

PROFlenergy



PROFlenergy

**Efficient Energy
Management
Based On
PROFINET**

Motivation
Experience
Use Cases
Protocol
Example
Benefit



SIEMENS

Rexroth
Bosch Group



Lenze

SEW
EURODRIVE



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



Motivation

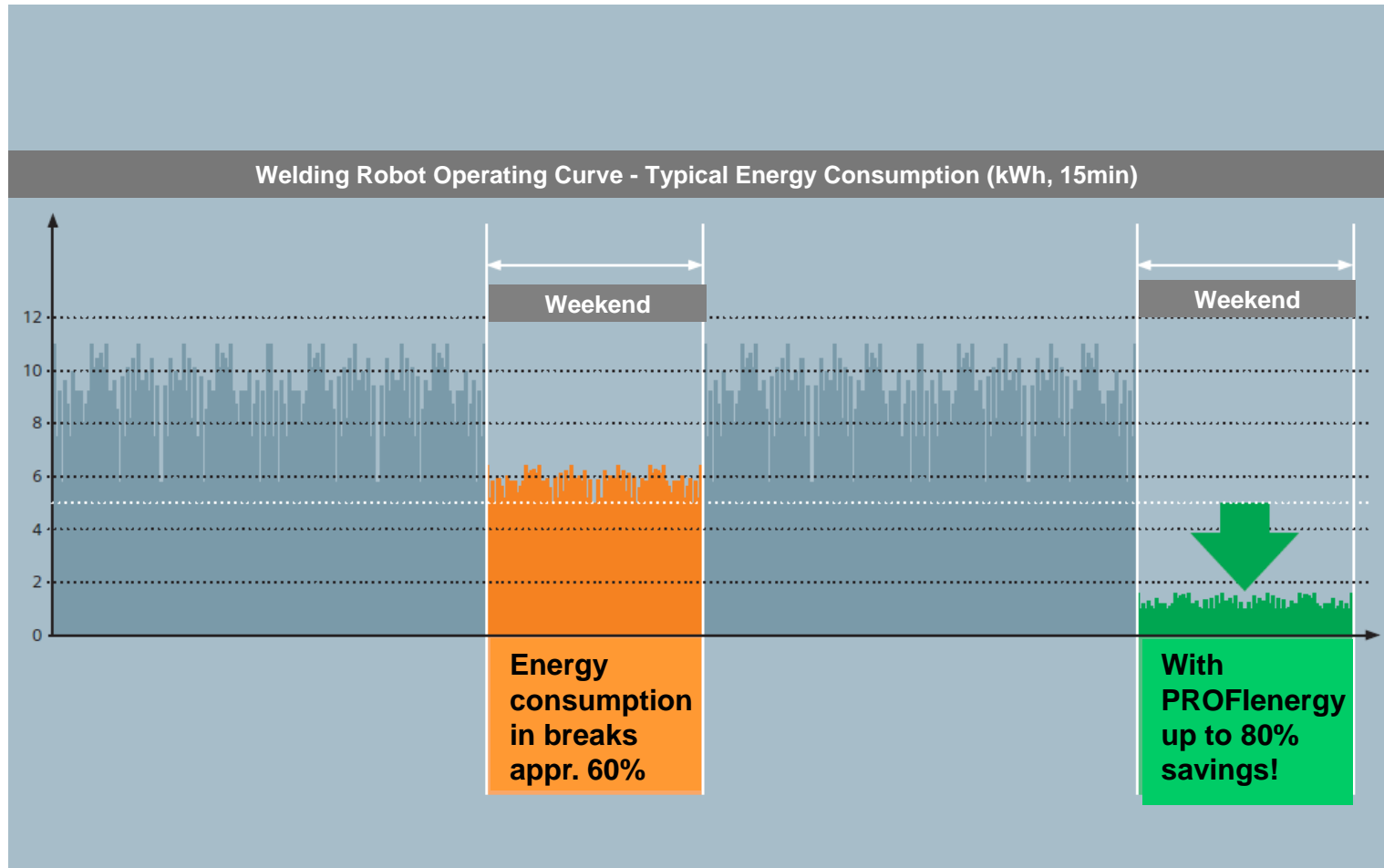
Experience

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Energy consumption during breaks approx. 60%!

