

SYKO®
Gesellschaft für Leistungselektronik mbH

HYBRID



*“flexible and
savety determining”*

Vehicle Start-up Unit

*Self-energy start, external-energy start
Special technology, Railway applications*



SYKO Gesellschaft für Leistungselektronik

® registered trademark of Company SYKO Gesellschaft für Forschung und Entwicklung GmbH & Co. KG

Patented System Components

- **Protection of mobility**
- **Support of on-board network**
- **Extension of vehicles service time**
- **Improvement of vehicles availability**

● **Series NSE.V** **Vehicle Start-up Unit**

Main characteristics:

- Start operation even with 'defect' or 'weak' battery
- External start energy or re-use of transferred self residual energy
- Automatic detection of source nominal voltage level
- Any source voltage level 8 - 36V (12V / 24V battery)
- Transient proof 50V/50ms 70V/2ms
- Any target voltage level 12V or 24V-starter
- Mobile unit or vehicle integration
- Intelligent charging management with charging current adaptation
- Programmable on-board network support / over-plugging
- Bidirectional connector / cross plugging protected

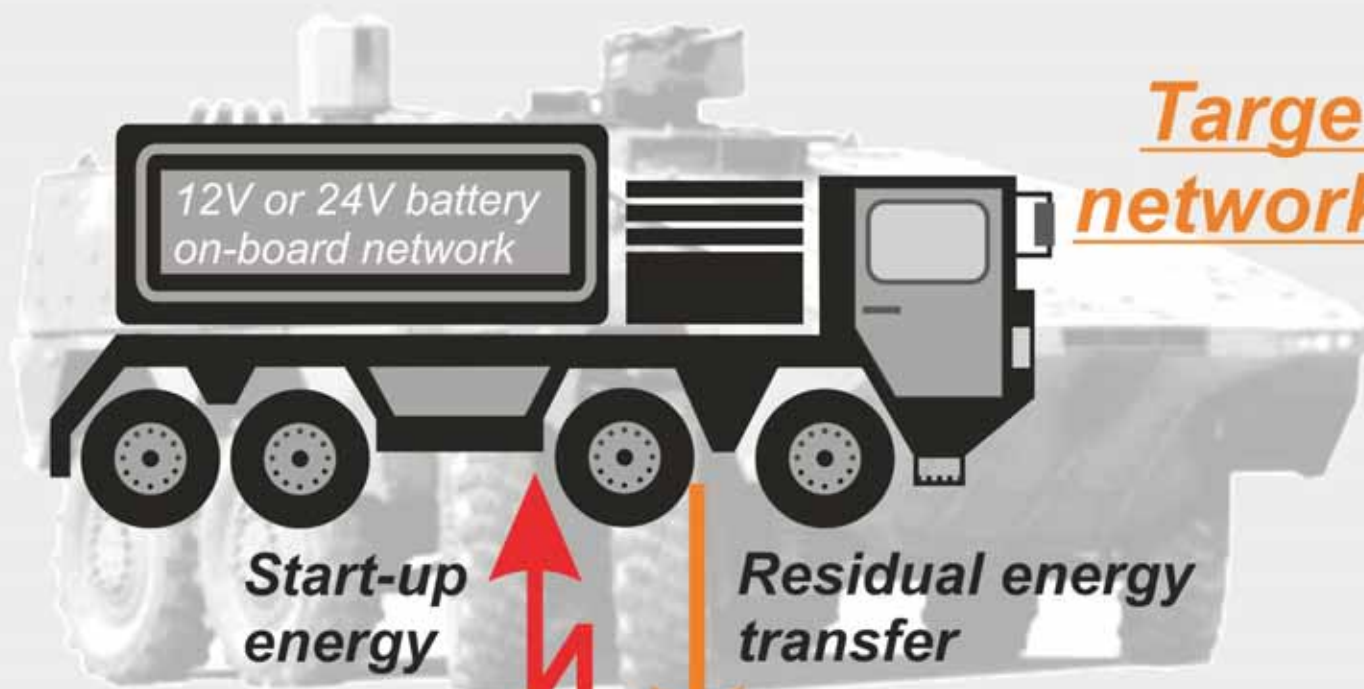
Possible energy sources:

- All kinds of batteries, Caps, Fuel cells, Generators 12V / 24V
- Vehicle on-board networks of Cars / Trucks / Motorbikes / others
- Mobile electronic units (mobile battery packs)
- Public network supply with AC/DC converters / battery chargers
- Own vehicles battery by re-use of transferred residual energy

