

Energy Control Pack

V 01.00

BOM Energy Control Pack - Compact -



Energy Control Pack

Energy Control for Industrial Applications

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Energy Control Pack

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Energy Control

Description of the Energy Control Pack

The first Energy Control Pack (ECP) was designed in 1978 and started the long tradition and several tens of references in the field of electric demand systems. Technology has made a large progress and the third generation of these systems has already been developed since then.

The ECP key feature is the limitation of the power consumption which results in reduction of electric bills, especially outstanding for consumers with irregular consumption.

Electricity distributors tend to reach regular transfer of electric energy over the network. Therefore, they provide financial stimulation in a way that consumers are penalized for irregular consumption with high power peaks. Figure 1 represents an example of electrical energy consumption time history.

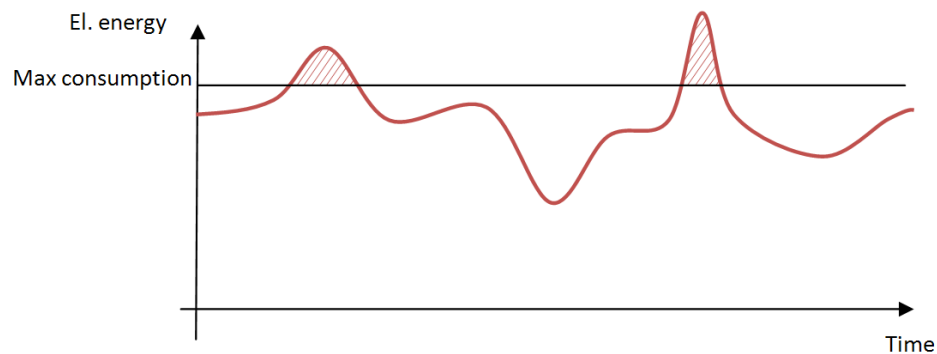


Figure 1: Electrical energy consumption time history

Industrial processes are assembled from several sub processes and each of them may consist of several loads which consume electrical energy. With the energy consumption control of these loads with minimal influence on the production, there is a possibility to straighten the electrical energy consumption flow. Figure 2 represents an example result of electrical energy consumption with load control.

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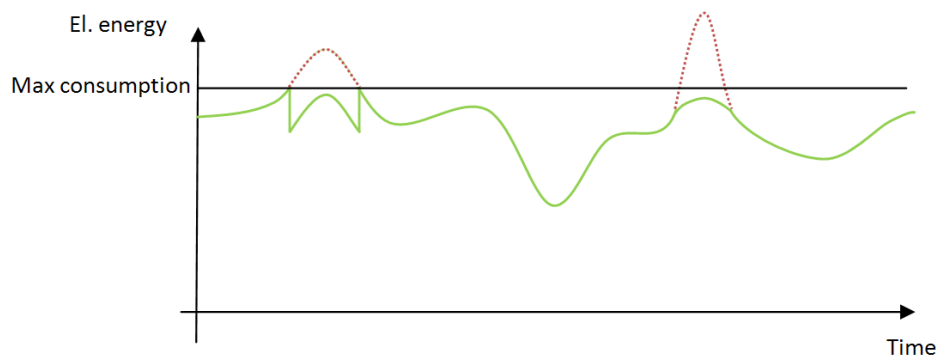


Figure 2: Electrical energy consumption with load control system

The tool for controlling load consumption is called Energy Control Pack (ECP). It is based on the maximal consumption power parameter. When consumption of electrical energy rises to the threshold value (Max consumption), the ECP system intervenes at individual loads to reduce consumption.

The power peak is charged by the Distribution System Operator (DSO). The Base for charging the energy consumption is an average power within the predefined time interval. In many countries the electricity distribution tariff system that interval is 15 min. Beside the consumed energy, consumers pay peak power for the maximum average power consumption (the average of the 15 minutes powers) in one month. In most countries the tariff system the average of three highest averaged power consumptions are used in the bill calculation.

$$C_{PP} = c_{PP} \cdot \frac{1}{n} \sum_{i=1}^n P_{MAX}[i]$$

C_{PP} ...Cost of peak power

c_{PP} ...Price of peak power

$P_{MAX}[i]$...n maximum powers (average 15 minutes powers) in one month

n...number of maximum powers used to calculate peak power in one month (3-for most countries)

