Control Panel Technical Guide

How to "Ecodesign" your pump motor control system

schneider-electric.com

Life Is On Schneider



F



"Ecodesign" it, for reducing Total Cost of Ownership

60% Pump purchase + maintenance



40% of Total Cost of Ownership is energy*

* Source: Pump System Matter – Hydraulic institute

Control Panel - Technical Guide

Total Cost of Ownership (TCO)

TCO

The Total Cost of Ownership includes purchase price and all operating costs. It is a financial estimate intended to help buyers and owners determine the direct and indirect costs of a product or system. It is a management accounting concept that can be used in full cost accounting or even ecological economics where it includes social costs.

Customer's interest into TCO

Environmental concerns and increasing energy costs are strong end-user's economical policy drivers.

As a consequence, Total Cost of Ownership (TCO) that includes purchase price and all operating costs is a new strong factor when investment decisions are made.

"Ecodesigned" machines will reduce TCO and give you a definite advantage over the competition



Ecodesign directive



Ecodesign

Ecodesign Directive provides EU-wide rules for improving the environmental performance of products as a response to United Nations climate conferences (COP). Regulations set out minimum mandatory efficiency targets. Standards specify performance and design requirements.

As an example in Europe, starting from January 1st 2017, **Regulation (EC) No 640/2009** requests to use either IE3 motors (0.75-375 kW motors) or IE2 motors + motor drive. EN 50598 and IEC 61800 define the Extended Product Approach to assess the final control/motor association taking the application duty profile into consideration.





Directives, regulation and standards evolution



Ecodesign directive



Use the Extended Product Approach (EPA)

Designing with Extended Product Approach (EPA) ensures compliance with Ecodesign Regulations for motors

Extended Product Approach (EPA)

EN 50598 and IEC 61800 standards define EPA design method. An EPA-based solution is intrinsically conform to Ecodesign Regulations requirements, this to ensure the best energy efficiency of the Extended Product, and not of each product taken separately.

Notion of Extended Product

A motor-driven application is composed of two sub assemblies forming the Extended Product:

- Motor system
- Driven Equipment



How to select the Motor Control System with the EPA, avoiding its relative complexity?



Follow Schneider Electric methodology

Phase 1:

Easily select the most efficient Motor Control System depending on your application thanks to our Motor Control System Selection flowchart



Phase 2:

If needed, validate the choice by assessing the Energy Efficiency Index (EEI)

Summary

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Star-Delta starters
Soft starters p. 13
Variable speed drives

EPA - phase 2

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PHASE 1

From application requirements to product combination selection

Designer's dilemma

"Motor System + Driven Equipment" functions can be achieved by several product combinations:

- Motor starter + motor IE3 + pump with valve
- Variable speed drive + motor IE2 + pump
- Variable speed drive + motor IE3 + pump
- etc.

These combinations have different efficiency levels depending on application.

The designer' challenge is to define the combination which will ensure the best global efficiency, answering the following questions:



General sizing advice

Extended Product: component rated power must match the application power requirements. Avoid component oversizing in order to operate near the best efficiency points. For example, an oversized pumping system combined with permanent flow reduction, via throttle, is not efficient.

From application requirements to product combination selection

Schneider Electric recommended combinations

In order to provide some help, we propose a **Motor Control System Selection flowchart** (see next page), based on Schneider Electric's experience.

In 4 steps, this chart will help you to select the recommended motor control solution depending on the application. Ranges of motor circuit breakers, contactors, all-in-one starters, soft starters, variable speed drives will be proposed.

The recommended product combinations are proven to give the best Energy Efficiency Index as per EPA.

A link to an online product selector is provided to refine the choice and get product commercial references.

Once the motor control system is selected, it is recommended to compare the EEI of various combinations (EPA – phase 2), including Schneider Electric recommended choice as a justification for customers.

Throttling Valve + motor starter or Variable Speed Drive (VSD)?

The choice of the pump control system depends on the application:

- if constant flow required:
- a motor starter-based solution is sufficient and the most efficient.
- If flow variation required:
- 2 options appear, using throttling valve or VSD:

- If flow variation is limited around the Best Operation Point (BOP) of the pump, the association of a motor starter and a throttling valve is an efficient and low-cost solution to control the pumping system

- If flow variation is consequent and/or requires accuracy, a VSD provides a very efficient active solution as it adapts the speed of the motor to the desired flow.

