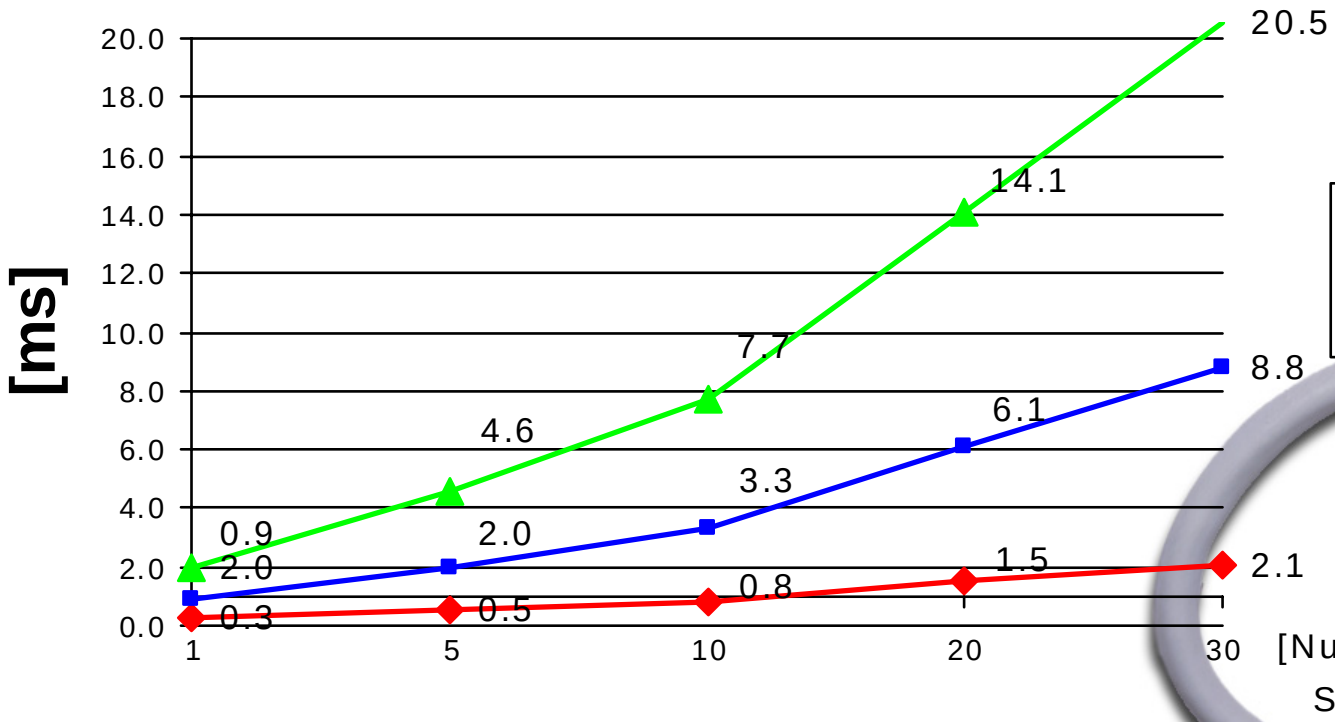
Calculated Parameters and Data Cycle Times

T_td:	99	[t_bit]	Ttr:	107545	
T_rdy:	11	[t_bit]			
T_id1:	240	[t_bit]	Typical Data Cycle Time:	0.0020	[s]
T_id2:	800	[t_bit]	Maximum Data Cycle Time:	0.0090	[s]
T_slot_eff:	1000	[t_bit]	Minimum Response Monitoring:	0.0187	[s]

PROFIBUS Basics

High-Speed Data Exchange Timing

✓ Typical Cycle Time - Each Station With 2 Byte I/O



PROFIBUS Basics

PROFIBUS Summary

- ✓ Extensive Parameterization Features
- ✓ Extensive Diagnostic Features
- ✓ Fail-Safe Behavior
- ✓ Deterministic
- ✓ Fast (Up to 12 MBaud)
- ✓ Safe and Reliable
- ✓ Easy Configuration
- ✓ Capabilities for Complete Plant Solution from Cell to Bit Level