

**PROFlenergy**



***PROFlenergy***

**Efficient Energy  
Management  
Based On  
PROFINET**

- Motivation
- Experience
- Use Cases
- Protocol
- Example
- Benefit



# SIEMENS



# Lenze



13 companies with a total of 26 participants are currently represented in the WG

Motivation

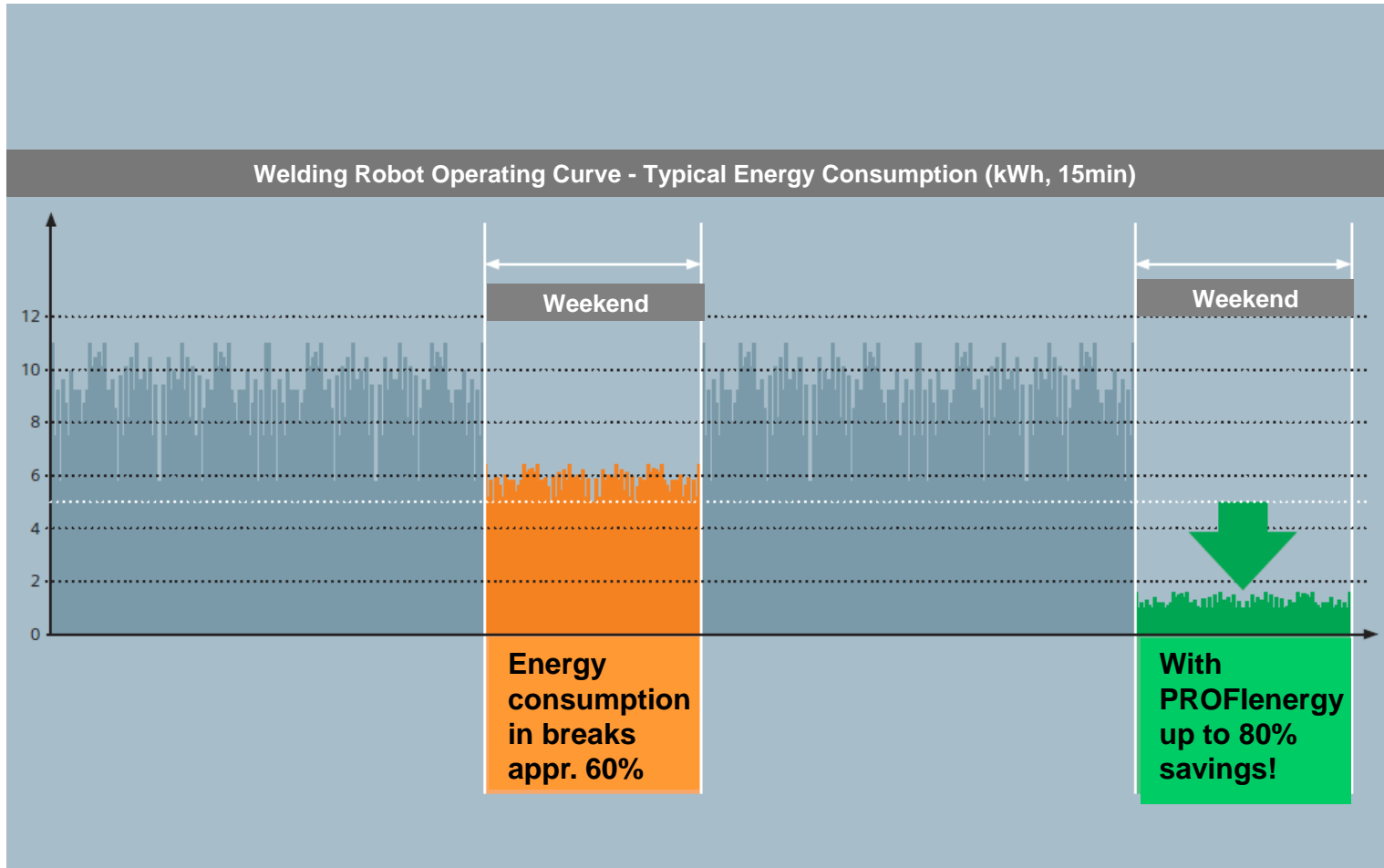
Experience

Use Cases

Protocol

Example

Benefit



Energy consumption during breaks approx. 60%!