Flow-time profile	Recommended motor control system
Pump mostly used near Best Operation Points	Motor starter + throttling valve (if needed)
High accuracy or large flow variation	Complete Drive Module with appropriate auxiliaries



IE2 or IE3 motor?

The use of an IE3 engine rather than an IE2 will always improve the overall energy efficiency of the Extended Product regardless of which Motor Control System is selected.

Ecodesign Regulation 640/2009/EC only tolerates the use of an IE2 motor when associated with a Variable Speed Drive to encourage the swift from low efficiency throttling valves to VSD in **variable flow installations.**



PHASE

Select Motor Control System in 4 steps





On-line motor controller selector

https://smartselector.schneider-electric.com/#/

www.schneider-electric.com

XXX Your choice

PHASE 1

PHASE 1

Components for Direct Online starters



ON-OFF control in constant flow systems for:

- Jockey pump
- Backup pump
- Primary pump
- Circulating pump
- Transfer pump
- Flood and drainage
 control systems
- Boiler feed water pump
- Tank filling pump



- Low consumption
 device
- Easy to install, operate and maintain
- Soft starters, variable speed drives recommended above 90 kW



All-in-one motor starter, thermal magnetic circuit breakers:

circuit disconnection, protection against short-circuits and motor overloads. Coordination type 1 or 2, or total (TeSys U).

Green Programmer	Green Promium		Green Provide Streen Provide Streen	Green Premum	Green Premis
GV2ME	GV2P	GV3P	GV4P* GV4PE* GV4PEM*	GV7	TeSys U
Product type					
Thermal magnetic circuit breaker (Pushbutton)	Thermal magnetic circuit breaker (Rotary handle)	Thermal magnetic circuit breaker (Rotary handle)	Thermal magnetic CB (P: Rotary handle) (PE, PEM: Toggle handle)	Thermal magnetic circuit breaker (Toggle handle)	All-in-one motor starter
Motor power at 40	νv				
0.06 to 11 kW	0.06 to 15 kW	5.5 to 30 kW (up to 45 kW end 2017)	0.25 to 55 kW	7.5 to 110 kW	Up to 15 kW
Terminals					
Screw clamp, Lug, ring	Screw clamp	Everlink, Lug	Everlink, Lug	Screw clamp	Screw clamp
Main features					
Possible addition of auxiliary contact block, electronic trips	Possible addition of auxiliary contact block, electronic trips	Possible addition of auxiliary contact block, electronic trips	Auxiliary contact blocks, electronic trips, many possibilities of handles GV4PEM ⁽¹⁾	Possible addition of auxiliary contact block, electronic trips, fault discrimination devices	Advanced functionalities: communication, alarm

* Available end 2017.

(1) advanced motor protection, alarming and fault differentiation module

AC-3 contactors (AC-1 also available)

For start/stop motor control.



* Available end 2017.

Green

Green Premium is

the only label that

allows you to effectively

an environmental policy

This ecolabel guarantees

up-to-date environmental

regulations, but it does

develop and promote

whilst preserving your

business policy.

compliance with

more than this.

Premium

Overload relays?

In addition to magnetic circuit breaker and

complementary function:

Remote or automatic

overload reset, with

TeSys LRD thermal

· Long motor starting

time compatibility,

electronic overload

relay (selectable trip

class, 5 A to 30 A).

with TeSys LR9D

overload relay

contactor assembly,

they provide a

11

PHASE 1

Components for Star-Delta starters



TeSys offer is compliant with Premium Efficiency motors (IE3)



ON-OFF control with inrush current limitation in constant flow systems for:

- · Primary pump
- · Circulating pump
- Transfer pump
- · Flood and drainage control systems
- Water tapping pump
- Water lifting pump
- Pumping station



- Low consumption device
- Inrush current limitation
- · Soft starters, variable speed drives recommended above 90 kW



circuit disconnection, protection against short-circuits and motor overloads. Coordination type 1 or 2.

