



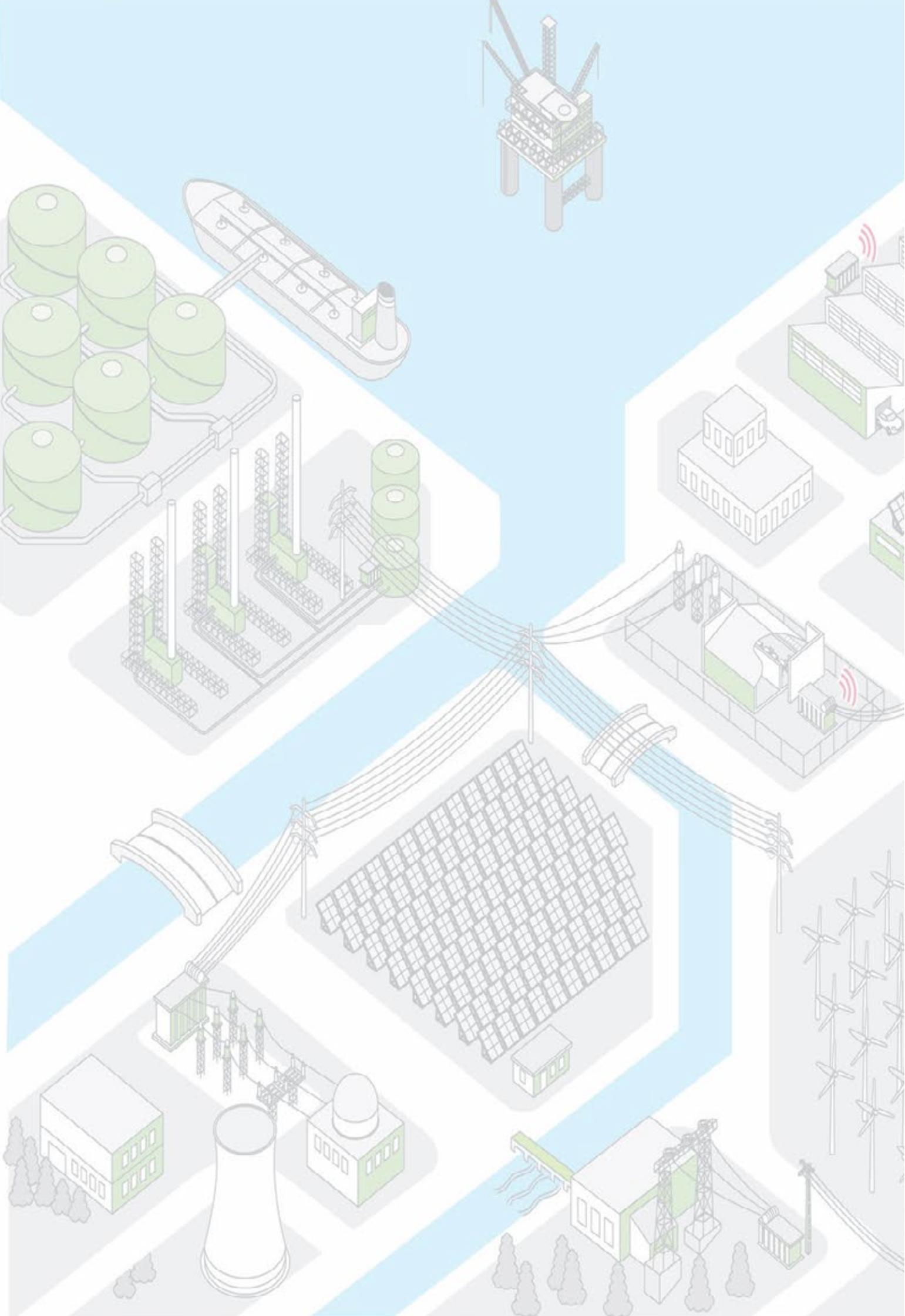
Services

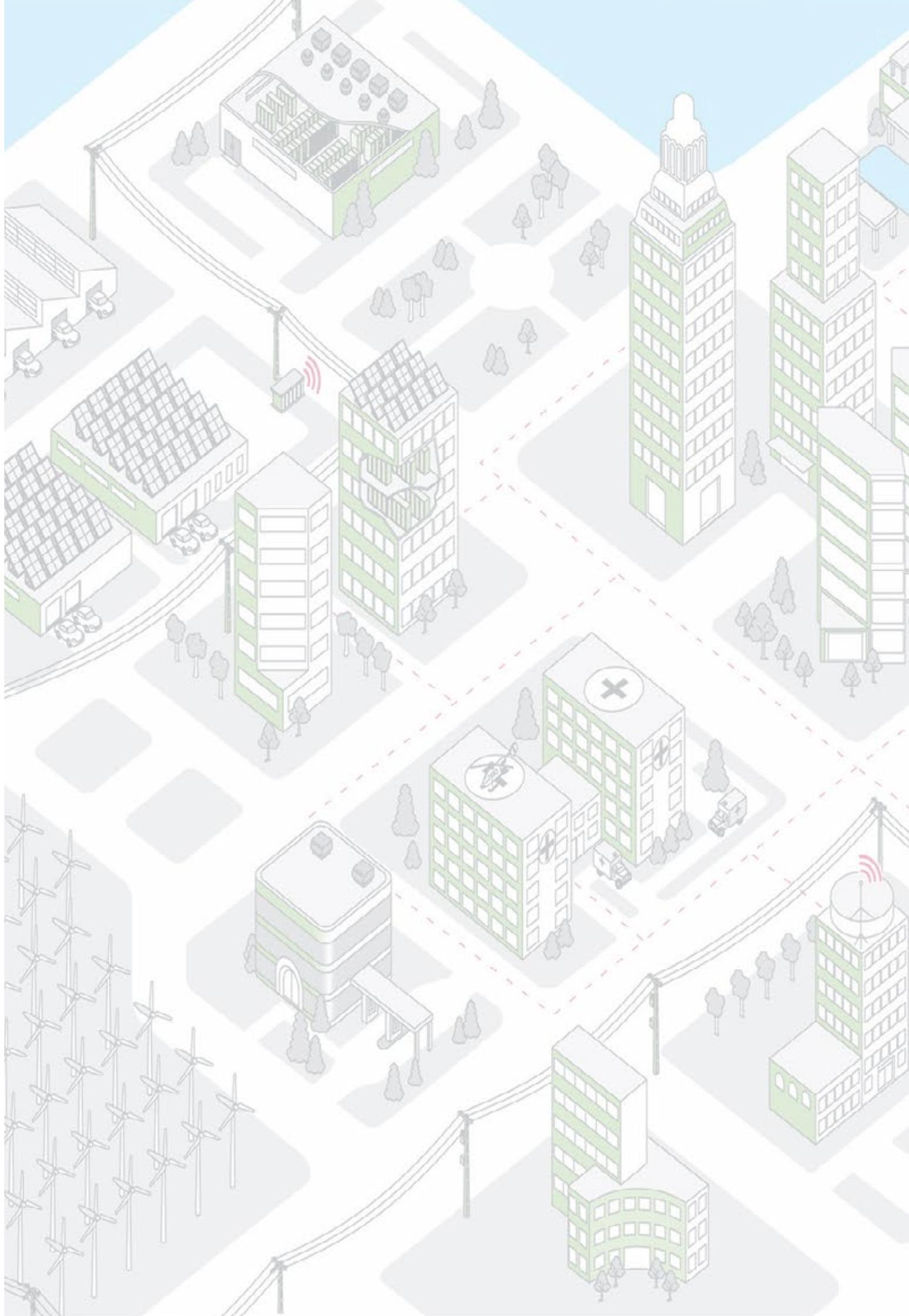
Peace of mind throughout your installation's lifecycle

www.schneider-electric.com.eg

Life Is On

Schneider
Electric





A long history of innovation for a global offer



Based on this experience as world leader, Schneider Electric has developed a **large and comprehensive range of innovative devices & services** with one of the world leaders, you take benefit of a global leader experience and know-how in electric distribution, automation and power & control.

All the services included in this overview have been designed and manufactured to incorporate the benefits of this extensive experience

Contents

Introduction	5-8	Technical Training	43-46
Installation Assessment	9-14	> Customer Training Center (CTC)	44-45
> Electric Distribution Network Assessment	10-12	> E-Learning Training	46
> Energy Management Consultation Services	13-14	Automation Services	48-49
Modernisation	15-24	IT - Critical Power & Cooling Services	50-51
> Panel Upgrade, Adaptation & Extension	16	Building Management Systems Services	52-53
> Renovation & Revamping	16	Energy Efficiency Solutions	54-68
> ECOFIT	17-24	> Power Management System	57-58
Services Maintenance Contracts	25-38	> Power Factor Correction & Harmonics Mitigation Solutions	59-62
> ED Advantage Service Plans	26	> Motor Control Solutions	63-65
Corrective Maintenance	27	> Lighting Control Solutions	66-67
Preventive Maintenance	28	> ISO50001	68
Predictive Maintenance	29	> Energy Savings Assessment Form	69
> Spare Parts	30-34		
> MV Transformers Maintenance	35-37		
On-Demand Maintenance	39		
Installation & Commissioning	40		
> Installed Base Assessment Form	41-42		

Services for your installation's entire life cycle

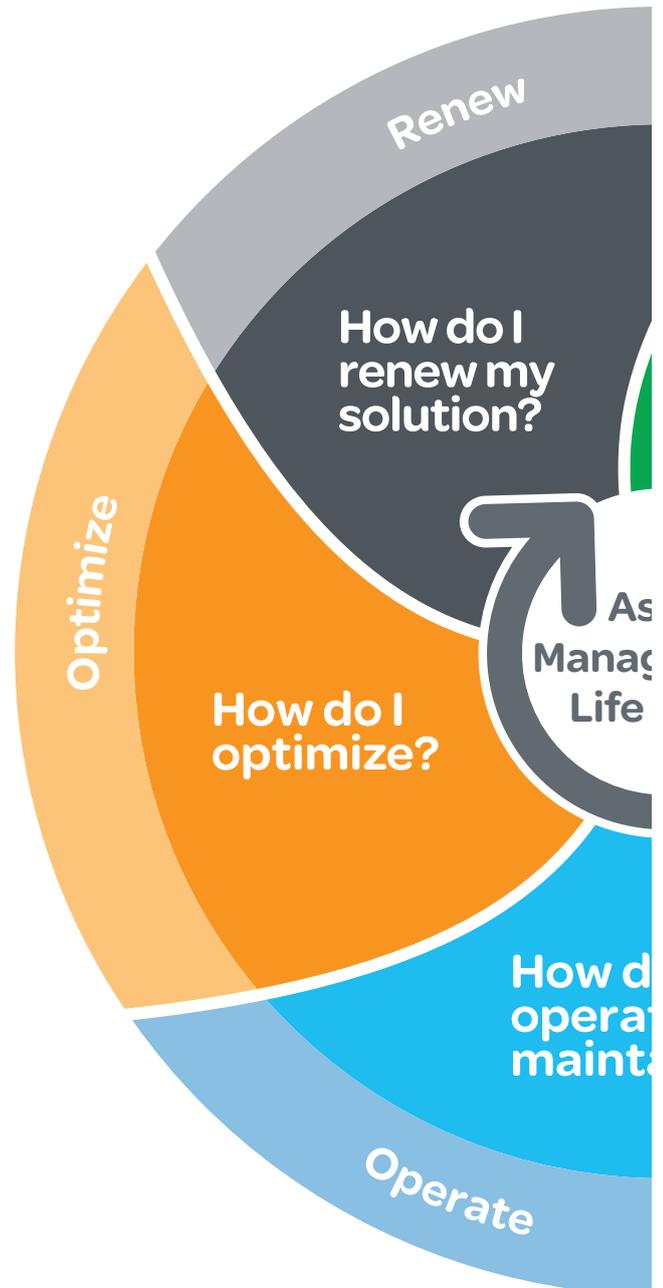
Reduce expensive downtime risk and increase operational efficiency.

Optimize: Our Solution Experts give you the proactive and tailored recommendations you need to reduce risk and improve solution performance and reliability.

- > Maintenance and modernization consulting
- > On-site reliability and safety/security assessment
- > Remote Monitoring Services

Operate: We help you maximize your solution uptime and performance, with capital expenditure control through a proactive set of actions.

- > Technical support
- > Software update and support
- > Operators training
- > Warranty extensions
- > Multilevel Service Plans
- > Preventative, predictive maintenance
- > Vendor management/facility operations/managed maintenance/spare parts management



> Serving all segments



Airport



Automotive



Buildings



Datacenter



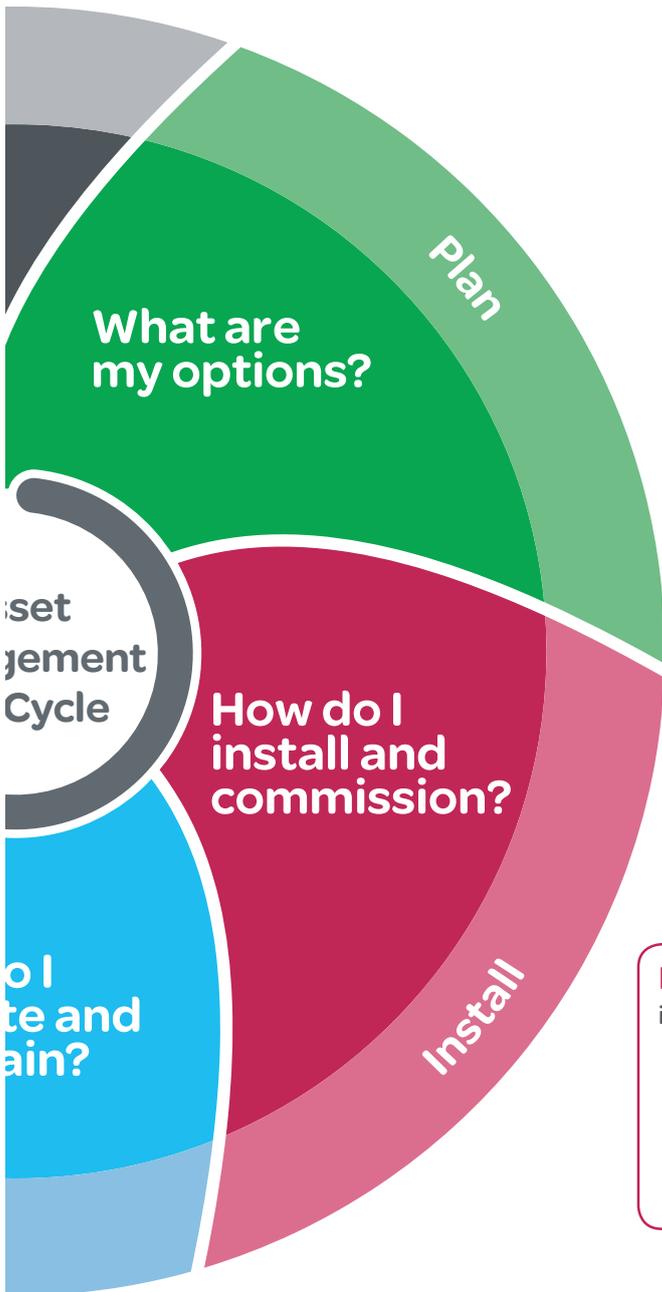
Energy infrastructure



Food & Beverages

Renew: We help you define and implement the best solution evolution, increasing performance and flexibility, while controlling aging infrastructure-associated costs.

- > Custom “green” disposal
- > Infrastructure enhancement to comply with the latest regulations
- > Solutions retrofit/modernization



Plan: Schneider Electric experts help you plan, define, and design the right solution for your needs.

- > Technical feasibility studies
- > Architecture and design studies
- > Facility assessments

Install: We help you convert your plans into an efficient, reliable, and safe solution.