Motivation

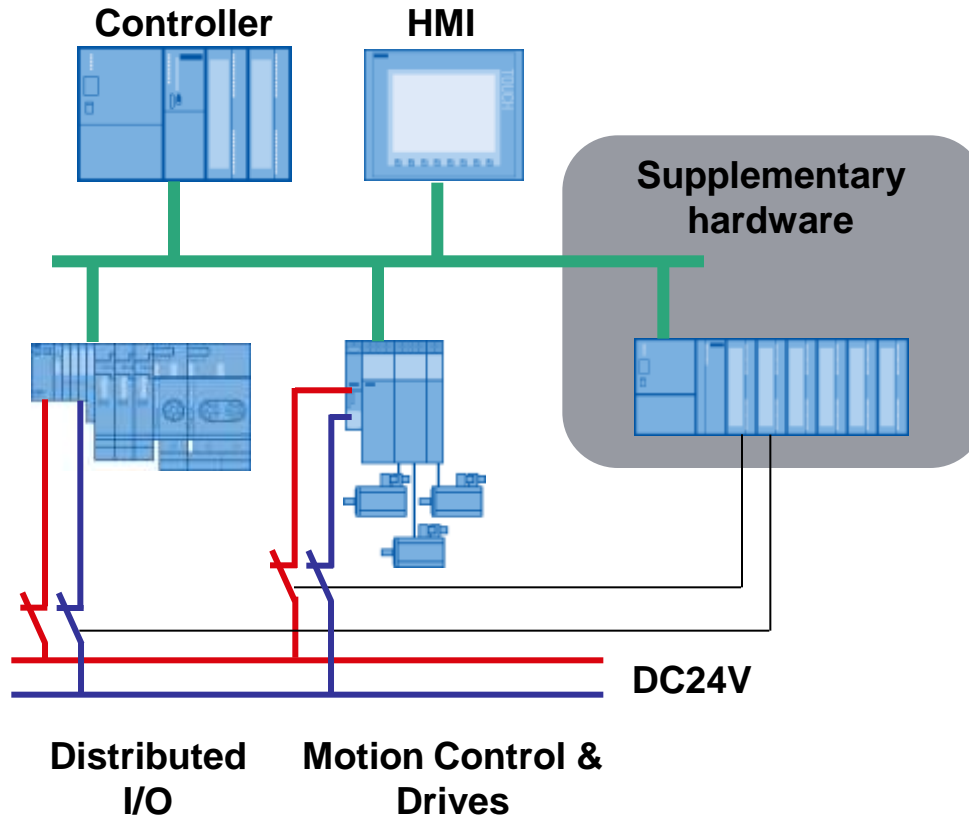
Experience

Use Cases

Protocol

Example

Benefit



## Use of external hardware:

- Requires space and money
- Engineering and maintenance required
- Individual program

## Manual switch-off:

- Time-consuming
- Start-up unreliable
- Frequently only one main switch

Measures taken are application specific.

Cost soon outweighs the actual savings.