Motivation

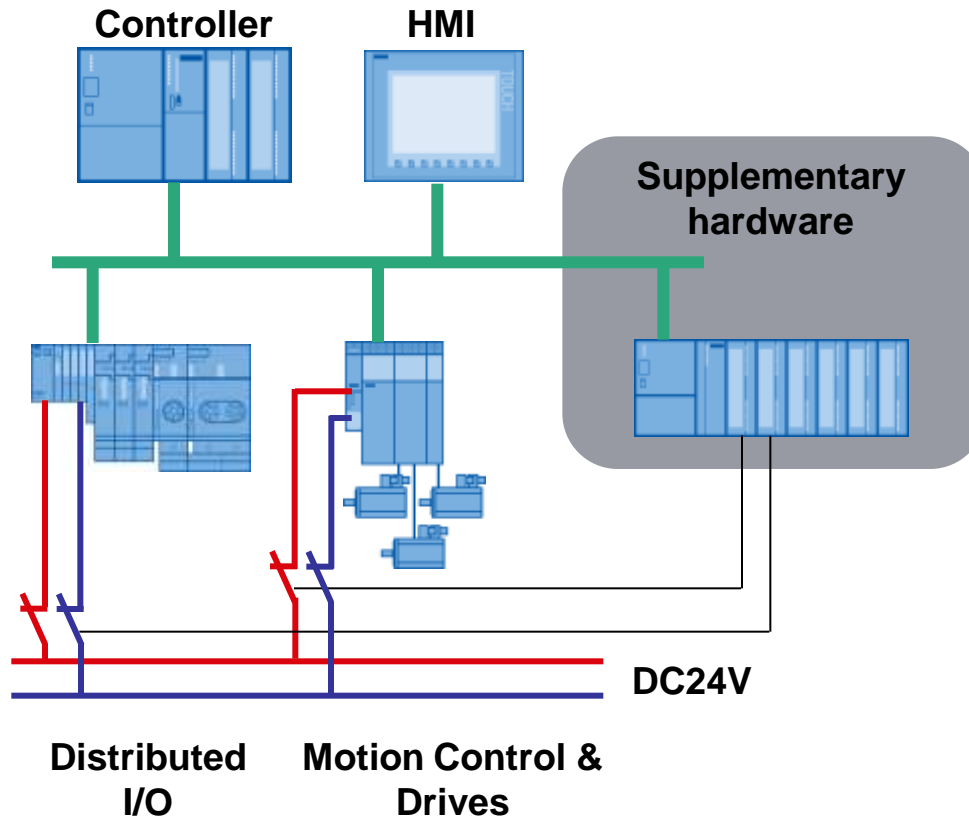
Experience

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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

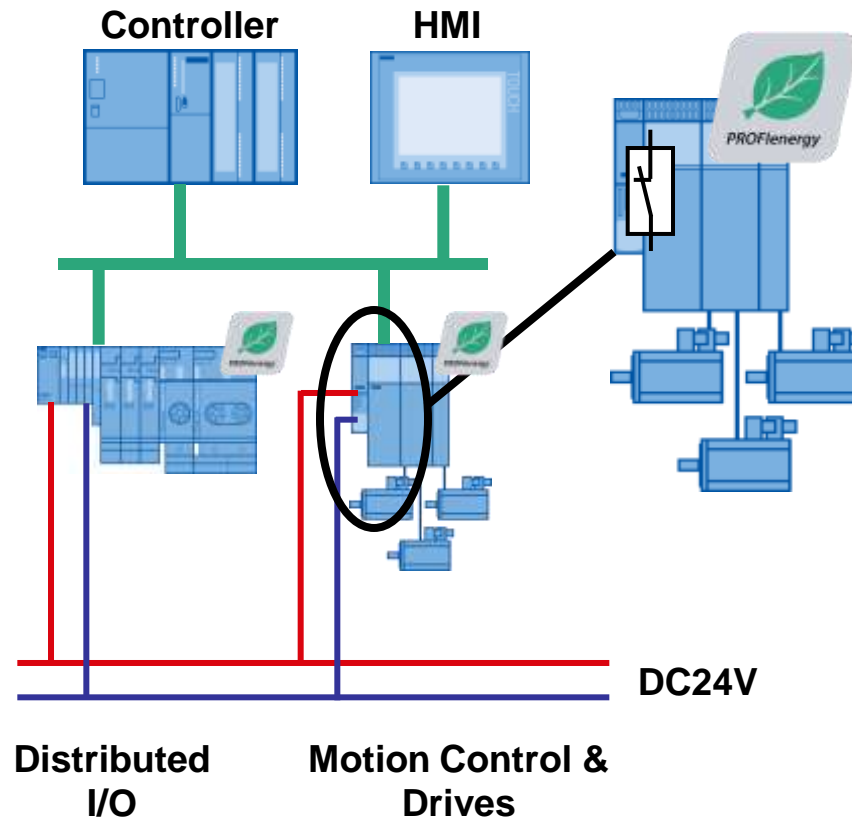
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- **Cost savings** through omission of external hardware
- **Energy saving** even in short pauses thanks to granular switching
- **High system reliability** through coordinated switching
- **Investment safeguarding** through simple reaction-free integration 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!