- > Assembly/start-up
- > Commissioning
- > Project management
- > Site coordination
- > Software install and setup



Hotels



IT



MMM



Oil & Gas



Wastewater



Water

Why services are vital for your installed base



How can you cut costs and improve performance at the same time? When it comes to your electrical distribution infrastructure, the answer is straightforward – get professional expertise.

Installed Base Services from Schneider Electric™ enable you to achieve your goals. Whether you're preparing to install brand new equipment, looking to extend the life of an existing installation, or planning to decommission an outdated facility, we have the experience and the service specialists to support you.

Doing business in today's economic environment is challenging enough. Let us handle your electrical distribution installation for your peace of mind.



When it comes to your electrical distribution installation, we can help you:

- > Increase productivity, reliability, and safety
- > Mitigate risk and limit downtime
- > Keep equipment up to date and extend its lifespan
- > Cut costs and increase savings
- > Improve your return on investment



Schneider
Electric

a brand you can trust

Installation Assessment

- > Electrical Distribution Network Assessment
- > Energy Management Consultation Services



Electrical Distribution Network Assessment

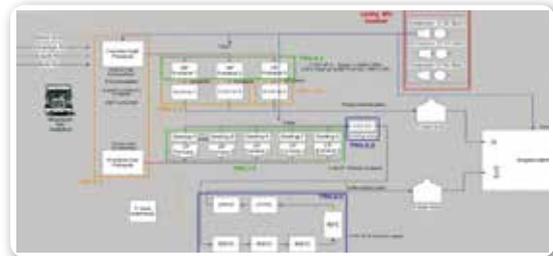
MP4 Methodology

- > Partnered by your teams and our electrical consultants
- > Supported by professional software embedding Schneider Electric Know-how

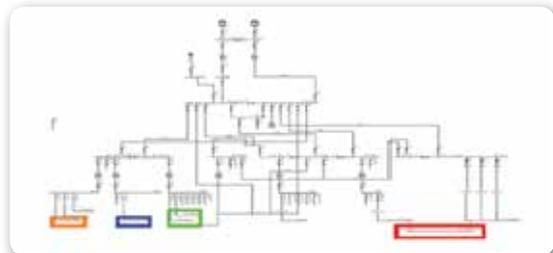
Step 1

Specify your electrical energy needs and assess your current capabilities

- Understand your process & quantify your risks
- Identify the critical points in your process
- Make the link with the electrical network, and pinpoint the devices or busbars that could trigger these high-risk events
- Locate the main energy consumption points
- Understand your current and future operations & maintenance organisation and capabilities



Example of process modelling and critical points



Example of electrical risk identification

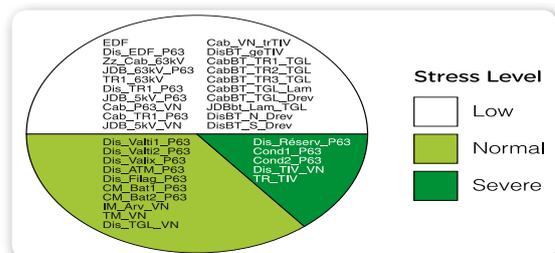
Step 2

Assess equipment and evaluate network robustness

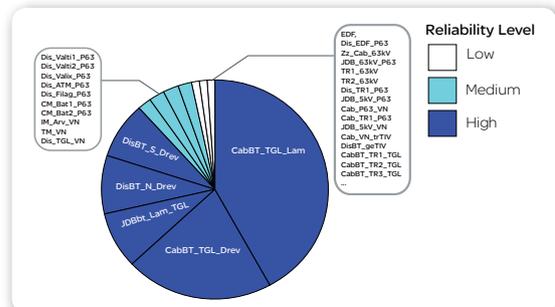
- For each set of equipment, build a stress indicator based on:

- environmental conditions (humidity, temperature, salinity, etc.)
- operating conditions (load rate, number of operations, etc.)
- equipment ageing

- Carry out a reliability study to evaluate the robustness of network design with regards to the critical points identified in Step 1
- Classify each set of equipment according to its contribution to the probability of occurrence of the unwanted events



Example of equipment assessment



Example of reliability calculation

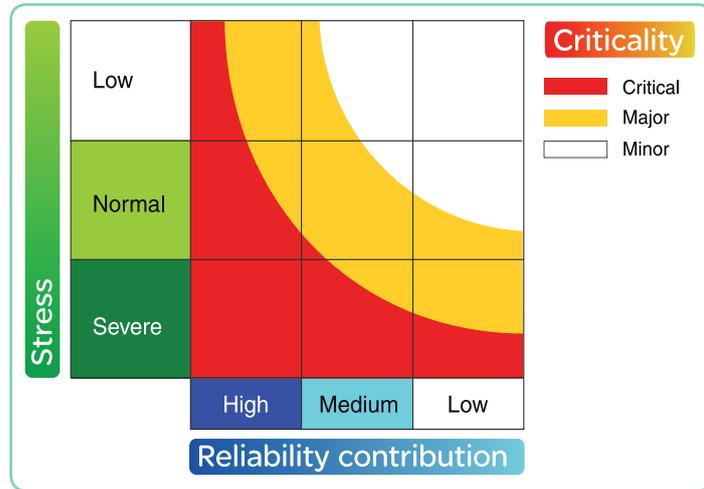
 MP4 assessments are delivered in 1 to 2 weeks by electrical experts

Step 3

Rate criticality levels

Combine stress and reliability levels to rate the criticality of each set of equipment and define the appropriate service policy:

- Critical equipment (predictive maintenance, emergency recovery plan, upgrading action, etc.)
- Major equipment (preventive maintenance, etc.)
- Minor equipment (periodic inspection, etc.)



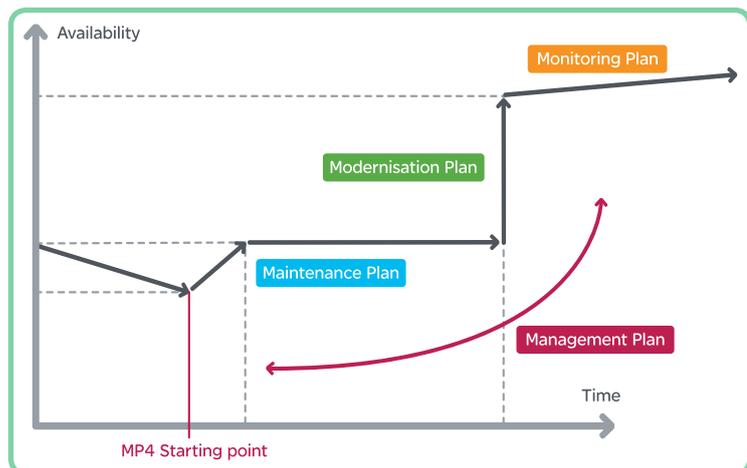
Example of criticality matrix

Step 4

Draw up plans and share conclusions

Based on the outputs of Step 3, the following deliverables are consolidated:

- **List of critical safety issues**
- Upgrading actions necessary to restore nominal installation performance
- 4 plans to:
 - Optimise your operating expenditure (Maintenance Plan)
 - Improve your performance (Modernisation and Monitoring Plans)
 - Track the implementation of actions including training, spare parts management, recovery plan, etc, (Management Plan). The priority of each recommendation and its economic balance sheet are assessed
- Formal presentation of conclusions and recommendations to ensure good understanding and buy-in by all parties involved



 MP4 improvement plans help you master your electrical installation

MP4 deliverables

4 improvement plans including critical safety issues

Maintenance Plan

- A description of the level of maintenance to be performed
- The stress and reliability levels of critical devices
- A strategy for the maintenance plan schedule

Modernisation Plan

- A list of equipment at the end of its service life and proposals of available retrofit solutions
- Advice on improving installation performance
- Suggestions on how to adapt your installation to meet your new business requirements

Monitoring Plan

- A predictive approach to anticipate potential device failure
- Energy quality and availability indicators
- Opportunities for energy savings in relation to the various solutions deployed

Management Plan

- The plan outlines recommendations targeting:
- The safety of people working on the equipment
 - Service contracts with respect to your subcontracting policy
 - Management of spare parts
 - Competency management including expertise and training
 - Data management through direct access to the Schneider Electric expert system

The MP4 report allows you to identify critical safety issues such as:

- Incorrect breaking capacity
- Absence of interlocking devices
- Inappropriate protection of people
- Unprotected access to live parts, etc.



Energy Management Consultation Services

Energy Efficiency Audit

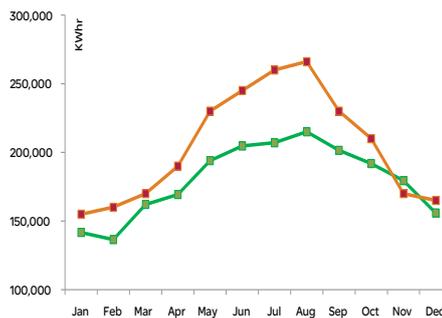
Our Energy Efficiency Audit is a comprehensive energy savings program that delivers a competitive edge through reduced operating costs, improved process performance and environments.

Energy Management Services



Energy assessment

We compare your utility bills to similar facilities in the region to determine energy conservation opportunity

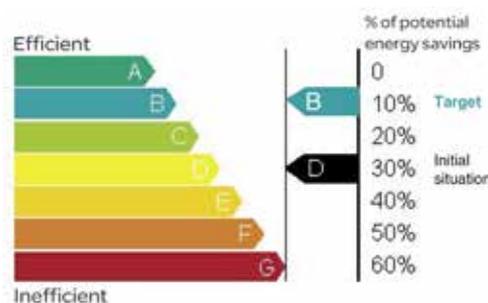


> Our method

- Calculate and compare against Benchmarks
- Conduct an energy efficiency workshop
- Demonstrate potential energy savings

Preliminary report

A high-level site survey to identify potential Energy Conservation Measures (ECM) and align your energy profile with business objectives.

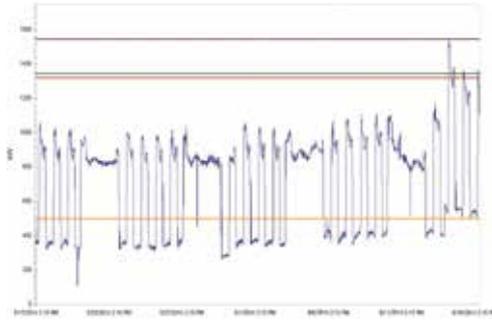


> Our method

- Conduct walk-through audit
- Determine feasibility of project
- Calculate estimated cost savings and ROI**
- Present preliminary report

Comprehensive analysis

Through a detailed energy analysis of your facility by a Certified Energy Manager, we create a program and plan to improve building operation and meet energy targets.



> Our method

Detailed comprehensive audit of your site

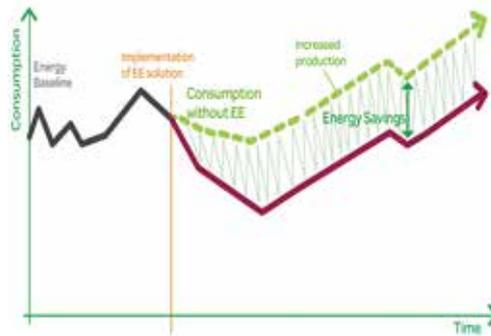
In-depth data analysis to determine accurate ECM* costs,

savings and ROI

Present project proposal and comprehensive analysis report

Program implementation

We'll work closely with you throughout the implementation process ensuring milestones are met and providing detailed reports.



> Our method

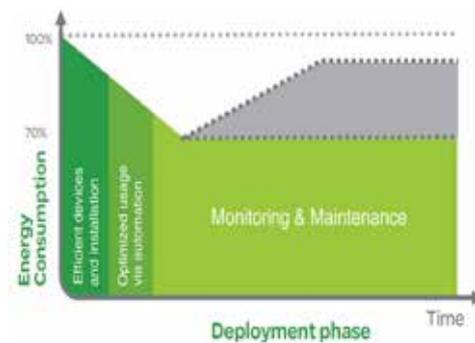
ECM* installation

Implement Performance Measurements and Verification

Solution Training & Validation

Sustained performance

We regularly review the project and results, ensure performance goals are met, and fine-tune to sustain continued energy efficiency and savings.



> Our method

Connecting system to our Energy Performance Bureau

Continuous monitoring and coaching

Periodical energy efficiency reporting



Energy Efficiency is on your doorstep thanks to our energy experts

Modernisation

- > Panel Upgrade, Adaptation & Extension
- > Renovation & Revamping
- > ECOFIT™



Panel upgrade, Adaptation & Extension

Schneider provide panel upgrade, adaptation & extension for your existing switchgear in addition to protection upgrade. The replacement of electro-mechanical and / or electronic protection and measuring devices with the latest technology in micro-processor based integrated relays and communication options.

Renovation & Revamping

Modernization of medium voltage & low voltage switchgears, bus duct and transformers with modern devices for your old range installation is will formulate optimum renovation solutions.

The experience of a world leader in Low & Medium Voltage

Schneider Electric has been manufacturing LV and MV products for more than 50 years and its installed base amounts to thousand millions products and devices.



Discover our Capabilities in doing related Civil work as Schneider Electric Egypt is a certified contractor from the Egyptian Union for Construction and Building Contractors

ECOFIT™

What does this mean?

ECOFIT™ solutions are tested, validated, and certified by Schneider Electric. They allow replacing only the core devices of the switchgear with new circuit breaker or protection relay, thanks to standardized solutions with plug and play concept

Benefits

- > Prolongs your switchgear's lifetime by more than 50%.
- > Enhances availability and operational dependability.
- > Optimizes service and infrastructure costs by 30% to 70%.
- > Maintains compliance with evolving industry standards and legislation.
- > Ensures the safety of your personnel and surrounding equipment by using the latest technology.
- > Access to Energy Management.

« Green is our colour » - ECOFIT™
is the most economical means of reducing your network's environmental footprint without buying a whole new system

Economical winning card

Life time extension for existing switchgear.
 Less downtime than with full panel replacement.
 Reduces infrastructure downtime from days to minutes.



Ecological winning card

Limited parts' replacement need.
 Optimized service and infrastructure costs.
 Reduction in recycling costs.



Peace of mind

Engineered solution with manufacturer's warranty.
 Less risk because no cable changes and no civil footprint changes.
 Technology benefits thanks to a solution using dependable latest technology.
 Safety of people and surrounding equipment.
 Enhances availability and dependability by reducing CB failures.



Schneider Electric is helping you get the most of your equipment and installations

ECOFIT™ Cost benefits?

Optimisation with minimal shutdown.



