

# Rise above your energy challenges

Energy monitoring devices



- Measure more lines with fewer devices
- Accurate measurements with minimal installation space
- Monitor electrical and other forms of energy

# Energy Awareness

Measure, visualize and optimize to reduce your energy bill while gaining competitiveness with our energy monitoring solutions. A combination of hardware, software and expertise enables you to effectively manage your energy use without sacrificing production or quality.

As an energy manager, you are obliged to implement EU directive 27/2012 and ISO50001 at your site. Our energy monitoring hardware and software helps you meet these demands.



## Measure

When you measure something, you understand it and when you understand it, you can improve it. Our energy monitoring devices provide high precision energy measurements to facilitate a better understanding of your power consumption. Ask your trusted Machine Builder to integrate the measuring device that fits best.



## Visualize

Collect data using the free of charge Easy KM Manager software. Enabling you to visualize, monitor and analyse a system's energy usage.



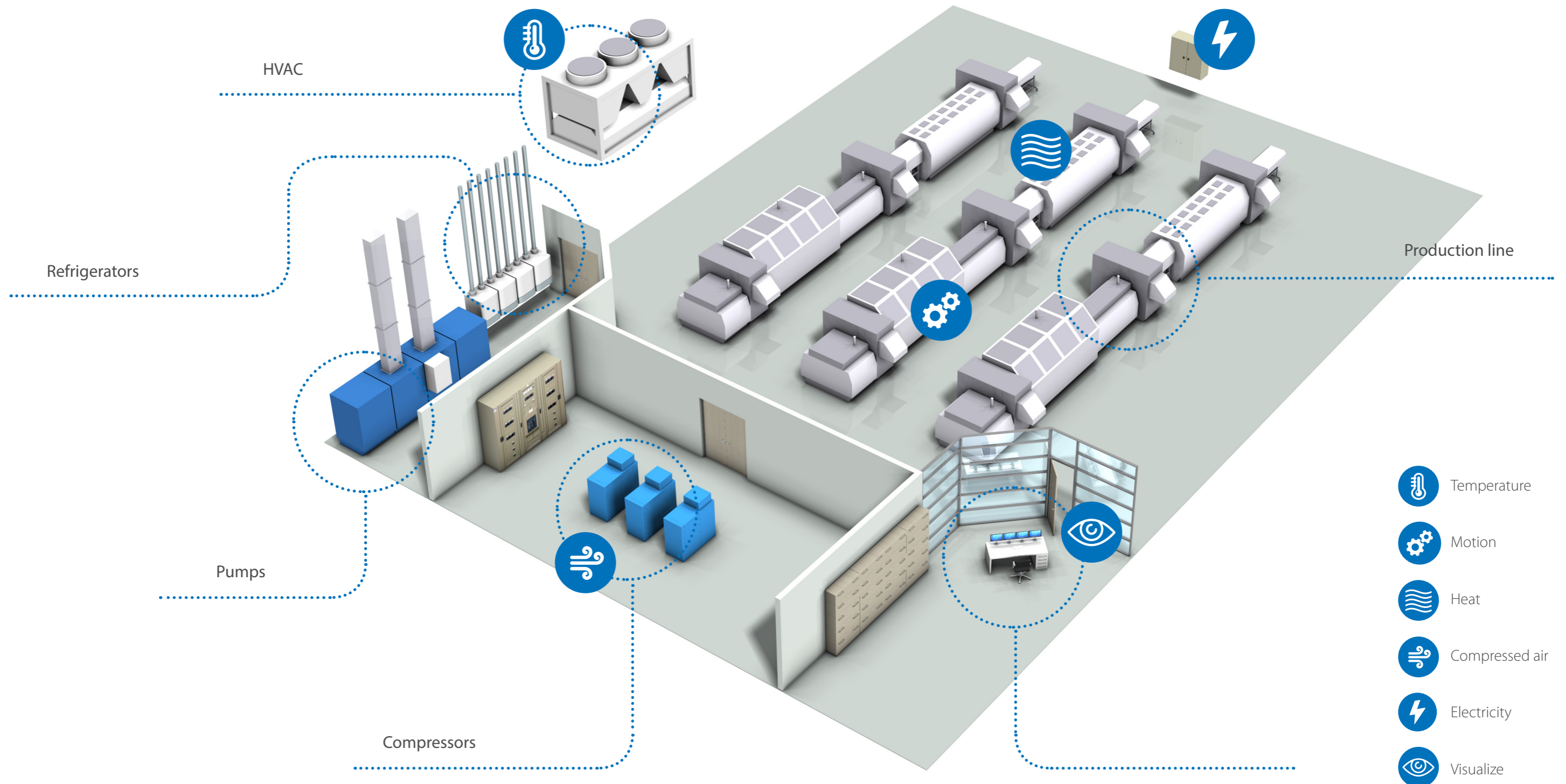
## Optimize

Implement energy management techniques to realize an immediate reduction of your energy bill. Use your trusted System Integrator or Energy Service Company (ESCO) to optimize your energy management.

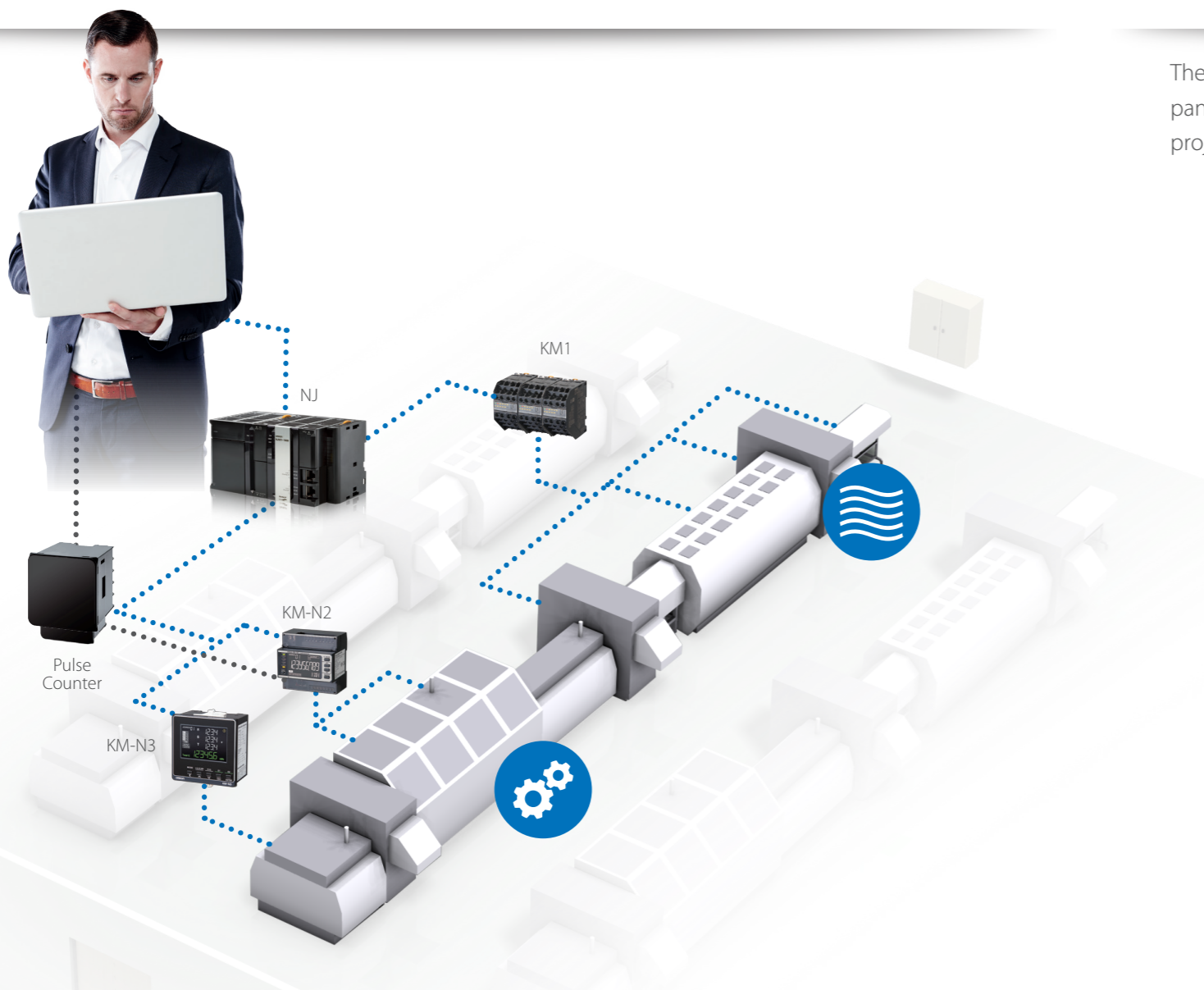


# Find energy inefficiencies at every level

Our energy monitoring devices find energy waste for both the direct and indirect processes of your entire site. The KM series of power monitoring devices have the versatility to function at multiple levels to reveal detailed information in a consistent manner.



# Smart power monitoring devices



## Over 20 years of history in Power Monitoring and Quality

Our Power Monitors were first marketed in Japan in 1992. Since then, we have continually polished our product technology and constantly improved its quality.

The result? A genuinely proven solution that not only gives our customers total confidence, but also a reliable weapon to start investigating savings and keep these constantly monitored.