● The start-up unit **NSE.V** is based on the international patented Regenerator-Topology. It is developed to be able to transfer a vehicle's external or internal energy with any voltage level to an internal High-Cap block for an active start support in the case of a weak battery. With this solution it is possible to give start support to vehicles with different voltage level. (e.g. 12V Car can support 24V Truck und vice versa). An intelligent charging management regulates by adapting the unit's input current in accordance to the supplying network and the stability of the network as function of its internal resistance (battery capacity). The effect is that at a weak battery extends the CAP charging time by reducing the input current. To protect the CAPs, their charging end voltage, symmetry of half cell quantity and cell temperature is monitored and actively discharged in the case of un-allowed cell voltage levels.

System capable, flexible, reliable

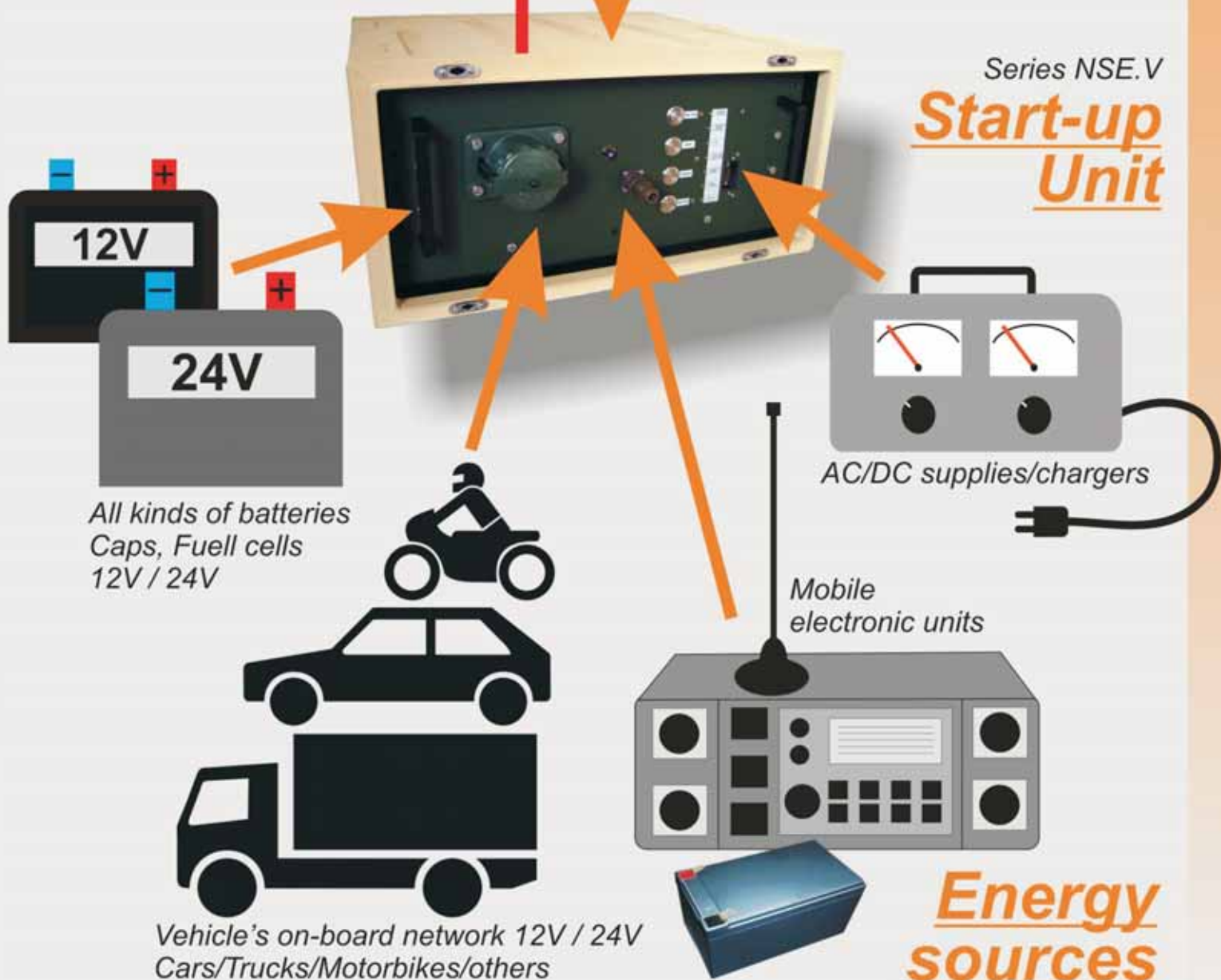
Target network



Start-up energy

Residual energy transfer

Series NSE.V
Start-up Unit



Energy sources

Power electronics with functionality

Operational Modes:

The NSE series is a start support application for 12/24V-vehicles based on an extremely low resistive ($<5m\Omega$) energy block (250F/28V). The bidirectional standard connector allows the transfer of residual energy out of the vehicles own on-board network or out of an external energy source, which is available then compacted and time delayed for the start activity. The energy over-plugging is activated with a remote interface signal or by pushing the "START"-button. When the NSE is connected to a source network the unit automatically detects if the source network's voltage is a 12V or 24V level. The NSE unit just allows the over-plugging sequence when the charged CAP-voltage and the target network are equal levels. In other words the over-plugging sequence of CAPs, which are charged to 28V level, to a 12V level is blocked. While the voltage detecting sequence is running all front LEDs are flashing and signalling this activity. Another operational mode is not possible in this time.

„CHARGE” Mode

When the source voltage level 12V or 24V is detected the NSE unit's processor takes over the regulated input current adaptation. This process is a parameter driven input current adaptation [$I_{in} = f(U_{in})$]. The result of an input current reduction is an extended charging time.

The "CHARGE" mode operation activates when:

- no other operational mode is activated
- the voltage level detection is completed
- the processor's internal enable signal is available

The "CHARGE" mode operation stops when:

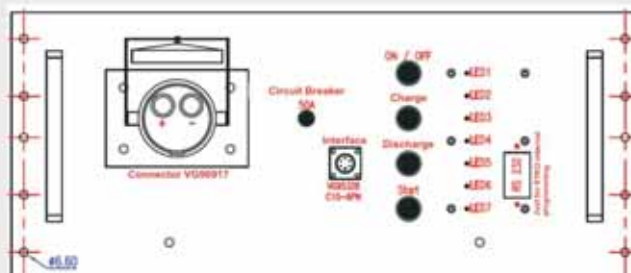
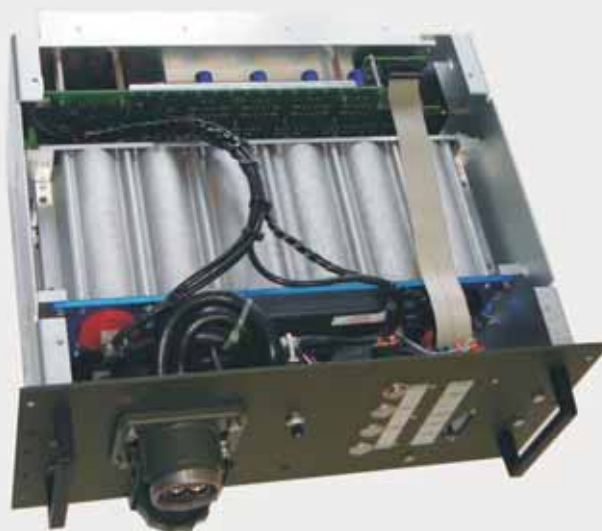
- the "CHARGE"-button is pressed again
- the start sequence is activated by pressing „START”

„DISCHARGE” Mode

The operational mode "DISCHARGE", activated by pressing the "DISCHARGE"-button, is a controlled discharge of the CAP's energy. This discharging operation is realised with an internal active load by "burning" the energy. Forced convection as cooling operation transports the occurring heat out of the unit. The speed of discharge is slow and the operation is temperature regulated. With reaching the parameter driven temperature limit the discharging mode is interrupted until the temperature dropped under the given level.

The "DISCHARGING" mode stops when:

- the parameter driven discharge voltage level is reached
- the "DISCHARGE"-button is pressed again



“START” Mode

The "START" operation or over-plugging sequence switches the before charged CAP energy onto the supply cables of the according network to support a weak battery while start operation.

The "START" mode operation activates when:

- the programmable charging level is reached and
- the "START"-button is pressed out of the „STANDBY" mode or
- the external signal "interface" is given
- Option: programmable auto-detection

The "START" mode operation stops when::

- the "START"-button is pressed again
- The „START" mode operation is preferred. That means that this sequence is not blocked by over temperature, Unsymmetrical CAPs or other CAP errors

All listed data and performance characteristics in this catalogue are not a guarantee of quality in accordance to §5 444/639 BGB. Mistakes, changes and errors excepted.