Our main legacies and responsibilities for ECOFIT

- Schneider Electric
- Merlin Gerin
- AREVA
- ALSTOM
- CEM
- DELLE
- AEG
- sprecher+schuh
- CONCORDIA SPRECHER
- VEM
- S&C
- GEC ALSTHOM
- AEI
- YORKSHIRE SWITCHGEAR
- D
- MAGRINI GALILEO
- VI
- FEDERAL POWER

+

Other Brands

For many ECOFIT™ solutions, Schneider Electric replaces original equipment tracks without shutdown of the busbar

Minimal panel shutdown period



- Saves money
- Saves time
- Simplicity

Medium Voltage ECOFIT™ solutions

Original Brand	Panel type	Original device type	New device type
All Brands	All	SF6 CB	LF1 - LF2 - LF3 SF1 - SF2
All Brands	All	Vacuum CB	Evolis
AEG	D-12	BAL, VAA, VA	VA - VAA
AEG	D-24	BAL, VAA	VAA
AEG	GS-10	GE	VA - VAA
AEG	L	D-E	HVX
AEG	R	E-M-MC	VA - VAA
AEG	WAK	D-E	HVX
AEG	WBA	VA, VAA, ECA, BAL, AL	VA, VAA, Contactor
AEG	WBB	VA, VAA, ECA, BAL, AL	VA, VAA, Contactor
AEG	WK	WKC/ WKE/ WKB types	WKC/ WKE/ WKB cubicles
AEI, GEC Alsthom	BVP 17	BVP 17	VMX
Alsthom	DNF4-2E	FP, GFA	FP, HVX, CVX
Alsthom	DNF4 MI&FI	FP	FP, HVX
Alsthom	DNF5/DNF5-2B	FP	FP, HVX
Alsthom	DNF6	FP	FP, HVX
Alsthom	DNF7	FP	FP, HVX-O2
Ansaldo	Siclad	MAG II	LF2
CEM	CEMABLOC- C23mc 15 & 27	CB	FP
CEM	CEMABLOC- C23mc 15 & 27	CB	HVX
CEM	CEMAFLUOR-C26.0	CS	FPR
CEM	KIT 25-PGDt	CC	FP
CEM	KIT 27.2-PGHt	HF4K	FP
Concordia Sprecher	All AEG cubicles	TG	TG
Concordia Sprecher	HP	HP-W-TW-TM	HVX
Delle Alsthom	FLUOMATIC F540	FR62	FP62
Delle Alsthom	FLUOMATIC F943	FR62	BLV
Delle Alsthom	NORMABLOC N1347	HL	HVX - FPX
Delle Alsthom	NORMASEPT N743	HL	FP
Federal Pioneer	Metalclad switchgear	DST 2 & 5	DST 2V & 5V



ECOFIT™ = tested, validated, and certified by
Schneider Electric

Medium Voltage ECOFIT™ solutions

Original Brand	Panel type	Original device type	New device type
GEC Alstom	HMC 400 & HMC 410	HMC 400 - HMC 410	HMC 400 - HMC 410
GEC Alstom	HMC 1072	HMC 1072	HMC 1072
GEC Alstom	HMC 1172	HMC 1172	HMC 1172
GEC Alstom	HMX 36	HMX 36	HMX 36
GEC Alstom	MX 51 & MX 81	MX 51 - MX 81	MX 51 - MX 81
GEC, GEC Alstom, Alstom	VMX	VMX	VMX
Merlin Gerin	Belledonne B200-B400	DSE22 to DSE78	LF2 - LF3 - SF1 - Evolis
Merlin Gerin	Belledonne B200G	DSE22K-DSE23K	LF1 - Evolis
Merlin Gerin	Belledonne B650	DIS	LF1 - R400 - R400D - Evolis
Merlin Gerin	Belledonne B900	DIS	SF1
Merlin Gerin	Chamrousse	DIS	LF2 - R400 - R400D
Merlin Gerin	Fluair F100-F200	FG1-FG2	LF2 - LF3 - Evolis
Merlin Gerin	Fluair F100C	R400-R400D	R400 - R400D
Merlin Gerin	Fluair F300	FG3	SF1 - SF2
Merlin Gerin	Fluair F400C	FC4	SF2
Merlin Gerin	Fluair F400G	FG4	SF1 - SF2
Merlin Gerin	Motorstart P12D-P30D	KA-KDA	R400 - R400D
Merlin Gerin	Motorstart P50D	C-CD	R400 - R400D - CTV1
Merlin Gerin	Motorstart P500D	C1-CD1	R400 - R400D - CTV1
Merlin Gerin	Taillefer T900-T1080	DST	LF3
Merlin Gerin	VM6 DM12	FB4	SF1
Merlin Gerin	VM6 DM22-DM23	FB4	SF1
Nuova Magrini Galileo	Composit	MG	SF1
Nuova Magrini Galileo	Epoclad	DHF-F	LF1 - LF2 - LF3 - SF1
Nuova Magrini Galileo	Venus	GI-GL	LF1-LF3
Square D	5-15 kV MC switchgear	VAD2-3	Magnum CB
Square D	Solenarc DSE Metal-Clad switchgear	DSE	Magnum CB
VEB Otto Buchwitz	CSIM 1-12	SCI-4	VEIVACUUM F
VEB Otto Buchwitz	CSIM 3-12	SCI-4	VEIVACUUM F, VA10031
Yorkshire Switchgear	YSF6	YSF6	YSF6 Evolis



ECOFIT™ is the economical complement to maintenance operations

Low Voltage ECOFIT™ solutions

Original Brand	Panel type	Original device type	New device type
All Brands	All	Air CB	Masterpact NT - NW
All Brands	All	MCCB	Compact NS
Federal Pioneer	All	H series	Masterpact NT - NW
Merlin Gerin	All	Compact C801-C1251	Compact NS
Merlin Gerin	All	DA	Masterpact NW
Merlin Gerin	All	Masterpact M	Masterpact NW
Merlin Gerin	All	Selpact	Masterpact NT - NW
Merlin Gerin	All	Visucompact CM	Masterpact NW
Nuova Magrini Galileo	All	B Control	Masterpact NW
Square D	All	DS	Masterpact NW
Square D, Westinghouse	All	SE	Masterpact NW
Unelec-Areva	Normabloc 660	Unelec CNP	Masterpact NW

Protection relays ECOFIT™ solutions

Original Brand	Panel type	Original device type	New device type
All	All	All	MiCOM - Sepam
Areva or older	All / draw out	M range - MCGG 11, 21 & 22	MiCOM P120H
Areva or older	All / draw out	M range - MCTI 39-40	MiCOM P821MF
GEC Alstom, Areva	All	KCGG 122 & 142	MiCOM P123R
Merlin Gerin	All	Sepam 2000	Sepam series 40 - 60 - 80
Merlin Gerin	RM6+	VIP11R & VIP12R	ECOFIT™ VIP11-12R

Our common values :

- Quality
- Safety
- Professionalism

Example of MV CB or Contactor or Disconnecter Fluair F100-F200 Circuit Breaker

To give a new life to your installations

- **Original brand:** Merlin Gerin
- **Version type:** withdrawable device compatible with Fluair F100/200 cubicles

PE90409



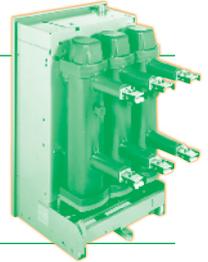
FG1 → **LF2 (SF6), LF3 (SF6)**
FG2 → **Evolis (Vacuum)**

Main technical characteristics

	FG1 / FG2		
	Rated Voltage Un (50/60 Hz)		
	7.2kV	12kV	17.5kV
630 A to 3150 A	25 to 50 kA*		25 to 31.5 kA*
Rated Current (Ir)			

* Intensity short circuit (Isc)

PE90410



	Rated Voltage Un (50/60 Hz)		
	7.2kV	12kV	17.5kV
630 A to 3150 A	LF2/LF3 (25 to 50 kA*)		LF2/LF3 (29 to 31.5 kA*)
	Evolis (40 kA* - 2500 A max)		
Rated Current (Ir)			

* Intensity short circuit (Isc)

PE90411

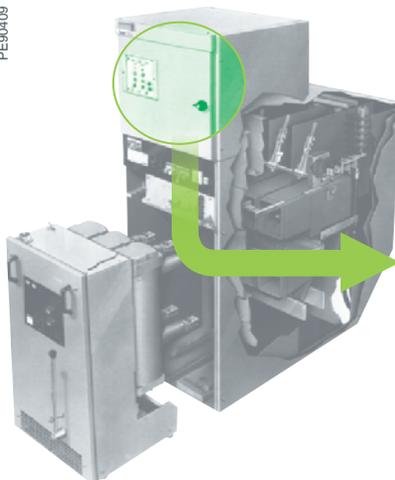


A true extended life time

Commercialisation	End of commercialisation	End of spare parts	End of life
1980	1998	2011	
		1999	Ongoing
		ECOFIT	LF2, LF3 Evolis

Offer extension

PE90409



PE90437



MICOM P series 10 - 20 - 30 - 40

PE90488



Sepam series 10 - 20 - 40 - 60 - 80



Example of MV CB or Contactor or Disconnecter

YSF6 Circuit Breaker

To give a new life to your installations

- **Original brand:** Yorkshire Switchgear / Merlin Gerin
- **Version type:** withdrawable device compatible with YSF6 cubicle

PE90607



YSF6 (SF6)

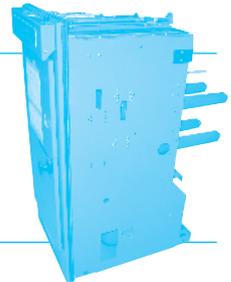


YSF6 Evolis (Vacuum)

Main technical characteristics

	YSF6	
	Rated Voltage Un (50/60 Hz)	12 kV
630 A to 1250 A	Rated Current (Ir)	Up to 25 kA*

PE90608



* Intensity short circuit (Isc)



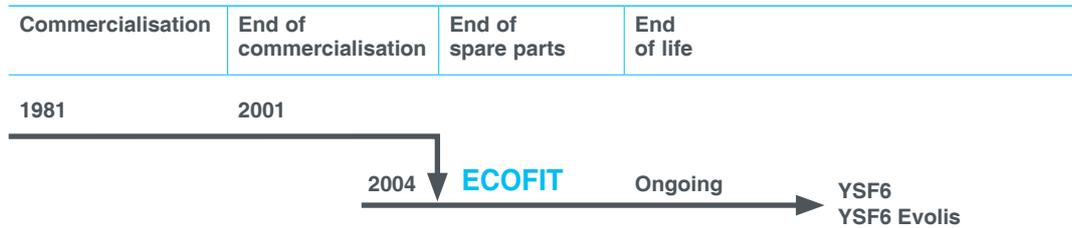
	YSF6 Evolis	
	Rated Voltage Un (50/60 Hz)	12 kV
630 A to 1250 A	Rated Current (Ir)	Up to 25 kA*

PE90609



* Intensity short circuit (Isc)

A true extended life time



Offer extension

PE90419



PE90437



MiCOM P series 10 - 20 - 30 - 40



PE90488



Sepam series 10 - 20 - 40 - 60 - 80



Example of LV CB or Contactor Masterpact M Circuit Breaker

To give a new life to your installations

- **Original brand:** Merlin Gerin
- **Version type:** fixed and withdrawable device compatible with all LV switchboard



035928



The **ECOFIT™ Masterpact Plug & Play** solution lets you retrofit the latest generation of Masterpact NW circuit breakers in the existing Masterpact M chassis with very short on-site servicing times. Solution available for withdrawable type only, 3P & 4P, 800A to 3200A.

The **ECOFIT™ Masterkit** solution enables to benefit from all the enhanced features of Masterpact NW circuit breakers and accessories. It requires total shutdown of the installation to access the busbars. Solution available for fixed and withdrawable types, 3P & 4P, 800A to 6300A.

M08 to M63 → Masterpact NW

Main technical characteristics

M08 to M63		Masterpact NW								
Rated Voltage Un (50/60 Hz)		220 V	415 V	440 V	500 V	525 V	600 V	660 V	690 V	
800 A to 6300 A	40 to 150 kA*	40 to 85 kA*								
Rated Current (Ir)										



035928

* Intensity short circuit (Isc)

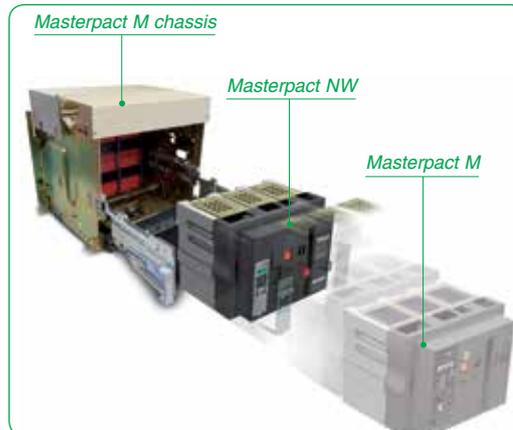


Masterpact NW		Masterpact M							
Rated Voltage Un (50/60 Hz)		220 V	415 V	440 V	500 V	525 V	600 V	660 V	690 V
800 A to 6300 A	42 to 150 kA*					42 to 130 kA*			42 to 100 kA*
Rated Current (Ir)									

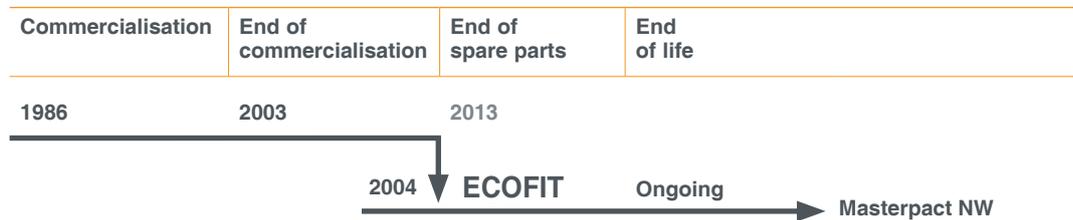


PE90429

* Intensity short circuit (Isc)



A true extended life time



Services Maintenance Contracts

- > ED Advantage Service Plans

- Corrective Maintenance
- Preventive Maintenance
- Predictive Maintenance

- > Spare Parts

- > MV Transformers Maintenance



Advantage Service Plans

Tailored maintenance service plans improve asset management



Unexpected downtime can cause significant financial losses. The problem is often compounded by slow-to-respond repair personnel or equipment that under-performs after it's repaired.

Our maintenance services contracts were created to prevent such issues. By focusing on predictive and preventive maintenance that's tailored specifically to your site and processes, you can keep control over your budget and ensure a prompt response in the case of any failure.

Advantage Service Plans	Advantage Plus	Advantage Prime	Advantage Ultra
Preventive Maintenance	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Predictive Maintenance	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Corrective Maintenance			
24/7 Hotline	–	–	<input checked="" type="checkbox"/>
Emergency on-site intervention	Available at preferred rates	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Emergency on-site intervention Cost of Parts	Available at preferred rates	Available at preferred rates	<input checked="" type="checkbox"/>
Emergency on-site intervention Labour & Travel cost	Available at preferred rates	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Additional Services			
Customer Training	Optional	Optional	Optional
Asset On-line	Optional	Optional	<input checked="" type="checkbox"/>

Service Plans can be customized as per request



Advantage service plans optimize equipment safety, lower your total cost of ownership and give you peace of mind, so you can focus on your core business

Corrective Maintenance

The reactivity you need

When unexpected downtime occurs, every second counts. In order to safeguard your business and speed up restart time you need the assurance of timely reactivity by an experienced, well-trained field service team as well as the guarantee of spare part availability.

Corrective maintenance from Schneider Electric gives you the reactivity you need in the event of a technical issue.



The right response, at the right time

Emergency on-site intervention

When a speedy intervention is necessary, we dispatch a field service expert to your site so that repairs are made as quickly as possible.

A response is guaranteed within a period of time specified in the service plan.

Spare-part delivery

Includes priority access to spare parts. We deliver spare parts that are best suited to your installation's needs, so that you don't have to keep bulky, expensive equipment on-site at all times.

Intervention and spare-part cost coverage

Certain Advantage service plans include partial or full cost coverage for emergency on-site interventions and emergency spare-part deliveries.

This reduces the threat of unexpected costs and increases control over your maintenance budget.



Maintenance by the Manufacturer

Preventive Maintenance

Continuity of service

- > Maintain your electrical equipment regularly in order to retain its original operational level,
- > Entrust your installations to a professional in electrical distribution who is competent to handle the various technical grades of your equipment.