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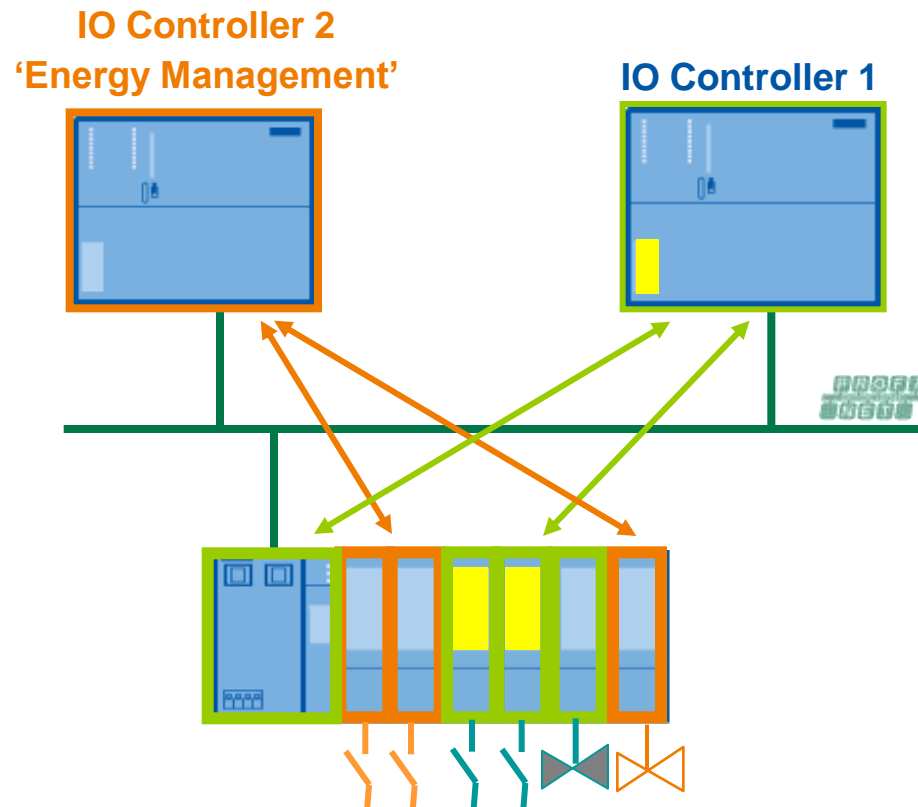
Example

Benefit



■ Access to one device from several controllers

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



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HW Project 2

Steckplatz	Baugr.	Bestellnummer	E-Adr...	A-Adr...	Diagno...	K...	Zugriff
0	Kuchen	6ES7 151-3BA23-0AB0			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/ AC24V/230V	6ES7 138-4CB00-0AB0					...
2	2AI TC HF	6ES7 134-4NB01-0AB0					...
3	2AO I HF	6ES7 135-4MB02-0AB0					...
4	4DI DC24V	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 151-3BA23-0AB0			2032*		...
X1	PN-IO						...
X1 P1 R	Port 1						...
X1 P2 R	Port 2						...
1	PM-E DC24V/48V/ AC24V/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					...

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 DC24V/48V/ AC24V/230V	...
(2) 2AI TC HF	...
(3) 2AO I HF	...
(4) 4DI DC24V ST	Full
(5) 4DO DC24V/0,5A ST	...
(6) PM-E DC24V/48V/ AC24V/230V	...