Motivation

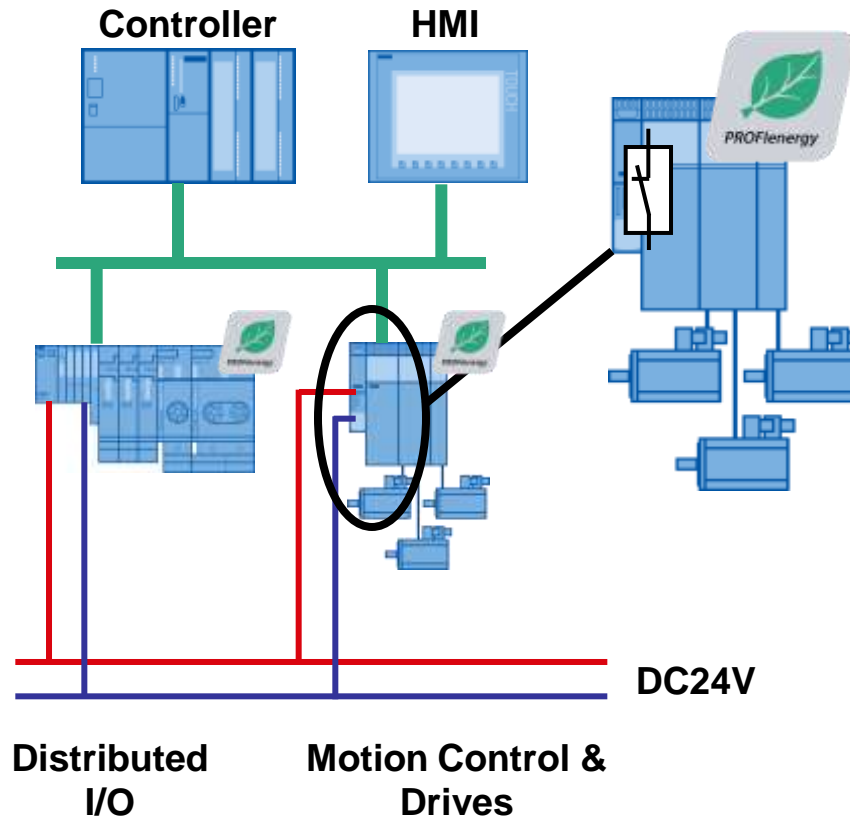
Experience

Use Cases

Protocol

Example

Benefit



- **Cost savings** through omission of external hardware
- **Energy saving** even in short pauses thanks to granular switching
- **High system reliability** through coordinated switching
- **Investment safeguarding** through simple reaction-free integration into existing standards
- **Free selection of device** through vendor-independent standard

PROFlenergy gives the opportunity to react flexibly to break times, through switching-off of non-required loads!



Motivation

Experience

Use Cases

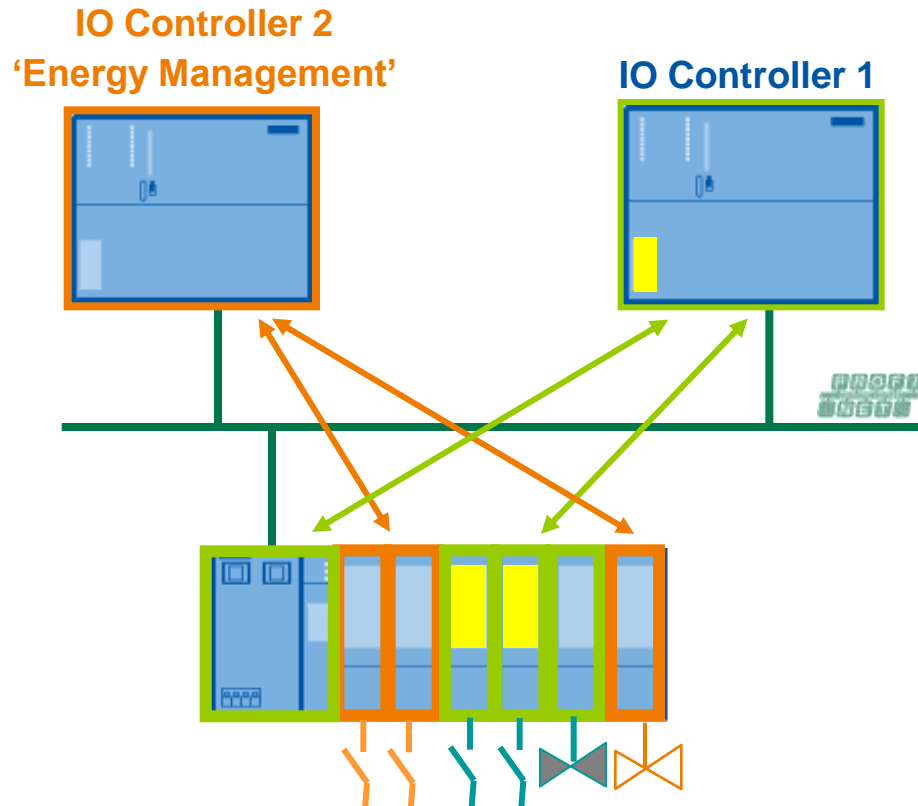
Protocol

Example

Benefit

## Access to one device from several controllers

- Flexible assignment of channels and modules to different controllers
- For inputs and outputs



