Allen-Bradley

Application Note

1606-XL 480EPT

- World-wide approvals (CE cULus cULus LISTED) for industry
- Input: AC 115/230V **auto select**
- Output: 24...28V / 480W (600W)
- 90% efficiency
- Ideal for parallel operation
- Remote shut-down

Input

Input voltage	AC 100...120V/200...240V, 47...63Hz, auto select
Rated tolerances	
• Continuous operation	AC 85...132V resp. AC 184...264V
• Short-term (1 min) at 24V/20A	AC 85...140V resp. AC 170...280V
Input current	<10A (115V range) <5A (230V range)
Inrush current	typ. <18A @ AC 264V and cold start
Fuse loading	$<5A^2s$ (cold start)

If you intend to protect the primary side of the power supply with a fuse or a circuit breaker, a 15 A slow acting fuse (HBC) or a supplementary protector 1492-SPU1C150 is recommended (1492-SP1C160 for Europe). In order to meet local requirements, please consult local codes and regulations for proper installation.

EN 61000-3-2 (harmonic current emissions [PFC]) is fulfilled

Transient handling	Transient resistance acc. to VDE 0160 / W2 (750V/1.3ms), for *all* load conditions.
Hold-up time	30ms at 24V/20A, AC $230V_{in}$ 30ms at 24V/20A, AC $120V_{in}$ 15ms at 24V/20A, AC $100V_{in}$

Efficiency, Reliability

Efficiency	typ. 90.5% (AC 230V, 24V/20A)
Losses	typ. 50W (AC 230V, 24V/20A)
MTBF	519.000h acc. to Siemensnorm SN29500 (24V/20A, 230V, T_{amb} = 40°C)
Life cycle (electrolytics)	The unit exclusively uses longlife electrolytics, specified for +105°C. High reliability, as • only five aluminium electrolytics and • no small aluminium electrolytics are used.

Output (signal terminals see)

Output voltage	DC 24...28V, adjustable by (covered) front panel potentiometer. Adjust. range guaranteed.
Output noise suppression	Radiated EMI values below EN50081-1, even when using long, unscreened output cables.
Ambient temperature range T_{amb}	Operation: 0°C...+70°C (>60°C: Derating) Storage: -25°C...+85°C
Rated continuous loading with convection cooling:	
• T_{amb}=0°C...60°C	24V/20A resp. 28V/18A short-term (<30s) 24V/25A resp. 28V/22A
Derating	12W/K (at T_{amb} = 60...70°C)
Voltage regulation	better than 2% over all
Ripple	(incl. spikes (20MHz bandwidth), 50Ω measurement
• Output charact. S	$<20mV_{PP}$ (<0.1%)
• Output charact. P	$<40mV_{PP}$ (In: AC 230V, Out: 24V/20A)
(S/P: **S**ingle/**P**arallel Mode)	$<100mV_{PP}$ (In: AC 184V, Out: 24V/20A)
Over-voltage protection	At 33V ± 10%: switch to hiccup mode

Front panel indicators:
- Green LED on, when $V_{out} > U_T$, where U_T is appr. 2V below V_{out} adjusted (24V...28V)
- Red LED on, when $V_{out} < U_T$

Parallel operation	Yes, up to ten units

To achieve current sharing the output V/I characteristic can be altered to be 'softer' (25V at 0.4A, 24V at 20A). This is done by repositioning an external bridge connection (without opening the unit).

Power Back Immunity	max. 30V

Construction / Mechanics

Housing dimensions and Weight

• W x H x D	220mm x 124mm x 102mm (+ DIN rail)
• Free space for ventilation	above/below 70mm recommended left/right 25mm recommended
• Weight	2,5kg

Design advantages: All connection blocks are easy to reach as mounted on the front panel; PVC insulated cable can be used for all connections, as the connection blocks are mounted in the cooler area on the underside of the unit.

Wire Size Input/Output:
Stranded 20...10 AWG (0.5...4 mm²), Solid 20...10 AWG (0.5...6 mm²)
Tightening Torque: 7 lbs in (0.8 Nm) recommended

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Start / Overload Behavior

Startup delay	typ. 0.55s
Rise time	appr. 20...80ms, depending on load
Overload behavior	Overload Design (see diagram)

Advantages:
- No disconnection/hiccup, thus overloading is possible also for a longer period of time (load start-up), ideal for parallel operation.
- High overload/short-circuit current due to straight characteristic; each bias point of the V/I characteristic extends 20A.

