AuCom

THE SOFT START SPECIALISTS

AUTOTRANSFORMER-MOTORSTARTER FOR MEDIUM VOLTAGE APPLICATIONS

- lowest possible start current
- no harmonics
- all-in-one solution
- including consultation and calculation

AUCOM – RIGHT FROM THE START

AuCom Electronics is a specialist in the design and manufacture of motor starters, motor control centres and medium voltage switchgear.
Since 1978 AuCom has worked closely with industry to optimise the performance of motors, machines and the electrical supplies that power them and has grown to become a global business in a highly competitive market.
Throughout AuCom's history, AuCom has always been dedicated to innovation and research. Through a mix of agility and hard work AuCom keeps at the forefront of industrial start technology. We are known for our flexibility and engineering skill, and are recognised as the world's leading specialist in motor starters.
Our worldwide network of offices ensure we can provide the very highest level of service and support to our clients across the globe and we are dedicated to meeting the highest quality standards. Our experienced team of motor control specialists have a comprehensive understanding of your clients' drive system. Using our extensive knowledge and industry experience we'll help you to design the ideal motor start solution for any situation. We're committed to delivering the best possible experience for our clients, from providing expert commissioning staff to assist with your commissioning process, to product support to ensure that your system runs smoothly for years to come.

The Starter

Our starters reduce the start current of the electrical motors and therewith the voltage drop during acceleration of the motor.

Which motors can be accelerated by our starters?

Types	all squirrel cage motors (asynchronous and synchronous)
operation voltage	from 1 to 15 kV
power	up to 20 MV

For which applications can you use our starters?

In principle, our starters can be used for all kinds of driven machines. To reach a significant start current reduction, the torque requirement of the machine (counter torque) should be clearly lower than the acceleration torque of the motor.

Applications

We have named the most common industrial sectors and applications which regularly need our starter. Naturally, the starter can be also implemented in any other sector or application.

Water / Waste Water
Pumps / Compressors

Wood / Paper
Hackers / Refiners

Electrical Industry
Rotating Converters

Chemical / Petrochemical Industry
Extruders / Pumps

Cement / Stone
Fans / Mills

Building
Compressors / Fans

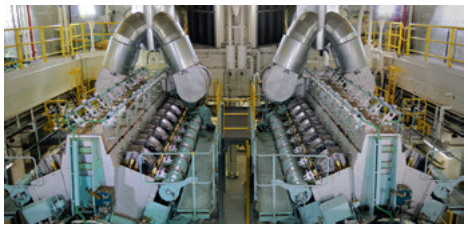
Marine (onshore / offshore)
Bow Thrusters / Pumps

Manufacturing Industry
Compressors / Pumps

Recycling
Shredders

Mining
Fans

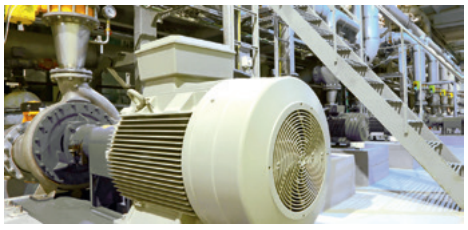
Steel Mill
Pumps / Compressors



Isolated Networks
Compressors / Pumps

Air Separation
Compressors

Refrigeration
Chillers



Others
Various Machines

Technical data

ambient temperature	standard 40 °C (up to 55 °C possible)
installation	indoor
marine classification	yes (individual inspections)

Acceleration Data

start time	unlimited
cooling time between 2 starts	standard 30 minutes (up to 10-60 minutes possible)
number of consecutive starts from cold	standard 2 (up to 3 possible)

Electrical Data

rated voltage	up to 17,5 kV
short circuit current	up to 40 kA – 1 sec
altitude	standard < 1.000 m (up to 2.900 m possible) over NHN

Autotransformer

description	dry-type, vacuum pressure impregnated with lifting lugs and overvoltage arresters in the star point
cooling	AN (air natural convection)
number of tappings	standard 3 (up to 5 possible)
insulation class	H
connection class	Ya0
winding material	copper
temperature supervision	2 PT 100 elements
make	Start›Ing

Type Tested

IEC 62271-200	AuCom L-Series Panels are fully type tested according IEC 62271-200

Switching Devices

by-pass	vacuum contactor, contactor with HH fuses or vacuum circuit breaker
star point	vacuum contactor or vacuum circuit breaker
remark	the mains switching device with the motor protection relay is located in the MV distribution and is no constituent of the starter

Cabinet

description	powder coated steel cabinet with lifting lugs, suitable for fork lift transportation
protection class	standard IP 3X (up to IP 43 possible)

Control

functions | supervisions	start current | start time | cooling time number of consecutive starts achievement of cold condition start release | switching sequence switch position control for 2 switching devices in the starter and one switching device (mains) outside the starter autotransformer temperature
control voltage	standard 230 V AC (others are possible), to be provided at site

Start procedure

The main components of the motor starter are: autotransformer T, by-pass switch B and star-point switch S. The mains switch N is located in the MV distribution.