- Motivation
- Experience
- Use Cases
- Protocol
- Example
- Benefit

### HW Project 2

Steckplatz	Baugr...	Bestellnummer	E-Adres...	A-Adr...	Diagno...	K...	Zugriff
0	Kuchen	6ES7 151-3BA23-0AB			2034*	voll	
X1	PN-IO				2033*	voll	
X1 P1 R	Port 1				2036*	voll	
X1 P2 R	Port 2				2035*	voll	
1	PM-E DC24V/48V/ AC24/230V	6ES7 138-4CB00-0AB0				...	
2	2AI TC HF	6ES7 134-4NB01-0AB0				...	
3	2AO I HF	6ES7 135-4MB02-0AB0				...	
4	4DI DC24V/0,5A ST	6ES7 131-4BD00-0AA0	24.0...24.3			voll	

### HW Project 1

Steckplatz	Baugruppe	Bestellnummer	E-Adr...	A-Adr...	Diag...	K...	Zugriff
0	Kuchen	6ES7 151-3BA23-0AB			2032*	...	
X1	PN-IO					...	
X1 P1 R	Port 1					...	
X1 P2 R	Port 2					...	
1	PM-E DC24/48V/ AC24/230V	6ES7 138-4CB00-0AB0			2032*	voll	
2	2AI TC HF	6ES7 134-4NB01-0AB0	260...263			voll	
3	2AO I HF	6ES7 135-4MB02-0AB0		260...263		voll	
4	4DI DC24V ST	6ES7 131-4BD00-0AA0				...	

### Properties - Kuchen

Slot / Name	Value
(0) Kuchen	Full
(X1) PN-IO	Full
(X1 P1 R) Port 1	Full
(X1 P2 R) Port 2	Full
(1) PM-E DC24/48V/ AC24/230V	...
(2) 2AI TC HF	...
(3) 2AO I HF	...
(4) 4DI DC24V ST	Full
(5) 4DO DC24V/0,5A ST	...
(6) PM-E DC24/48V/ AC24/230V	...



