



MOTOR CONTROL IS OUR NATURE

MEDIUM VOLTAGE SOFT STARTERS



General

This advanced, micro-processor controlled through fiber optic links, Medium Voltage soft starter is designed for use with standard asynchronous and synchronous motors. The HRVS-DN is a highly sophisticated digital soft starter which ensures smooth, stepless acceleration and deceleration, eliminating current and mechanical shocks to the motor and load.

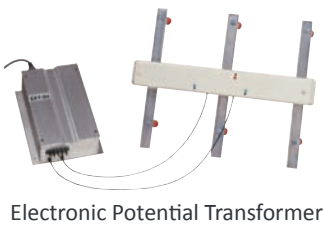
Advantages at a Glance

- Tailor made designed and manufactured according to all relevant IEC standards and ISO 9001.2000
- Heavy duty design at 50°C ambient temperature
- Unique starting & stopping characteristics
- Sophisticated motor protection package
- User friendly setup and operation
- Unique synchronous motor starting module
- Advanced Electronic Potential Transformer utilizing
- Patent pending fibre optic voltage measurement system
- Unique, Patent Pending fibre-optic firing system providing
- Complete isolation between MV and LV compartments
- Each starter is Partial Discharge tested according to EN50178/625.1
- Power factor capacitors can be connected directly to the upstream contactor (omitting the need for capacitor contactor)
- Communication options including: MODBUS, MODBUS TCP, PROFIBUS, DeviceNet, and more
- Wide 45-65Hz Auto-tracking frequency range

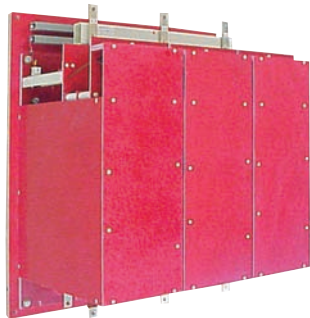
Sizing The Appropriate Soft Starter

- Type of application (Pump, Compressor, Conveyor, etc.)
- Motor Rated Power (KW or HP)
- Motor Nominal Current (A)
- Motor Nominal voltage (V)
- Motor Synchronous speed (RPM)
- Curve of motor current vs. speed or Ist/In (% or Per Unit)
- Curve of motor torque vs. speed or Tst/Tn and Tmax/Tn (% or Per Unit)
- Rotor inertia  $J=GD^2/4$  (Kgm<sup>2</sup>)
- Curve of load torque vs. speed (% or Per Unit)
- Load inertia  $J=GD^2/4$  (Kgm<sup>2</sup>) at motor speed
- Number of starts per hour and time between starts
- Ambient temperature
- Altitude (Meters Above Sea Level)

HRVS-DN (IP00 Kit)



Electronic Potential Transformer

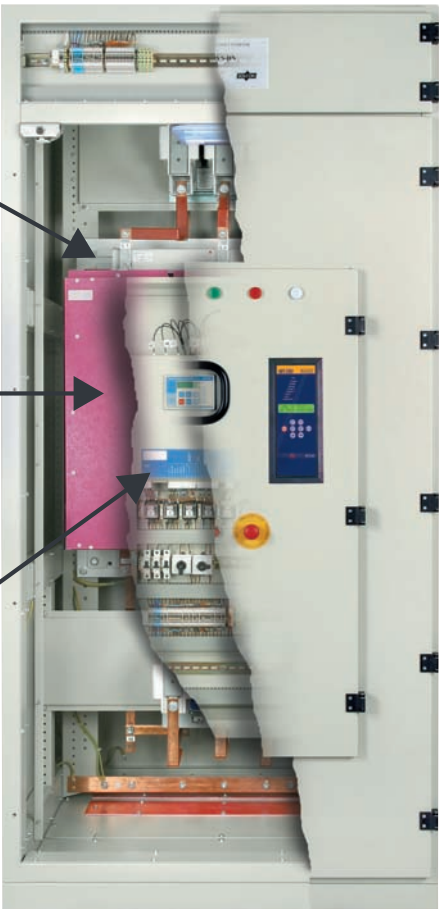


Soft Starter Power Module



Control Panel

HRVS-DN (Standard Switchgear)