Various levels of preventive maintenance

Level	Operation	Performed by
Level 1	<ul style="list-style-type: none"> ● Replacement of consumable components that may be accessed with minimal safety risks. ● Simple activities such as visual/audible inspection. 	Technicians from the manufacturer
Level 2	<ul style="list-style-type: none"> ● Checking of basic equipment operation. Trouble-shooting by standard replacement. ● Minor preventive maintenance operations such as cleaning, lubrication etc... 	Specialist technicians from the manufacturer
Level 3	<ul style="list-style-type: none"> ● Failure identification and diagnostics. ● Complex maintenance operations. 	Specialist technicians from the manufacturer
Level 4	<ul style="list-style-type: none"> ● Major preventive maintenance work. ● Major corrective maintenance work 	Highly specialist technicians from the manufacturer

77%

of breakdown causes can be avoided by Maintenance

34 % Contacts of faulty parts
17 % Work incorrectly carried out

8 % Environment
9 % Faulty equipment

9 % humidity

Predictive Maintenance

Anticipate future equipment failure

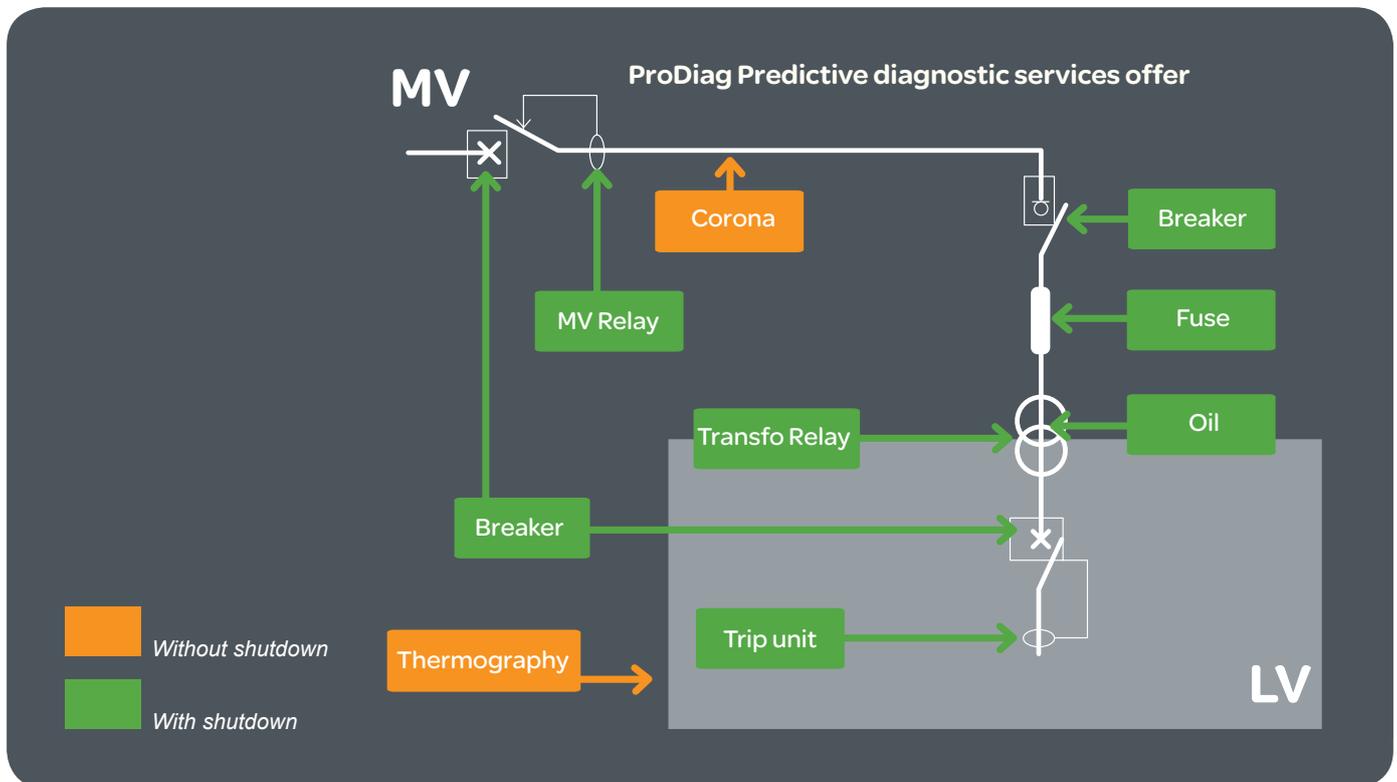


The undesirable phenomena in electrical distribution are:

- | | | |
|--------------------------|--|---------------------------|
| > Electrical | > Mechanical | > Environmental |
| - Short-circuit | - Effect of wear on the operating system | - Humidity/ventilation |
| - Current overload | - Effect of wear on the breaking system, etc | - Pollution, etc |
| - Overheating | | |
| - Partial discharge, etc | | |

Specific diagnosis tools and consumables

- > Schneider Electric has developed specific proprietary tools required for diagnostic work on electrical distribution equipment.
- > Feedback from maintenance missions and the problems encountered allow us to develop and evolve these tools at crucial places in the electrical distribution:



Plan for the future of your electrical distribution installation

ProDiag Breaker

Diagnosis of MV and LV Circuit Breakers

What is ProDiag Breaker?

ProDiag Breaker compares the mechanical and electrical parameters measured during the full operation of circuit breakers with the data collected from our production facilities.

This allows detecting possible failure in advance.

It measures, records and displays on a screen the key electrical parameters in MV and LV circuit breakers, relating to opening, closing and spring-loading operations.

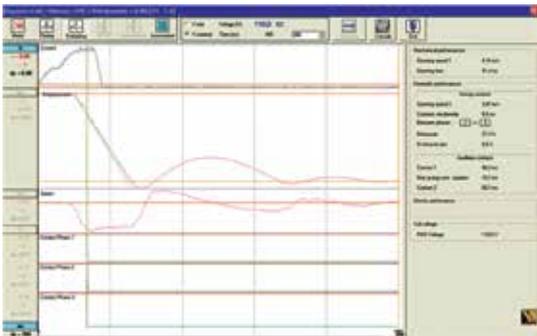
All this data is automatically compared with the criteria for the circuit breaker designated in the software, which indicates which values are within the acceptable range, which are on the limit and which are outside it.

Two tests are always performed on each circuit breakers, one at minimum voltage and one at nominal voltage.

A written report is generated and provided by Schneider Electric so that the customer can use it as a tool to define the necessary corrective action (maintenance, repair or replacement).

ProDiag Breaker provides a report of the complete nature of the circuit breaker, detailing :

closing / opening time, contact simultaneity, bounce and resistance, mechanical closing and opening forces.



Measurements taken on de-energized equipment:

1. Charging time of control mechanism
2. Opening and closing times
3. Opening and closing speeds
4. Simultaneousness of contacts at opening and closing
5. Check safety to close (overtravel and stabilisation)
6. Check safety to open (overtravel and stabilisation)
7. Wear of arcing contacts
8. Contact and insulator resistance
9. Check / adjustment of condition of the damper and / or stop device



ProDiag Corona Diagnosis of partial discharges

What is ProDiag Corona?

ProDiag Corona detects partial discharges in Medium Voltage cubicles.

> Partial Discharge occurs across part of the insulation between two conducting electrodes, without completely bridging the gap.

> Partial discharge can happen under normal working conditions as a result of insulation breakdown due to premature aging caused by thermal or electrical over-stressing of the high voltage system.

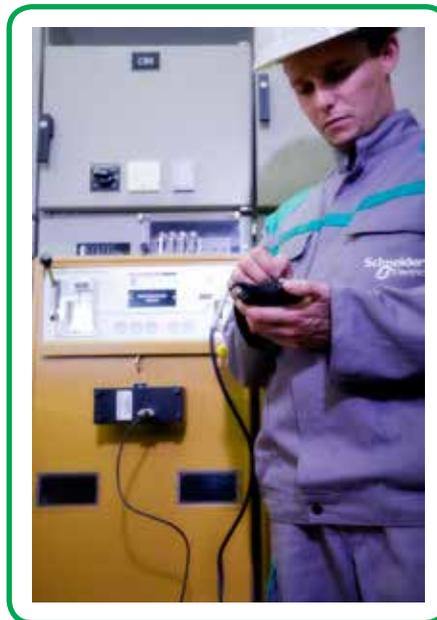
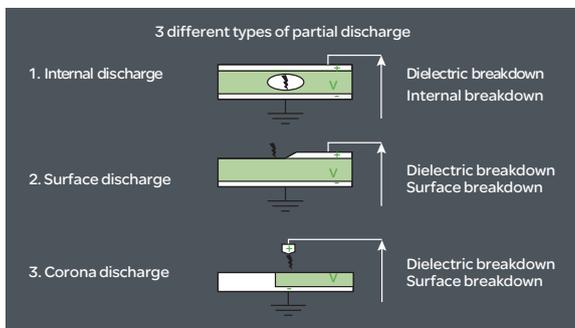
ProDiag Corona analyses the primary electrical signal through VIS (Voltage Indicator System) fixed on the switchboards. Measurements are taken by an electronic sensor and the data is transmitted to the ProDiag Corona software in order to evaluate the level of criticality of the controlled equipment.

ProDiag Corona is not a certification tool.

ProDiag Corona executes the assessment of the energized equipment, without any shutdown and then without disruption for the users

A written report is generated, which will be handed over by Schneider Electric so that the customer can use it as a tool to define the necessary corrective action, whether maintenance, repair or replacement.

ProDiag Corona provides a report of the complete electrical room, detailing: ventilation, air filtration, due point calculation, level of criticality of each set of equipment, constructor recommendations on any potential maintenance, repair & rehabilitation.



ProDiag Transfo Relay

Diagnosis of oil Distribution Transformer Protection Relay

What is ProDiag Transfo Relay?

ProDiag Transfo Relay protects your oil immersed transformer against internal faults by detecting: temperature, pressure, and gas.

The ProDiag Transfo Relay solution validates the proper functioning of the Transformer Protection Relay and avoids the risk of overheating.

Correct operations tested on DGPT2, DMCR and RIS relays of any Oil distribution transformer

> Checking all 3 relay functions

1. Temperature (alarm and tripping)
2. Pressure
3. Release of gas

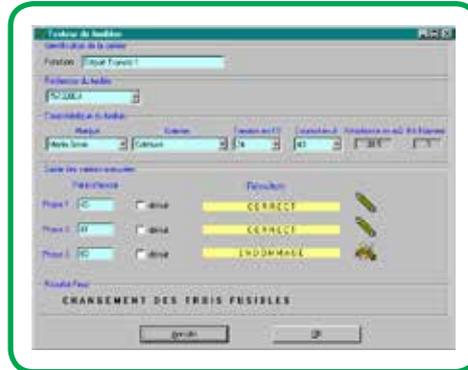


ProDiag Fuse Diagnosis of MV fuses

Description of test

Measure the resistance of an MV fuse using a milliohmeter

Checking of this measurement with the ProDiag Fuse software



Operating principle:



Advantages:

Avoid thermal runaway of fuses

Avoid fuse blowing following an overload

ProDiag Thermography

Description of test

Checking installations using a thermal imaging camera

Checking measured temperatures with respect to normal operating temperatures

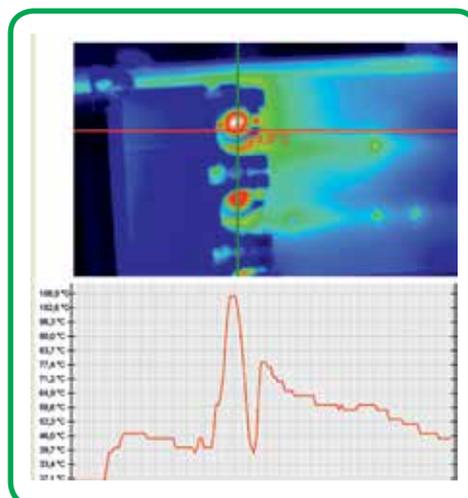
Operating principle:

Thermal imaging cameras provide an image of what is happening in the form of a temperature gradient. These images allow installation hot spots to be identified.

Advantages:

Detect hot spots in a live electrical installation (due to a bad connection, harmonics, overloads, unbalancing etc.)

Foresee risks of a fire and any other malfunction that could endanger people and equipment



Downstream switchgear connection

ProDiag Trip Unit

Diagnosis of LV Circuit Breakers

What is ProDiag Trip Unit?

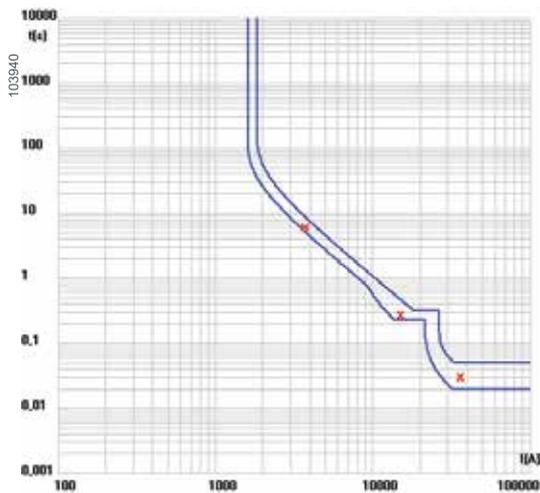
ProDiag Trip Unit is a software tool used to check the selected protection relay functionalities on de-energized Low Voltage Circuit Breakers according to the customers' real protection settings.

The expert measures the protection tripping times by carrying out secondary injection testing and enters the test results in the software tool.

The tripping times are highlighted on the tripping curve and give a clear indication of whether or not they are within the specified parameters ProDiag Trip Unit can also be used to check the discrimination between upstream and downstream devices

ProDiag Trip Unit is not a certification tool.

A written report is generated, which will be handed over by Schneider Electric so that the customer can use it as a tool to define the necessary corrective action, whether maintenance, repair or replacement.



> Typical curves analyzed by ProSelect LV™

Date: 25/02/2014
Customer: EQI test 1
Site: EHI
Substation: Dekhela port
Switchboard: MV01
Function: feeder
Engineer: M.Sadek
Type of device: Masterpact NW16N1
Serial number:
Control unit: Micrologic 5.0P
CT rated current: In = 1600 A
Breaking capacity (415 V): 42 kA
Settings:
Long Time
 Ir = 1520 A
 Tr(6 Ir) = 1 s
 Idmtl = I T
Short Time
 Isd = 9120 A
 Tsd = 0,3 s
 Option I t = ON
Instantaneous
 Inst = 24000 A

> Injection measurements

Measurement	Current (A)	Guaranteed no-tripping time (s)	Time measured (s)	Guaranteed tripping time (s)	Result
1	3700	5,3	6,1	8,65	valid
2	15000	0,23	0,272	0,48	valid
3	36000	0,02	0,03	0,05	valid



Spare Parts

Having a service plan with Schneider Electric guarantees to you:

- > Original manufacturer, design & quality
- > Guarantee of Spare Parts Availability
- > Key Contributor to Customers' Satisfaction
 - Provide to you the most relevant information, such as obsolescence

Examples of parts that must be installed by the manufacturer

> MV Circuit Breaker - Switch Cubicle

Recommended Spare Parts			
Secure: Parts commonly used in corrective maintenance interventions			
Relay, LV Fuse			Light maintenance
Auxiliary Contact			Light maintenance
Tripping coil			Light maintenance
Mitop for switch			Light maintenance
Undervoltage coil			Advanced maintenance
Motor			Advanced maintenance
Prevent: Parts whose condition are checked in preventive maintenance interventions			
Gear motor			Exclusive maintenance
Operating mechanism			Exclusive maintenance
Life extension: Parts to extend the life of the equipment			
Capacitive insulator			Advanced maintenance
Earthing cluster			Advanced maintenance

> LV Circuit Breaker / Switch Disconnecter

Recommended Spare Parts			
Secure: Parts commonly used in corrective maintenance interventions			
Auxiliary contacts			Light maintenance
Closing / opening coil			Advanced maintenance
Undervoltage coil			Advanced maintenance
Prevent: Parts whose condition are checked in preventive maintenance interventions			
Clusters			Exclusive maintenance
Operations counter			Advanced maintenance
Life extension: Parts to extend the life of the equipment			
Adjustable delay unit			Advanced maintenance
Automatic controller			Exclusive maintenance
Arc Chute			Exclusive maintenance

- Exclusive maintenance conducted by ED equipment manufacturer only
- Advanced maintenance, preferably conducted by ED equipment manufacturer or manufacturer certified partner
- Light maintenance, conducted by ED equipment manufacturer or customer competent technician



MV Transformers Services Range

Preventive	
<p>Oil Immersed Transformers</p> 	<ul style="list-style-type: none"> • Visual inspection: <ul style="list-style-type: none"> - Cleanliness. - Surface coating damage. - Checks for leakage. - Checks on tightening. - Oil level. - Connections and setting of protection relays. • Accessories: <ul style="list-style-type: none"> - Installation of surge arresters. - Locking devices on connections and housing. - Retention tank. - Cable boxes. - Silica gel replacement, etc. • Maintenance on OLTC (On Load Tap Changer)
<p>Cast Resin Transformers</p> 	<ul style="list-style-type: none"> • Visual inspection: <ul style="list-style-type: none"> - Cleanliness. - Surface coating damage. - Checks on tightening. - Winding status. - Connections and setting of protection relays. • Accessories: <ul style="list-style-type: none"> - Installation of surge arresters. - IP housing. - Locking devices on connections and housing. - Cable boxes, etc.