# Compact Power Monitor Device

The KM-N2 and the KM-N3 are our latest power monitoring device technologies that fit every panel. Designed to give advantages to the total value chain involved in the energy monitoring projects from the designer, to the installer, to the final user.



### Fast wiring via Push-In Plus technology

Just insert the wires – no tools required. Do all your wiring in less than half the time needed with screw technology.

### Easy to insert

Our Push-in plus technology is as easy as inserting to an earphone jack – reducing your work load and improving wiring quality at the same time.

### Held firmly in place

Even though less insertion force is required than other monitoring devices with push-in technology, the wires are held firmly in place – thanks to the advanced mechanism design and manufacturing technology.



# Smart power monitoring devices

The KM series accommodates a wide range of applications, from simple measurements to high-precision power monitoring.



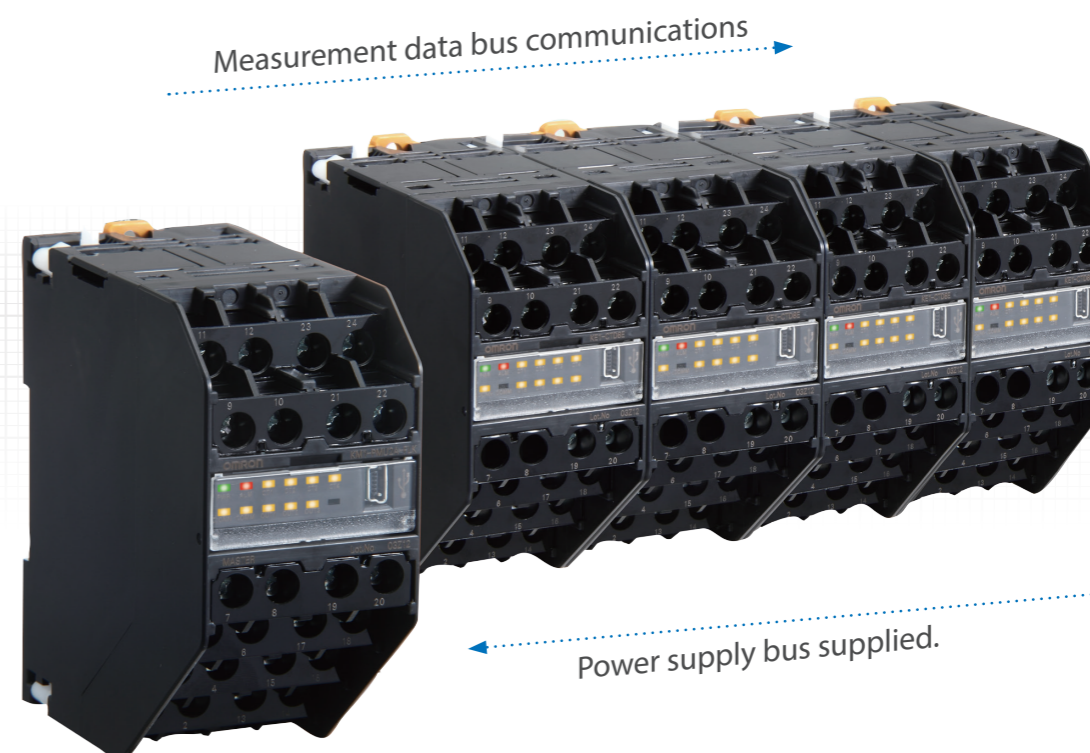
## KM1 Platform features

- Visualization of power consumption for in panel applications
- Simultaneous measurement of electric and non-electric parameters
- Master unit connects up to 4 slave units
- Multi-circuit measurements



## KM50-E1-FLK features

- Coloured display for on-panel assistance in finding actions to improve energy management
- Measure produced and consumed power, current, voltage, leading reactive power, lagging reactive power, power factor, frequency and more
- Simultaneously measure power and current



## Collect data allowing you to visualize, monitor and analyse

### Easy KM-Manager software

- Free data collection software
- Collect data directly on your computer
- Trend analysis of instantaneous values
- Graphs of energy and other data

### KM1 setup tool

- Free setting tool
- Connect the KM1 to a PC easily
- USB-powered
- Simple setting parameters



### Key Benefits of KM1 series

- Mounting space reduced by 76% compared to traditional monitoring products (in the case of single-phase, two-wire lines)
- Reduced number of devices for monitoring multiple circuits (up to 36 circuits with one platform)
- Inner bus provides high speed communication and shared power supply from the master to reduce wiring effort
- Customizable platform for various applications
- No VT required\*
- Up to 7 pulse inputs
- Free KM1 setting tool
- Install clamp-type CT (KM20 current transformer) without interrupting current flow\*



KM20

\* Applies also to KM50

# Invisible air flow is energy

Among indirect processes, compressed air typically accounts for 20% to 40% of electricity consumption with peaks of 60% to 80%. Optimizing the compressor brings to a 5-10% of energy consumption reduction.\*



D6FZ-FGS1000



D6FZ-FGT200  
D6FZ-FGT500



### D6FZ-FGS features

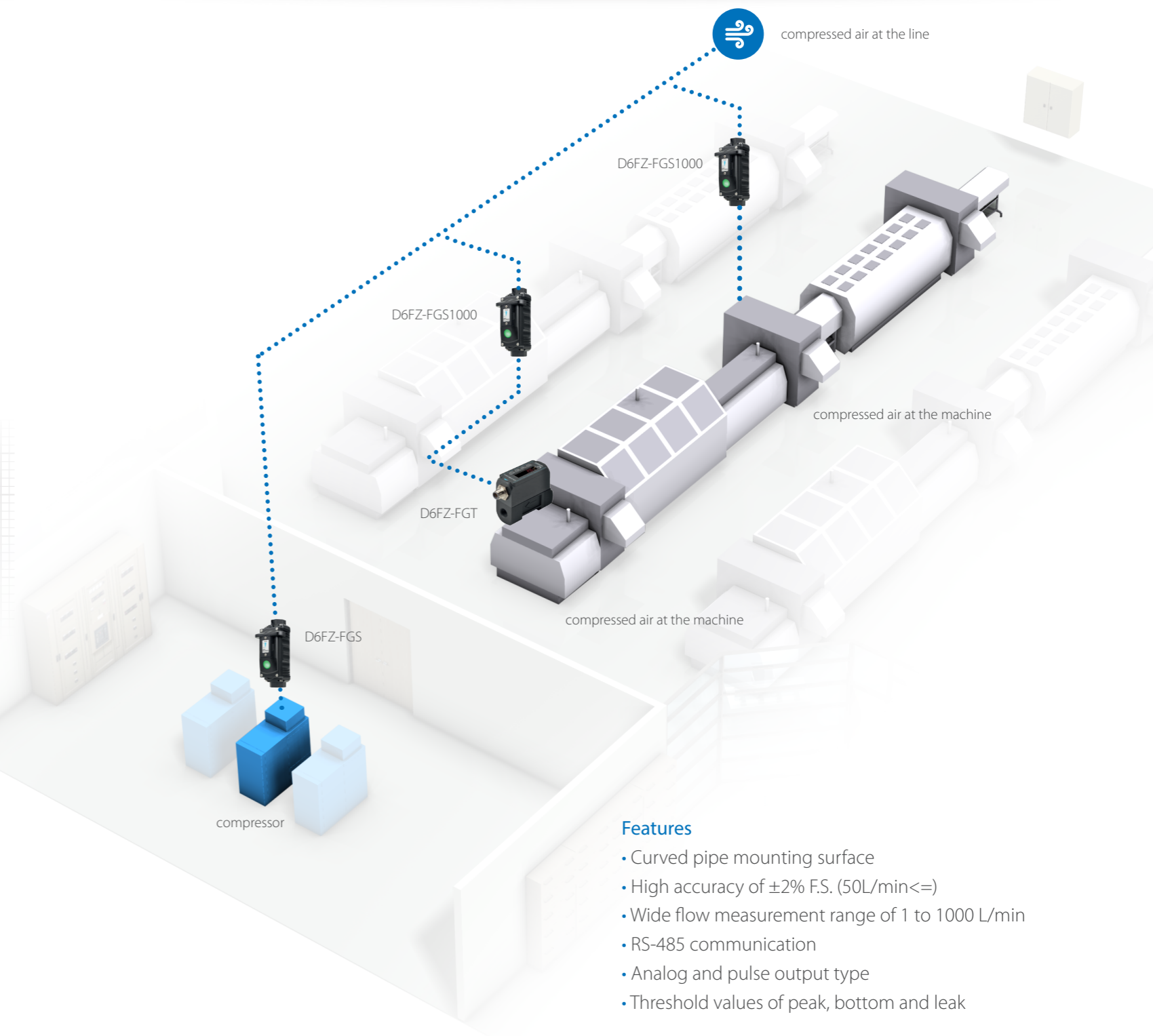
- Measure compressed air at the line level
- Detect leakage while measuring pressure and flow
- Wide measurement range of 0 to 1000 L/min

### D6FZ-FGT series features

- Measure compressed air at the machine level
- Detect leakage and measure usage
- Wide measurement range of 0 to 200 L/min and 0 to 500 L/min
- 11 segment coloured display

Compact size and high accuracy ( $\pm 2\%$  F.S. at 50 L/min or less) is achieved by D6FZ-FGT, thanks to our unique MEMS chip. This chip measures a specific deviated air flow sample – not the full air flow – resulting in very high accuracy of measurement even at low air flow levels.