# APPLICATIONS

- Ball Mill
  - Pulp Mill
  - SAG Mill
  - Centrifuges
  - Sinter Fans
  - Turbo Blowers
  - Centrifugal Blowers
  - Blast Furnace Blowers
- 
- Gas Compressors
  - Turbo Compressors
  - Screw Compressors
  - Cryogenic Compressors
  - Centrifugal Compressors
  - Reciprocating Compressors
  - Conveyors and monorail systems
- 
- Fire Fighting Pumps
  - Water & Ballast pumps
  - LP and HP Gas Compressors
  - Thrusters (Bow, Stern & Pods)
  - Hydraulic pumps & power packs
  - Refrigeration Chillers & Compressors
  - High Pressure Seawater Injection Pumps
  - Main Propulsion Motors (Variable Pitch Propellers)
  - LNG & LPG Cargo Pumps (multi-start application)

## WATER



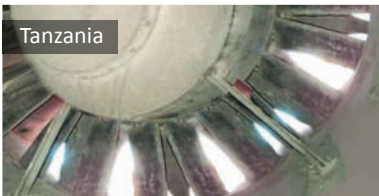
## OIL & GAS



## INDUSTRY



## MINING



## MARINE





# UNIQUE PERFORMANCE

## HRVS-Partial Discharge Design & Test (Korona)

The HRVS-DN withstands EN 50178 part HD 625.1. Each starter is fully tested for Partial Discharge (Korona) improving safety and ensuring long term reliability.

## EMC Design & Test (KEMA)

The HRVS-DN is EMC tested to withstand EN 61000-6-4 and EN 61000-6-2.

## Low Voltage Test

Innovative low voltage testing with a small 400V motor. This unique mode of operation allows fully functional performance test. Enabling Line and Bypass contactors operation as well as plant control system. (The procedure is field Initiated in minutes and includes active protection status with no need for any additional equipment).



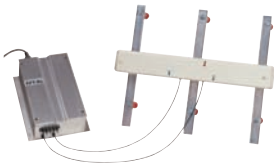
## “Dry”, No Voltage Testing

Dry” testing allows thyristor firing, relays, indication lights and contactors to be tested without mains voltage connection.

## Wireless Electronic Potential Transformer (EPT)

Advanced Electronic Potential Transformer utilizing Patent Pending “wireless” voltage measurement system.

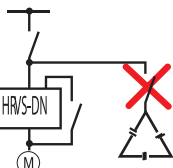
**Saves: Space, Weight, Cabling, Engineering & Costs**



## Direct Power Factor Capacitor Connection

Power factor capacitors can be connected directly to the upstream contactor, omitting the need for additional contactor, providing stable mains (-15% + 10%) during starting.

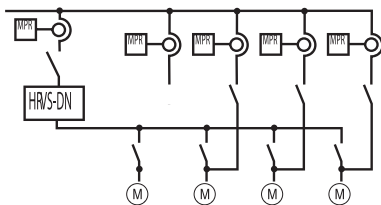
**Saves: Space, Weight, Cabling, Engineering & Costs**



## Multi-Motor Starting

Unique Multi-Motor program allows for more than one motor to be started with the same soft starter.

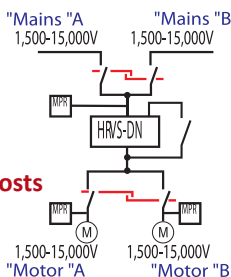
**Saves: Space, Weight, Cabling, Engineering & Costs**



## Multi-Voltage Starters

Unique Dual-Voltage connection allows for more than one voltage level to be used with the same soft starter.

**Saves: Space, Weight, Cabling, Engineering & Costs**



## Fiber-Optic Firing System

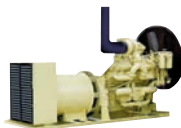
Unique, Patent Pending fiber-optic firing system provides complete isolation between MV and LV compartments.

## Individual Thyristor Fault Indication

Unique fault indication down to the individual thyristor level.