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The ECP consists of the following hardware

- Programmable Logic Controller (PLC) with the Energy Control Pack algorithm. The algorithm can be applied to the Mitsubishi FX3U or the Q series controller
- Loads connected to the PLC
- Energy measurement units to connect to the PLC
- Control console (GOT) for setting up parameters of the application and to monitor the system actions
- Optionally a SCADA type web application on a separate server might be added as HMI

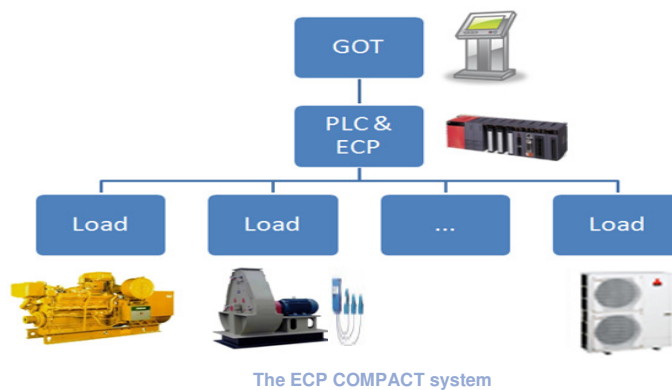


Figure 3: Architecture of the Energy Control Pack hardware

The simple system consists of one PLC, which is capable of controlling up to 16 loads. In complex systems with many loads which are dispersed on several locations, several PLCs are installed, where one is declared as a master and the rest are slaves.

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Bill of Materials Energy Control Pack - COMPACT

	Product Identification Code	Description	Page
	Hardware		
<input type="checkbox"/>	MIT	Controller FX3U-64MT/ESS Base Unit 24 VDC; 32 IN 24 VDC / 32 transistor OUT	7
<input type="checkbox"/>	MIT	FX3U-32MT/ESS Expansion Unit; 16IN / 16 Transistor OUT	7
	Optional Modules		
<input type="checkbox"/>	MIT	FX3U-ENET, Ethernet Modul TCP/IP 100MBaud	7
<input type="checkbox"/>	MIT206191	FX3U-485ADP-MB - RS485 Interface & Modbus master/ slave module	7
<input type="checkbox"/>	MIT	FX3U-64DP-M, Profibus/DP Master	7
<input type="checkbox"/>	MIT	FX3U-32DP; Profibus/DP slave	7
	Optional HMI		
<input type="checkbox"/>	MIT218491	GT1055-QSBD - 5.7" touch screen; STN 256 colors 320x240 Pixels	8
	Software		
<input type="checkbox"/>		Application Software - Energy Control Pack Energy Control Pack - Compact / Basic license with 16 loads / 1 license (CD with complete application software, documentation (maintenance, SAT, FAT, tender text), EPLAN drawing and Bill of Materials)	12
<input type="checkbox"/>	MIT-	ECP - Option for meters with digital pulses	12
<input type="checkbox"/>	MIT-	ECP - Option for meters with intelligent communication	12
<input type="checkbox"/>	MIT-	ECP - Option for intelligent communication with other systems	12