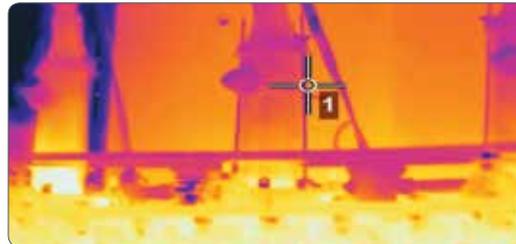
Predictive

Diagnosis

- Oil sampling and analysis



- Check on hot spots:
 - IR thermography.
 - Measurement of contact resistance.
 - Results interpretation.



- Dielectric measurements:
 - Expertise and interpretation of results.

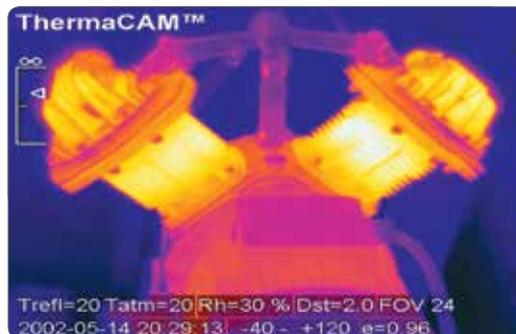
- Accessories:
 - Checks on sensors and temperature protection relays (Pro Relay Box).
 - Online transformer monitoring.
 - Online DGA (Dissolved Gas Analysis).



Risk assessment according to environment, conditions of use, criticality.

Diagnosis

- Check on hot spots:
 - IR thermography.
 - Measurement of contact resistance.
 - Interpretation of results.



- Dielectric measurements:
 - Expertise appraisal and interpretation of results.

- Accessories:
 - Checks on sensors and temperature protection relays.
 - Online transformer monitoring.



Corrective

- Oil treatment:
 - Particle filtration.
 - Cleanup and depollution.
 - Oil replacement, oil recycling, PCB decontamination.

- On-site repairs
 - Leakages.
 - Painting.
 - Gasket replacements.

- In-house repairs
 - Gasket replacements, re-painting, replacement of protection devices, inspection and cleaning of bushings, complete electrical testing, etc.

- Fan installation

- Spare parts

- On-site repairs
 - Painting.
 - Winding wedging.

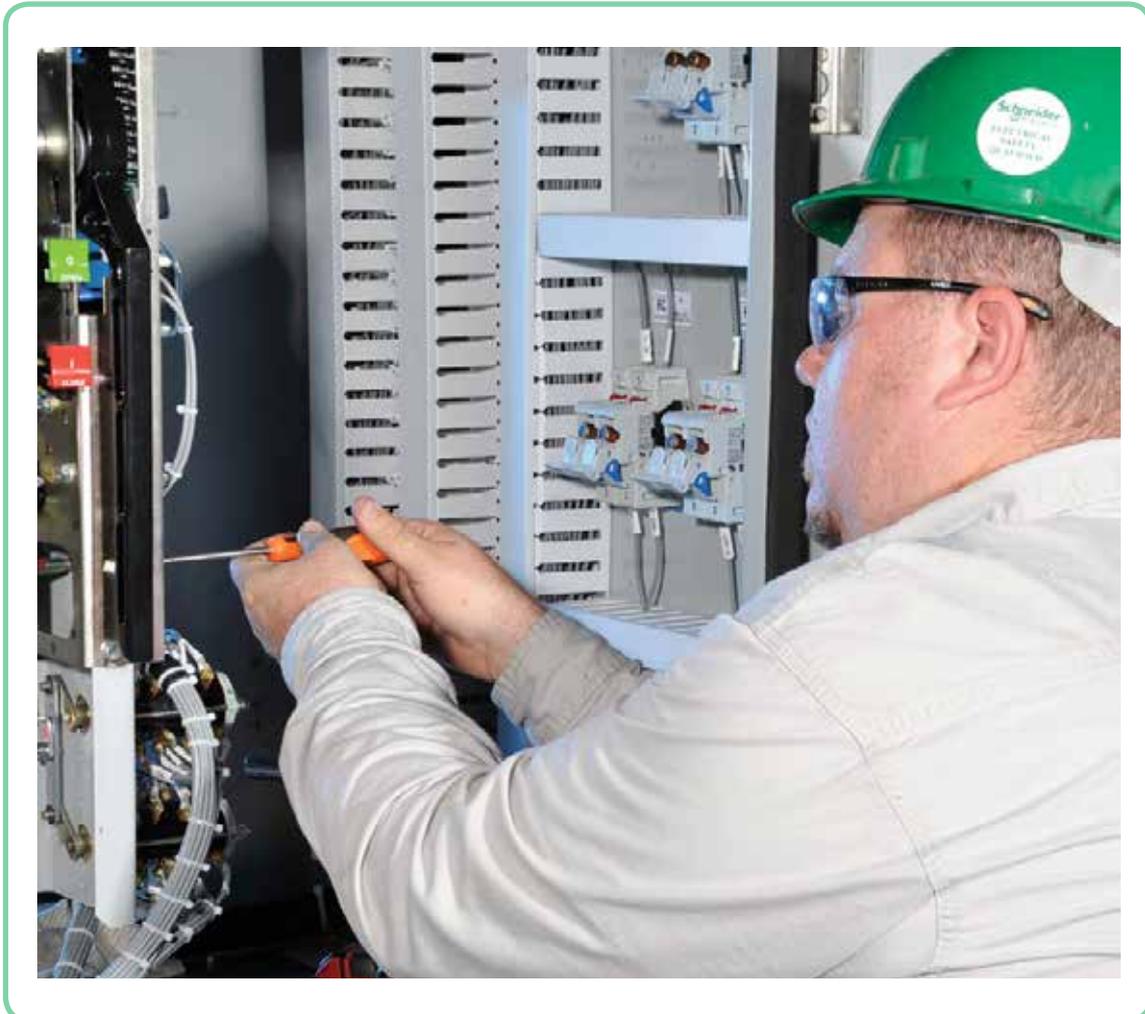
- In-house repairs
 - Re-painting, replacement of protection devices, inspection and cleaning of bushings, complete electrical testing, etc.

- Fan installation

- Spare parts



On-Demand Maintenance



Schneider Electric's policy has always been to provide its customers with very close support in their daily activities to enable them to achieve operational excellence.

- > limit down time by relying on our knowledge of our products and your business,
- > inspected or commissioned equipment will meet requirements to ensure optimal production quality,
- > in case of a fault, get operations started again as quickly as possible to limit losses and risks,
- > equipment is started up as recommended by the manufacturer



Combining technical know-how and fast response

Installation & Commissioning



Precision, proven tools and procedures, expert knowledge, and experience – that's what it takes to start up an electrical distribution installation the right way.

Without these, you increase the risk of start-up delays and premature equipment failure.

Schneider Electric installation & commissioning services were created specifically to improve the launch phase of MV/LV electrical distribution installations.

We give you an extra level of assurance that your equipment will function optimally after start-up and we offer expert advice on how to keep it running for a long time.

- > Reduced risk of delays
- > Reduced risk of premature failure
- > On-site recommendations for set-up, operation, and maintenance
- > Traceability of Schneider Electric interventions



Minimize risk of warranty issues with correct equipment start-up

Installed Base Assessment Form

End User data

Project:
Customer:
Address:
Contact person:
Job Title:
Phone:
Email:

Electrical Distribution

MV / LV switchgear data

Brand:
Type:
Manufacturing year:
Rated Voltage:
Rated Busbar current In(A):
No.of cubicles of switchboard:

C.B data

Brand:		
Installation Mode: Qty Fixed (-----), Qty Withdrawable (-----)		
Qty	Type	Rating (V & I)

Protection Relay data

Brand:	
Qty	Type

Power Transformer data

Brand:		
Qty	Type	Rating (KVA)

Please hand it to Schneider Electric services representative or send it on customer.care@eg.schneider-electric.com in order to provide you with the recommendations for your Maintenance plan.

Installed Base Assessment Form

End User data

Project:
Customer:
Address:
Contact person:
Job Title:
Phone:
Email:

Automation

PLC	SCADA
Brand:	Brand:
Type:	Type:
Qty:	Qty:
Year of Installation:	Year of Installation:

Human Machine Interface (HMI)	Drives & Soft Starters
Brand:	Brand:
Type:	Type:
Qty:	Qty:
Year of Installation:	Year of Installation:

Critical Power & Cooling

UPS
Brand:
Model:
Serial #:
Rating:
Qty:
Year of Installation:

Cooling Products
Brand:
Model:
Serial #:
Qty:
Year of Installation:

Building Management Systems
Brand:
Year of Installation:

Please hand it to Schneider Electric services representative or send it on customer.care@eg.schneider-electric.com in order to provide you with the recommendations for your Maintenance plan.

Technical Training



Technical Training

Customer Training Center (CTC)

As the global leader in energy management, we at Schneider Electric understand the importance of knowledge in making electrical energy safer, reliable and available to everyone.

We also understand your needs for making your workplace safer and your utilization of electrical energy more efficient, therefore we have invested heavily in building our training center.

We have equipped it with very modern educational equipment and designed the training courses to meet your training needs and answer your questions.

Our trainers at CTC come with solid hands-on field experience and academic knowledge and are enthusiastic to share with you their expertise that will make you use the best of your electrical energy

Lab and Training Kits

> 3D Simulator Training Kit



> Ecostruxure Training Demo Room



> Training Kits



Technical Training

... a profitable investment

Course name

Code

Electrical Power & Distribution

● Wiring And Troubleshooting Of The Electrical & Control Circuits For Technicians	● الكشف و صيانة الأعطال لدوائر الكهرباء والتحكم للفنيين	● TECH01
● Design, Maintenance & Testing of LV switchgear	● تصميم وتشغيل واختبار لوحات الجهد المنخفض	● LVD 01
● Design of LV switchboards using Ecodial Software	● تصميم اللوحات الكهربائية باستخدام برنامج الإيكوديال	● LVD 02
● Design, Testing and Certification of LV Electrical Installation	● تصميم وإختبار وإعتماد التركيبات الكهربائية لشبكات الجهد المنخفض	● LVD 03
● Safety & Earthing Arrangements For Electrical Networks	● السلامة ونظم التأريض والأمان في الشبكات الكهربائية	● LVD 04
● Design, Maintenance & Testing of MV switchgear	● تصميم وتشغيل واختبار لوحات الجهد المتوسط	● MVD 01

Protection Relays

● Implementing and using SEPAM products	● تركيب وتشغيل واختبار جهاز الوقاية (SEPAM)	● MVD 02
● Electrical Network Protection Diploma Level : I	● دبلومة نظم الوقاية للشبكات الكهربائية المستوى الأول	● PR 01
● Electrical Network Protection Diploma Level : II	● دبلومة نظم الوقاية للشبكات الكهربائية المستوى الثاني	● PR 02

Power Quality & Green Energy

● Power Quality Improvement in the electrical distribution networks	● تحسين كفاءة القدرة في شبكات التوزيع الكهربائي	● PQ 01
● Design of Photovoltaic Systems (Grid-tie type)	● تصميم أنظمة توليد الطاقة الشمسية الكهروضوئية (الفوتوفولتية) من النوع المتصل بالشبكة	● PV 01

Motor Starters & Drives

● Motor starting, operation and protection (LV)	● بادئات تشغيل ووقاية المحركات الكهربائية جهد منخفض	● IC 01
● LV Soft Starters for electrical motors	● بادئات الحركة الناعمة للمحركات الكهربائية ذات الجهد المنخفض	● IC 02
● LV Variable Speed Drives for electrical motors	● مغيرات السرعة لمحركات الجهد المنخفض	● IC 03

Automation & Scada

● Design and Management of Smart Homes Using KNX System	● تصميم وإدارة البيوت الذكية بنظام KNX	● KNX 01
● Basics of PLC	● مقدمة في الحاكم المنطقي المبرمج	● AUT 01
● Advanced PLC	● الحاكم المنطقي المبرمج المتقدم	● AUT 02
● Control of Industrial Processes- Applications using 2D and 3D simulators	● التحكم في المنظومات الصناعية- تطبيقات باستخدام المحاكيات ثنائية وثلاثية الأبعاد	● AUT 03
● Basics of Vijeo Citect SCADA	● مقدمة في البرنامج Vijeo Citect الخاص بمنظومة تجميع البيانات و التحكم الإشرافي (SCADA)	● AUT 04
● Advanced of Vijeo Citect SCADA	● البرنامج Vijeo Citect الخاص بمنظومة تجميع البيانات و التحكم الإشرافي المستوى المتقدم (SCADA)	● AUT 05
● Human Machine Interface (HMI)	● شاشات الاتصال المبرمجة الجرافيكية (HMI)	● AUT 06
● Industrial Communication	● الإتصالات الصناعية	● AUT 07

E-Learning Training



Become a champion of energy efficiency with Energy University

Your energy education begins here

Energy University is a free, Web-based learning program focused on improving energy efficiency and conservation in any organization. Developed by Schneider Electric, The Global Specialist in Energy Management, Energy University delivers timely, unbiased information from energy experts across multiple industries.

Designed to fit your schedule and meet your needs

On demand courses are designed in convenient thirty-minute modules. Courses qualify for professional education credits from numerous associations as well.

Energy University™

by Schneider Electric

Energy University at a glance

- > Free of charge
- > Professional education credits
- > Available online 24 hours a day
- > Progress and course completions tracked
- > Available in multiple languages worldwide
- > User-friendly website

Energy University is approved or endorsed by many professional organizations:



The U.S. Green Building Council (USGBC)



The Institute of Electrical and Electronic Engineers (IEEE)



The Italian Federation for the Rational use of Energy (FIRE)



The Renewable Energy & Energy Efficiency Partnership (REEEP)



BOMI International



The chartered Institution of Building Services Engineers (CIBSE)



The American Council On Renewable Energy (ACORE)



The American Hotel & Lodging Educational Institute (AH&LEI)



Engineers Ireland



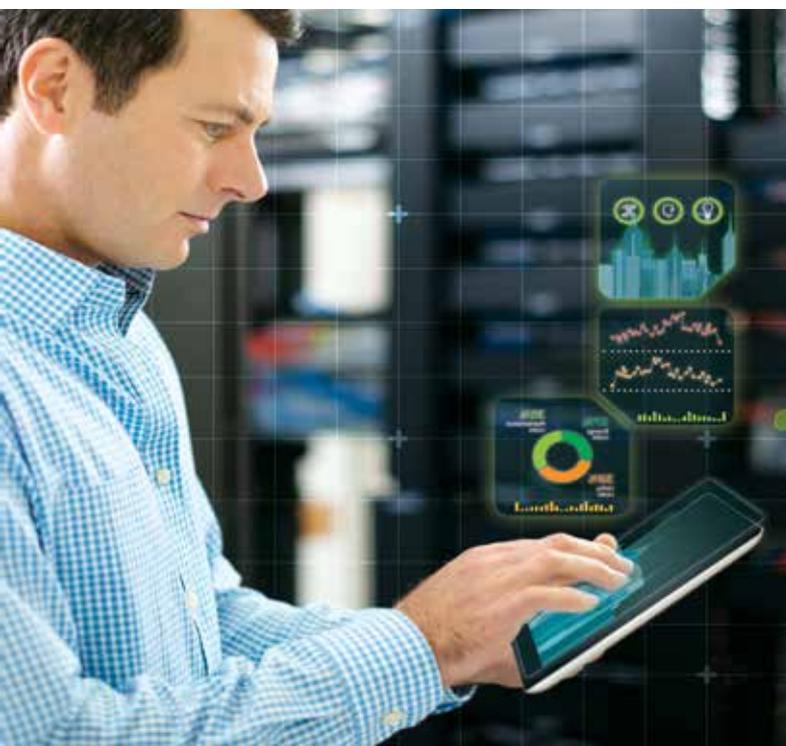
The Association for Facilities Engineering (AFE)

Visit www.myenergyuniversity.com and enroll now for free. For more information call our Customer Care Center 19775.