- Motivation
- Experience
- Use Cases**
- Protocol
- Example
- Benefit

**Switching-off for Brief Pauses**

Optimized energy saving with fast availability

**Switching-off for Longer Pauses**

Maximum energy saving

**Switching-off for Unscheduled Pauses**

Time and duration of the break are unknown



**PROFenergy concentrates on switching-off during breaks.**

**Reading out of measured data**

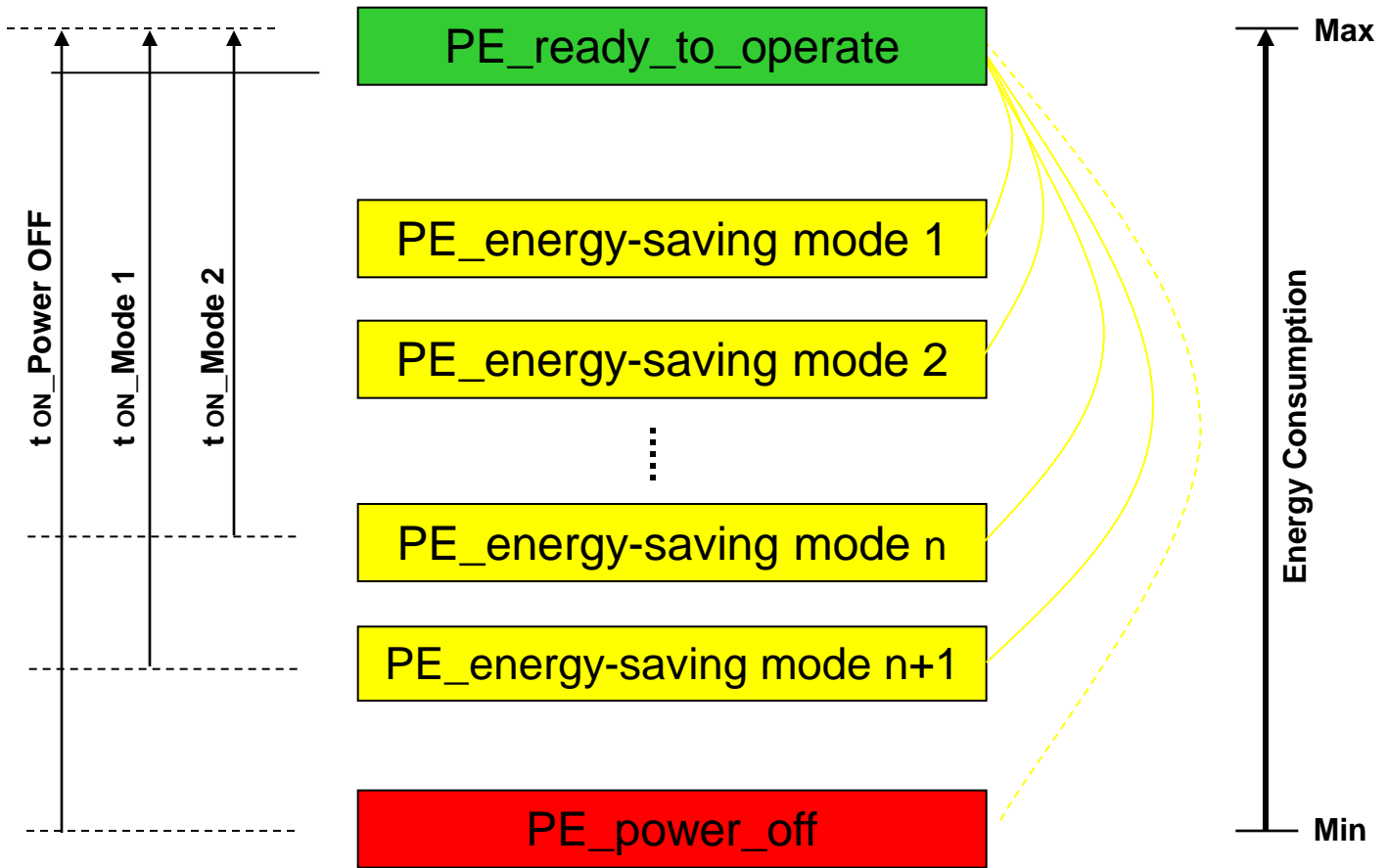
Many devices have energy measurement built in (e.g. FCs)



