

## SEC STPi

Technical specifications of centralized power controllers with advanced communication capability and related accessories



### INTRODUCTION

É uno stabilizzatore di tensione centralizzato che consente una regolazione della potenza erogata a circuiti di lampade mediante un'azione di riduzione lineare della tensione di alimentazione secondo cicli programmabili in valore ed in tempo in funzione dei flussi di traffico stimati.

Tutta la gamma STPi è classificata R1 - L1 - A1 Y1 - Efe25,8 - fe 13 - fe 21,2 - fe 12,5 secondo la norma UNI 11431.

**n. (...) centralized Power Controller from Reverberi Enetec srl, Reverberi range, model “SEC STPi (QIR...../M) PLUS”, to control lamp power, dim and stabilize– three-phase (single phase) voltage – consisting of:**

REFERENCE	DESCRIPTION	SPECIFICATIONS
STPi ...	POWER CONTROLLER	A
STPi QIR ...	POWER CONTROLLER	A
STPi QIR ...	QIR BUILT-IN CONTROL PANEL	B
STPi QIR.../M	POWER CONTROLLER	A
STPi QIR.../M	QIR BUILT-IN CONTROL PANEL	B
STPi QIR.../M	METERING COMPARTMENT	C
REMOTE CONTROL SYSTEM (OPTIONAL)		D

## A – POWER CONTROLLER

### GENERAL CHARACTERISTICS

- Regulation and stabilization of voltage on load side through static system. No moving part or mechanical part or brush or variac is allowed, in order to reduce maintenance to zero.
- Accuracy in output voltage stabilization  $\leq 1\%$ , independently in each phase.
- Minimum guaranteed efficiency 98%, with active load applied between 30% and 100% of nominal active power. The efficiency must be over 98% as well when output power is 190V.
- Minimum guaranteed efficiency has to be certified by an independent Third Party Laboratory
- No harmonics generation on the current absorbed by the controller, specifically the power controller does not introduce harmonic distortions, not more than 2%.The performance has to be certified by an independent Third Party Laboratory
- Noise level  $\leq 40$  dB, for urban installation, the performance has to be guaranteed by an independent Third Party Laboratory
- Performance Class in accordance to Italian standard for Power Controllers UNI 11431: R1-L1-A1-Y1-P1-E fe28.5-fe16.7-fe21,2-fe11, The performance has to be guaranteed by an independent Third Party Laboratory
- Failure rate of less than 8% per 50,000 hours of operation
- Possibility to manage LED lamps equipped with drivers with voltage tracking function.
- The discharge lamps can be switched on at the rated voltage and maintained for 15 minutes, as prescribed by all manufacturers.
- Control panel with functions keys and manual regulation keys
- LCD display 16 lines for 2 columns with contrast regulation.
- Serial output mini USB, high-speed communication systems compatible with changes to Internet system, to download electrical parameters and recorded alarms, working programs, etc.

- Freely configurable 12Vdc digital output
- Two Relay outputs to switch the control from astronomical to twilight
- Two Relay outputs programmable to the following functions:  
Astronomical/crepuscular operation exchange, Astronomical, Modem reset, Timer, Plant on/off forcing, By pass, I/O.
- Two programmable digital inputs to force the controller ON, bypass, full light and reduction or to signal the status of MCB, tripped differentials, burglar alarm, etc.
- Possibility of interfacing with external devices using different communication protocols

## FUNCTIONAL FEATURES

- The switching required to ensure stabilization takes place without relevant transients and discontinuities on the supply voltage at the load, in particular, in the reduction phase, the voltage at the load is never abruptly changed, for example bringing it for one or more cycles near the supply voltage.
- Static By-Pass, independent phase per phase, NO BREAK execution. A fault in one phase makes the machine go to by-pass only on that phase.
- Automatic By-Pass in case of alarm, with auto-reset system.
- Up to 90% power reduction with LED lamps equipped with drivers with "voltage tracking" function (AmpDim, MainsDIM etc.).
- Up to 40-50% power reduction with discharge lamps.
- Toroidal type transformers to minimize losses due to the operation of the machine and ensure an efficiency of 98%.
- Working temperature : -20 °C / + 55 °C.
- Stabilization of output voltage with independent phases, each phase keeps the voltage within +/- 1% of the single set value, even in the presence of imbalances between the phases of the input voltages (symbol Y according to Italian standard UNI 11431) with upstream voltages ranging from 200 to 245 Volts.
- Setting of the following parameters, personalized for each phase: start voltage, full light voltage, reduced voltage, warm-up time, upstream ramp speed, downstream ramp speed.
- Alarms programming menu for values over and/or below the pre-set thresholds of upstream voltage, downstream voltage and differential current (optional)
- Alarms programming menu for each phase for values over and/or below of a determined value of power factor .
- Alarms programming menu, based on the dimming level, for each phase for values over and/or below of a determined value of the line current and active power.
- Management of cumulative alarms for the generation of higher level alarms
- Power save system for the limitation of the load current when it is greater than the size of the controller (in case of overload, the controller reduces the voltage to slow down the load current within the limit of rated range)
- Availability of 4 standard cycles, with times and percentages of reduction in accordance with Italian standard UNI 11431
- Availability of 4 seasonal reduction programs (one for each season) programmable with the possibility of selecting the percentage of reduction and OFF/ON cycles (switch-off and switch-on of the controller) and the corresponding time slots of operation during the night up to a maximum of 10 time slots.