Automation Services

IT - Critical Power & Cooling Services



Building Management Systems Services

Automation Services

A dedicated services offer for your installed base

Schneider Electric, with its experts, products and dedicated tools, provides services such as system design, consultancy, maintenance contracts, modernisation of facilities or delivering projects.

Maintenance and support services

Spare parts, exchanges and repairs

Everything you need to get equipment working again as quickly as possible

Solutions to respond very quickly to requests for spare parts, exchanges and repairs to your installed automation equipment (automation platforms, Human Machine Interfaces, drives, distributed I/O):

Spare parts management:

- > Identification of critical parts
- > Stock of spare parts: a Schneider Electric owned stock of spare parts, on your site or in one of our warehouses
- > Testing of spare parts stored on site

Repairs:

> Broken down products are repaired in a network of worldwide repair centers. For each repaired product, our experts provide a detailed report.

On-site repair:

- > Our experts' knowledge and expertise
- > Monitoring of specific repair procedures

Exchanges:

> With standard replacements, receive a new or reconditioned product before the broken down product has even been sent back



Preventive maintenance

Improving and guaranteeing the long-term reliability and performance of your installations

Schneider Electric's preventive maintenance expert assesses your site, the equipment to be managed and sets up a maintenance program to accommodate specific requirements.

Extended warranty

An additional manufacturer warranty covering replacement or repair of the equipment

The extended warranty offers the option to take out a 3-year warranty.

Online support

Access to dedicated experts

Priority access to experts who can answer technical questions promptly concerning equipment and software both on sale and no longer commercially available.

Software subscription

Access to software upgrades and new features



Unscheduled downtime is expensive. The global process industry loses \$20 billion, or five percent of annual production, due to unscheduled downtime and poor quality. ARC estimates that almost 80 percent of these losses are preventable...»

ARC Advisory Group, 2010

Consultancy services

M2C (Maintenance and Modernization Consultancy)

Professional tools and methods, proven experience of managing obsolescence and updating installed bases, to reduce downtimes and improve performance

With our maintenance and modernization consultancy offer, Schneider Electric will help you check the state of your installed base by:

- > Defining the scope and depth of the analysis in collaboration with you
- > Collecting the technical data without shutting down production
- > Analyzing and identifying avenues for improvement
- > Producing a recommendation plan

Customer benefits:

- > Learning about the components that make up the installed base and how up-to-date they are
- > Better downtime anticipation
- > Expert advice designed to improve performance



Modernization solutions

Migration to PlantStruxure

Proven expertise, tools and methods to give you a clear vision of the improvement opportunities and guide you toward a successful modernization project

Schneider Electric offers a gradual program of modernization through a series of products, tools and services that allow you to upgrade to newer technology. There are several stages in this gradual modernization program:

- > Partial program: replacement of an old component with a new one
- > Staggered program: gradual incorporation of new offers in the system
- > Total program: total renovation of the system

PlantStruxure™

To find out more about PlantStruxure architectures, please visit our website
www.schneider-electric.com/PlantStruxure

Customization services

Schneider Electric is able to meet your specific requirements and provide you with adapted products:

- > Protective coating for Human Machine Interfaces, automation platforms and distributed I/O modules for use in harsh environments
- > Customized cable lengths to match your specific needs
- > Customized front panels for Human Machine Interfaces

The table below lists our various migration offers:

Wide range of migration offers		Change the CPU	Keep the I/O racks & wiring	Change the I/O racks & keep the wiring	Migrate your application	Manage your project	Execute your project
Platform (1)	TSX47 to TSX107	☑	☑	☑	☑	☑	☑
	April series 1000			☑	☑	☑	☑
	Modicon p84, Compact	☑	☑	☑	☑	☑	☑
	April SMC				☑	☑	☑
	Merlin Gerin PB				☑	☑	☑
	AEG	☑	☑	☑	☑	☑	☑
	Symax	☑			☑	☑	☑
	Rockwell SLC500			☑	☑	☑	☑
		☑	Service available				
<p><small>(1) Our migration service offer also includes SCADA, Human Machine Interfaces, drives, communication networks and distributed I/O.</small></p>							

IT - Critical Power & Cooling Services

Expertise, service, and support for building, industry, power, and data center infrastructure

Benefits of regular service	
Prevents potential problems, reducing or even eliminating costly downtime	✓
Makes equipment more energy efficient	✓
Ensures peak system performance – much like regular oil changes or tune-ups will improve your car's performance	✓
Protects your investment and can prolong the life of your system	✓
Frees you to focus on your core competencies	✓



Integration Services

Plan	Build	Operate
<p>Planning is the strong foundation of any data center project. Utilizing CPCS expertise in planning and design will ensure a successful outcome in the later stages.</p> <ul style="list-style-type: none"> > Data center assessments > Design and planning consultation 	<p>When the planning stage is complete, CPCS provides the services that can take your data center project from acquisition through implementation to ensure an efficiently operational system.</p> <ul style="list-style-type: none"> > Data center assessments > Project services > Integration services > Installation services > Testing and training 	<p>CPCS offers a portfolio of services designed to ensure your critical application receives the care it needs for optimal performance and maximum availability.</p> <ul style="list-style-type: none"> > Data center assessments > Maintenance services > Service plans

Modernization Services

Complete renovation for data center & its infrastructure



Installation Services

Assembly and Start-up

Start service by a certified FSE ensures full factory warranty coverage

Testing and Training Services

Testing

Witness your product in a testing environment before hooking it up to a critical load

Training

Skill-building and learning opportunities to help you efficiently operate your equipment

Maintenance Services

Preventive Maintenance Services

An on-site examination of your system that ensures optimal performance and prevents problems before they occur

On-Site Warranty Extension

Delivers the on-site support you need to bring your business back up and running in a time frame compatible with your business requirements

IT services include

- > Service contracts
- > SWAP centers
- > Battery replacement
- > UPS (single & 3 ph.) and Cooling systems services

Building Management Systems Services

Improve the efficiency, occupant comfort, and financial well-being of your building

Preventative maintenance

Traditional services

BMS are critical to day-to-day facility operation and occupant comfort. Preventative maintenance services keep your BMS running in top condition and ensure they provide the foundation for effective implementation of all other services offers.

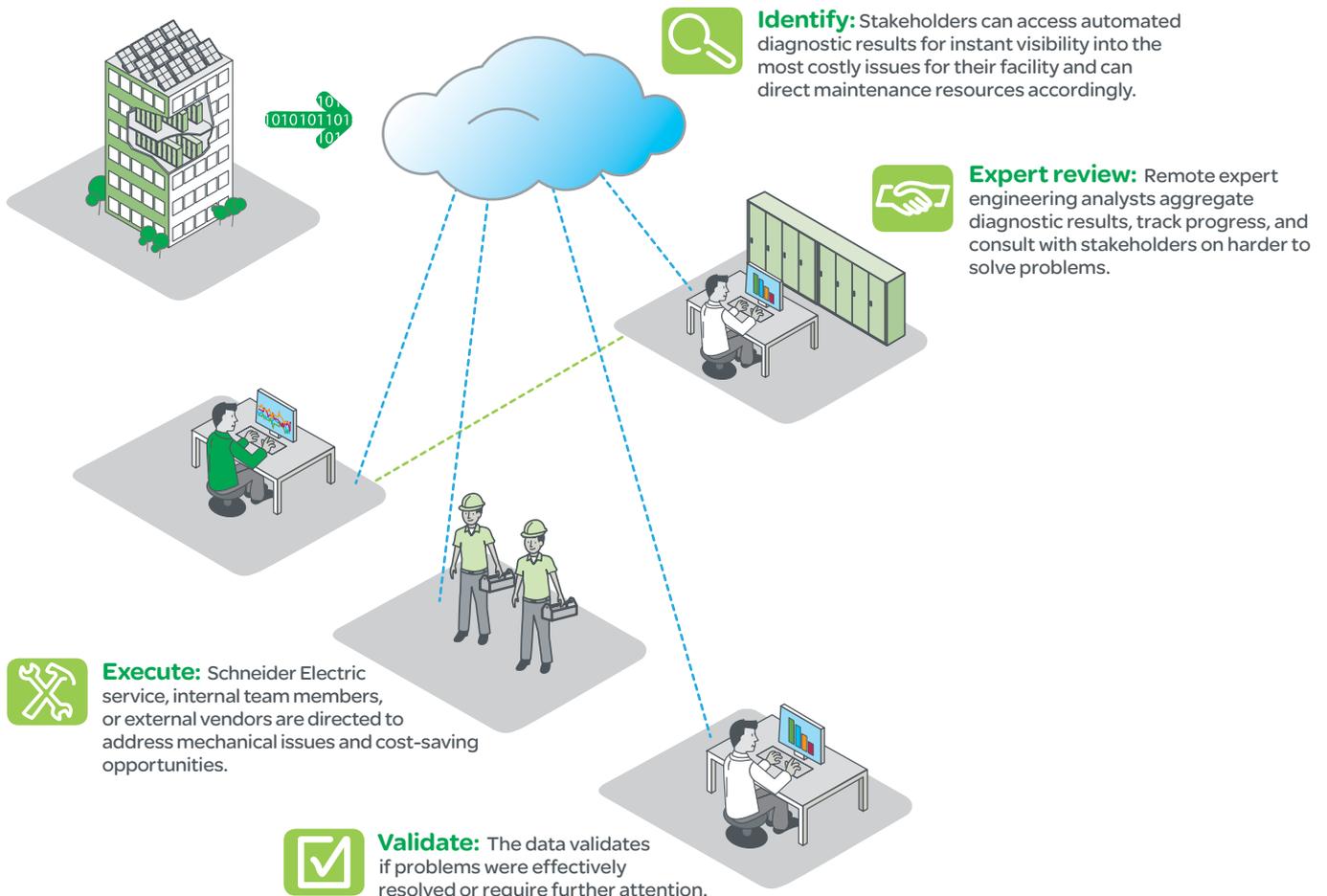
Commissioning

Restore designed operations

Re- and retro-commissioning services restore building operations to their designed state by looking at the engineered design parameters and considering the interaction of all system components. Engineers calibrate, tune, and repair components to restore working order to the entire facility.

Building Analytics

Reduce facility operating costs over time by targeting maintenance efforts.



Building Optimization



Ensure optimal HVAC operation automatically

By continually optimizing the HVAC system's energy consumption and pre-planning its operations, Building Optimization enables you to:

- > Reduce energy expense
- > Free up resources through automated, real-time monitoring of HVAC operations
- > Improve your property's valuation by increasing net operating income
- > Automate demand response events and avoid peak day pricing penalties
- > Lower your carbon footprint
- > Contribute to your building's ENERGY STAR®, LEED®, NABERS, and other green building ratings



Lower HVAC energy costs up to **25%**, which reduces total energy use up to **8%**, with Building Optimization

Energy Efficiency Solutions





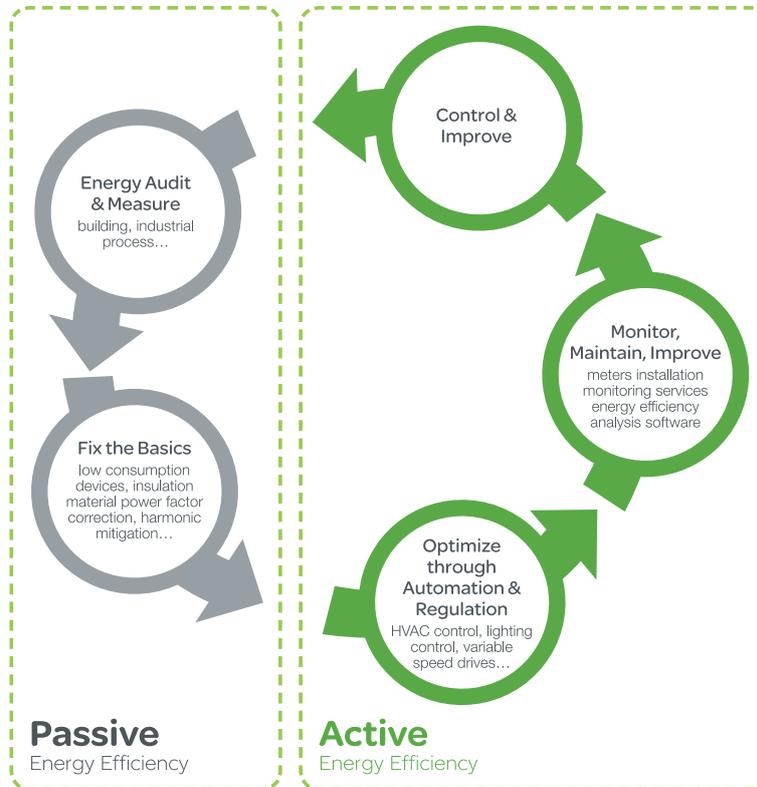
C.1

C.4

C.2

Energy Efficiency Solutions

Schneider Electric has developed a life cycle solution to illustrate the process.



EnergySTEP (Energy Sustainability Tiered Efficiency Program)

Our EnergySTEP™ program is designed to help you to spot opportunities for energy saving and take action.

Our Energy Efficiency Power Consultants conduct energy efficiency and process audits on your premises to identify energy saving areas and equipment. They work to a methodology that is carefully structured to match your specific production-related energy needs.