Advantage: Due to the high and continuously supplied overload current the unit starts reliably even with awkward loads (DC-DC converters, motors). No 'sticking' can occur, for example, with fold-back characteristics, and secondary fuses trigger more reliably.

Signal terminals

The remote On/off control is activated via the signal terminals 'Remote Shutdown 1 and 2'. The unit is delivered with the signal terminals jumpered (control state is 'On' with the terminals jumpered).

a) Remote shut-down by switch:
Unit turns on when the signal terminals 'Remote Shutdown 1 and 2' are closed by a switch (R<10Ω).
- Connect the switch contact with the signal terminals Remote Shutdown 1 and 2, only. Ensure the switch contact is not connected to the output voltage or in contact with any separate voltages.
- Unit is in standby mode with open switch contact (R>100kΩ)

b) Remote shut-down by control voltage:
Positive voltage is applied to 'Remote Shutdown 1' against minus output (ref. potential)
- Unit turns on, when positive voltage (3...30V, 0.3...2mA) is applied to 'Remote Shutdown 1' against the minus output
- Unit switches off at <0.6V
- Input voltages of 0.6...3V and negative voltages are not defined

Parallel operation / cascading of outputs:
- Use a multi-pole switch with one switch contact for each power supply unit (1 x On); connection of the signal terminals with one switch contact is not permissible when being used in parallel operation

Additional control features with parallel operation:
Unit turns on:
- positive voltage (4...30V) is applied to 'Remote Shutdown 1' against negative output voltage

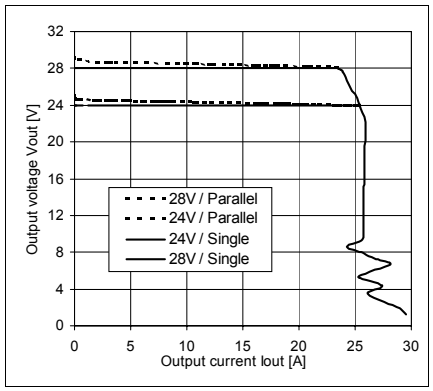
Unit switches off:
- 0...0.5V_{in} is applied to 'Remote Shutdown 1'

Note:
- Connection of the terminals 'Remote Shutdown 1' is possible with parallel operation; do not use the terminals 'Remote Shutdown 2'
- Only connect the signalling lines at one single point of the negative output voltage; a voltage drop between the connection point and the minus terminals must not exceed 0.5V, even at maximum load.

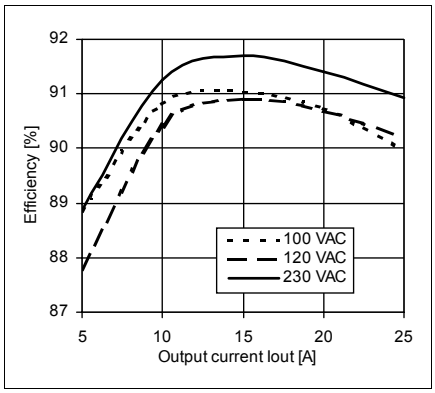
Additional data regarding remote shut-down:

• Output current	< 5mA (mean)
• Power consumption	<2.5W
• Residual voltage at zero load	<3V
• Startup delay	<500ms
• Switching operations per min.	<10

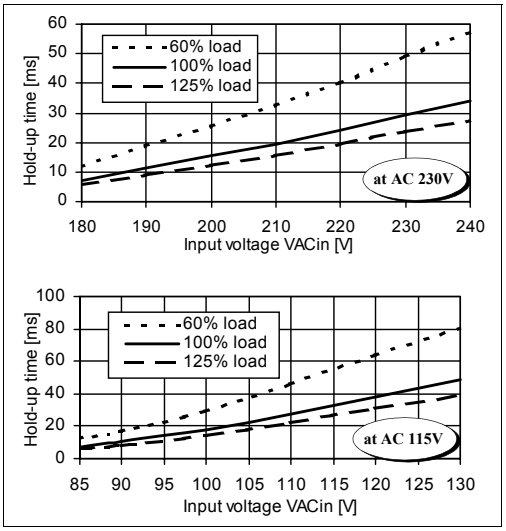
Output characteristic (typ.)



Efficiency (typ., at V_{out}=24V)



Hold-up time (min., at V_{out}=24V)



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Specifications valid for 230 V AC input voltage, +25°C ambient temperature, and 5 min run-in time, unless otherwise stated. They are subject to change without prior notice

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