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Green Marine	Green Premute Martin	o"		meteorem Scener	
GV2ME	GV2P	GV3P	GV4P* GV4PE* GV4PEM*	GV7	Compact NSX
Product type					
Thermal magnetic circuit breaker (Pushbutton)	Thermal magnetic circuit breaker (Rotary handle)	Thermal magnetic circuit breaker (Rotary handle)	Thermal magnetic circuit breaker (P: Rotary handle) (PE, PEM: Toggle handle)	Thermal magnetic circuit breaker (Toggle handle)	Thermal magnetic circuit breaker (Toggle handle)
Motor power at 40	00 V				
0.06 to 15 kW	0.06 to 15 kW	5.5 to 30 kW (up to 45 kW end 2017)	0.25 to 55 kW	7.5 to 110 kW	Up to 355 kW
Terminals					
Screw clamp, Lug, ring	Screw clamp	Everlink, Lug	Everlink, Lug	Screw clamp	Screw
Main features					
Possible addition of auxiliary contact block, electronic trips	Possible addition of auxiliary contact block, electronic trips	Possible addition of auxiliary contact block, electronic trips	Auxiliary contact blocks, electronic trips, many possibilities of handles GV4PEM ⁽¹⁾	Possible addition of auxiliary contact block, electronic trips, fault discrimination devices	Micrologic electronic trip units (according version): tripping on detection of motor & main supply fault. Power metering

Green Premium

* Available end 2017.

(1) advanced motor protection, alarming and fault differentiation module

Star-delta contactor assembly

Star-delta start/stop motor control.



Green Premium is the only label that allows you to effectively develop and promote an environmental policy whilst preserving your business policy. This ecolabel guarantees compliance with up-to-date environmental regulations, but it does more than this.



Product type	
Fully pre-assembled contactor assembly	Fully pre-assembled contactor assembly
Motor power at 400 V	
Up to 132 kW	Up to 315 kW
Terminals	
Screw clamp	Screw for bar or lug
Main features	
AC coils	AC coils
1 to 3 integrated auxiliary contact	8 integrated auxiliary contact
1 time delay up to 30 seconds	Start delay 20/30 seconds
Plate or DIN rail mounted	Plate mounted

Starting torque?

The pumps load curves are predominantly quadratic and require a starting torque ≤ 3 times the nominal torque. This is compatible with star-delta starters.

TeSvs I

PHASE 1

Components for soft starters



TeSys and Altistart are compliant with Premium Efficiency motors (IE3)



Magnetic circuit breakers

Circuit disconnection, protection against short-circuits. Coordination type 1 or 2.

222 222 222 GV3L Compact NSX Compact NSX GV4L' GV4LE* GV2LE Product type Magnetic circuit breaker Magnetic circuit breaker Magnetic circuit breaker Magnetic circuit breaker Thermal Magnetic with MA or Micrologic (L: Rotary handle) (Rotary handle) (L: Rotary handle) circuit breaker (LE: Toggle handle) (LE: Toggle handle) 1.3M trip unit (Toggle handle) (Toggle handle) Motor power at 400 V 0.09 to 15 kW (GV2L) 5.5 to 30 kW 0.25 to 55 kW Up to 355 kW Up to 750 kW (up to 45 kW end 2017) 0.06 to 15 kW (GV2LE) Terminals Screw clamp Everlink, Lug Everlink, Lug Screw type Screw type Main features Possible addition of Possible addition of Adjustable short circuit Micrologic electronic Micrologic electronic auxiliary contact block, auxiliary contact block, level protection, auxiliary trip units (according trip units (according electronic trips electronic trips contact blocks, electronic version): tripping on version): tripping on detection of motor & detection of motor & trips. Many possibilities of handles main supply fault. main supply fault. Power metering Power metering

* Available end 2017.

Soft starter

Progressive start/stop motor control.





Green Premium is the only label that allows you to effectively develop and promote an environmental policy whilst preserving your business policy. This ecolabel guarantees compliance with up-to-date environmental regulations, but it does more than this.





Primary pump

Water hammer management.

- Transfer pump
- Flood and drainage systems
- Water tapping pump
- Water lifting pump
- Well pump
- Pumping station
- Rainwater evacuation



- Water hammer reduction
- Starter bypass function
- Inrush current limitation
- Easy to install

PHASE 1

Components for variable speed drives



Fine control in variable flow systems for:

- Secondary pump
- Boosters
- · Progressive cavity
- pump systems Water distribution systems
- · Water treatment plant
- Lifting station
- Water intake station
- HVAC & R
- Water storage station



- Operation at the Best Efficiency Point (BEP) of the pump
- · Energy efficiency management
- Water hammer reduction
- · Speed threshold against cavitation

Green Premium is

the only label that

business policy.

compliance with

more than this.