What our EnergySTEP teams do	The benefits
Benchmark major energy processes and items	Clearer view and understanding of your electricity use
Draw up energy balance sheet showing how site and its workshop perform, and define medium-term and long-term energy efficiency action plans	You are given energy saving solutions with their estimated ROI
Identify areas where energy savings can be made and their potential ROI	You can decide which action in your energy efficiency to prioritize
Recommend electricity deals and rates that will reduce your electricity bill	You use your energy more cost-efficiently

> Power Management System



Easy-to-implement
energy efficiency
measures with
quick results

Power availability and reliability

Verify the reliable operation of power equipment

- > Ensure and indicate that operations are normal
- > Proactively optimise electrical distribution network
- > Monitor breaker status, trip counting, real-time voltage, transformers, ATS, generators, capacitor banks, and tap changers
- > Stay alert to adverse trends; take corrective action when necessary

Improve response to power-related problems

- > Verify normal activities and provide information to help proactively assess issues
- > Quickly review events, trends, and load status before, during, and after a problem

Validate that power quality complies with the energy contract

- > Analyze and verify metrics to ensure compliance with agreed-upon levels of quality

Billing and cost allocation

Produce accurate tenant energy bills

- > Automatically collect meter energy consumption data (AMR)
- > Calculate the cost for energy (WAGES) usage based on tiered rates, coincidence demand, Time of Use (TOU), Power Factor penalties, taxes, and other charges
- > Totalize metering points for accurate energy usage allocation
- > Account for changing tenants at any time

Identify billing discrepancies

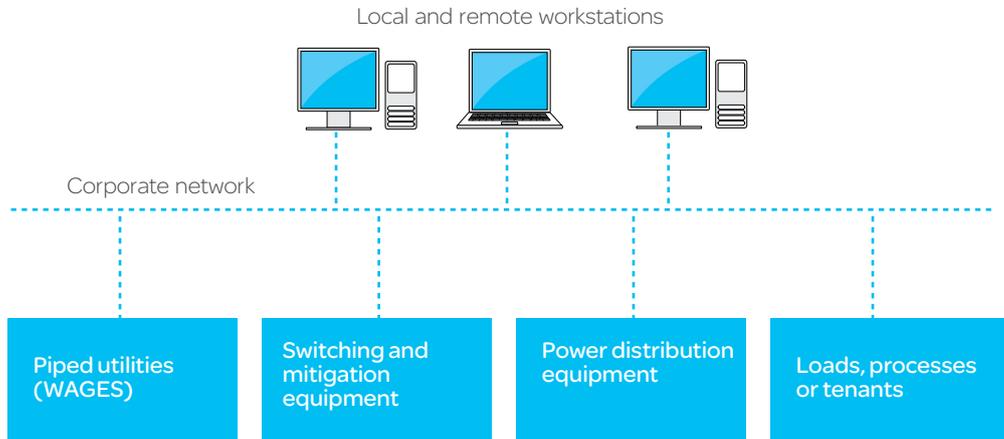
- > Validate utility bills, document errors, and measure energy contract compliance
- > Identify false penalty charges and validate benefits of on-site generation

Allocate costs to departments or processes

- > Collect, calculate, and report costs for buildings, departments, processes, shifts, lines, or equipment
- > Reduce expenses, enable best practices, and validate all your conservation initiatives



See, measure, and manage critical
energy data like never before



Energy efficiency

Measure efficiency, reveal opportunities and verify savings

- > Measure and compare consumption across departments, processes, and industry KPIs to identify the optimal places for improvement or adjustment
- > Confirm ROI for system improvements with advanced reporting and analysis

Reduce peak demand, power factor penalties

- > Identify locations of poor power factor and justify power factor improvement measures
- > Automatically monitor capacitor banks, load tap changers
- > Alert on demand levels, analyze trends to identify demand reduction and load shifting opportunities

Electrical distribution monitoring

Leverage existing infrastructure capacity and avoid over-building

- > Reveal historical and current load patterns and hidden capacity
- > Determine if existing infrastructure will accommodate new equipment

Support proactive maintenance to prolong asset life

- > Real-time and historical data reveals relationships between equipment and the conditions affecting system stability

What you cannot measure, you cannot control

> Power Factor Correction & Harmonics Mitigation Solutions

Schneider Electric power quality correction products are part of the solution.

Most utilities charge for peak electrical demand on each month's electrical bill. The demand charge is to allow the utilities to recoup part of their capital investment in the distribution network they operate. Each customer pays a demand charge for its peak operating load. Often inherent in the structure of these demand charges is an allowance for some inefficiency but most utilities will offer an incentive to their customers to keep electrical efficiency (measured by power factor) high. Power factor correction devices improve overall electrical efficiency upstream of their point of connection in the electrical network and can be used to minimize utility kVA demand charges.

Harmonics may disrupt normal operation of other devices and increase operating costs. Symptoms of problematic harmonic levels include overheating of transformers, motors and cables, thermal tripping of protective devices, logic faults of digital devices and drives.

Harmonics can cause vibrations and noise in electrical machines (motors, transformers, reactors). The life span of many devices can be reduced by elevated operating temperature.

Other benefits include:

> **Transformer and distribution network offloading.** Improving power factor reduces kVA loading of the distribution network such that additional process equipment may be added without the need for incremental investment in transformers and distribution equipment.

> **Ensuring compliance with harmonic standards.** Standards limiting a customer's harmonic pollution of the utility grid exist and can be enforced by the utility.

> **Improving reliability of the distribution network and process equipment.** Harmonics generated by non-linear loads can cause problems, such as logic faults of digital devices with sensitive process equipment leading to downtime and scrap.

> **Reducing overheating** of transformers, motors and cables to prolong the life span of these components.



Power factor correction

Power factor basics

AC Power flow has three components:

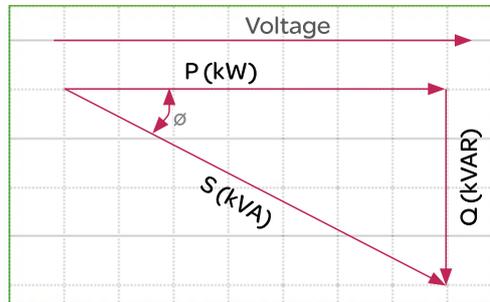
- > **Active Power (P)** is the power needed for useful work such as turning a lathe, providing light or pumping water. It is expressed in Watt or KiloWatt (kW).
- > **Reactive Power (Q)** is a measure of the stored energy reflected to the source. It is expressed in var or Kilovar (kVAR).
- > **Apparent Power (S)** is the vector sum of both the active and the reactive components. It is expressed in Volt Amperes or in KiloVolt Amperes (kVA).

Power triangle

The relations between the various power components are illustrated in the power triangle shown in f.1.

From f.1, it is apparent that the active power component is in phase with the applied voltage while the reactive component occurs 90° out of phase with the voltage.

The equation that defines this relationship is:
 $(kW)^2 + (kVAR)^2 = (kVA)^2$

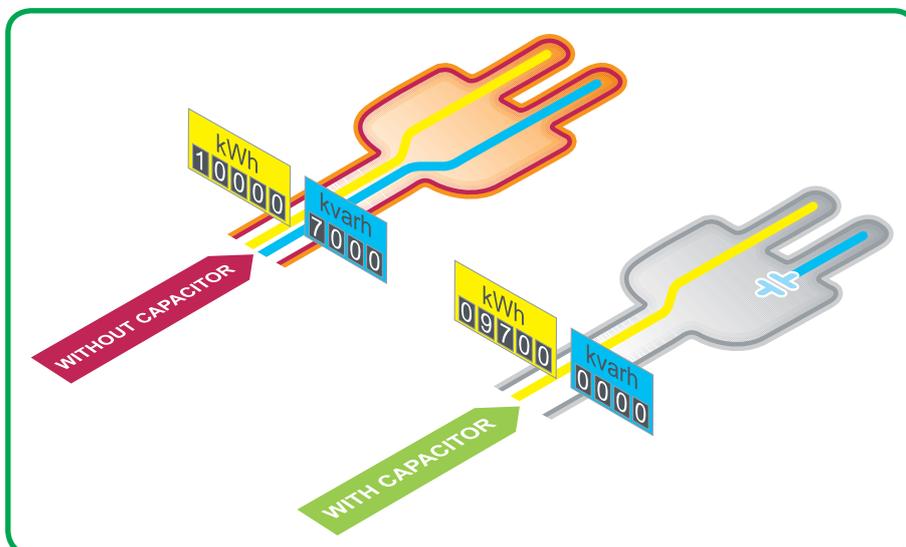


f.1

Power factor (PF) is, in fact, a measure of efficiency. When the PF reaches unity (as measured at the utility power meter), it can be said that the electrical system in the plant is operating at maximum efficiency. Depending on the local utility rate structure, a PF below target PF may result in higher utility power bills than are necessary.

There are two commonly used definitions of power factor:

- > **PF** = Cosine of phase displacement between current and voltage.
- > **PF** = Cosine of angle between active power and apparent power.



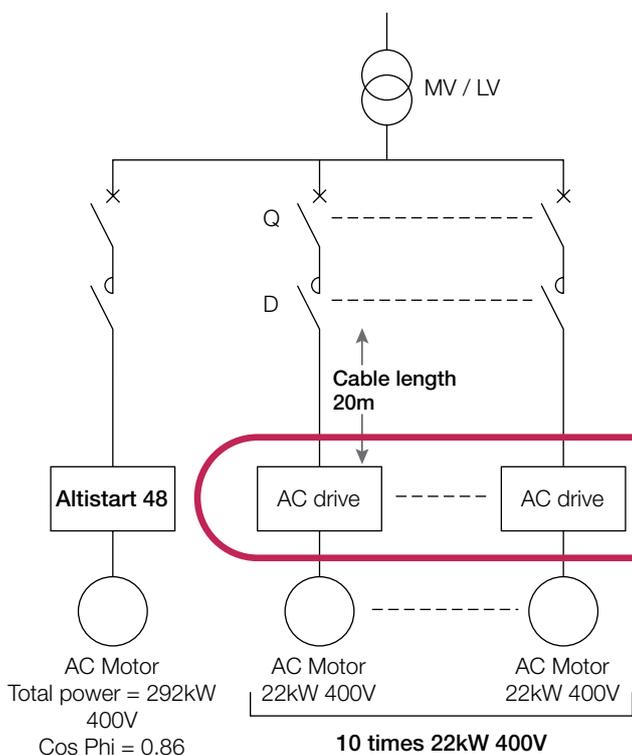
Harmonic mitigation

- Up to 25% Capex and Opex reduction commonly achievable,
- Improved business performance: downtime significantly reduced, increased equipment lifetime.

Harmonic mitigation provides several benefits that could be translated into financial savings for the investor and for the user.

We propose solutions which maximize the savings when balanced with the cost of the harmonic mitigation equipment to get a reasonable Return On Investment (ROI).

In order to illustrate the benefits, we will take the example of the following installation with two different situations.



AC drives standard type
Line current waveform (6 pulses):

Maximum line r.m.s. current = 60A

Altivar ATV212
Line current waveform with C-Less technology:

Total harmonic distortion: THDi = 35%
Line r.m.s. current = **38A**

In both cases, the transformer is chosen to keep the Total Harmonic Voltage Distortion THD_u below 5%.

Usage and simultaneity factors have been taken into account for convenient sizing of equipment.

Reduction of the capital expenditures (Capex)

Saving on Capex is the permanent concern of the investor. Harmonic management gives the opportunity of significant savings. We will focus on the cost of equipment and will not quote other savings such as space savings or labour costs.

Harmonic mitigation reduces the r.m.s. value of the current and so reduces the size of cables, the rating of circuit breakers and contactors, as summarized in the following table.

	Without mitigation	With mitigation	Capex difference
Drive line current	60A	38A	
Transformer	800 kVA	630 kVA	-11%
Cables	16 mm ²	10 mm ²	-43%
Circuit breakers	NSX80HMA80	NSX80HMA50	-9%
Contactors	TeSys D50	TeSys D32	-40%
Total			-15%

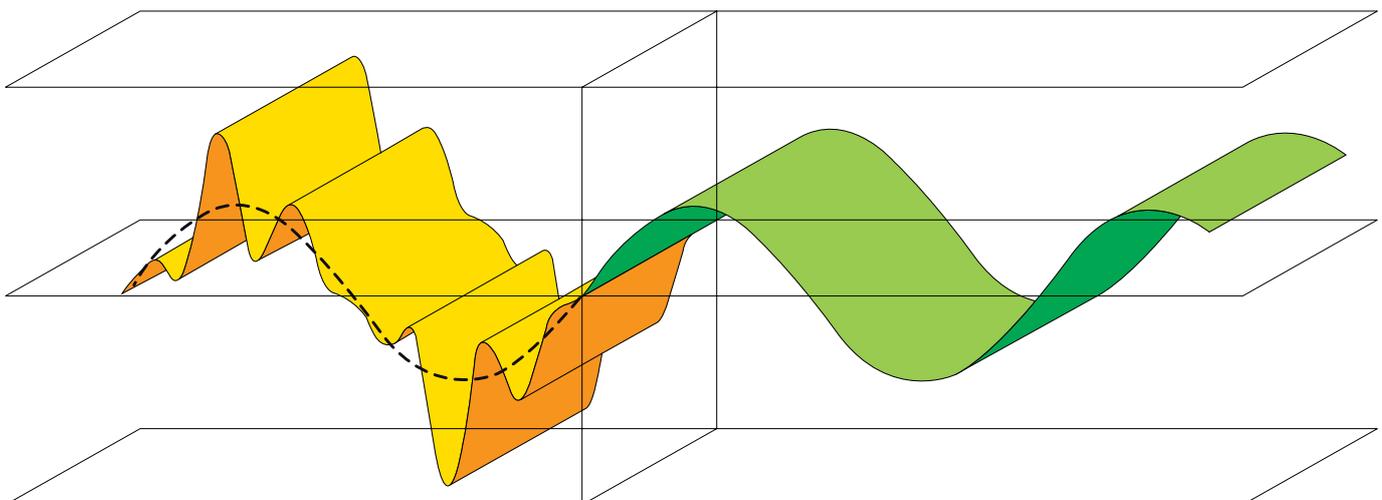
Reduction of the operating expenses (Opex)

Opex will be impacted in different ways:

> Harmonic mitigation generally contributes to reduced power losses in transformers, cables, switchgear... The maximum savings should be obtained considering the same equipment ratings. In the example given here, the energy savings are less significant compared to the annual power consumption, because the advantage of lower currents has been counterbalanced by higher impedance of the selected smaller transformer and cables.

> Harmonic mitigation allows reducing the subscribed power to the energy supplier.

This saving depends on the energy supplier. In most of the cases, savings could be up to 10% of the electricity bill.

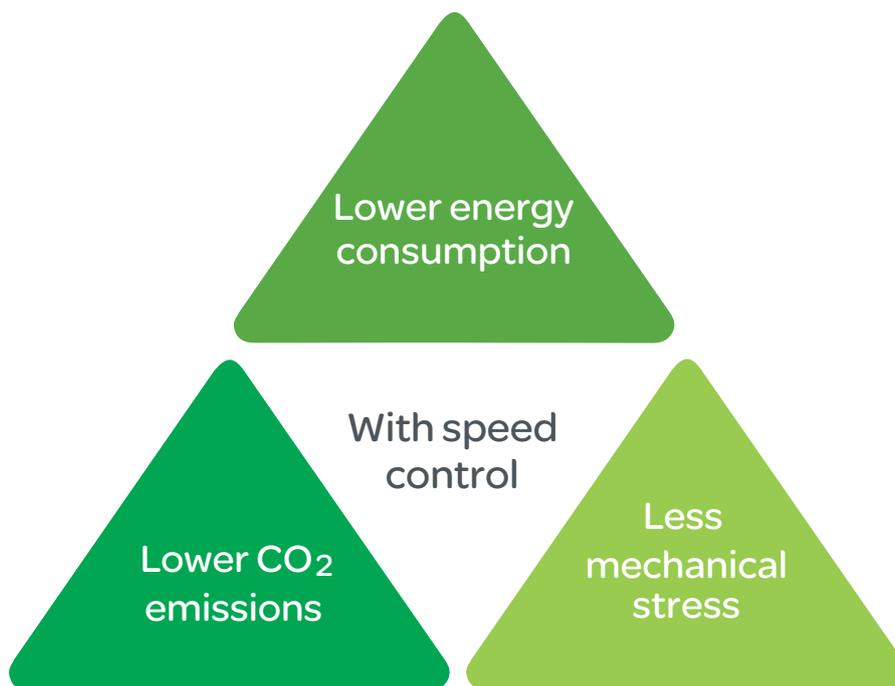


Distorted sinewave

Pure sinewave

> Motor Control Solutions

The highest potential energy savings are to be found on pumps, fans and compressors, by using Variable Speed Drives.



Benefits

- > Higher efficiency and better performance than traditional mechanical solutions
- > Eco friendly
- > More reliable, low maintenance equipment
- > Greater comfort

Motors consume:



30% of the energy of a building



60% of the energy of industries and infrastructures



i.e. **25%** of the world's energy



A rapid return on investment
(generally less than 24 months)

Measurable savings

Two fluid control techniques are applied to pumps, fans and compressors.