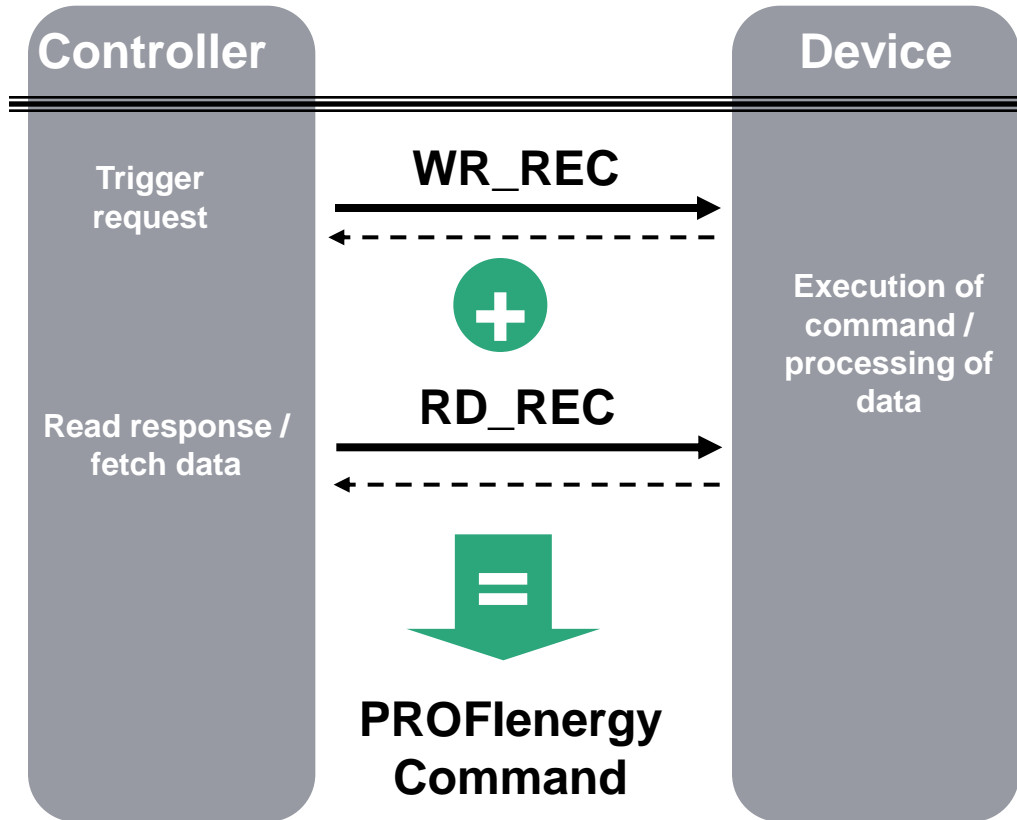
**PROFenergy is the basis for an active load management, e.g. avoiding peaks of load.**



- Motivation
- Experience
- Use Cases
- Protocol
- Example
- Benefit



- Motivation
- Experience
- Use Cases
- Protocol
- Example
- Benefit



- **Fast implementation** through use of existing PROFINET mechanisms
- **ProfiEnergy Commands** always consists of a “Write/Read Record” sequence
- **Two Control Commands** in the specification - “Start Pause” “End Pause”

System and device vendors offer corresponding blocks which conceal the protocol.



- Motivation
- Experience
- Use Cases
- Protocol
- Example**
- Benefit

## Controller



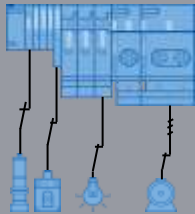
- ❑ Knows the switching response of the devices
- ❑ Coordinates switch-on and off sequences

## Conditions:

- Conveyor must be switched off 2 minutes after the robot, and switched on 2 minutes before the robot
- Start of pause: 12:00
- End of pause: 12:45

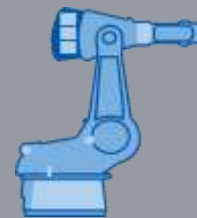


## Conveyor



- ❑ Switch-off time = 1 min
- ❑ Switch-on time = 1 min
- ❑ Minimum hold time = 2 min
- ❑ Minimum pause time thus = 4 min