Magnetic circuit breakers

Circuit disconnection, protection against short-circuits. Coordination type 1 or 2.

Green Creening Creeni	Green Para	Green Rest Rest		
GV2L GV2LE	GV3L	GV4L* GV4LE*	Compact NSX	Compact NS
Product type				
Magnetic circuit breaker (L: Rotary handle) (LE: Toggle handle)	Magnetic circuit breaker (Rotary handle)	Magnetic circuit breaker (L: Rotary handle) (LE: Toggle handle)	Magnetic circuit breaker with MA or Micrologic 1.3M trip unit (Toggle handle)	Thermal Magnetic circuit breaker (Toggle handle)
Motor power at 400 V				
0.09 to 15 kW (GV2L) 0.06 to 15 kW (GV2LE)	5.5 to 30 kW (up to 45 kW end 2017)	0.25 to 55 kW	Up to 355 kW	Up to 750 kW
Terminals				
Screw clamp	circuit breaker	circuit breaker	Screw type	Screw type
Main features				
Possible addition of auxiliary contact block, electronic trips	Possible addition of auxiliary contact block, electronic trips	Adjustable short circuit level protection, auxiliary contact blocks, electronic trips. Many possibilities of handles	Micrologic electronic trip units (according version): tripping on detection of motor & main supply fault. Power metering	Micrologic electronic trip units (according version): tripping on detection of motor & main supply fault. Power metering

Variable speed drives

Open loop speed control for synchronous and asynchronous motors.







PHASE 2

Validate the selected product combination as the most efficient

Use of Extended Product Approach to confirm the best architecture

The process is carried on several product combinations of: Motor Control System + Driven Equipment (pump, valve...).

The possible combinations are compared in terms of energy efficiency. The result of each comparison is expressed as an EEI (Energy Efficiency Index). **The product combination with the best EEI is finally selected.**

Using the EPA approach ensures compliance with the Ecodesign Directive

Energy Efficiency Index (EEI) definition

As expressed by EN 50598, the EEI is a "value describing an energy efficiency aspect of an application, resulting from the extended product approach (EPA)".

Examples of EEIs : weighted average electrical power consumption (Pelectrical), weighted average electrical power losses (Pelectrical, losses), ratio of average power to a reference power... The most relevant EEI is chosen depending on the application.

An example of Energy Efficiency Index (EEI) calculated as weighted average electrical power losses is given page 20.

Energy Efficiency Index (EEI) specified by Europump

For pumping application, Europump has defined the EEI as the ratio of the average power input of the studied solution, calculated on a load-time profile divided by a reference power input.

Energy Efficiency Index (EEI) assessment

(see page 20 for example)

The energy efficiency of every possible combination is calculated from:

Application load-time profile

Example: pump works on standby mode 10% of working time 1/2 flow 70% of time, full flow 20% of time.

Energy efficiency characteristics (losses profile)

Example: variable speed drive + 30 kW motor. Losses profile for this combination is 0.05 kW on standby mode, 2 kW at 1/2 flow, 10 kW at full flow.

Note

The EPA study is conducted under the responsibility of the extended product manufacturer or machine builder.



PHASE 2

EPA methodology in details

Extended Product Approach graphical overview







Phases 2 3 4 must be run for every potential solution.

Only the solution with the best Extended Product EEI will be selected.

Application duty profile, Semi Analytic model: see details next page.

PHASE 2

Operating Point (OP)

OPi

EPA methodology in details

1 Pumping application **load-time (flow-time) profile**

The application specification describes the different pumping phases. Then, the application load-time profile can be defined:

- The operation is characterized by n operating points (OPn), each one associated with a specific load status and duration.
- The standardized load-time profile shows the OPs related to their fraction (%) of time.





20 0 OP1 OP2 Application standardized load-time profile each operating point (OP)

100

80

60

40

Time Fraction: fraction of runtime

Semi Analytical Models (SAM)

The SAM is a model for determining energy efficiency characteristics of each element of an extended product. They are based on maths equations and/or measured data. Each product manufacturer is accountant for its SAM.

3

Losses in the driven equipment 2 (transmission, pump, valve...)

> The SAM of the driven equipment is to be defined by the relevant entity, e.g. professional organizations or technical committee.

Losses in motor system (motor + motor control)

This is the subject of EN51598-2 and IEC61800-9-2 which define a method for determining the losses of a Power Drive System (PDS) and of its Complete Drive Module (CDM). Power losses are assessed at 8 operating points. Stand-by mode consumption must also be given.