\*Data provided by CertiNergia, a certified EScO belonging to CertiNergy Group.



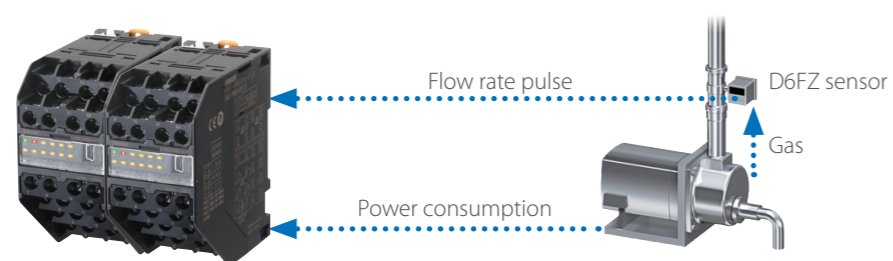
### Features

- Curved pipe mounting surface
- High accuracy of  $\pm 2\%$  F.S. (50L/min $\leq$ )
- Wide flow measurement range of 1 to 1000 L/min
- RS-485 communication
- Analog and pulse output type
- Threshold values of peak, bottom and leak

# Application examples

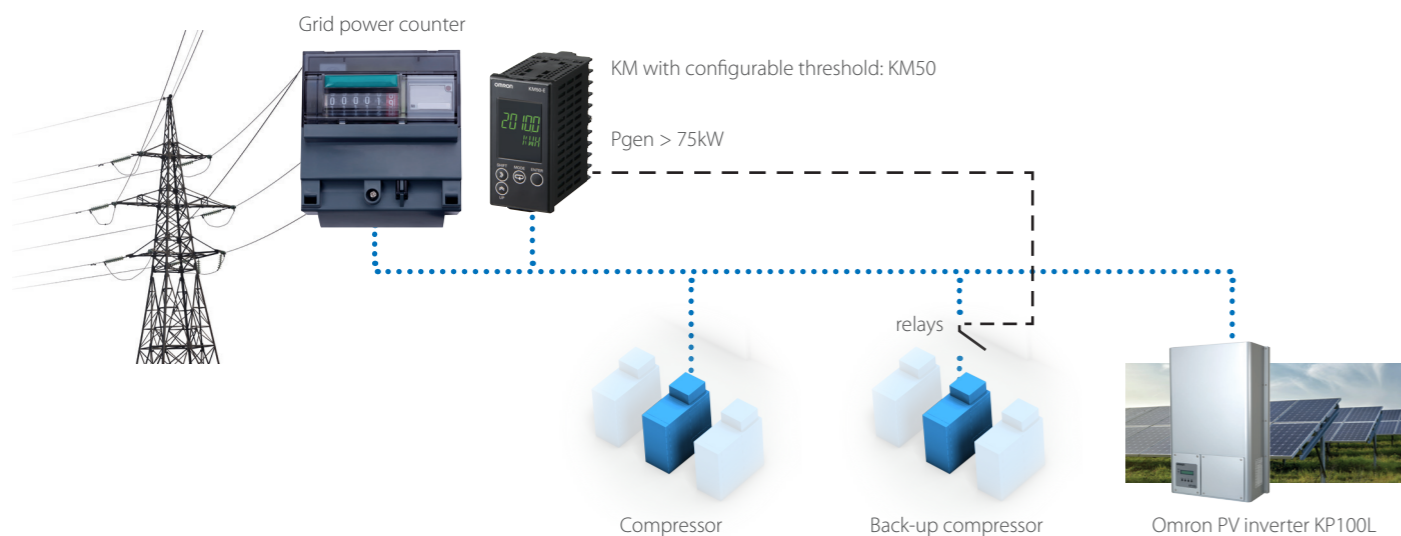
## Monitor compressor efficiency

Comparing compressor power consumption with air flow rates allows close monitoring of compressor operating efficiency. Measuring the air output and comparing with the electricity input gives you the right key performance indicators to understand the level of efficiency for your air compressor or set of air compressors. Directly connecting the digital output from a D6FZ sensor to the digital input of the KM50 and KM1 series allows you to use these power monitor devices as unique serial port interfaces to acquire electricity and air flow measurements without additional devices.



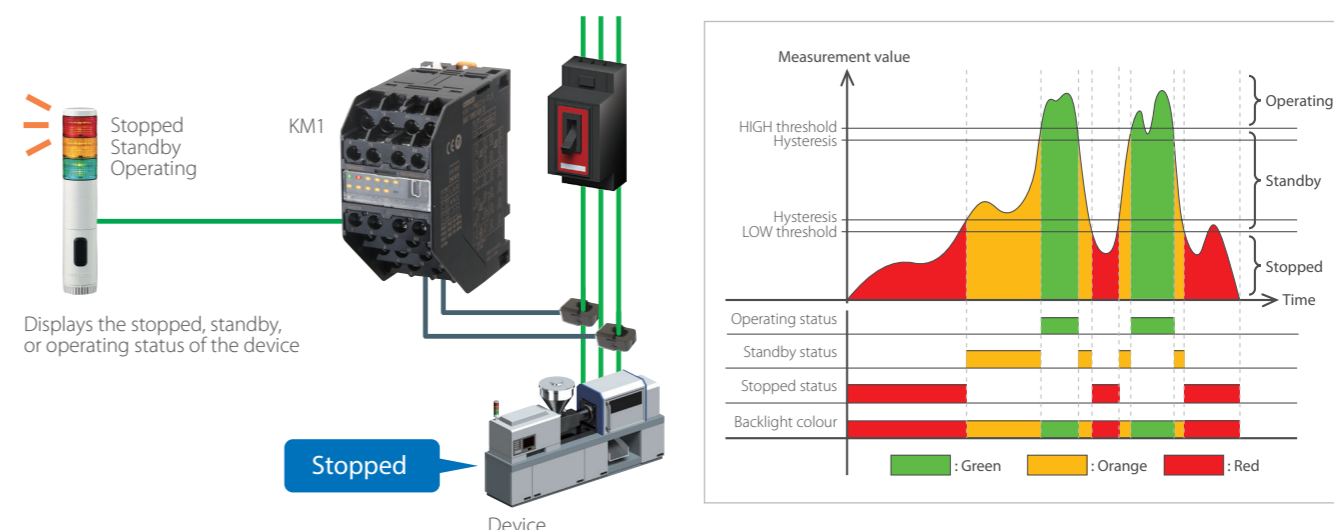
## Manage energy loads automatically

Intelligent energy management with the KM series allows you to increase the self-consumption rate from your power generation efforts. When the generated power exceeds demand, the KM alarm output can trigger supplementary tasks such as increasing compressed air capacity or other energy storage methods.



## Energy classification

The KM1 and the KM50 offer assistance in identifying wasted energy, by classifying energy usage according to the machine status, whether it is operating, stand-by, or stopped. Classification is performed by programming threshold values within the KM device directly.



For example, a company working in packaging area, producing paper-based packaging, may find that the cartoning machines are often on stand-by mode when being cleaned. Notifying to the machine operators that some parts are still powered while not producing can save up to 15-20% energy per year.

# Application examples

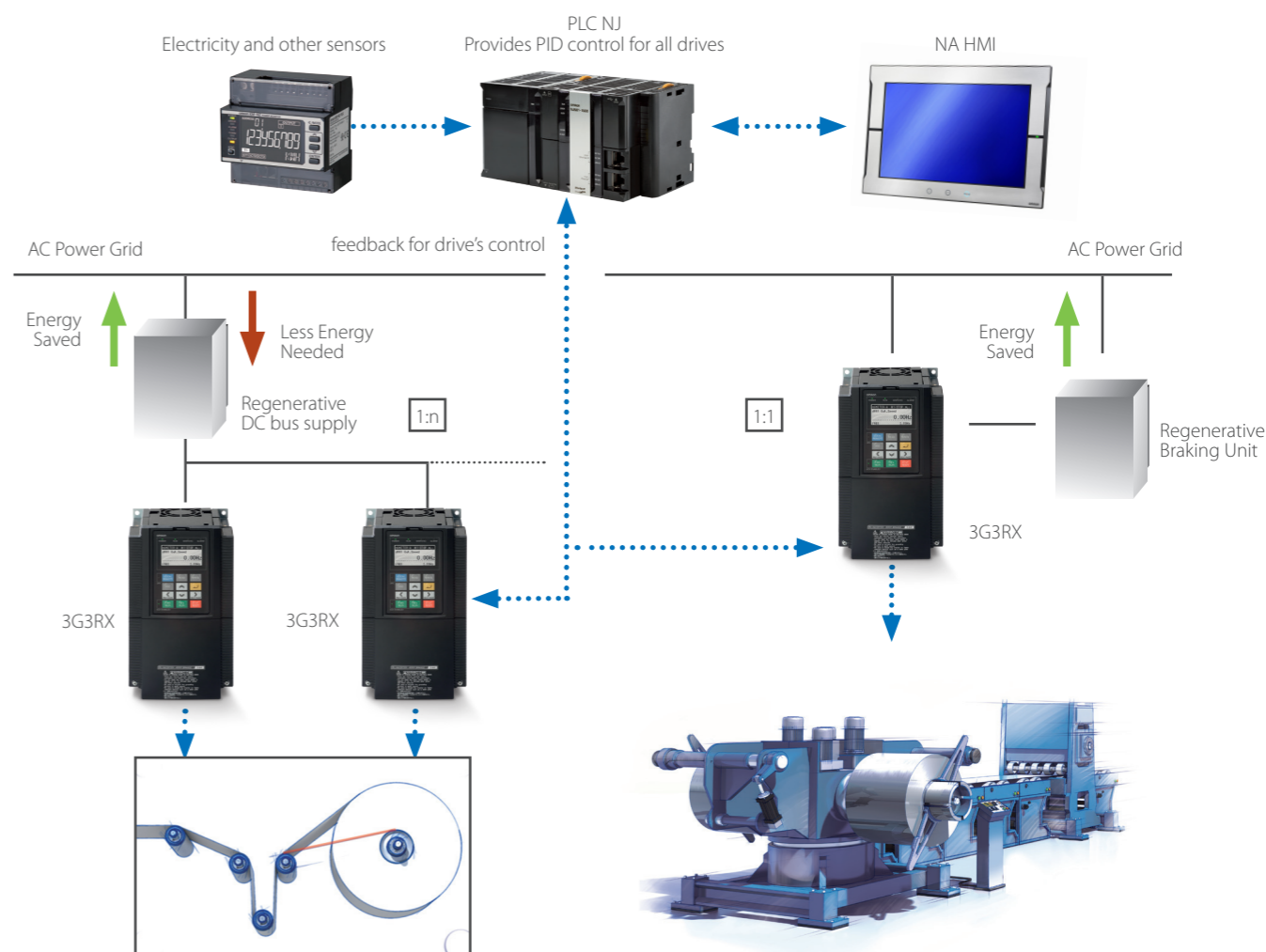
## Optimize energy consumption in the sealing machine in packaging process