Before the start
N is open. The motor is standing still.

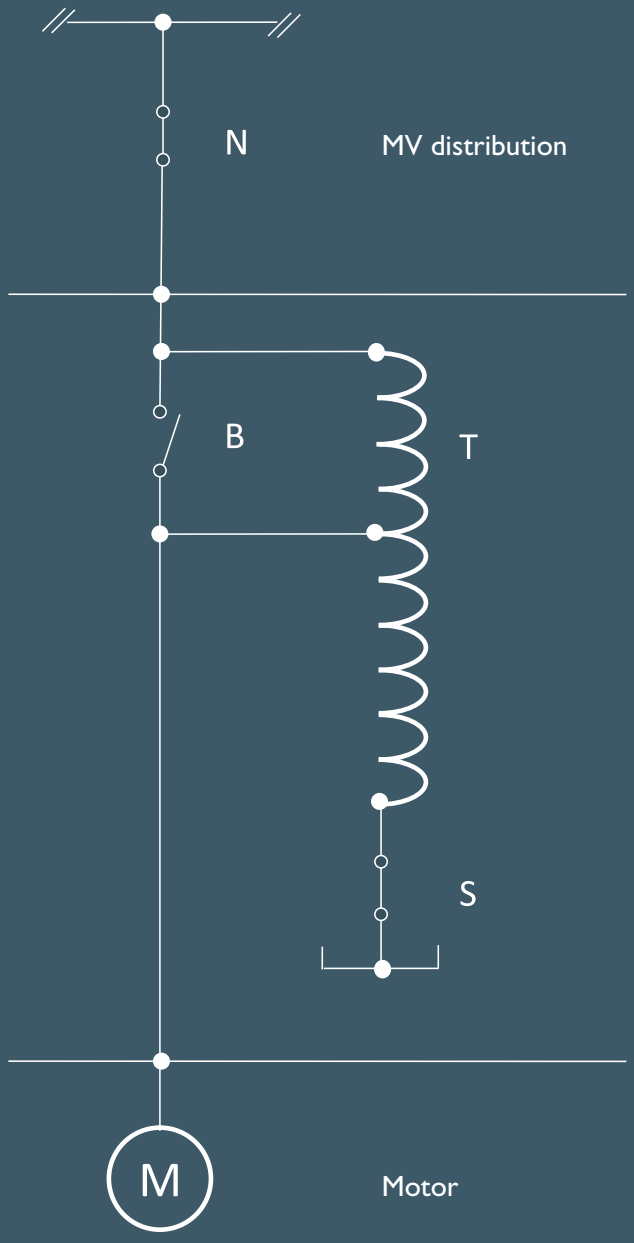
The start
B open, S closed, N closed.
The motor is started with reduced voltage.

Transformation provides a lower start current
Compared to other starting methods (electronic soft starter, starting reactor etc.) the mains current is lower than the motor current during the starting process. This results in a lower voltage drop respectively a higher motor torque.

Switch over
N remains closed. S will be opened. Immediately after B will be closed. During the switching over (S already opened, B not yet closed) the autotransformer works as a reactor. This results in a continuous voltage supply of the motor.

Operation
B closed, S open, N closed.

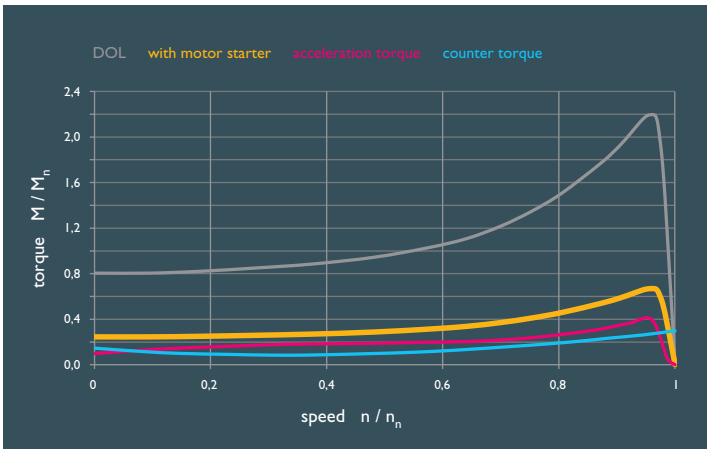
Stop
N will be opened. The motor stops.