For contactors and by-passed Soft Starters losses are easy to estimate: Losses = 0.1% of motor nominal power.

Extended Product Approach & Energy Efficiency Index (EEI) 4

Both SAMs are combined with the load-time profile of the application to produce an Energy Efficiency Index (EEI) for the Extended Product within the specified application.

Example: Weighted Average Electrical Power Losses are taken as an EEI:

1. Determination of Total Power Loss Pi at every operating point OPi. Total Power Loss Pi is the sum of xi, yi, zi losses of sub elements (pump + valve, motor, control system).

xi, yi, zi are assessed from the relevant Semi Analytical Models (SAM).



2. Calculation of weighted average electrical power losses (PElectrical losses).

PElectrical losses represents the average power loss of the Extended Product, taking account of operating point occurrence. It can be used as an EEI.



A practical example is proposed next page to illustrate the EPA

PHASE 2

EPA methodology - Example

Two Extended Product configuration at test.

According to European regulation EC640/2009, IE2 motors may still be used when controlled by a Variable Speed Drive. As an application of the Extended Product Approach, let's compare a (IE2 motor + VSD) with a (IE3 motor + contactor + throttling valve) configuration and find out which is the most effective Extended Product, depending on the duty profile of the pumping system.

Solution A: Contactor / IE3 motor / valve



- Motor starter:
- TeSys GV3P thermal magnetic motor circuit breaker - TeSys D contactor
- IE3 Premium Efficiency motor (30 kW)
- Centrifugal pump
- Throttling valve (proportional/linear)



- Motor variable speed drive:
- TeSys GV3P thermal magnetic motor circuit breaker - ATV212 variable speed drive
- IE2 High Efficiency motor (30 kW)
- Centrifugal pump

Step 1

Calculate the "Extended product" Total Energy Losses

Loss values at various percentage of flow are established from manufacturer values.

Solution A	Operating points		
	Full flow (valve 100% open)	Half flow (valve 50% open)	Standby (valve closed)
Energy losses (kV	V)		
Contactor	0.03	0.03	0
IE3 Motor	2	1.5	0
Pump + Valve	5.4	9.4	0
Total losses (kW)	7.43	10.93	0

ADVANTAGE:

no energy consumption in the contactor during standby phase, little during operation.

DRAWBACK:

significant energy loss in the throttling valve at half flow due to hydraulic perturbations.

Solution B	Operating points				
	Full flow (pump 100% speed / torque)	Half flow (pump 50% speed / 25 % torque)	Standby (pump 0% speed / torque)		
Energy losses (kW)					
/ariable speed drive	1.5	0.6	0.05		
E2 Motor	2.9	0.75	0		
Pump	5.4	0.8	0		
otal losses (kW)	9.8	2.15	0.05		

ADVANTAGE:

use of variable speed drive (VSD) to control the flow rate allows to operate the pump at its Best Efficiency Point.

DRAWBACK:

additional energy losses in the VSD during operation and standby phases. IE2 motor is less efficient than IE3 at full flow.

EPA standard methodology - Example

PHASE 2

EPA methodology - Example

Step 2

Identify the pumping load-time profile (also called flow-time profile)

The load-time profile describes the various flow levels required by the pumping application (including standby) and the duration of time during which the machine is operated at these levels. 2 examples of load time profile:



Step 3 Calculate the Weighted Power Losses (Pelec) according to EN 50598

Using step 1 values, calculate Pelec (kW) for every product solution and duty cycle with the formula: Pelec = % Full flow x Total Loss Full flow + % Half flow x Total Loss Half flow + % Standby x Total Loss Standby



Step 4 For each duty profile, select the solution with the lowest Pelec

 CONSTANT FLOW"

 Pelec = 6.86 kW

 "Contactor + Valve" solution has the lowest Weighted loss at constant flow: 19% less than "Speed drive" solution, in our example



Pelec = 3.47 kW

"Speed drive" solution has the lowest Weighted loss at variable flow: 62% less than "Contactor" solution, in our example

The most energy efficient solution is found using Extended Product Approach: • at constant flow: Contactor + Throttling valve, with IE3 motor • at variable flow: Speed drive, with IE2 motor – a more efficient solution could be with an IE3 motor at a higher cost.