When it comes to packaging processes used in the Pharma and F&B industries, it makes sense to couple the temperature regulation of the sealing bars with monitoring of heater's power consumptions. Thanks to the energy monitoring, the energy consumption associated to different settings of the machine can be immediately compared.

This way the advantage is double: not only getting the best final product out of the production line, but also to have it with the lowest power consumption, thus reducing production costs.

## Unwinder machine



During deceleration of a winding application, for example, the kinetic energy of the system is typically converted into heat and dissipated. But with regenerative units, the kinetic is converted to electrical energy and is fed into the network, increasing energy efficiency. The regenerative units are wired in parallel to the drive, replacing braking transistors / resistors and handle regenerative power only. Alternatively, you can enable the supply of several drives through the DC-Bus, with the use of just one central regenerative unit. These regenerative units can be used in several applications such as elevators, centrifuges, test stands, and winders.

The KM series measures both energy consumption and the regenerated energy with just one point of measure, thus giving you a comprehensive view of the energy efficiency improvement.



# Selection table

Function icon	Product type	Product code	Description				
Measure	Electricity	KM-N2	main device	KM-N2-FLK	Power monitor, in-panel with LED display, multi-circuit, push-in plus technology, single phase / 2-wire, three-phase / 3-wire, three-phase / 4-wire, Compoway/F and Modbus		
		KM-N3	main device	KM-N3-FLK	Power monitor, on-panel with LED display, multi-circuit, push-in plus technology, single phase / 2-wire, three-phase / 3-wire, three-phase / 4-wire, Compoway/F and Modbus		
		KM1	main device	KM1-PMU1A-FLK	Power monitor, master unit, single system, three-phase / 4-wire, Compoway/F and Modbus		
				KM1-PMU2A-FLK	Power monitor, master unit, dual system, single phase / 2-wire, three-phase / 3-wire, Compoway/F and Modbus		
				KE1-CTD8E	Power monitor, expansion unit for current transformer		
		Temperature, pulses	KM1	main device	KM1-EMU8A-FLK	Power monitor, expansion unit, pulse & temperature input, Compoway/F and Modbus	
	KE1-DRT-FLK				DeviceNet communications unit, RS-485 or DeviceNet.		
	Conversion unit						
	Electricity, temperature, pulses	KM50	main device	KM50-E1-FLK	Power monitor, on-panel with LED display, single phase / 2-wire, three-phase / 3-wire, three-phase / 4-wire, Compoway/F and Modbus		
				accessory	KM50-OPT-ED1	Mounting form for KM50 E-version (DIN rail mounting type)	
					KM50-OPT-EM1	Mounting form for KM50 E-version (magnet mounting type)	
	Electricity	KM	accessory	KM20-CTB-5A/50A*	Current transformer, in panel screw mounted installation, 5A / 50A, for cable dia. 8.4mm max		
				KM20-CTF-100A*	Current transformer, field installation, 100A, for cable dia. 14.5mm max		
KM20-CTF-200A*				Current transformer, field installation, 200A, for cable dia. 24mm max			
KM20-CTF-400A*				Current transformer, field installation, 400A, for cable dia. 35.5mm max			
KM20-CTF-50A*				Current transformer, field installation, 50A, for cable dia. 9.5mm max			
KM20-CTF-5A*				Current transformer, field installation, 5A, for cable dia. 7.9mm max			
KM20-CTF-600A*				Current transformer, field installation, 600A, for cable dia. 35.5mm max			
KM20-CTF-CB3*				Cable for current transformer, 3m			
Measure				Compressed air	D6FZ	main device	D6FZ-FGS1000
	D6FZ-FGS1000-S	Air Flow Sensor Set (1000L type) including 01 x Air Flow Sensor (1000L type), 01 x Air Flow Station, 01 x T-branch connector, 01 Single-end wire cable (3m)					
	D6FZ-FGT200	Air Flow Sensor (200L type)					
	D6FZ-FGT500	Air Flow Sensor (500L type)					
	accessory	D6FZ-FC02	T-branch connector				
		D6FZ-FC03	Mounting bracket (x1) plus screws (M3)x4 (Air Flow Sensor D6FZ-FGT only)				
		D6FZ-JD10A	Single-end wire cable (cable length 10m)				
		D6FZ-JD10B	Double-end connector cable (cable length 10m)				
		D6FZ-JD20A	Single-end wire cable (cable length 20m)				
		D6FZ-JD20B	Double-end connector cable (cable length 20m)				
		D6FZ-JD3A	Single-end wire cable (cable length 3m)				
		D6FZ-JD3B	Double-end connector cable (cable length 3m)				
		D6FZ-JD5B	Double-end connector cable (cable length 5m)				
		Visualize	Compressed air		D6FZ	main device	D6FZ-FGX21
	Visualize	Electricity	ZN		main device	ZN-KMX21-A	Power sensor station compatible with KM50, logging on SD card
Visualize	Electricity, temperature, pulses	KM50, KM1	Software	Easy KM Manager	Display graphs and download csv file from connected KM units via RS485-USB converter like the E3SC by Omron		
				Multi data viewer light	Display Graphs and download csv file from ZN and D6FZ station.		
Setting	Electricity, temperature, pulses	KM1	Software	KM1-KE1 setting	Make setting to all the KM1 units by connecting via USB cable		

\* not compatible with KM-N2 and KM-N3, compatible only with KM1 and KM50.

## KM-N2

## Multi-circuit compact power monitor



### Multi-circuit compact power monitor

- Over 20 years of history in Power Monitoring Technology.
- Compact with multi-circuit capabilities (up to 4 circuits connected to one unit).
- Solve design, installation, wiring, and commissioning issues with only one model.
- IEC 62053-22 accuracy class 0.5S
- Push-in plus technology for easy wiring
- Automatic LED and acoustic alarm in case of incorrect wiring
- Large, easy-to-read, white LCD.
- DIN rail mounting
- Bi-directional power measurement

### Ordering information

Applicable circuits and rated input voltage	Power supply voltage	Dimensions (W×H×D)	Communications	Order code
Single-phase, 2-wire: 100 to 277 VAC Single-phase, 3-wire: 100 to 240 VAC (L-N) or 200 to 480 VAC (L-L) Three-phase, 3-wire: 100 to 277 VAC (L-N) or 173 to 480 VAC (L-L) Three-phase, 4-wire: 100 to 277 VAC (L-N) or 173 to 480 VAC (L-L)	Rated input voltage 85 to 115%	90 × 65 × 90 mm	RS-485, Modbus (RTU) or Compoway/F	KM-N2-FLK

### Specifications

#### Ratings

<b>Applicable circuits</b>	Single-phase two-wire, single-phase three-wire, three-phase three-wire, and three-phase four-wire
<b>Maximum number of measured circuits<sup>*1</sup></b>	Single-phase two-wire: 4 circuits, single-phase three-wire or three-phase three-wire: 2 circuits, three-phase four-wire: 1 circuit
<b>Rated input voltages (power supply voltages)</b>	Single-phase, 2-wire: 100 to 277 VAC Single-phase, 3-wire: 100 to 240 VAC (L-N) or 200 to 480 VAC (L-L) Three-phase, 3-wire: 100 to 277 VAC (L-N) or 173 to 480 VAC (L-L) Three-phase, 4-wire: 100 to 277 VAC (L-N) or 173 to 480 VAC (L-L)
<b>Allowable supply and input voltage range</b>	85% to 115% of rated power supply voltage
<b>Power consumption</b>	7 VA max.
<b>Input current (CT2 primary-side current)<sup>*2</sup></b>	General-purpose CT: 1 A or 5 A Rated load: 0.5 VA min.
<b>Rated input frequency</b>	50/60 Hz
<b>Allowable input current</b>	6 A max.
<b>Ambient operating temperature</b>	-25 to 55°C (with no condensation or icing)
<b>Storage temperature</b>	-25 to 85°C (with no condensation or icing)
<b>Ambient and storage humidity</b>	25% to 85%
<b>Operating altitude</b>	2,000 m max.
<b>Installation environment</b>	Overvoltage category II, pollution degree 2, measurement category II
<b>Electromagnetic environment</b>	Industrial electromagnetic environment (EN/IEC 61326-1 Table 2)
<b>Compliant standards</b>	EN 61010-2-030, EN 61326-1, and UL 61010-1

\*1 A CT with a different capacity can be specified for each circuit.