Start calculation

AuCom will prepare a start calculation for each starter even in the offer stage. Below you can find a typical example for a start calculation.

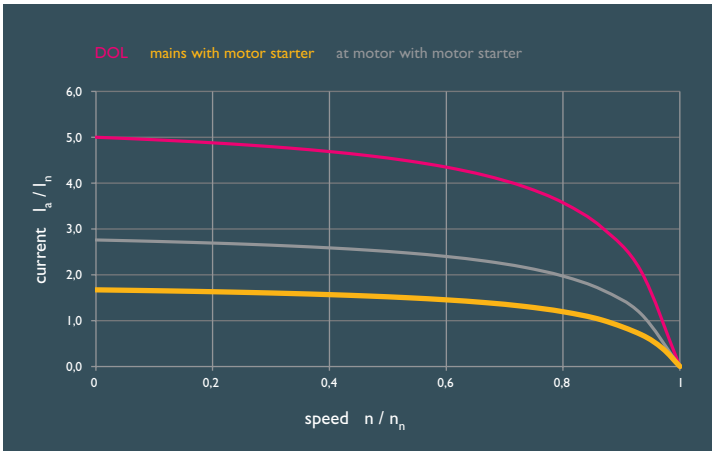
motor rated power	P_n	2.000 kW
rated voltage	U_n	6.000 V
motor rated current	I_n	250 A
motor start current DOL	I_a	5 × I_n
motor rated speed (synchronous)	n_n	1.500 upm
moments of inertia		
motor	J_M	80 kgm^2
driven machine	J_L	50 kgm^2
start voltage	U_s	0,61 × U_n
start time	t_s	9 s



Torque

The starter starts the motor with reduced voltage, 61 % of the rated voltage in this example (U_s/U_n = 0,61). The torque speed curve of the motor will be reduced by the factor $M_s/M_{DOL} = (U_s/U_n \times F)^2$.
$M_s/M_{DOL} = (0{,}61 \times 0{,}91)^2 = 0{,}31$ (F is a factor dependent on the motor). The torque of the motor must always be higher than the counter torque. The start voltage U_s/U_n has been determined accordingly. The difference between the reduced motor torque M_s and the counter torque is the acceleration torque M_a.

Start time
The start time t_s is calculated from the acceleration torque M_a and the total moment of inertia
$J = J_M + J_L = 80 + 50$ kgm^2 = 130 kgm^2.



Start Current

The motor current is
$I_{Mot} = U_s/U_n \times I_{DOL} \times F = 0{,}61 \times 5 \times 0{,}91 = 2{,}8 \times I_n$

A transformer has the same power at primary and secondary, which leads to the fact that the products of current and voltage are the same.

$U_n \times I_s = U_s/U_n \times I_{Mot} \Rightarrow I_s = U_s/U_n \times I_{Mot} / U_n$
$I_s = 0{,}61 \times 2{,}8 = 1{,}7 \times I_n$

The mains start current is therefore much lower than the motor start current.

For other start methods (electronic soft starter, starting reactor etc.) the following is valid: The mains current equals the motor current:

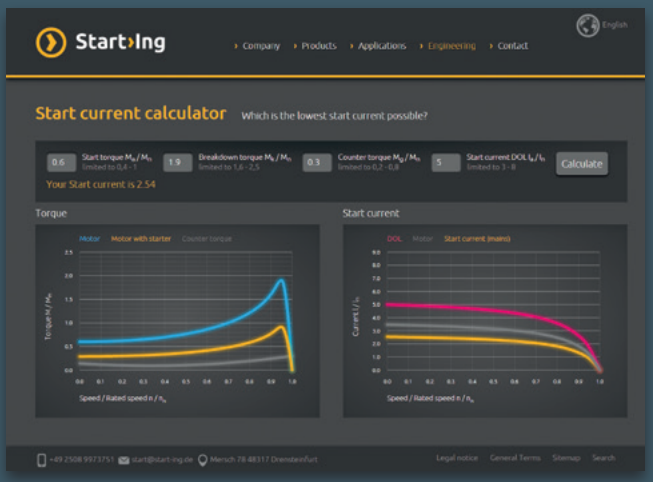
$I_s = I_{Mot} = 2{,}8 \times I_n$

Voltage drop calculation

If we know the configuration and the technical data of your feeding MV grid, we will prepare a network analysis which shows as a result the voltage drop during the start.

Interactive start current calculator

Have a look at the start current calculator on www.start-ing.de and you will get a first impression of the greatest possible start current reduction.



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