Spacial and Thalassa enclosures ClimaSys thermal management system

Appropriate enclosure and thermal management system must be chosen in order to increase your electrical equipment's lifetime and ensure the continuity of the service of your pumping system.

Outdoor

Thalassa

Polyester





Spacial

Multi purpose metallic enclosures

- Steel & Stainless Steel
- IP 55 or IP 66
- Wall mounting or Modular and Compact Floor standing
- Specific Motor Control Center dedicated offer (Spacial SFM)

Thermal management systems

ClimaSys

Heating, cooling & control thermal solutions

- ClimaSys CV Ventilation
- ClimaSys CA Airing
- ClimaSys CE Air-Air Exchangers
- ClimaSys CU Cooling units
- ClimaSys CR Resistance heaters or heating units
- ClimaSys CC Thermostats, hygrostats, hygrotherm control



Multi purpose insulating enclosures

• Floorstanding IP43 to 55: PLA offer

• Wallmounting IP66: PLM offer



How to reduce damage to components through effective thermal management

Ref: CPTG001_EN ■本会会 ■ Scan or







Universal Enclosures Catalogue

Ref: UE16MK16EN 回総然回 Scan or







Specific offer dedicated to Motor Control Center applications: Spacial SFM



Choose your enclosure and your accessories online



Fixed Motor Control Centres Switchboards catalogue



New range of circuit breakers: Compact NSXm (IEC), multistandard PowerPact B (UL equivalent)

Space & time savings

- Click, easy mounting spring-type connection auxiliaries
- Fast Everlink® power connection
- Built-in DIN rail and plate
- Embedded earth leakage protection (available Q4 2017).

Flexibility

- Both Compact NSXm and multistandard PowerPact B with same footprint, for last minute machine IEC or UL customization
- Front (direct or extended), right or left side rotary handles, for adapting to most panel constraints
- DIN rail and plate mount built in capabilities: no accessory needed.

Added value fo customer

- Long lasting connection reliability thanks to Everlink[®] creep compensation patented technology
- Printed QR code on front face for direct access to product information (instruction sheet...) Visible auxiliaries from outside.





Learn more about Compact NSXm & PowerPact B range -

Compact NSXm

- Up to 160 A and 70 kA at 415 V AC
- IEC, CCC, EAC certified circuit-breakers
- 4 pole version with Earth Leakage Protection Embedded soon available (Q4 2017)
- Adjustable thermal magnetic integrated protection.



Compact NSXm catalog Ref: LVPED216030EN

Scan or Click on QR code



- Up to 125 A and 65 kA at 480 V AC
- UL listed, CSA, IEC, CCC and EAC
- Certified circuit-breakers
- Fixed thermal magnetic integrated protection.



PowerPact B Multistandard catalog

Ref: LVPED216029EN

Scan or Click on QR code

Common features

- Auxiliaries (contacts OF, SD and voltage release MN/MX) externally visible
- Everlink connectors
- Built-in DIN rail and plate mount
- Green Premium certification
- Toggle handle, direct, front extended and side rotary handles as accessories.

PRF, fixed surge protection devices PRD, pluggable cartridge-type surge protection devices

Ranges of surge protection devices (SPD) for high, common risks and terminal equipment. A circuit breaker-based disconnector is strongly recommended to deal with SPD end-of-life.



Pump and control equipment are exposed to surge risks due to atmospheric lightnings and high inductive load switching.

Risks are higher for remote equipment powered by aerial cables.

Surge protection device will protect and ensure service continuity as long as installation rules are duly respected.

Conditions for best surge protection efficiency

- Pump, control enclosure and building electrical distribution are all connected to same protective earth.
- 2 Multi-stage surge protection, several SPD with decreasing ratings are distributed from main incomer to final distribution/control enclosures.
 - Close to main incomer:
 - Type 1 SPD: if risk is high or if lightning rod on top of roof
 - Type 2 SPD: if risk is common or as a complement of Type 1 SPD
 - In every final distribution or control enclosure:
 - Type 2 SPD: in all cases
 - Close to every sensitive device (PLC, sensors, etc...):
 - Type 3 SPD: as a complement of upstream surge protection.

Respect of installation rules: disconnector in line with every Type 1 and Type 2 SPD, very short disconnector + SPD cabling between phases and protective earth (total circuit < 50 cm).



SPD for 230/400 V main supply, 50 kA lsc max. Coordinated circuit breaker must be used as disconnector with every Type 1 and Type 2 SPD. See selection guide.