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Products

PLC Control

PID	Description	Price in €
Mitsubishi Compact PLC		
MIT206174	FX3U-16MR/DS Base Unit 24 VDC; 8 IN 24 VDC / 8 relay OUT	
MIT206136	FX3U-16MR/ES Base Unit 230 VAC; 8 IN 24 VDC / 8 relay OUT	
MIT206175	FX3U-32MR/DS Base Unit 24 VDC; 16 IN 24 VDC / 16 relay OUT	
MIT206137	FX3U-32MR/ES Base Unit 230 VAC; 16 IN 24 VDC / 16 relay OUT	
MIT206176	FX3U-48MR/DS Base Unit 24 VDC; 24 IN 24 VDC / 24 relay OUT	
MIT206138	FX3U-48MR/ES Base Unit 230 VAC; 24 IN 24 VDC / 24 relay OUT	
MIT206177	FX3U-64MR/DS Base Unit 24 VDC; 32 IN 24 VDC / 32 relay OUT	
MIT206139	FX3U-64MR/ES Base Unit 230 VAC; 32 IN 24 VDC / 32 relay OUT	
MIT206178	FX3U-80MR/DS Base Unit 24 VDC; 40 IN 24 VDC / 40 relay OUT	
MIT206140	FX3U-80MR/ES Base Unit 230 VAC; 40 IN 24 VDC / 40 relay OUT	
MIT206141	FX3U-128MR/ES Base Unit 230 VAC; 64 IN 24 VDC / 64 relay OUT	
Expansion Units with Power Supply		
MIT65568	FX2N-32ER-ES/UL - Expansion Unit with power supply AC 16 IN / 16 relay OUT	
MIT66633	FX2N-48ER-DS - Expansion Unit with power supply DC 24 IN / 24 relay OUT	
MIT65571	FX2N-48ER-ES/UL - Expansion Unit with power supply AC 24 IN / 24 relay OUT	
Expansion Units without Power Supply		
MIT166284	FX2N-8EX-ES/UL - Expansion Unit 8 IN	
MIT166285	FX2N-8ER-ES/UL - Expansion Unit 4 IN / 4 relay OUT	
MIT166286	FX2N-8EYR-ES/UL - Expansion Unit 8 relay OUT	
MIT65776	FX2N-16EX-ES/UL - Expansion Unit 16 IN	
MIT65580	FX2N-16EYR-ES/UL - Expansion Unit 16 relay OUT	
Analog Expansion Units		
MIT41790	FX0N-3A - analog Expansion Unit 2 IN / 1 OUT	
MIT153740	FX2N-5A - analog Expansion Unit 4 IN / 1 OUT	
MIT102869	FX2N-2AD - analog Expansion Unit in 2 channel	
MIT102868	FX2N-2DA - analog Expansion Unit OUT 2 channel	
MIT65585	FX2N-4AD - analog Expansion Unit IN 4 channel	
MIT65586	FX2N-4DA - analog Expansion Unit OUT 4 channel	
MIT129195	FX2N-8AD - analog Expansion Unit IN 8 channel	
MIT41790	FX0N-3A - analog Expansion Unit 2 IN / 1 OUT	
MIT153740	FX2N-5A - analog Expansion Unit 4 IN / 1 OUT	
Communication & Networks		
MIT165281	FX3U-232-BD - RS232 Interface adapter	
MIT165282	FX3U-422-BD - RS422 Interface adapter	
MIT165283	FX3U-485-BD - RS485 Interface adapter	
MIT165284	FX3U-USB-BD - USB Interface adapter	
MIT165285	FX3U-CNV-BD - Converter adapter bus	
MIT206190	FX3U-232ADP-MB - RS232 Interface & Modbus master/ slave module	
MIT206191	FX3U-485ADP-MB - RS485 Interface & Modbus master/ slave module	
MIT165288	FX-USB-AW - Interface connector USB to RS422 programming port	
MIT66640	FX2N-232-IF - RS232 Interface module no protocol	

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GOT operator panels (HMI)

PID	Description	Price in €
	GOT 1050 touch screen Operator Panel	
MIT218492	GT1050-QBBD - 5.7" touch screen; STN Mono display 16 blue scales 320x240 Pixels	
MIT218491	GT1055-QSBD - 5.7" touch screen; STN 256 colors 320x240 Pixels	
	Connection cables for GOT1000 series	
	CPU connection	
MIT163949	GT01-C10R4-8P – FX1S/FX1N/FX2N/FX3U connection cable between GOT and CPU 1m	
MIT163948	GT01-C30R4-8P – FX1S/FX1N/FX2N/FX3U connection cable between GOT and CPU 3m	
MIT163950	GT01-C100R4-8P - FX1S/FX1N/FX2N/FX3U connection cable between GOT and CPU 10m	
MIT163951	GT01-C200R4-8P - FX1S/FX1N/FX2N/FX3U connection cable between GOT and CPU 20m	
MIT163952	GT01-C300R4-8P - FX1S/FX1N/FX2N/FX3U connection cable between GOT and CPU 30m	