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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.

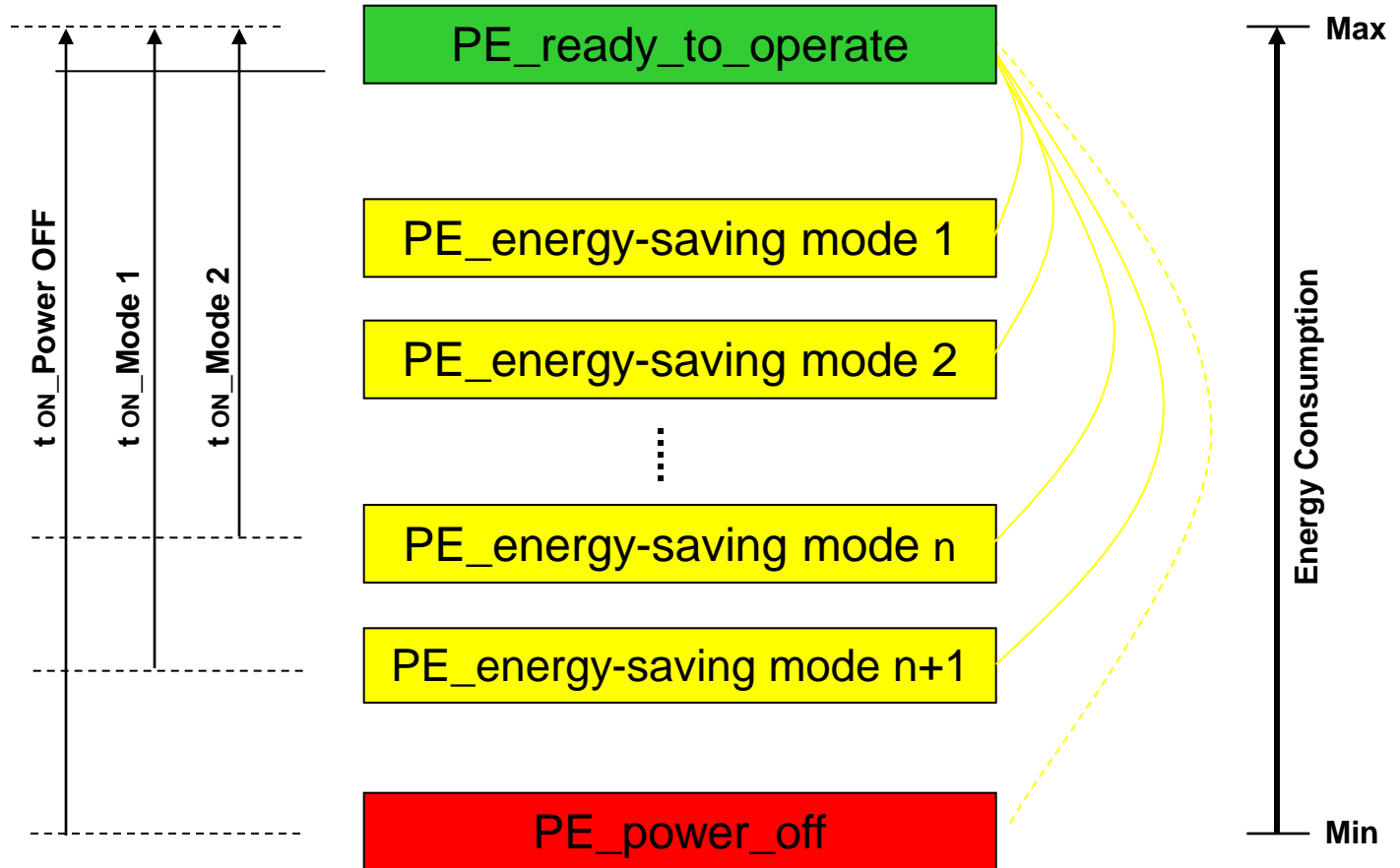
**Reading out of measured
data**

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

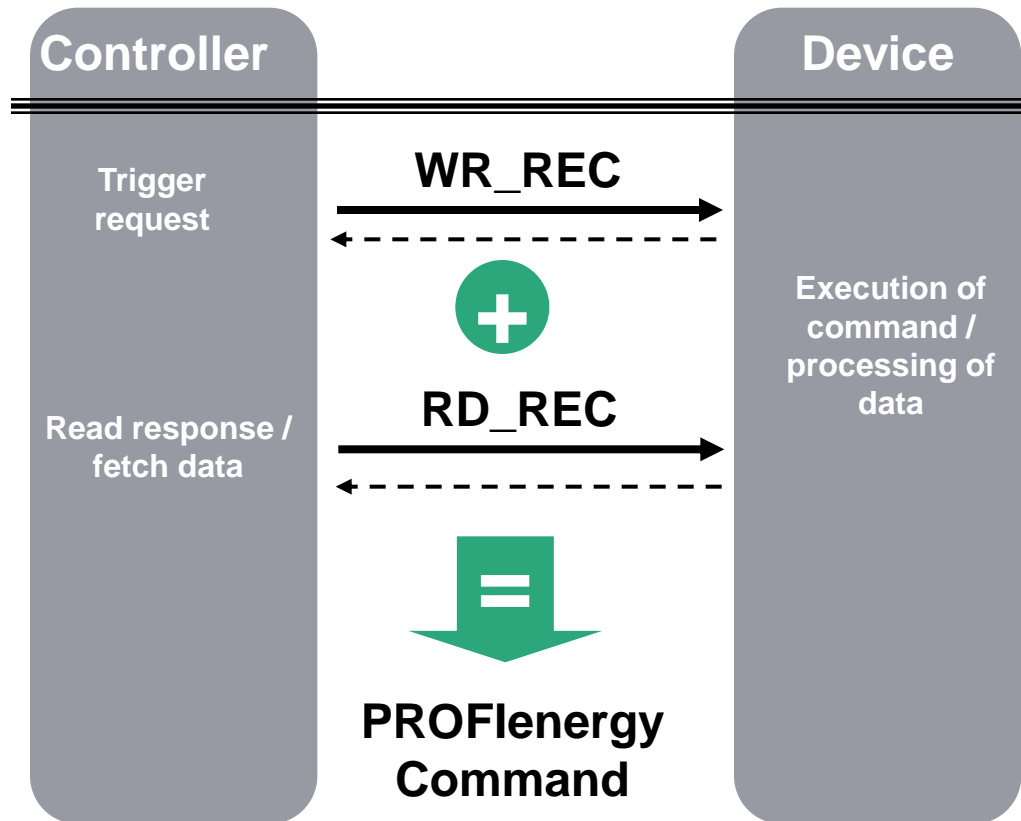
**PROFenergy is the basis for an active load management,
e.g. avoiding peaks of load.**



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- **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.



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Controller



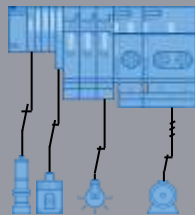
- ❑ Knows the switching response of the devices
- ❑ Coordinates switch-on and off sequences