How to prevent machine malfunction and electronic damage due to voltage surge Ref: CPTG002_EN

Scan or Click on Click on Click on CR code



Surge arrestors for commercial and industrial buildings Selection guide

Ref: A9DP96EN



Scan or click on QR code

Multi9, range of circuit breakers, residual current devices, auxiliaries / accessories

Multistandard offer facilitates OEM's business with 3 major advantages

Easy worldwide business

- Multi 9 offer complies with all global standards for industry applications UL, IEC, CCC, EAC or CSA
- With Multi 9 Multistandard, one design fits all Multi 9 Multistandard range complies with main international standards, including UL and CSA making easier worldwide OEM business.
- · Multi 9 offer is available worldwide with the same references. Simplified bill of materials.

Optimization enabler

- Optimizes panel footprint: compact, modular components
- Optimizes panel cost: high performance and quality at competitive price
- Optimizes assembling time: with busbar system and ring terminal simplified connection
- Optimizes logistics: reduced number of commercial references, 1 single, logical reference per product, all over the world.

Premium quality offer

Performing:

- Icu 10, 15, 25 kA circuit breakers
- Consistent: AC 440 V or DC 500 V circuit breakers. ratings up to 63 A
 - Ring terminal type also available for vibrating environments
- Earth leakage protection device (RCCB, RCBO and Vigibox)
- Auxiliaries, accessories and comb busbar systems
- Reliable:

World leader's technology and experience.

🐨 [AI (U) 🚯.





Multi 9 commercial references: coding system





Multi 9 - Multistandard protection for OEM -Catalog 2017

Ref: LVCATM9OEM_EN



click on QR code

TeSys, motor circuit breakers, contactors, overload relays, relays

Cover most of needs for motor circuits. World leader's years of experience make highly reliable and consistent offer.





Go Green with TeSys

- Environmental friendly materials Green Premium Schneider Electric ecolabel is granted to 80% of TeSys offer.
- IE3 motor compatible

TeSys motor starters compatibility has been tested and approved with Premium efficiency motors (IE3).

Even Greener with TeSys D Green contactors

- Reduced contactor consumption, half thermal losses 1.1 W "electronic" coil contactor consumption, from rating 9 to 38 A. TeSys D Green energy requirements: only 20% of electro-mechanical contactors.
- Halogen-free material To deal with enhanced fire safety needs.

Learn more about TeSys D Green



TeSys D Green catalogue

Catalogue 2017- AC/DC compatible contactors Ref: LVCATDELEC-EN



- Consistent low consumption range from 9 A up to 80 A
- \bullet Direct control with 24 V DC / 500 mA PLC static output, for contactors up to 80 A
- 4 coil references per rating, to cover 24 to 500V AC or DC installation specifications
- TeSys D common accessories compatible
- Everlink[®] power terminals for fast and long lasting connections



TeSys catalogue

Motor control and protection components 2017 catalogue Ref: MKTED210011EN





IE3 White Paper

IE3 premium-efficiency motors: choosing the right motor control and protection components Ref: EDCED115066EN



TeSys technology brings multiple advantages when choosing, designing, installing and using the equipment

Electronic reduces spare parts stock

Wider rating coverage with new electronic TeSys D Green contactors and TeSys LR9D overload relays reduces product references in the range, compared to electromechanical.



TeSys D Green 9 to 80 A contactors



TeSys LR9D 0.1 to 32 A overload relays Class 5, 10, 20, 30 selectable

RJ45 for easy starter connection and monitoring

TeSys SoLink connection modules make fast and reliable circuit breaker/contactor assemblies.

Thus, direct-on-line starters and reversers provide pre-cabled monitoring and control circuits on RJ45 connectors. Compatibility is ensured with PLC IO modules (TM3XTYS4) and splitter box (STBEPI2145, LU9G02) via RJ45 cables.



TeSvs SoLink connection modules for direct-on-line, reverser starter assemblies



RJ45 cables for starters monitoring/control from PLC

Downsizing optimize space

• 80 A in 55 mm wide (TeSys GV3P80*), • 115 A in 81 mm (TeSys GV4*).

New motor circuit breakers* bring remarkable compactness and advanced protection functions (GV4PEM).

* Available end 2017

Spring maintains pressure on cable

EverLink[®] patented terminal technology brings constant effort on cable by mean of compressed spring. No copper creeping, periodic re-tightening campaign is avoid.