Energy Meters

PID	Description	Price in €
	Mitsubishi Equipment	
MIT	ME96NSR-MB Energy Measurement Node with Display, Modbus connection	
	LEM Equipment	
	MESH Gate (Long Range (L) RF power 10mW)	
LEM 90.D2.98.040.0	MESH GATE 6424 10L ID 170, Maximum number of Nodes: 10	
LEM 90.D2.98.041.0	MESH GATE 6424 100L ID 200, Maximum number of Nodes: 100	
LEM 90.D2.98.042.0	MESH GATE 6424 200L ID 220; Maximum number of Nodes: 200	
	MESH Gate (Extra Long Range (XL) RF power 100mW)	
LEM 90.D2.98.043.0	MESH GATE 6424 10XL ID 170, Maximum number of Nodes: 10	
LEM 90.D2.98.044.0	MESH GATE 6424 100XL ID 200, Maximum number of Nodes: 100	
LEM 90.D2.98.045.0	MESH GATE 6424 200XL ID 220; Maximum number of Nodes: 200	
	MESH Node with (Long (L) RF power 10mW and Extra Long Range (XL) RF power 100mW)	
LEM 90.D2.98.032.0	Mesh Node L , Long Range, RF power 10mW	
LEM 90.D2.98.033.0	Mesh Node XL, Extra Long Range, RF power 60mW	
	Energy Measurement Node with Rogowski Coil 300VAC (L1 to Neutral)	
LEM 90.C7.44.600.0	EMN 200 W4, Energy Measurement Node 4 wires, 300VAC (L1 to Neutral), 200A	
LEM 90.C7.50.600.0	EMN 500 W4, Energy Measurement Node 4 wires, 300VAC (L1 to Neutral), 500A	
LEM 90.C7.60.600.0	EMN 1000 W4, Energy Measurement Node 4 wires, 300VAC (L1 to Neutral), 1000A	
LEM 90.C7.69.600.0	EMN 2000 W4, Energy Measurement Node 4 wires, 300VAC (L1 to Neutral), 2000A	
	Energy Measurement Node with Rogowski Coil 480VAC (Line to Line)	
LEM 90.C7.44.102.0	EMN 200 D3/SP2, Energy Measurement Node, 480VAC (Line to Line), 200A	
LEM 90.C7.50.102.0	EMN 500 D3/SP2, Energy Measurement Node, 480VAC (Line to Line), 500A	
LEM	EMN 1000 D3/SP2, Energy Measurement Node, 480VAC (Line to Line), 1000A	

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90.C7.60.102.0		
LEM		
90.C7.69.102.0	EMN 2000 D3/SP2, Energy Measurement Node, 480VAC (Line to Line), 2000A	
	Accessories	
LEM		
90.D2.98.004.0	AC Adaptor EU, AC power supply (Mesh Gate and Mesh Node) for <i>Europe</i>	

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Frequency inverters FR-D740 for load with drives

PID	Description	Price in €
	FR-D740 3-Phase Compact Frequency inverters	
MIT212414	FR-D740-012-EC - Frequency inverter 380/480V - 1,2A / 0,4kW	
MIT212415	FR-D740-022-EC - Frequency inverter 380/480V - 2,2A / 0,75kW	
MIT212416	FR-D740-036-EC - Frequency inverter 380/480V - 3,6A / 1,5kW	
MIT212417	FR-D740-050-EC - Frequency inverter 380/480V - 5,0A / 2,2kW	
MIT212418	FR-D740-080-EC - Frequency inverter 380/480V - 8,0A / 3,7kW	
MIT212419	FR-D740-120-EC - Frequency inverter 380/480V - 12,0A / 5,5kW	
MIT212420	FR-D740-160-EC - Frequency inverter 380/480V - 16,0A / 7,5kW	
	FR-D740 EMC Filters	
MIT215007	FFR-CSH-036-8A-RF1 - EMC Filter FR-D740-012/022/036 Footprint Type	
MIT215008	FFR-CSH-080-16A-RF1 - EMC Filter FR-D740-050/080-EC Footprint Type	
MIT215005	FFR-MSH-170-30A-RF1 - EMC Filter FR-D740-120/160-EC Footprint Type	