\*2 The KM-series CTs (the KM20-CTF or KM-NCT series) cannot be used. Use general-purpose CTs with a secondary-side output of 1 A or 5 A.

Performance

Measurement specifications	Active power	IEC 62053-22 class 0.5S (Accuracy $\pm 0.5\%$ F.S. $\pm 1$ digit) <sup>*1</sup>
	Reactive power	IEC 62053-23 class 2 (Accuracy $\pm 2\%$ F.S. $\pm 1$ digit) <sup>*1</sup>
	Sampling cycle	80 ms for 50 Hz and 66.7 ms for 60 Hz
Measured parameters	<ul style="list-style-type: none"> <li>Active Energy import and export [kWh], bi-directional active power [kW], current [A] and voltage [V] for each individual phase, frequency [Hz], power factor, bi-directional reactive power [kVAR], reactive energy import and export [kVARh]</li> </ul>	
Insulation resistance	<ul style="list-style-type: none"> <li>Between all electrical circuits and the case: 20 M<math>\Omega</math> min. (at 500 VDC)</li> <li>Between all power supply and voltage inputs and all communications and pulse output terminals: 20 M<math>\Omega</math> max. (at 500 VDC)</li> </ul>	
Dielectric strength	<ul style="list-style-type: none"> <li>Between all electrical circuits and the case: 2,200 VAC for 1 min</li> <li>Between all voltage and current inputs and all communications and pulse output terminals: 2,200 VAC for 1 min</li> </ul>	
Vibration resistance	Single amplitude: 0.1 mm, Acceleration: 15 m/s <sup>2</sup> , Frequency: 10 to 150 Hz, 10 sweeps for 8 min each along three axes	
Shock resistance	150 m/s <sup>2</sup> , 3 times each in 6 directions (up/down, left/right, forward/backward)	
Weight	Approx. 350 g (Power Monitor only)	
Degree of protection	IP20	
Installation method	DIN Rail mounting	
Pulse output	Number of outputs	Number of outputs: 4 (photoMOS relay outputs) Used for the total power consumption pulse output.
	Output capacity	50 mA at 40 VDC ON residual voltage: 1.5 V max. (for output current of 50 mA) OFF leakage current: 0.1 mA max.
	Output unit	1, 10, 100, 1k, 5k, 10k, 50k, or 100k (wh) Pulse ON time: 500 ms (Cannot be changed.)
Communications interface	Communications method	RS-485 (2-wire half-duplex with start-stop synchronization)
	Communications protocol	Modbus (RTU): Binary, CompoWay/F: ASCII
	Baud rate	1.2, 2.4, 4.8, 9.6, 19.2, or 38.4 kbps
	Data length	Data length: 7 or 8 bits Stop bits: 1 or 2 bits Vertical parity: Even, odd, or none
	Maximum transmission distance	1,200 m <sup>*1</sup>
Maximum number of connected Power Monitors	Modbus: 99, CompoWay/F: 31	

\*1 The error of the CT or VT is not included.



Multi-circuit compact Power Monitor for on panel installation

- Over 20 years of history in Power Monitoring Technology
- Compact with multi-circuit capabilities (up to 4 circuits connected to one unit)
- Solve design, installation, wiring, and commissioning issues with only one model
- IEC 62053-22 accuracy class 0.5S
- Push-in plus technology for easy wiring
- Clear indication in case of incorrect wiring
- Large, easy-to-read, white and green LCD
- On panel mounting
- Bi-directional power measurement

Ordering Information

Power Monitor

Applicable circuits and rated voltage	Power supply voltage	Dimensions (W×H×D)	Communications	Order Code
Single-phase, 2-wire: 100 to 277 VAC Single-phase, 3-wire: 100 to 240 VAC (L-N) or 200 to 480 VAC (L-L) Three-phase, 3-wire: 173 to 480 VAC (L-L) Three-phase, 4-wire: 100 to 277 VAC (L-N) or 173 to 480 VAC (L-L)	100 to 240 VAC Separate from measurement voltage.	96 × 96 × 64 mm (excluding protrusions)	RS-485 communications, pulse output	KM-N3-FLK

Note: To use a commercially available current transformer, use a CT with a secondary current rating of 1 A or 5 A, and a rated load of at least 1.0 VA.

Specifications

Ratings

Applicable phase wiring methods	Single-phase two-wire, single-phase three-wire, three-phase three-wire, and three-phase four-wire	
Number of measured circuits	Single-phase two-wire: 4 circuits max., Single-phase three-wire or three-phase three-wire: 2 circuits max., Three-phase four-wire: 1 circuit	
Power supply voltage (operating frequency)	100 to 240 VAC (50/60 Hz)	
Power supply allowable voltage range	85% to 110% of rated power supply voltage	
Power consumption	7 VA max.	
Input	Rated input voltages	Single-phase, 2-wire: 100 to 277 VAC Single-phase, 3-wire: 100 to 240 VAC (L-N) or 200 to 480 VAC (L-L) Three-phase, 3-wire: 173 to 480 VAC (L-L) Three-phase, 4-wire: 100 to 277 VAC (L-N) or 173 to 480 VAC (L-L)
	Allowable supply voltage range	85% to 115% of rated power supply voltage
	Connectable CTs	General-purpose CT with a rated secondary current of 1 A or 5 A <sup>*1</sup>
	Maximum CT secondary current	6 A
	Rated input frequency	50/60 Hz
Ambient operating temperature	-25 to 55°C (with no condensation or icing)	
Ambient operating humidity	25% to 85%	
Storage temperature	-25 to 85°C (with no condensation or icing)	
Storage humidity	25% to 85%	
Operating altitude	2,000 m max.	
Installation environment	Overvoltage category II, measurement category II, pollution degree 2	
Electromagnetic environment	Industrial electromagnetic environment (EN/IEC 61326-1 Table 2)	
Compliant standards	EN 61010-2-030, EN 61326-1, and UL 61010-1	

\*1 The KM-series CTs (the KM20-CTF Series) cannot be used. Use general-purpose CTs with a secondary-side output of 1 A or 5 A.

Performance		
Measured items	Energy consumption (active, regenerative, and reactive), power (active and reactive), current, voltage, power factor, and frequency	
Measurement specifications	Active power	0.5% (IEC 62053-22 class 0.5S <sup>*1</sup> )
	Reactive power	2% (IEC 62053-23 class 2) <sup>*1</sup>
	Sampling cycle	80 ms for 50 Hz and 66.7 ms for 60 Hz
Insulation resistance	(1) Between all electrical circuits and the case: 20 MΩ min. (at 500 VDC) (2) Between all power supply and voltage inputs and all communications and pulse output terminals: 20 MΩ max. (at 500 VDC)	
Dielectric strength	(1) Between all electrical circuits and the case: 1,400 VAC for 1 min (2) Between all voltage and current inputs and all communications and pulse output terminals: 2,200 VAC for 1 min	
Vibration resistance	Single amplitude: 0.1 mm, Acceleration: 15 m/s <sup>2</sup> , Frequency: 10 to 150 Hz, 10 sweeps for 8 min each along three axes	
Shock resistance	150 m/s <sup>2</sup> , 3 times each in 6 directions (up/down, left/right, forward/backward)	
Indications and operation method	LCD indications and operation buttons	
Weight	Approx. 350 g (Power Monitor only)	
Degree of protection	Front: IP65, Rear case: IP20, Terminal: IP00	
Pulse output	Number of outputs	Number of outputs: 4 (photoMOS relay outputs) Used for the total power consumption pulse output.
	Output capacity	50 mA at 40 VDC ON residual voltage: 1.5 V max. (for output current of 50 mA) OFF leakage current: 0.1 mA max.
	Output unit	Output unit: 1, 10, 100, 1k, 5k, 10k, 50k, or 100k (wh) Pulse ON time: 500 ms (Cannot be changed.)
Communications interface	Communications method	RS-485 (2-wire half-duplex with start-stop synchronization)
	Communications protocol	Modbus (RTU): Binary. CompoWay/F: ASCII
	Baud rate	1.2, 2.4, 4.8, 9.6, 19.2, or 38.4 kbps
	Data length	Data length: 7 or 8 bits Stop bits: 1 or 2 bits Vertical parity: Even, odd, or none
	Maximum transmission distance	1,200 m
Maximum number of connected Power Monitors	Modbus: 99, CompoWay/F: 31 If you measure more than one circuit with one Power Monitor, the number of circuits is treated as the number of connected Power Monitors.	
Dimensions (W×H×D)	96 × 96 × 64 mm (excluding protrusions)	
Installation method	On-panel installation	
Accessories	Instruction Manual and Compliance Sheet, Mounting adapter and waterproof packing	

\*1 The error of the CT or VT is not included. IEC 62053 is an international standard for power metering.



