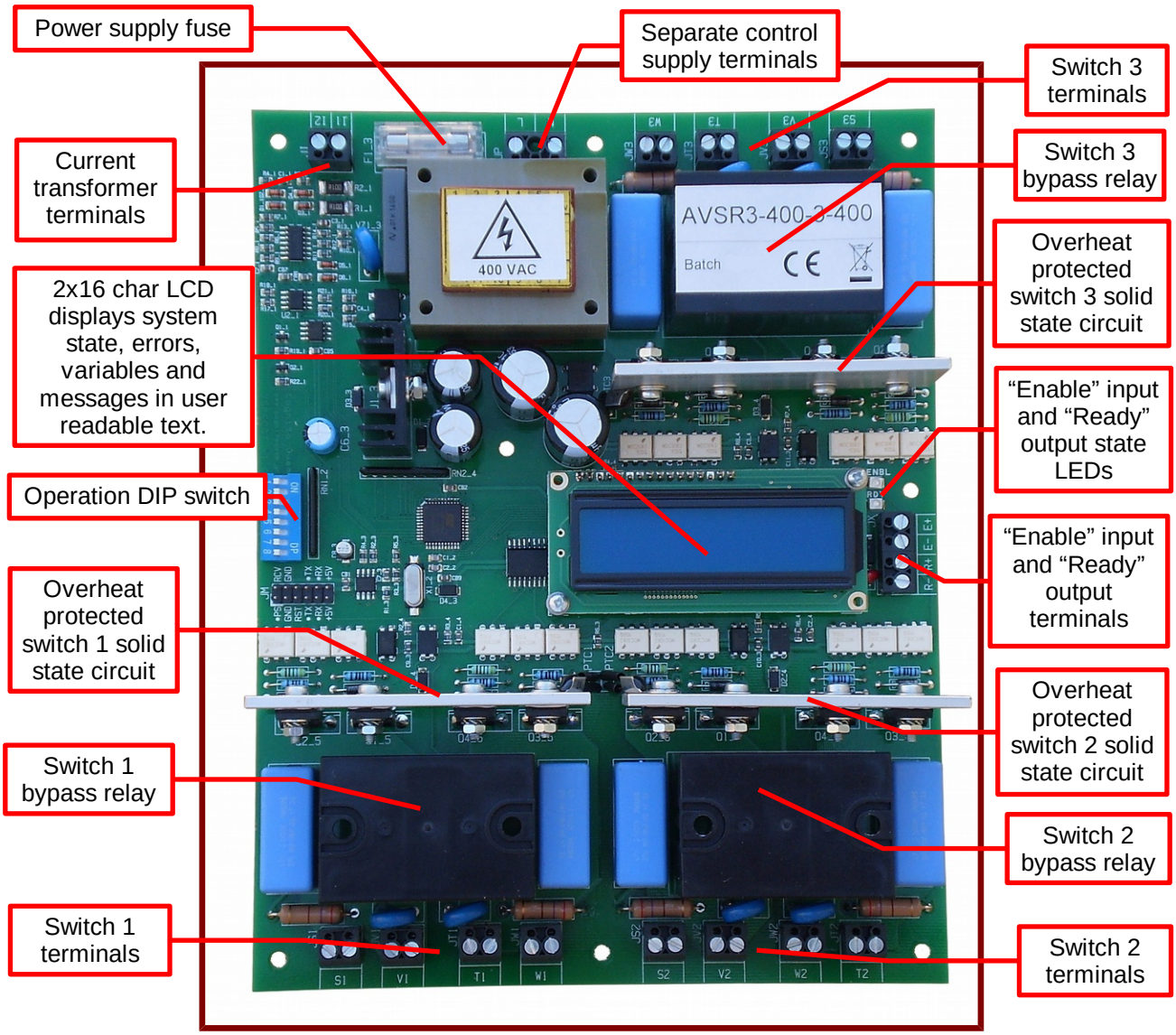
AVSR3 Triple Switch Autocalibrating Variable Step Regulator

The AVSR3 employs our variable step technology to compensate reactive current in seven steps. It features three 25 A solid state switches to connect three compensating capacitor banks in and out of the single- or three-phase line system. At installation no adjustments are required as each capacitor size is detected automatically making AVSR3 commissioning purely “wire-up-and-play”.