Frequency inverters FR-F740 series for loads with drives

PID	Description	Price in €
	FR-F740 3-Phase Compact Frequency inverters	
MIT156569	FR-F740-00023-EC - Frequency inverter including line filter 380/480V - 2,1A / 0,75kW	
MIT156570	FR-F740-00038-EC - Frequency inverter including line filter 380/480V - 3,5A / 1,5kW	
MIT156571	FR-F740-00052-EC - Frequency inverter including line filter 380/480V - 4,8A / 2,2kW	
MIT156572	FR-F740-00083-EC - Frequency inverter including line filter 380/480V - 7,6A / 3,7kW	
MIT156573	FR-F740-00126-EC - Frequency inverter including line filter 380/480V - 11,5A / 5,5kW	
MIT156594	FR-F740-00170-EC - Frequency inverter including line filter 380/480V - 16A / 7,5kW	
MIT156595	FR-F740-00250-EC - Frequency inverter including line filter 380/480V - 23A / 11kW	
MIT156596	FR-F740-00310-EC - Frequency inverter including line filter 380/480V - 29A / 15kW	
MIT156597	FR-F740-00380-EC - Frequency inverter including line filter 380/480V - 35A / 18,5kW	
MIT156598	FR-F740-00470-EC - Frequency inverter including line filter 380/480V - 43A / 22kW	
MIT156599	FR-F740-00620-EC - Frequency inverter including line filter 380/480V - 57A / 30kW	

Frequency inverters FR-A740 series for loads with drives

PID	Description	Price in €
	FR-A740 3-Phase Compact Frequency inverters	
MIT156569	FR-A740-00023-EC - Frequency inverter including line filter 380/480V - 2,1A / 0,75kW	
MIT156570	FR-A740-00038-EC - Frequency inverter including line filter 380/480V - 3,5A / 1,5kW	
MIT156571	FR-A740-00052-EC - Frequency inverter including line filter 380/480V - 4,8A / 2,2kW	
MIT156572	FR-A740-00083-EC - Frequency inverter including line filter 380/480V - 7,6A / 3,7kW	
MIT156573	FR-A740-00126-EC - Frequency inverter including line filter 380/480V - 11,5A / 5,5kW	
MIT156594	FR-A740-00170-EC - Frequency inverter including line filter 380/480V - 16A / 7,5kW	
MIT156595	FR-A740-00250-EC - Frequency inverter including line filter 380/480V - 23A / 11kW	
MIT156596	FR-A740-00310-EC - Frequency inverter including line filter 380/480V - 29A / 15kW	
MIT156597	FR-A740-00380-EC - Frequency inverter including line filter 380/480V - 35A / 18,5kW	
MIT156598	FR-A740-00470-EC - Frequency inverter including line filter 380/480V - 43A / 22kW	
MIT156599	FR-A740-00620-EC - Frequency inverter including line filter 380/480V - 57A / 30kW	

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Programming software and Programming cables

PID	Description	Price in €
	Programming software and Programming cables	
MIT	GXDEV-FX-1ST - 1 st license GX Developer FX programming software for Compact PLC series	
MIT	GXIEC-FX-1ST - 1 st license GX IEC Developer FX programming software for Compact PLC series	
MIT43393	SC09 – Programming cable for Compact and Modular PLC series	
MIT190586	FR-CONFIGURATOR - Programming software for Mitsubishi Electric Frequency inverters	
MIT88426	SC-FR-PC - Serial Programming cable	

CD with application license, software, EPLAN drawings and documentation

PID	Description	Price in €
	CD with complete application software, documentation (maintenance, SAT, FAT, tender text), EPLAN drawing and Bill of Materials	
MIT 237076	ECP-Compact16 V0100-1L0C-E (Energy Control Pack - Compact with 16 loads / 1 license)	
MIT 237077	ECP- Option Digital Puls V0100-1L0C-E (Option for meters with digital pulses)	
MIT 237078	ECP-Option intelligent comm V0100-1L0C-E (Option for meters with intelligent communication)	
MIT 237079	ECP-Option comms other V0100-1L0C-E (Option for intelligent communication with other systems)	

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General Terms and conditions of sale

Referring to the GENERAL TERMS AND CONDITIONS OF SALE of having its registered premises at,

we ask your attention for the following points:

Prices

All prices are in Euros, exclusive VAT, inclusive packaging, free domicile within the, keeps the right to change the information and prices in this price list without foregoing notice.

Payment

Net, 30 days from date of invoice.

Additional order charge

On every order with an order value lower than € (excl. VAT) an additional order charge of € ... will be calculated.

Rush order

We calculate a € handling fee. This includes the costs for (between 9:00 – 12:00 a.m.)

Return shipments

Are only accepted with an RMA-number and our order and invoice number after consult and approval by The goods we take back will be technically checked. We will calculate € 100 for this. This amount will also partially cover the administration costs, bookkeeping and warehouse handling.