**Multi-circuit smart power monitor**

The KM1 platform enables the visualization of power consumption for back panel applications utilizing a master-slave concept. Up to four slave units can be connected to a master unit for simultaneous measurement of electric and non-electric parameters.

- Installation time consistently reduced
- Mounting space reduced up to 24% compared to traditional monitoring products
- Reduced number of devices: one platform can measure up to 36 circuits
- Wiring reduced due to high speed inner bus communication and the power supply voltage from the master
- Customizable platform for any applications
- Integrated energy classification due to customizable internal thresholds
- High precision measurements even for currents below 5% of the nominal value.

**Ordering information**

**Smart power monitors**

Unit type	Unit category	Power supply voltage	Communications	Order code
Dual power system measurement unit	Measurement master	100 to 240 VAC	RS-485	KM1-PMU2A-FLK
Power measurement unit				KM1-PMU1A-FLK
Pulse/temperature input unit	Function slave			KM1-EMU8A-FLK
CT extension unit	CT extension slave	Power supplied from the measurement master unit	-	KE1-CTD8E
DeviceNet communications unit	Communications slave	100 to 240 VAC	RS-485 or DeviceNet	KE1-DRT-FLK

**Options (Order separately)**

**Separate or In-panel current transformer (CT)**

Rated primary current	Rated secondary current	Installation	Order code
5 A	Special output	Installed separately	KM20-CTF-5A
50 A			KM20-CTF-50A
100 A			KM20-CTF-100A
200 A			KM20-CTF-200A
400 A			KM20-CTF-400A
600 A			KM20-CTF-600A
5 A/50 A		In-panel (penetration type)	KM20-CTB-5A/50A

Note: CT cables are not included with the CTs.

**Current transformer (CT) cable**

Specification	Order code
3-m cable	KM20-CTF-CB3

Note: Use the CT cable specified by OMRON or one manufactured by JST Mfg. Co. You can also use a 1.25-B3A crimping terminal or AWG22 power cable.

**Related devices (Sold separately)**

**Communications interface converter**

Dimensions (mm)	Communications conversion	Power supply voltage	Order code
30 × 80 × 78 (W×H×D)	RS-232C, USB <-> Half-duplex RS-485	100 to 240 VAC	K3SC-10 AC100-240
		24 VAC/DC	K3SC-10 AC/DC24

Specifications

Ratings		Master unit		Slave unit	
Item		KM1-PMU2A-FLK (Dual power systems)	KM1-PMU1A-FLK (Single power system)	KM1-EMU8A-FLK (Pulses/temperatures)	KE1-CTD8E (CT extension unit)
Applicable phase wiring method		Single-phase two wire, single-phase three wire and three-phase three wire	Single-phase two wire, single-phase three wire, three-phase three wire and three-phase four wire	-	Single-phase two wire, single-phase three wire, three-phase three wire and three-phase four wire
Maximum number of CT connections		4	3	-	8
Selectable types of CT capacities		2 types	1 type	-	Two types per Slave Unit
Power supply	Rated power supply voltage	100 to 240 VAC, 50/60 Hz			-
	Allowable supply voltage range	85% to 110% of rated power supply voltage			-
	Power supply allowable frequency range	45 to 65 Hz			-
	Power consumption	Standalone: 10 VA max., Maximum expansion: 14 VA max.		10 VA max.	-
Input	Rated input voltage	100 to 480 VAC (single-phase, 2-wire): Line voltage 100/200 VAC (single-phase, 3-wire): Phase voltage/line voltage 100 to 480 VAC (3-phase, 3-wire): Line voltage	100 to 480 VAC (single-phase, 2-wire): Line voltage 100/200 VAC (single-phase, 3-wire): Phase voltage/line voltage 100 to 480 VAC (3-phase, 3-wire): Line voltage 58 to 277 VAC (3-phase, 4-wire): Phase voltage	-	-
	Rated input current (CT)	(5, 50, 100, 200, 400, or 600 A)		-	(5, 50, 100, 200, 400, or 600 A)
	Rated input power	With 5-A CT: 4 kW With 50-A CT: 40 kW With 100-A CT: 80 kW With 200-A CT: 160 kW With 400-A CT: 320 kW With 600-A CT: 480 kW		-	-
	Rated input frequency	50/60 Hz		-	-
	Allowable input frequency range	45 to 65 Hz		-	-
	Allowable input voltage	110% of rated input voltage (continuous)		-	-
	Allowable input current	120% of rated input current (continuous)		-	120% of rated input current (continuous)
Ambient operating temperature	-10 to 55°C (with no condensation or icing)				
Storage temperature	-25 to 65°C (with no condensation or icing)				
Ambient operating humidity	25% to 85%				
Storage humidity	25% to 85%				
Altitude	2,000 m max.				

Performance

Performance		Master unit		Slave unit	
Item		KM1-PMU2A-FLK (Dual power systems)	KM1-PMU1A-FLK (Single power system)	KM1-EMU8A-FLK (Pulses/temperatures)	KE1-CTD8E (CT extension unit)
Accuracy*1	Voltage	±1.0% FS, ±1 digit; or, ±2.0% FS, ±1 digit for voltage across Vtr under the same conditions			-
	Current	±1.0% FS, ±1 digit However, the accuracy is ±2.0% FS, ±1 digit for the phase-S current for a three-phase, three wire circuit and the phase-N current for a single-phase, three wire circuit under the same conditions.		-	±1.0% FS, ±1 digit However, the accuracy is ±2.0% FS, ±1 digit for the phase-S current for a three-phase, three wire circuit and the phase-N current for a single-phase, three wire circuit under the same conditions.
	Power (active power and reactive power)	Active power and reactive power ±2.0% FS, ±1 digit (Power factor = 1)		-	Active power and reactive power ±2.0% FS, ±1 digit (Power factor = 1)
	Frequency	±0.3 Hz ±1 digit		-	-
	Power factor*2	±5.0% FS at an ambient temperature of 23° C, rated input, rated frequency, and a power factor of 0.5 to 1 to 0.5		-	±5.0% FS at an ambient temperature of 23° C, rated input, rated frequency, and a power factor of 0.5 to 1 to 0.5
	Temperature	-		±5°C two hours after the power supply is turned ON (after performing any adjustments for the ambient temperature)	-

Item		Master unit		Slave unit	
		KM1-PMU2A-FLK (Dual power systems)	KM1-PMU1A-FLK (Single power system)	KM1-EMU8A-FLK (Pulses/temperatures)	KE1-CTD8E (CT extension unit)
RS-485	Protocols	Communications protocol setting: CompoWay/F or Modbus			
	Sync method	Start-stop			
	Node number setting	CompoWay/F: 0 to 99, Modbus: 1 to 99 When a switch operation is performed to set the protocol to Modbus when the node number is set to 0, the node number is automatically changed to 1.			
	Baud rate	9,600 bps, 19,200 bps, or 38,400 bps			
	Transmission code	CompoWay/F: ASCII, Modbus: Binary			
	Data length*3	CompoWay/F: 7 bits, 8 bits; Modbus: 8 bits			
	Stop bits*3	CompoWay/F: 1 bits or 2 bits; Modbus: 1 bit with priority, 2 bits without priority			
	Parity	Even, odd, or none			
	Maximum transmission distance	500 m			
	Maximum number of nodes	CompoWay/F: 31, Modbus: 99			
Communication items	Refer to the relevant communication specification manuals				
USB	USB 1.1 compatible				

\*1 Based on JISC1111, without special CT error, at ambient temperature of 23° C, rated input, and rated frequency. Applicable to 2nd, 3rd, 5th, 7th, 9th, 11th, and 13th harmonics.

\*2 Power factor formula: Power factor = Active power/Apparent power

$$\text{Apparent power} = \sqrt{(\text{Active power})^2 + (\text{Reactive power})^2}$$

\*3 The set value may change when the protocol is changed to Modbus. Check the set values if you change the DIP switch settings.

Special CTs

Current Transformer (CT) Cable

Configuration	Installed separately						In-panel (penetration type)
	KM20-CTF-5A	KM20-CTF-50A	KM20-CTF-100A	KM20-CTF-200A	KM20-CTF-400A	KM20-CTF-600A	
Model	KM20-CTF-5A	KM20-CTF-50A	KM20-CTF-100A	KM20-CTF-200A	KM20-CTF-400A	KM20-CTF-600A	KM20-CTB-5A/50A
Rated primary current	5 A	50 A	100 A	200 A	400 A	600 A	5 A/50 A
Rated secondary current	1.67 mA	1.67 mA	33.3 mA	66.7 mA	66.7 mA	66.7 mA	1.67 mA/16.7 mA
Secondary winding	3,000 turns			6,000 turns			9,000 turns
Applicable frequency	10 Hz to 5 kHz						
Insulation resistance	Between output terminals and case: 50 MΩ min. (at 500 VDC)						
Dielectric strength	Between output terminals and case: 2,000 VAC for 1 minute						
Protective element	7.5-V clamp element						
Allowable number of connections/disconnections	100 times						
Inner diameter (mm)	10	16	24	37	10		
Operating temperature and humidity ranges	-20 to 60° C, 85% max. (with no condensation)						
Storage temperature and humidity ranges	-30 to 65° C, 85% max. (with no condensation)						