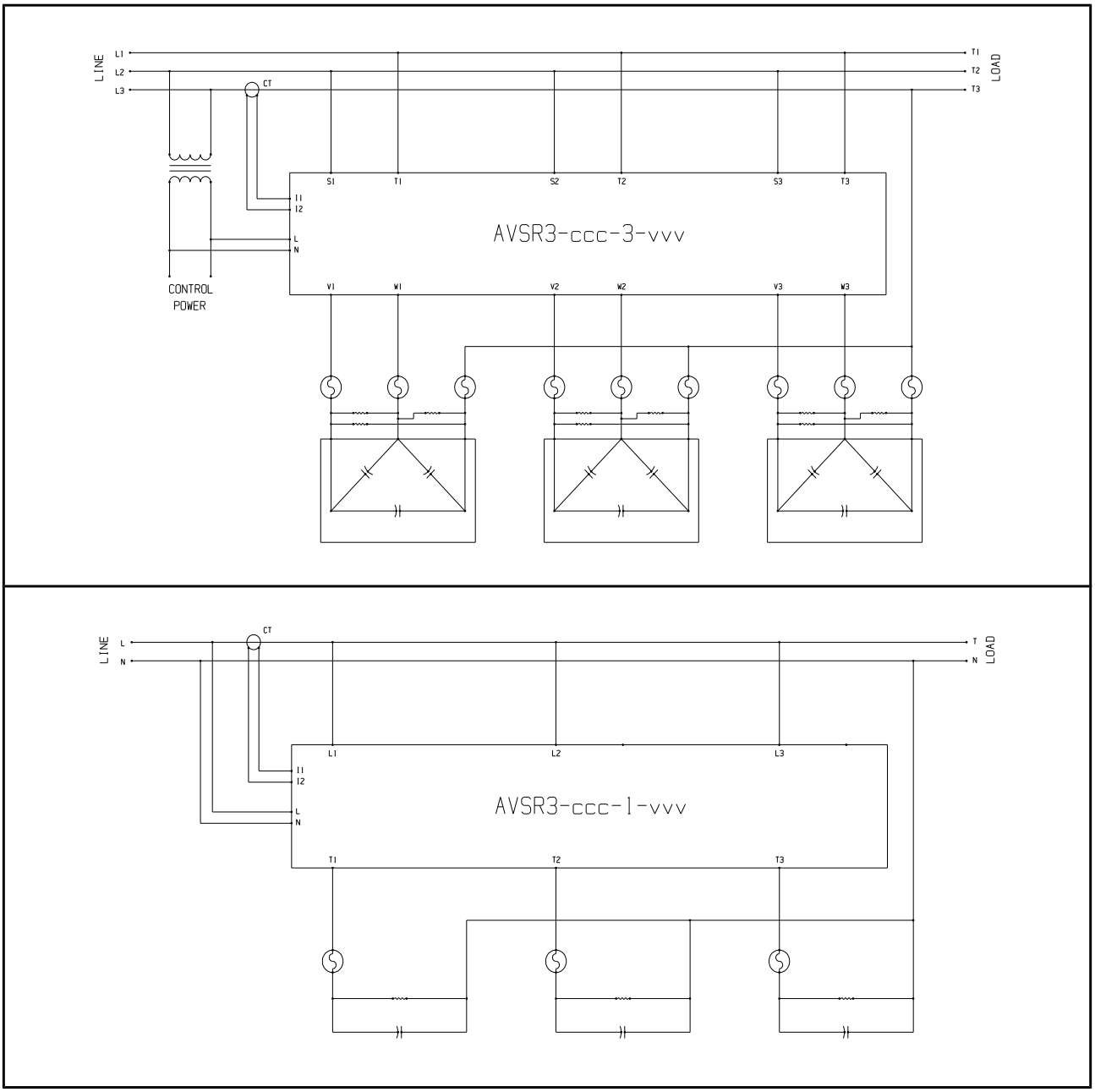
AVSR3 autocalibrating power factor regulator