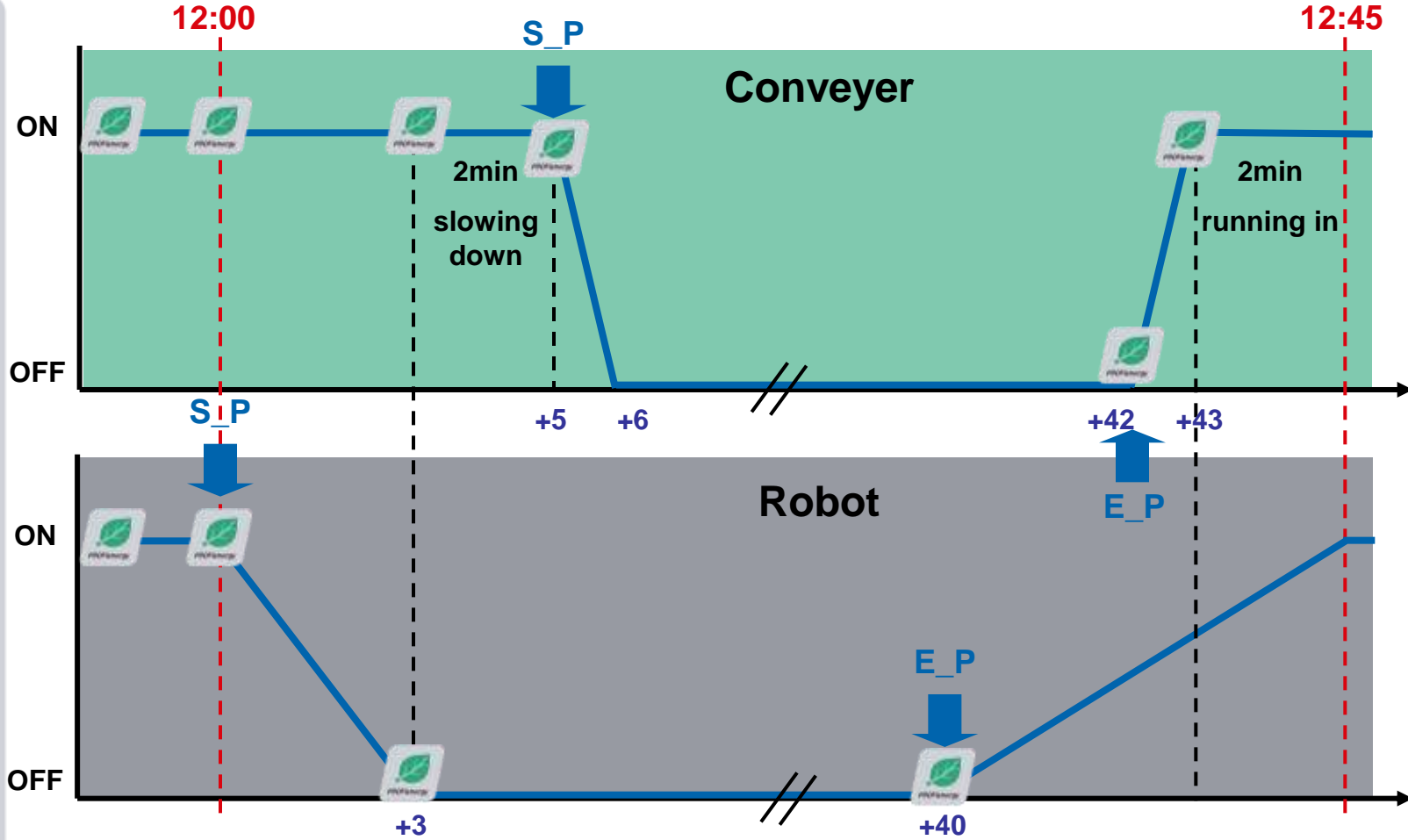
## Robot



- ❑ Switch-off time = 3 min
- ❑ Switch-on time = 5 min
- ❑ Minimum hold time = 2 min
- ❑ Minimum pause time thus = 10 min



- Motivation
- Experience
- Use Cases
- Protocol
- Example
- Benefit



**PROFlenergy also permits coordination of dependencies.**



Motivation  
Experience  
Use Cases  
Protocol  
Example  
**Benefit**

- **Competitive advantage ...**
  - ... through marketing of low-energy machines.
- **Safeguarding Investment ...**
  - ... through simple expansion of existing products and programs
- **Low programming requirements ...**
  - ... through re-useable function blocks.
- **Fast implementation ...**
  - ... through integration into known products and existing mechanisms
- **Free choice of manufacturer and devices ...**
  - ... through manufacturer independent standard
- **Environmental protection ...**
  - ... through lowering energy consumption and CO<sub>2</sub> emissions