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

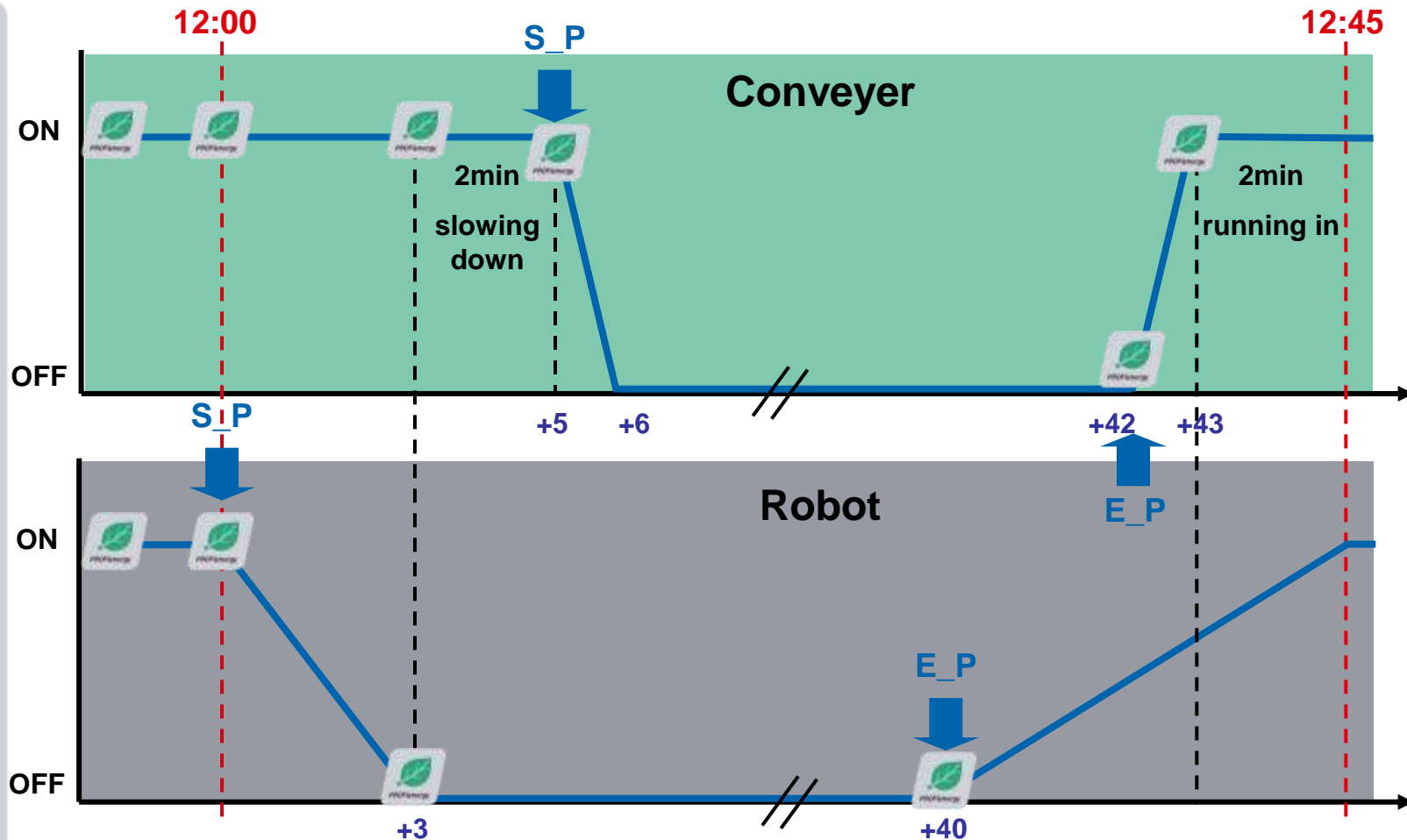
Robot



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



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PROFlenergy also permits coordination of dependencies.

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- **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 CO₂ emissions



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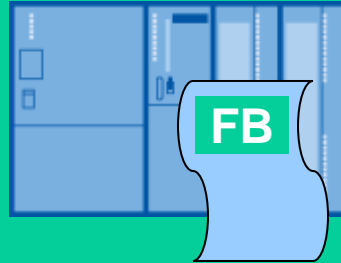
- **Installation savings...**
.... eliminates the disadvantages of conventional systems
- **Operational savings...**
... available from light and heavier power consumption
- **Asset Protection...**
... switching functions are integrated in devices
- **Fast Return On Investment...**
...as cost savings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



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PROFINET Controller

- ❑ Sends PROFlenergy commands
- ❑ Coordinates switch-on/off sequence
- ❑ Info Request option: status information



PROFINET Supervisor



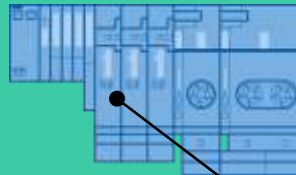
- ❑ Reads and visualises status and measured data

PROFINET
Industrial Ethernet

PROFINET Devices

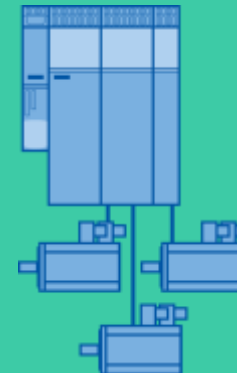
IO-Stations

- ❑ Switch off non-required consumers and the encoder supply



Drives

- ❑ Switch off the intermediate circuit



Power module

HMI



- ❑ Dim/switch off the display



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