The variable step technology provides for different capacitor banks of any size to correct power factor in practically any arbitary minimum step and correction range size. At every sampling instant, the controller calculates the required compensation step and connects or disconnects a combination of banks whose sum is equal or closest to the calculated step value. In the AVSR3, three banks are used and, if sized as x1, x2 and x4 multiples of the smallest required step, provide seven steps of compensating operation. Switch activation/deactivation happens at every sampling instant as set at the DIP switch between 5 and 30 seconds making the AVSR3 particularly suitable for dynamic power factor (PF) compensation of frequently-started, low-duty or variable loads such as lifts, conveyors, compressors, pumps and office lighting.

Tel/fax: +30.210.8049475 - http://www.cognitoquam.gr

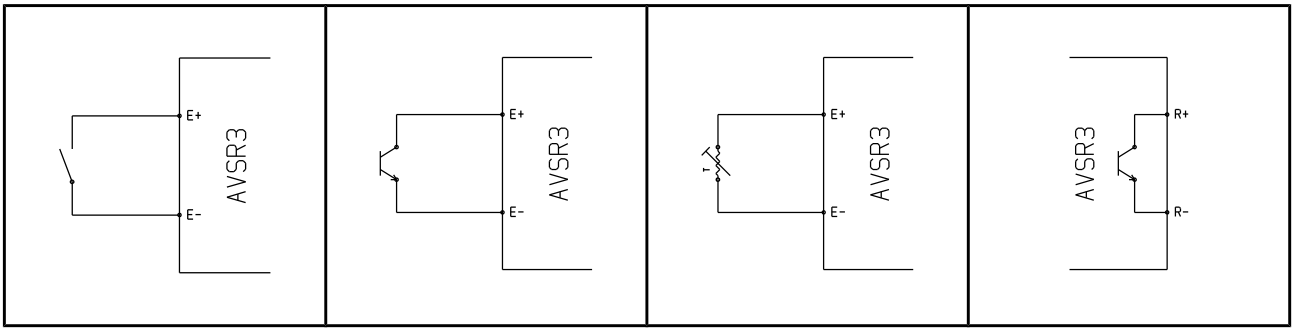
Each capacitor bank size is autodetected during AVSR3 installation. The unit features an autocalibrating function during which the AVSR3 corrects all internal errors and offsets, measures the current transformer phase shift and the individual capacitor bank sizes. The measured parameters are then used during normal operation ensuring accurate, effective and dependable performance. Following autocalibration no other adjustment is required making AVSR3 installation quick and error-free.