- Availability of 5 periodic and weekly programs that allow you to set different settings during the week and / or some periods of the year with the possibility of selecting the percentage of reduction and cycles of OFF / ON (switch off and on regulator) and the corresponding time slots of operation during the night up to a maximum of 10 time slots.
- Availability, through the use of the SDLx unit, of a cycle for proportional control of the signal coming from the luminance/illumination sensor to better manage the transition zone of the tunnels in accordance with UNI 11095 Italian standard.
- Availability, through the use of the LTM sensor, of a control cycle according to one of the operating modes between FAI (Full Adaptive Installation), CP (Constant Performance), TAI (Traffic Adaptive Installation), Time Dimming, Constant Dimming or Maximum Dimming. The LTM sensor is tested at I.N.Ri.M. Report 15-0891-01 "Photometric characterization of an ILMD matrix luminance meter for lighting measurements in street lighting systems".
- Earth fault differential current measurement with alarm generation for leakage values above the set threshold (optional)
- Available Input for energy metering units having a pulse output of the counter or photodiode (optional)
- Possibility to set a delay time start after a black-out, to allow the discharge lamps to cool before a new start (only QIR version)
- Possibility to read on the display the following electric parameters :
  - Upstream and downstream voltage of each phase.
  - Upstream and downstream absorbed current of each phase
  - Differential current (optional)
  - $\cos\phi$  and power factor of each phase
  - Upstream and downstream absorbed active power of each phase
  - Reactive and apparent absorbed power of each phase.
  - Frequency of each phase.
  - Consumed and saved energy of each phase
- Analogic input and output value (in mA).
- Storage of the following statistical data:
  - Hours of operation on line and in by-pass mode
  - Number of switching cycles of control relays
  - Stability of mains (steps/minute)
  - Number of black-outs
  - Number of resets
- Predisposed for connection to a remote control network for diagnostics and control of the equipment
- Astronomical clock integrated into the controller (specifically in DIM module), with possibility to program the work parameters from keyboard or from remote (optional).
- Possibility to download the historical data stored in the controller, via portable PC or modem
- Possibility to query from remote by SMS: the controller sends directly the answer by SMS to the mobile phone which did the request (The control Centre is not involved in the operation). It's possible to ask information regarding the measures, I/O state, alarms in progress, to force the plant switch on/off or the state of I/O.

## CHARACTERISTICS OF THE ENCLOSURE

- Material: SMC hot molded polyester reinforced with fiberglass, self-extinguishing and halogen-free
- Protection level: IP44 in accordance with CEI EN 60529, IEC 529/89
- Protection against mechanical impacts: IK10 - CEI EN 50102, IEC 62262
- Color: RAL 7032 – 7035.
- Hinged door with locking mechanism on 5 points with handle, fit for use by security lock unique encryption
- Frame Anchor to floor installation

## TWILIGHT ASTRONOMICAL SWITCH (OPTION)

- Automatic calculation of plant switch on / off times, with automatic adaptation to different daylight duration in the year
- Possibility to fix the latitude and longitude of the place of installation, in order to switch on / off the plant at the correct time in that given geographical area
- Possibility to add “offset” times to delay or advance the on / off times proposed by the twilight astronomical switch
- Calculation of the switch on / off times with an accuracy of less than  $\pm 2$  minutes/year
- Time-out hardware that, in case of failure of the astronomical clock, it's able to divert the on/off control of the plant to a back-up safety twilight sensor.
- Switching contact for operation signalling controlled by the twilight astronomical switch.

## LUMINANCE AND TRAFFIC SENSOR LTM FEATURES (OPTIONAL)

- Sensor for measuring the luminance level of the road monitored according to UNI 11248 and CEN13201-3 part 3 and 4 Italian standards.
- Measurement of night traffic present, in terms of number of vehicles per hour
- Evaluation of typical debilitating weather conditions at night (dry road, wet road, fog, snow).
- Management of the light control in order to obtain on the road the exact value required by current legislation, regardless of external conditions that may disturb the same.