Available on GV3, GV4 circuit breakers, TeSys D, TeSys D green contactors.

Red identifies safety chains

Red covers and contact blocks have been developed to make TeSys D contactors comply with EN 60947-5-1:2004, EN 50205 standards.

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GV3L80 magnetic, GV3P80 thermal magnetic motor circuit breakers



GV4L magnetic, GV4PEM thermal magnetic motor circuit breakers, rotary handle or toggle



Spring is compressed when tightening screw

cover



Spring pressure is applied on copper cables





TeSys D contactor fit with LADN22S aux. contact block

Copper creeping is

compensated by spring

OsiSence, industrial sensors, switches with or without digital display

For level and pressure monitoring, alarming and control in pumping applications





Telemecanique sensors for water pumping applications -overview Leaflet



Life Is On Schneider



Electronic sensors for pressure control OsiSense XM

Catalogue



Ref: DIA4ED2150102EN



Electromechanical sensors for pressure control OsiSense XM

Catalogue Ref: DIA4ED2150201EN



click on QR code

Catalogue references & download

Range description	Range name	Catalogue reference	Catalogue download
Metallic indoor enclosures	Spacial	UE16MK15EN	download
Polyester outdoor enclosure	Thalassa	UE16MK15EN	download
Enclosure thermal regulation devices	ClimaSys	UE16MK15EN	download
Molded case circuit breakers	Compact	LVPED208001EN_WEB	download
Moulded case circuit breakers	Powerpact	LVPED216029EN	download
Modular 18 mm circuit breakers	Multi9 C60	LVCATM9OEM_EN	download
Motor circuit breakers	TeSys GV	B6 - Circuit breakers_EN	download
Surge protection devices	Acti9 PRF, Acti9 PRi, Acti9 PRD	A9DP96EN	download
Meters, counters, com. gateways, software	Acti9 Powerlogic system	PLSED309005EN_Print	download
Control relays	TeSys K, TeSys D	B7 - Control relays_EN	download
Contactors	TeSys K, TeSys D	B8 - Contactors_EN	download
High power contactors	TeSys F	B9 - High power contactors_EN	download
Thermal overload relays	TeSys K, TeSys D, TeSys F	B11 - Overload relays_EN	download
Switch disconnectors	TeSys Vario	B3 - Switch-disconnectors_EN	download
All-in-one motor starters	TeSys H	A3 - TeSys H_EN	download
	TeSys U	A4 - TeSys U_EN	download
	Integral 63	A5 - Integral 63_EN	download
Soft starters for pumping application	Altistart 22	DIA2ED2140606EN	download
Variable speed drives	Altivar	DIA2ED2101102EN	download
Motor starter wiring systems	TeSys SoLink	B2 - Motor starter wiring systems_EN	download
Power supply	Phaseo	DIA3ED2131105EN	download
Ø22 mm push buttons, pilot lights	Harmony XA2	DIA5ED2140104EN	download
Safety switches	Preventa XCS	Catalogue_Preventa_XCS_EN	download
Electronic sensors	Osisense XM	DIA4ED2150102EN	download
Electromechanical sensors		DIA4ED2150101EN	download
PLC with software, for pumping solutions	Modicon M241	DIA3ED2140107EN	download
	Modicon M251	DIA3ED2140108EN	download
	Recommended architectures and products	DIA3ED2151003EN	download
PLC / Touchscreen panel Combo	Magelis SCU	DIA5ED2130505EN	download
Small panels with display	Magelis XBT N/R/RT	DIA5ED2130608EN	download
Advanced touchscreen panels	Magelis XBTGT	DIA5ED2131201EN	download
Universal panels	Magelis GTU	DIA5ED2140401EN	download

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Recommended documents



Pumping Solution architectures Recommended products

Ref: DIA3ED2151003EN



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protection components

choosing the right motor control and



Discover our White Paper Three steps for Reducing Total Cost of Ownership (TCO) in Pumping Systems

Ref: 998-2095-02-19-14AR0_EN



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- Available at the click of a button, these instructions provide:
- Recyclability rates for Schneider Electric products.
- Guidance to mitigate personnel hazards during the dismantling of products and before recycling operations.
- Parts identification for recycling or for selective treatment, to mitigate environmental hazards/ incompatibility with standard recycling processes.



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06-2017 CPTG010_EN