AVSR3 Feature Summary	
Variable compensating capacitance step	Variable compensating capacitance step is any combination of the three driven banks, effectively realizing an up to 7 step system.
Autocalibration mode	Autocalibration function corrects all errors and detects the current transformer phase shift and each capacitor bank size. No other adjustment is needed.
Line connection	Separate, galvanically isolated control supply terminals can be connected directly to the line or a separate control power line.
Isolated enabling bit input and output pair	Enabling bit I/O pair allows for integration in a supervisory system or connection to an external master. The input interfaces to a NPN (current sink) external control source or enabling signal. It is internally connected to the isolated internal interface power supply and is protected against overvoltage transients. The output features a 24 VDC optotransistor which is protected against overvoltage transients and is isolated from all other AVSR3 supply potentials. Alternative, DIP switch selectable operation modes allow for tandem and interlock external control.
Modes of external control	The “Enable” and “Ready” pair allow for the following DIP switch selectable operation modes: • Standard or static mode: Operation is enabled by the “Enable” input and reported by the “Ready” output. • Tandem mode: A number of AVSR3s are connected in tandem (ie each “Ready” output driving the “Enable” input of the next unit) to realize systems with more capacitor banks. Group control is effected via the “Enable” input of the first unit. • Interlock mode: A number of AVSR3s are connected in a ring (ie each “Ready” output driving the “Enable” input of the next unit in the ring) allowing for only one bank of the group to switch in/out. Used typically with single phase AVSR3s controlling the individual phases of a three phase load to minimize line disturbances when connected to a weak neutral. Group control is effected via a series switch in one of the “Enable” input.
Current detection	By standard 5 A secondary current transformer (CT). The transformer phase shift is detected at autocalibration and, as such, the CT can be placed in any of the phase lines.
Detection method	The reactive current is determined by measuring the current phase and magnitude.
Overheat protected solid state switch	Solid state circuits switch each 25 A compensating capacitor in and out of the line at every sampling instant. Each circuit is protected against overheating, typically caused by bypass relay failure (below).
Zero crossing type solid state switch	The capacitor is switched in when the line voltage equals the capacitor voltage ensuring very “quiet” operation. Capacitor inrush current and the associated generation of harmonics and ringing is eliminated and capacitor life is extended and safeguarded.
Bypass relay	Bypass relay across each solid state switch minimizes switch losses. Its eventual wear-out will trigger the power circuit overheat protection.
Sampling time	DIP switch selectable of 5, 10, 20 and 30 seconds.
Forced state	DIP switch selectable state turns each switch on or off regardless of current input enabling individual power circuit testing or orderly system disconnection.
2x16 character LCD	LCD display shows system state, variable and error messages in user readable and friendly format.
Isolated control circuit	Control circuit is galvanically isolated enhancing safety and noise immunity.
Protection	Against line overvoltages, faults and power circuit overheating.



Typical three-phase (top) and single-phase (bottom) power factor correction AVSR3 systems. (Model number “ccc” refers to the AVSR3 control voltage and “vvv” to the installation line voltage). In the three-phase system the AVSR3 is powered by a separate control supply, as provided by the shown isolation transformer. The current transformer (CT) phase shift is detected at autocalibration and can be placed in any phase line. In the presence of significant line harmonics, the capacitors must be protected by detuning chokes.

During normal operation the AVSR3 display indicates system status, error conditions (such as out-of-range line frequency or an overheated switch) and variables such as load/line power factor and power, percentage capacity switched-in and switch state. In the event of a power circuit overheating, the failing switch is deactivated until power is removed. Overheating is usually the result of switch bypass relay failure and in such a case the worn relay must be replaced.



AVSR3 enable input connection (from left to right) to a switch or relay contacts, optotransistor and thermistor. The system is enabled with the switch closed or the optotransistor conducting current. The AVSR3 output (right) is an uncommitted optotransistor and is on when the system is ready.

The AVSR3 is highly integrated and adaptable to all power factor capacitor compensation applications. The only other parts required to build a complete power factor correction system are the current transformer, the compensating capacitors and their protective fuses.

The AVSR3 can be specially ordered with the LCD on the back so that it can be placed on the cabinet door inside and show through a suitable viewing hole. Assembled, ready-to-install systems are also available on a custom order basis.

Ordering Information by Line System and Supply Voltage					
Description	**Single phase 110-130 V, 50-60 Hz lines**	**Single phase 220-240 V, 50-60 Hz lines**	**Three-phase 3x220-240 V, 50-60 Hz lines**	**Three-phase 3x400 V, 50-60 Hz lines**	**Three-phase 3x480 V, 50-60 Hz lines**
Triple switch autocalibrating variable step regulator, 110-130 VAC supply	AVSR3-115-1-115	AVSR3-115-1-230	AVSR3-115-3-230	AVSR3-115-3-400	AVSR3-115-3-480
Triple switch autocalibrating variable step regulator, 220-240 VAC supply		AVSR3-230-1-230	AVSR3-230-3-230	AVSR3-230-3-400	AVSR3-230-3-480
Triple switch autocalibrating variable step regulator, 400 VAC supply				AVSR3-400-3-400	
Triple switch autocalibrating variable step regulator, 480 VAC supply					AVSR3-480-3-480

Supplied by