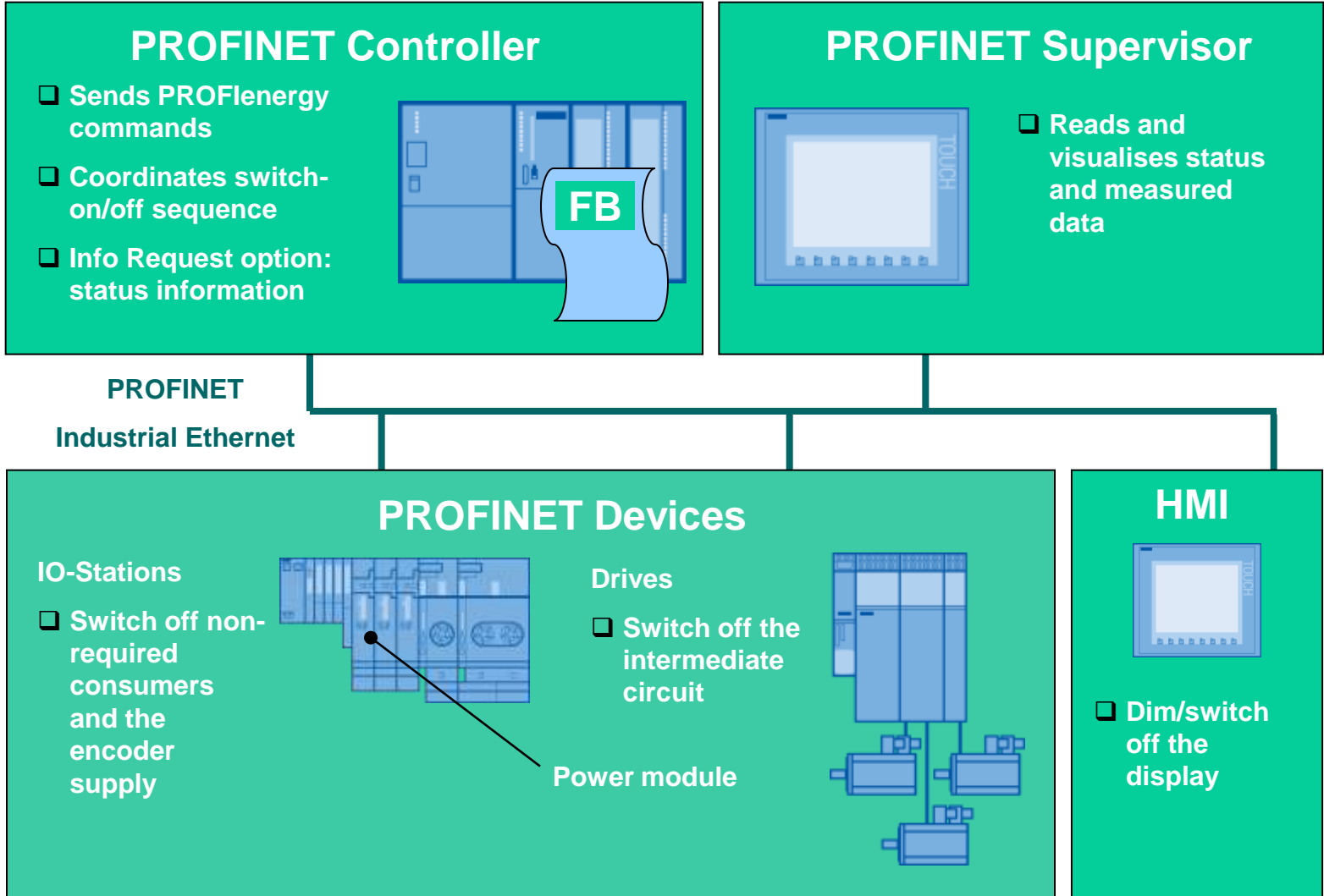


- Motivation
- Experience
- Use Cases
- Protocol
- Example
- Benefit**

- **Installation savings...**  
... eliminates the disadvantages of conventional systems
- **Operational savings...**  
... available from light and heavier power consumption
- **Asset Protection...**  
... switching functions are integrated in devices
- **Fast Return On Investment...**  
...as cost savings are potentially significant.
- **Peak Load Management...**  
...measurement used to reduce energy consumption



- Motivation
- Experience
- Use Cases
- Protocol
- Example
- Benefit



**PROFlenergy**



***PROFlenergy***

**Efficient Energy  
Management  
Based On  
PROFINET**