KM-series Power monitor models

Series name	KM1 Series		
Model	KM1-PMU_A-FLK	KE1-CTD8E	KM1-EMU8A-FLK
Dimensions (mm)	45 × 96 × 90 (W×H×D) (maximum width of 45 × 5 when five Units are linked together)		
Applicable phase wiring method	Single-phase, two wire	OK	-
	Single-phase, three wire	OK	-
	Three-phase, three wire	OK	OK
	Three-phase, four wire	PMU1A only	OK
400-V direct measurement	OK	-	-
Power Monitor power supply	100 to 240 VAC	Provided from the Master Unit	100 to 240 VAC
Measured items	Total power consumption	OK	-
	Active power	OK	-
	Instantaneous reactive power	OK	-
	Current	OK	OK
	Voltage	OK	-
	Power factor	OK	OK
	Frequency	OK	-
	Pulse count	-	-
Temperature	-	-	OK

KE1-DRT-FLK DeviceNet communications unit

Item	Specification																
Communications	<ul style="list-style-type: none"> <li>Remote I/O communications (I/O assignment settings with simple assignment settings or the Configurator)</li> <li>Message communications</li> </ul>																
Connection configuration	Can be a combination of multidrops and T-branching (for both main and branch lines).																
Baud rate	500, 250, or 125 kbps (automatically detected)																
Rated primary current	5 dedicated lines (2 signal lines, 2 power lines, and 1 shield)																
Communications distance	<table border="1"> <thead> <tr> <th>Baud rate</th> <th>Maximum network length<sup>*1</sup></th> <th>Branch line length</th> <th>Total for all branch lines</th> </tr> </thead> <tbody> <tr> <td>500 kbps</td> <td>100 m max. (100 m max.)</td> <td>6 m max.</td> <td>39 m max.</td> </tr> <tr> <td>250 kbps</td> <td>250 m max. (100 m max.)</td> <td>6 m max.</td> <td>78 m max.</td> </tr> <tr> <td>125 kbps</td> <td>500 m max. (100 m max.)</td> <td>6 m max.</td> <td>156 m max.</td> </tr> </tbody> </table>	Baud rate	Maximum network length <sup>*1</sup>	Branch line length	Total for all branch lines	500 kbps	100 m max. (100 m max.)	6 m max.	39 m max.	250 kbps	250 m max. (100 m max.)	6 m max.	78 m max.	125 kbps	500 m max. (100 m max.)	6 m max.	156 m max.
Baud rate	Maximum network length <sup>*1</sup>	Branch line length	Total for all branch lines														
500 kbps	100 m max. (100 m max.)	6 m max.	39 m max.														
250 kbps	250 m max. (100 m max.)	6 m max.	78 m max.														
125 kbps	500 m max. (100 m max.)	6 m max.	156 m max.														

\*1 Numbers in parentheses are the lengths for thin cable.



Highly visible on-panel energy monitoring

The KM50 can measure produced and consumed power, current and voltage as well as leading reactive power, lagging reactive power, power factor, and frequency amongst others.

- Assist energy saving analysis with built-in energy classification functionality
- High precision measurements, even for currents below 5% of the nominal value, through automatic range switching
- Able to measure and distinguish consumed and generated power
- Measurement of reactive power and power factor
- Integrated pulse measurement and direct conversion to measure energy management KPI

Ordering information

KM50-E Smart power monitor

Applicable circuits	Power supply voltage (shared)	Dimensions	Communications	Protocol	Order code
Single-phase, two wire: 100 to 480 VAC Single-phase, three wire: 100/200 VAC Three-phase, three wire: 100 to 480 VAC Three-phase, four wire: 85 to 277 VAC	100 to 240 VAC	96 × 48 × 93 (H × W × D)	RS-485	CompoWay/F: 31 nodes, Modbus: 99 nodes (Both are supported by the same model.)	KM50-E1-FLK

CTs

Rated primary current	Rated secondary current	Installation	Order code
5 A	Special output	Installed separately	KM20-CTF-5A
50 A			KM20-CTF-50A
100 A			KM20-CTF-100A
200 A			KM20-CTF-200A
400 A			KM20-CTF-400A
600 A			KM20-CTF-600A

Note: CT cables are not included with the CTs.

CT Cable

Cable length	Order code
3 m	KM20-CTF-CB3

Note: Either use the CT Cable specified by OMRON or use 1.25-B3A crimp terminals and AWG22 wire from J.S.T. Mfg. Co., Ltd.

Specifications

Ratings

Item	KM50-E	
Applicable circuit	Single-phase two wire, single-phase three wire, three-phase three wire and three-phase four wire power	
Rated power supply voltage	100 to 240 VAC, 50/60 Hz	
Allowable supply voltage range	85% to 110% of rated power supply voltage	
Allowable frequency range	45 to 65 Hz	
Power consumption	7 VA max.	
Rated input	Rated input voltage	100 to 480 VAC (single-phase, 2-wire): Line voltage 100/200 VAC (single-phase, 3-wire): Phase voltage/line voltage 100 to 480 VAC (3-phase, 3-wire): Line voltage 58 to 277 VAC (3-phase, 4-wire): Phase voltage
	Rated input current	5 A, 50 A, 100 A, 200 A, 400 A, or 600 A (primary current of Special CT) <sup>*1</sup>
	Rated frequency	50/60 Hz
	Rated input power	With 5-A CT: 4 kW With 100-A CT: 80 kW With 400-A CT: 320 kW With 50-A CT: 40 kW With 200-A CT: 160 kW With 600-A CT: 480 kW
	Allowable input voltage	110% of rated input voltage (continuous)
	Allowable input current	120% of rated input current (continuous)
Ambient operating temperature	-10 to 55°C (with no condensation or icing)	
Storage temperature	-25 to 65°C (with no condensation or icing)	
Ambient and storage operation humidity	25% to 85%	
Installation environment	Overvoltage category and measurement category: 2, Pollution level: 2	

\*1 A special output signal is output as the secondary current from the Special CT.

Performance

Smart power monitor

Item		KM50-E
Accuracy	Voltage	±1.0% FS ±1 digit (at ambient temperature of 23°C, rated input, and rated frequency). However, the accuracy is ±2.0% FS ±1 digit for the Vtr line voltage for three-phase, three wire power and the Vrs line voltage for single-phase, three wire power under the same conditions.
	Current	±1.0% FS ±1 digit (at ambient temperature of 23°C, rated input, and rated frequency). However, the accuracy is ±2.0% FS ±1 digit for the phase-S current for three-phase, three wire power and the phase-N current for single-phase, three wire power under the same conditions.
	Active power Reactive power	±2.0% FS ±1 digit (at ambient temperature of 23°C, rated input, rated frequency, and a power factor of 1) Reactive power formula: $\text{Reactive power} = v \times i \times \sin \theta$ "v" is the instantaneous voltage and "i" is the instantaneous current. θ is the phase difference between the voltage and current.
	Frequency	±0.3 Hz ±1 digit (at ambient temperature of 23°C, rated input, and rated frequency)
	Power factor	±5.0% FS ±1 digit (at ambient temperature of 23°C, rated input, rated frequency, and power factor = 0.5 to 1 to 0.5) Power factor formula: $\text{Power factor} = \text{Active power} / \text{Apparent power}$ Apparent power = $\sqrt{(\text{Active power})^2 + (\text{Reactive power})^2}$
	Temperature	±5°C two hours after the power is turned ON (after setting the offset to match the ambient environment)
	Communications	Communications method
Sync method		Start-stop
Unit number setting		CompoWay/F: 0 to 99, Modbus: 1 to 99
Baud rate		1.2, 2.4, 4.8, 9.6, 19.2, 38.4 kbps
Transmission code		CompoWay/F: ASCII, Modbus: Binary
Data length		7, 8 bits
Stop bit length		1, 2 bits
Vertical parity		Even, odd, or none
Maximum transmission distance		500 m
Maximum number of connected Power Monitors		CompoWay/F: 31, Modbus: 99

CTs

Item	KM20-CTF-5A	KM20-CTF-50A	KM20-CTF-100A	KM20-CTF-200A	KM20-CTF-400A	KM20-CTF-600A
Rated primary current	5 A	50 A	100 A	200 A	400 A	600 A
Secondary winding	3,000 turns			6,000 turns		9,000 turns
Application frequency	10 Hz to 5 kHz					
Insulation resistance	Between output terminal and external case: 50 MΩ min. (at 500 VDC)					
Dielectric strength	Between output terminal and external case: 2,000 VAC for 1 min					
Protective element	7.5 V clamp element					
Allowable number of connections/disconnections	100 times					
Inner diameter	10 dia.	16 dia.	24 dia.	37 dia.		
Operating temperature and humidity range	-20 to 60°C 85% (with no condensation)					
Storage temperature and humidity range	-30 to 65°C 85% (with no condensation)					



Identify waste in your compressed air lines with the D6FZ-FGS1000 and at machine level with the D6FZ-FGT200/500

Air flow sensors provide visualization of invisible energy waste for compressed air systems to improve energy management and Energy Service company (ESCO) actions.