## Starting from Diesel Generator

Wide 45-65Hz Auto-tracking frequency range combining special software with unique hardware arrangement (designed for Marine, Offshore and Generators operating under continuous frequency variation).



## Synchronous Motor Starting

Highly sophisticated optional module allows for Synchronous motor starting.

## Motor Insulation Protection

- Optional Motor Insulation Protection (Internal PCB).
- MIP 6 - Insulation protection system (Analysis and historical event recorder).

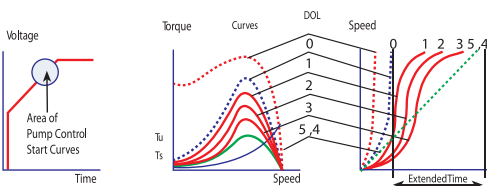


## Pump and Special Load Control

Two major problems are associated with the starting and stopping of pumps (see our “Pump Application” Guide).

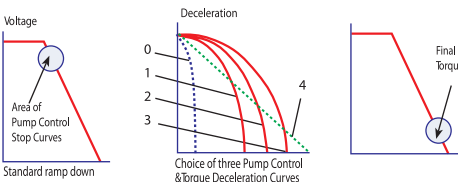
## Over-Pressure During Starting

The sharp increase of torque towards the end of acceleration can cause high pressure and damage the pipe system. The Pump Control enables selection between three voltage ramp-up curves as well as torque curve to reduce peak torque. Current ramp is available for special loads.



## Water Hammer During Stopping

During Soft Stop, when voltage is decreasing, motor torque may fall below load torque causing abrupt stalling instead of smoothly decreasing speed to zero. This creates the Water Hammer phenomenon (resulting in a loud noise and damage to the pipe system). The Pump Control feature enables selection between three voltage ramp-down curves or torque curve to prevent stall conditions and eliminate Water Hammer.



# STANDARD & SPECIAL DESIGNS

## Cabinet Designs



**Holland**  
Retrofit, Dual Voltage,  
2300-3300V, 1500mm  
(59") Height.



**Global**  
Standard Version  
2300-7200V, 30-1800A



**Spain**  
Soft-starter for 3300V, 250A  
with incoming compartment,  
disconnect switch and a fuse  
base.



**Norway**  
Marine & Offshore

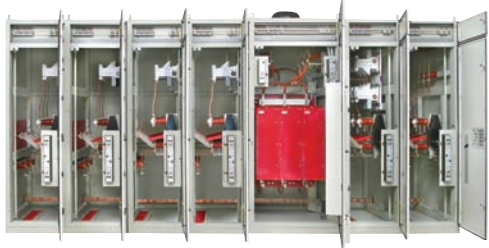


**USA**  
Standard medium voltage  
10-15KV, 30-3000A construction.

## Multi-Start Version



**Russia**  
Soft Starting multistart configuration  
(6600V, 250A). Load make fault break  
disconnect switch in addition to  
vacuum line and bypass contactors.

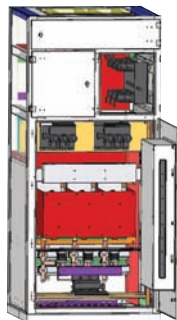


## HRVS-DVNCI



Compact Medium Voltage Soft Starter  
designed specifically for complete  
solutions for Industrial Applications.  
Up to 11kV 400A.

This arrangement provides a small  
footprint cabinet, HRVS-DVNCI with  
Load Make Fault Break switch, Fuse  
base, Medium Voltage Fuses, as well  
as Line and Bypass Vacuum Contactors.



## Mega Starter

Up to 50MW - Medium Voltage Soft Starter  
HRVS-DN MEGA Starter 1400-3000, 2300-15000V

Starting Solution Comparison	Solcon's Solution: HRVS-DN MEGA Starter	Others Solution like: LCI
Size	Small	Very large
Design	Simple	Complicated
Commissioning	Short & Simple	Long & Complicated
Maintenance	None	Complicated
Price	Much lower than LCI	High

25MW MEGA HRVS-DN  
Medium Voltage Soft-Starter



# SOLCON

WATER

OIL & GAS

INDUSTRY

MINING

MARINE



Soft Starters ■ Motor Protection ■ Power Controllers

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