Conventional pump solution with valve



- The motor constantly runs at full power, supplied directly by the line supply
- The flow is controlled by the position of the valve
- The poor efficiency of the valves amplifies the losses

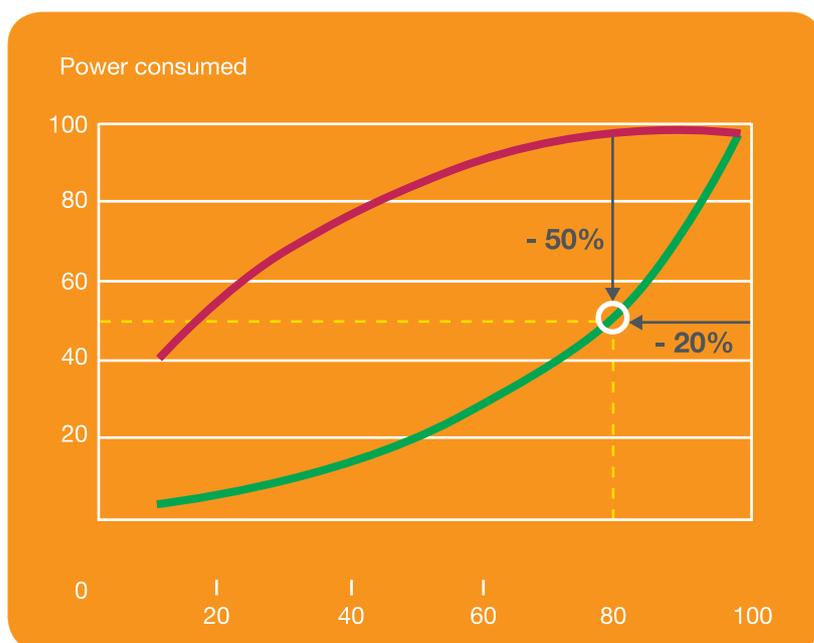
Increased productivity with variable speed drive



- Improved efficiency by doing away with the mechanical device
- Motor speed adjusted to demand, reducing energy consumption

— : Traditional solution with valves

— : Solution with Altivar variable speed drive



At 80% flow, power consumption falls by 50% with the variable speed drive

Increase your productivity with the Altivar Variable Speed Drives range

Compressors:

up to 30% energy savings

The variable speed drive is recommended in particular for screw compressors (air or cooling)

- Maintenance of a constant pressure
- Increased service life of the compressor
- Control of the current on starting
- Reduction of pressure surges
- Low maintenance

Pumps:

up to 50% energy savings

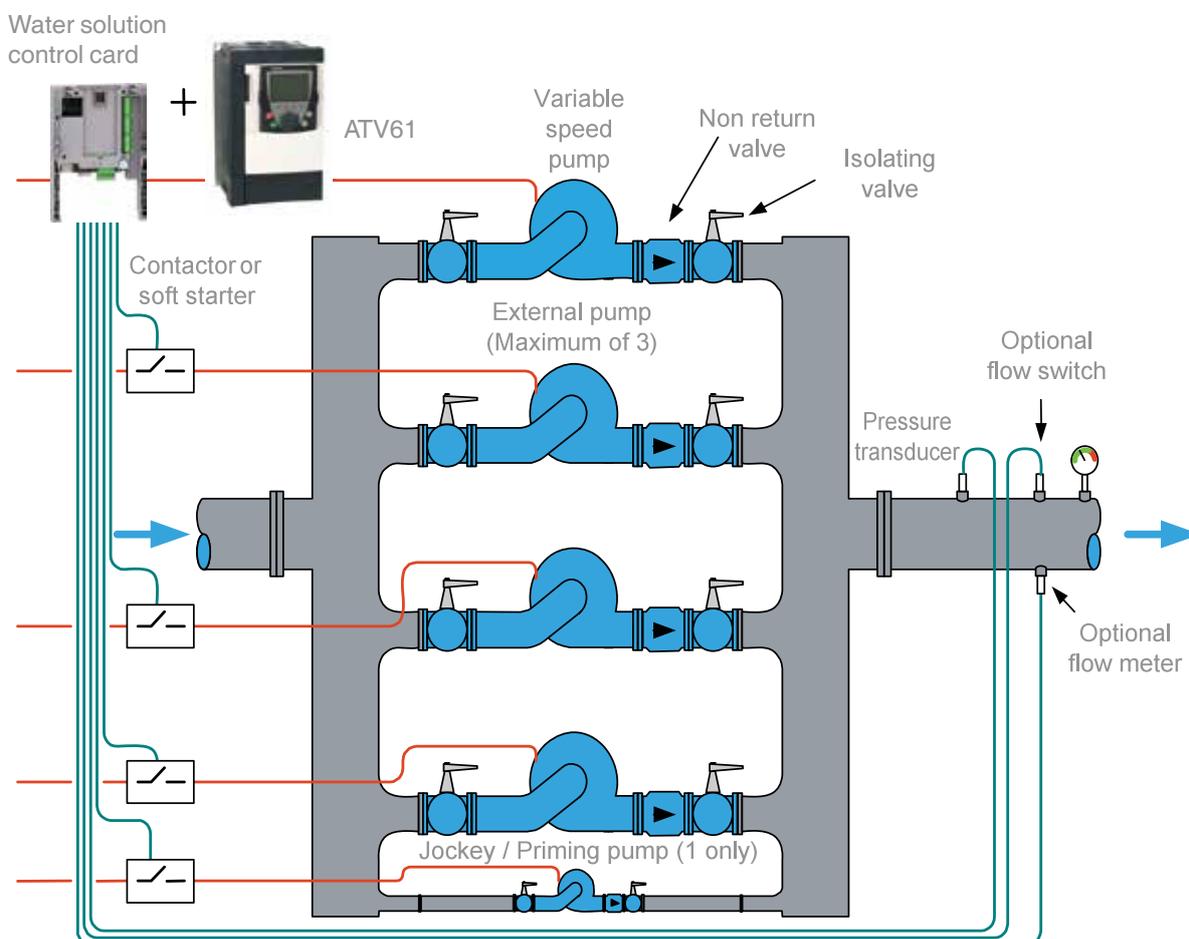
- Reduction of mechanical stress due to elimination of pressure surges
- Precise control according to requirement (temperature, flow rate, pressure)
- Protection of the pump and your pipes
- Multi-pump management

Fans:

up to 70% energy savings

- More precise control of the system
- Reduced noise level in installations
- Improved control of air quality (control of the speed according to CO2 emissions)
- Reduced maintenance costs on belts and bearings

Example of Altivar variable speed multi-pump control



> Lighting Control Solutions

Argus Presence detectors

Increasing energy costs and growing awareness of the environment now means that more innovative solutions for efficient energy use are required than ever before.

To keep your energy costs down you can count on Schneider Electric's wide range of lighting control solutions for buildings, Public lighting and street lighting



Presence detectors react to the smallest movements, so they are ideal for indoor use in rooms with a high proportion of daylight or prolonged use. Once the ambient light falls below a certain level, the light is also switched on if a movement is detected.

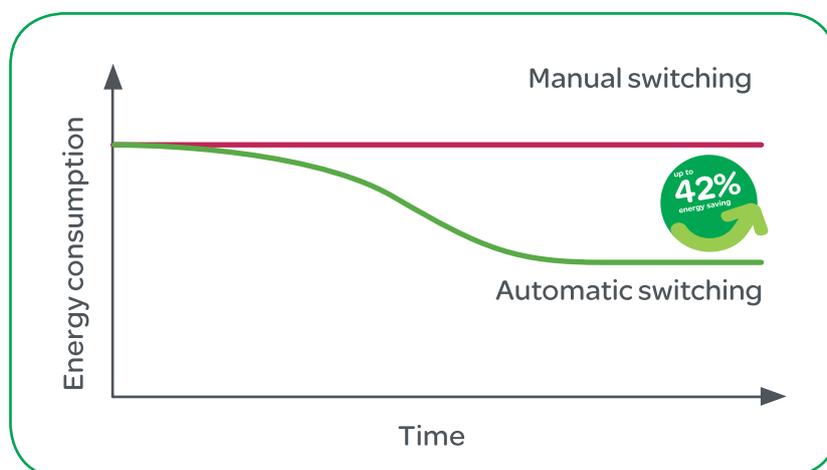
Unlike the normal movement detector, the presence detector has two different channels: the first operates the lights and the second controls other functions such as heating, air conditioning or ventilation. The first channel switches on according to daylight and movement, the second only for movement. So with sufficient light, no energy is wasted and all other functions work.

An example of energy saving

Using a simple example we want to show you the significant savings that are possible with Argus: In one office space, a ceiling Argus presence detector was installed for automatic lighting control in each of the 20 rooms. With the movement and brightness control of the light, energy savings compared to manual switching were up 42%!

In this case, this corresponds to 2,100 kWh or put another way: 1,300 kg CO₂ reduction per year.

This is the amount of CO₂ that a car produces over a distance of 7,828 km!

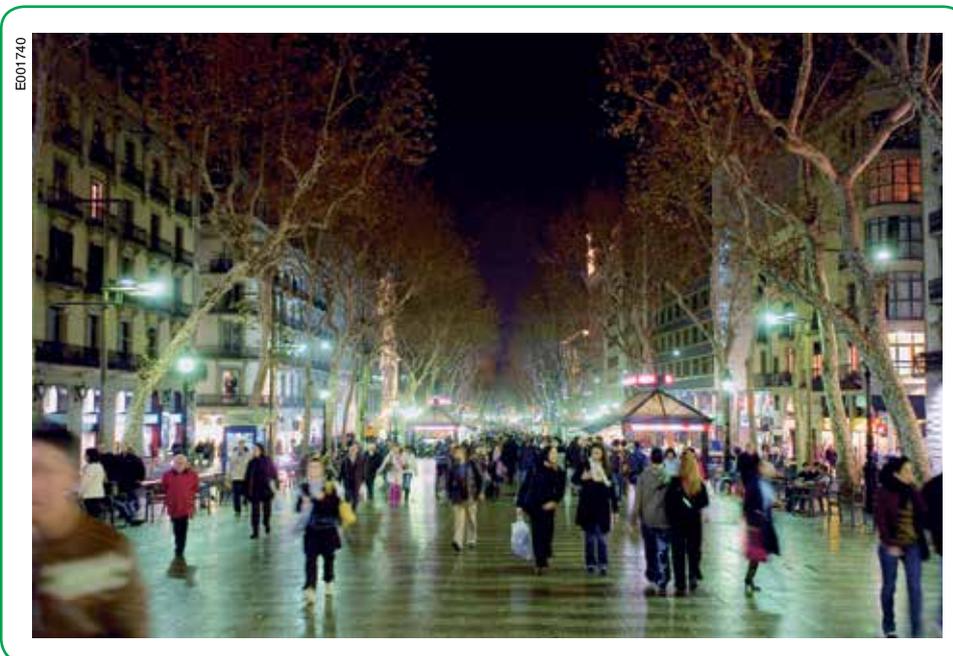


Twilight IC Astro

Twilight IC Astro is the optimal solution for optimizing outdoor lighting, it works without a photocell, it is used to switch lighting On/off automatically in accordance with sunrise and sunset times is set according to the place of installation.

Using Twilight IC Astro can avoid the problems normally associated with the photocells, such as malfunctioning due to different environmental conditions or misuse.

It is available to control two separated channels, and through time management, different scenarios could take place, increasing the efficiency of the system, for example decreasing the lighting consumption from 2 am to 5 am where traffic decreases, or according to the peak loading on the electrical network for instance.



The most efficient light is one that is turned off when not needed !

> ISO 50001

Introduction to ISO 50001: What is it and why do I want to comply?

ISO 50001 enables organizations to establish the systems and processes necessary to improve energy performance, including energy efficiency, use and consumption. The goal of this standard is to create an energy management system (EnMS) within an organization that will lead to a reduction in greenhouse gas emissions and other harmful environmental impacts while controlling energy costs.

This International Standard lays out the best practices for managing energy. Those who adopt ISO 50001 will experience cost savings, quality improvement and risk mitigation.

Schneider Electric: Your partner for ISO 50001 Compliance

At Schneider Electric, our goal is to provide our customers with the solutions required to ensure ISO 50001 compliance. Additional benefits from compliance include greater visibility and control of energy resources, positive return on investment and reduced energy consumption and related costs.

Schneider Electric provides technology and integrated solutions to optimise energy usage . With a unique portfolio in energy management, energy procurement, global data management, electrical distribution, industrial automation, critical power & cooling, building management and security.

> Schneider Electric's world headquarters «The Hive» was the first site to receive ISO 50001 certification



> Also Schneider Electric Egypt, Badr Plant is now officially Certified with The Energy Management ISO 50001 by Bureau Veritas to become the first site in Africa & Middle East Certified with the ISO 50001.

Energy Aspect Reviews	Awareness, Training, Competencies	Monitoring and Measurement	Operational Control
<ul style="list-style-type: none">• Past and Present Consumption• Estimated expected consumption• Identification of stakeholders	<ul style="list-style-type: none">• Training for all levels of management	<ul style="list-style-type: none">• Energy Metering Plan• Consumption and Energy KPI's	<ul style="list-style-type: none">• Energy considerations in purchasing• Design/change or restoration

Energy Savings Assessment Form

End User data

Facility name:
Address:
Contact person:
Job Title:
Phone:
Email:

Electrical Bill data

Total installed power transformers (KVA):			
Annual consumption (KWhr):	KWhr tariff (LE):		
Peak demand (KW):	KW tariff (LE):		
Yearly average Power factor:	Bonus <input type="checkbox"/>	Penalty <input type="checkbox"/>	
Location of the Electricity Meter:	MV <input type="checkbox"/>	LV <input type="checkbox"/>	

Pumps

Pumps application:
Number of pumps used in this application on same head:
Rating of pumps motors (KW):
Head pressure required (bar):

Heating, Ventilating & Air Conditioning (HVAC)

HVAC:	Central <input type="checkbox"/>	Split <input type="checkbox"/>
Chiller type:	Absorption <input type="checkbox"/>	Water cooled <input type="checkbox"/>
AHU:	Fixed speed <input type="checkbox"/>	Variable speed <input type="checkbox"/>
Fan coils:	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Room temperature controller:	Yes <input type="checkbox"/>	No <input type="checkbox"/>

Indoor Lighting

Room Area	Lighting total wattage/room (W)	Number of persons in room

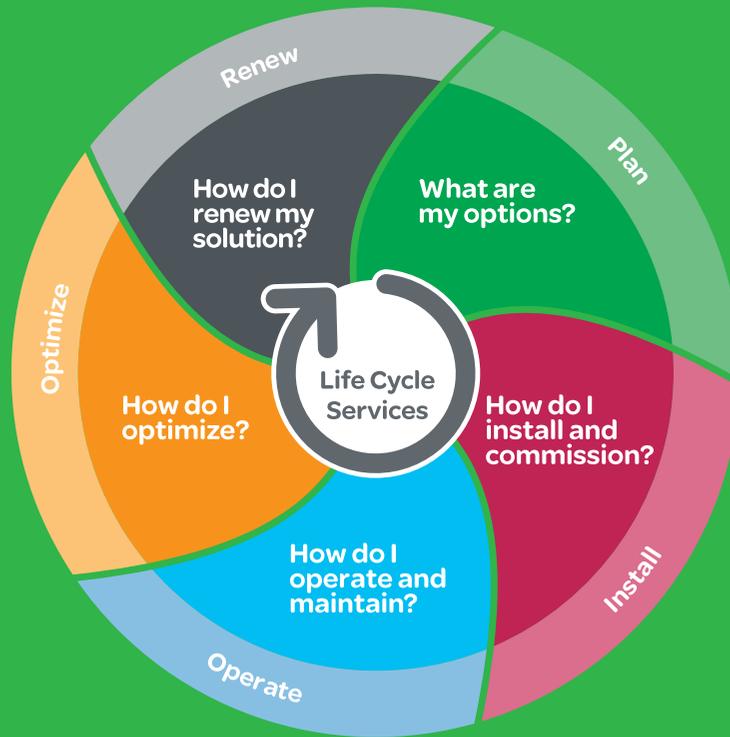
Outdoor Lighting

Lighting total wattage (W):	
Switching method:	Automatic <input type="checkbox"/> Manual <input type="checkbox"/>
Control method:	Lux <input type="checkbox"/> Geographical <input type="checkbox"/>

Please hand it to Schneider Electric services representative or send it* on customer.care@eg.schneider-electric.com in order to provide you with the recommendations for Energy Savings Solutions.

*For more details please attach your electricity bills and annual settlement bill.

We have services to meet your equipment's needs throughout its life cycle



Discover more about Schneider Electric electrical distribution services.

Log on to www.schneider-electric.com/electricaldistributionsservices today!

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