- High accuracy flow measurement
- Simultaneous measurements of leakage, usage (every model), pressure and temperature (only D6FZ-FGS1000)
- Analog and pulse outputs
- RS-485 communications
- mountable to curved pipe or coupler

Ordering information

Units

Appearance	Product name	Order code
	Air flow sensor (200L type)	D6FZ-FGT200
	Air flow sensor (500L type)	D6FZ-FGT500
	Air flow sensor (1000L type, cable length: 0.2 m)	D6FZ-FGS1000
	Air flow station (Cable length 1.5 m, including T-branch connector cable)	D6FZ-FGX21
	Air flow sensor set (1000L type) Air flow sensor (1000L type) Air flow station T-branch connector Single-end wire cable (3 m)	D6FZ-FGS1000-S

Accessories (sold separately)

Appearance	Product name	Order code		
	T-branch connector	D6FZ-FC02		
	(Air flow sensor D6FZ-FGT only) Mounting bracket Mounting bracket: 1 Plus screw (M3): 4	D6FZ-FC03		
	(Air flow station D6FZ-FGX21 only) Mounting magnet Mounting magnet: 2 Plus screw (M3): 2	ZN9-EM01-S		
	Single-end wire cable	Cable length 3 m	M12 connector (8 pin)	D6FZ-JD3A
		Cable length 10 m		D6FZ-JD10A
		Cable length 20 m		D6FZ-JD20A
	Double-end connector cable	Cable length 3 m	M12 connector (8 pin)	D6FZ-JD3B
		Cable length 5 m		D6FZ-JD5B
		Cable length 10 m		D6FZ-JD10B
		Cable length 20 m		D6FZ-JD20B

## Specifications

## Air flow sensor

Item	Model	D6FZ-FGT200	D6FZ-FGT500
Applicable fluid		Air, nitrogen (N <sub>2</sub> ) <sup>1</sup>	
Working pressure		0.75 MPa (withstands pressure of 1.5MPa)	
Measurement range <sup>*2</sup>		0 to 200 L/min	0 to 500 L/min
Accuracy <sup>*2</sup>		±2.0%F.S. at 50 L/min or more ±0.5%F.S. at less than 50 L/min	
Pressure loss		2 kPa max.	4 kPa max.
Power supply voltage		12 to 24 VDC ±10% ripple (p-p) 10% max.	
Current consumption		120 mA max.	
Functions		Momentary flow/integrated flow/reversing display/zero point adjustment/peak and bottom hold/key lock/eco model/scaling (analog output)/judgement hysteresis/teaching	
Output	Output interface	Analog	Current output 4 to 20 mA (1 contact), maximum load resistance 300Ω max.
		ON/OFF	Open collector output (2 outputs) 26.4 VDC 50 mA max. ON residual voltage 2 V max. (Outputs can be selected from judgement output, pulse output and unit error output)
		RS-485	2-wire half duplex communication, start-stop synchronized method Baud rate: 9.6k/19.2k/38.4k/115.2kbps, data bit length: 7/8bit, stop bit length: 1/2bit, parity: none/even/odd, termination resistor (120Ω): ON/OFF, communications protocol: compatible with CompoWay/F
	Output values	Momentary flow, integrated flow, judgement output, unit error output	
Connection bore diameter		Rc1/4 (8 A)	Rc1/2 (15 A)
Dimensions		30(W) × 77(D) × 63.7(H) mm	
Weight (when packaged)		Approx. 400 g (500 g)	

<sup>1</sup> Clean Dry Gas (must not contain large particle e.g. duct, oil and mist)

<sup>2</sup> Converted value assuming the accumulated flow quantity following conditions  
std (factory default): 20°C at 1 atmospheric pressure 101.3 kPa, nor: 0°C at 1 atmospheric pressure 101.3 kPa

Item	Model	D6FZ-FGS1000	
Applicable fluid		Air, nitrogen (N <sub>2</sub> )	
Working pressure		0.99 MPa max.	
Measurement	Flow	Detection range	1 to 1,000 L/min (std)
		Resolution	0.1 L/min
		Accuracy	±2.0% of reading at 50 L/min (std) or more ±0.1%F.S. at less than 50 L/min
	Pressure	Detection range	0 to 0.99 MPa
		Accuracy	±2%F.S.
	Temperature	Detection range	-10 to 60°C
	Accuracy	±1.5% (absolute temperature)	
Pressure loss		Direct piping: 10 kPa max. (0.5 MPa, at maximum flow) Using coupler (TL type by NAGAHORI INDUSTRY CO., LTD.): 10 kPa max. (0.5 MPa, at maximum flow)	
Power supply voltage		16 to 24 VDC ±10% ripple (p-p) 10% max. (Using single unit), 24 VDC ±10% ripple (p-p) 10% max. (Using multiple units)	
Power consumption		2 W max.	
Output	Output interface	Analog	Current output 4 to 20 mA (2 contact) <sup>*1</sup> Max. load resistance 270 Ω max.
		ON/OFF	Open drain output (2 outputs) <sup>*2</sup> 24 VDC 50mA max. ON residual voltage 1.5 V max., OFF leakage current 50 μA max.
		RS-485	2-wire half duplex communication, start-stop synchronized method Baud rate: 115.2 kbps (fixed), Data bit length: 8 bits (fixed), stop bit length: 1 bit (fixed), parity: even (fixed), communications protocol: compatible with CompoWay/F
	Output values	Momentary standard flow, integrated standard flow, pressure, unit error output	
Wiring connection		M12 connector (8-pin)	
Connection bore diameter		Rc1 (25 A) bushing enables conversion to 15 A and 20 A	
Dimensions		64(W) × 93(D) × 195(H) mm (excluding flange)	
Weight (when packaged)		Approx. 1.2 kg (Approx. 1.7 kg)	

<sup>1</sup> Analog output comprise the momentary standard flow rate and pressure.

<sup>2</sup> The integrated standard flow of the pulse output can be selected from 1, 10 (factory default), 100, or 1000 L(std)/P.

## Notes

# Omron at a glance

Listed in Forbes Top 2000 largest companies of the globe  
 Omron Corporation NASDAQ: OMRNY  
 Top ranking in Dow Jones Sustainability Index  
 Thomson Reuters Top 100 Global Innovators



## 200,000 products ranging Input, Logic, Output & Safety

Sensing, Control Systems, Visualisation, Drives, Robots,  
 Safety, Quality Control & Inspection, Control and  
 Switching Components

“To the machine the work of the machine,  
 to man the thrill of further creation.”

Kazuma Tateisi, founder of Omron

# 6%

Annual investment in Research & Development

## Innovation track record of 80 years

Top 150 global patent assignee  
 1,200 employees dedicated to R&D  
 11,000 + issued and pending patents

# 37,500

Employees worldwide

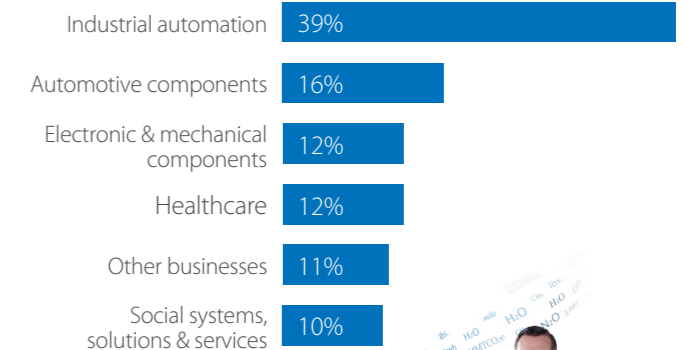
# 200

Locations worldwide

# 22

Countries in EMEA

## Working for the benefit of society



## Energy Efficiency

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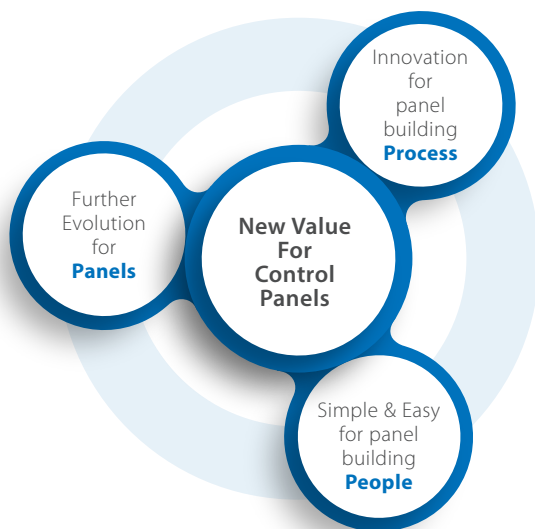
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## Panels

- Space saving
- Vibration resistance
- Improve airflow

## Process

- Designing with CAD & Eplan Library
- Swift customisation
- Express delivery within Europe

## People

- Front-in and front-release Easy wiring

## Our Panelbuilding portfolio

### NEW 2016 Released In October



Switch Mode Power Supplies (High-capacity models)



Sockets for Safety Relays



Push-In Plus Series Pushbutton Switches



Power Monitors (Mounted On-Panel)



Machine Automation Controller

### 2016 Released In April



Switch Mode Power Supplies (60/120W)



Solid-state Timers



Measuring and Monitoring Relays



Power Monitors (DIN Track mounting)



Common Sockets (for MY/H3Y(N)-B)



Common Sockets (for G2R-S/H3RN-B/K7L-B)



Slim I/O Relays



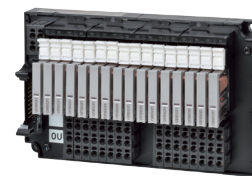
Solid-state Timers



Solid-state Timers



Liquid Leakage Sensor Amplifiers



I/O Relay Terminals



DIN Track Terminal Blocks

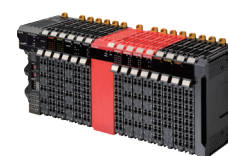
### 2015 Released



Digital Temperature Controllers



Solid State Relays for Heaters



EtherCAT Slave Terminals



Uninterruptible Power Supply (UPS)