## B – “QIR” BUILT-IN CONTROL PANEL

### GENERAL CHARACTERISTICS

- Main four/three poles magneto thermic breaker, with trip coil
- Earth fault relays with adjustable trip current and time tripping delay and automatic reset of up to three operations, two operating relays (contactor and main switch release if failure persists), test push-button, manual reset push-button. Not suitable to operate in electric system with PEN configuration.
- Four /three poles line contactor.
- Two poles magneto thermic breaker for protection of auxiliary circuits.
- Manual/automatic switch on/off control (twilight by-pass).
- Twilight photocell with threshold regulating amplifier selectable from 2 to 500 Lux, or astronomical switch, or Infralux sensor.
- INFRALUX sensor (as an alternative to the twilight switch and the astronomical clock) for switching on the basis of the amount of infrared rays present in the atmosphere.
- N° (...) magneto thermic breakers 4(2) x (.....)A for output line protection

### FEATURES INFRALUX INFRARED TWILIGHT SENSOR (OPTIONAL)

- Twilight switch with infrared emission sensor, consisting of control unit and sensor, which can also be installed within the light emission range of the lamp.
- Insensitivity to the light beam generated by the lamp because the discharge lamps emit negligible amounts of infrared rays.
- Setting of the ignition threshold according to the level of infrared rays present in the atmosphere. The sensor is sensitive to the presence of clouds, so it behaves exactly like a twilight sensor.
- Insensitive to dirt and therefore no need for maintenance as the presence of infrared is detected even when the sensor is dirty or placed in the shade.
- Possibility to switch on almost simultaneously the systems, calibrating in the same way several sensors, because of the insensitivity to the presence of dirt on the sensor.
- Programming via pushbuttons on the control unit and possibility of forcing on and off from the control module.

## C – METERING COMPARTMENT

- SMC material (moulded polyester reinforced by fiber glass)
- Protection level: IP44 in accordance with IEC 529/89 Standard
- Mounting plate made of insulated material, for metering units clamping.

## D – REMOTE CONTROL SYSTEM (OPTIONAL)

### GENERAL CHARACTERISTICS

Remote control system of parameters, based on the following equipment:

- RAM module
  - Serial communication between RAM and DIM modules
  - Two digital relay inputs, optically isolated, individually configurable
  - Eight optically isolated inputs, individually configurable
  - UPS function, with external battery, having the following characteristics:
    - UPS feeding exchange relay.
    - Slow charging facility (C/40), fast charging and maintaining charge.
    - Step UP power supply 22V/24V
    - Relay for external battery release.
    - Possibility to control the voltage both of internal battery and of central point of the same.
    - Discharge circuit to control the battery age.
- Battery release when, in discharge phase, a pre-set threshold is reached
- Signalling LED for voltage presence, I/O status, battery status, functional status.
- Battery for RAM module
  - NiMH type, rechargeable
  - Power supply 7.2Volt
  - Power output 2200mA
- Connection from controller to remote station control through Router 3/4G, GSM Modem or Ethernet.

### FUNCTIONAL FEATURES

- Back up battery, to supply DIM and RAM modules, to call to the control center also in case of lack of mains voltage.
- Ten optically isolated inputs/outputs, individually configurable to signal tripping of breakers, earth leakage relays, overvoltage protections, etc.
- Call to control center in conjunction with pre-defined alarms
- Remote reading of the recording of measurements and alarms of the Power Controller.
- Possibility to change the settings from remote control center:
  - Work parameters;
  - work cycles;
  - alarms;
  - clock;
  - All operation you can perform through the front panel keyboard.
- Visualization of the status of the inputs and outputs by means of an indication on the display
- Maximum 14 expansion modules IOM, total 112 I/O on the same control panel.
- Connection to MEM modules (expansion module measures for the reading of the electrical quantities, downstream of the outgoing CBs).

- Automatic synchronization of twilight astronomical clock with the PC time of the control center.
- Possibility to manage external apparatus (those to be used will be defined in the project) i.e.: traffic lights, pollution monitoring stations, water pumps, etc..

#### ANALOGUE MEASUREMENT EXPANSION MODULE MEM (OPTIONAL)

MEM module to be installed together with DIM in order to expand analogue measurement capabilities.

- Measurement of 4 three-phase current systems, to be used to monitor output currents to lines.
- Measurement of 1 three-phase voltage system, to be used to monitor output voltage.
- Power factor and active power calculation, for each of the 4 three-phase circuits.
- Possibility to set a threshold if the values are higher or lower than power expected (24 values).
- 0,8% precision.
- Maximum 32 modules connectable on same bus.

#### IOM DIGITAL INPUT AND OUTPUT EXPANSION MODULE (OPTIONAL)

Module to be installed together with DIM in order to expand I/O capability.

- Each IOM module can manage 8 Inputs or Outputs.
- I2CBUS serial port connection to DIM.
- Maximum 14 expansion modules, total 112 I/O on the same panel.