



### BUFFER UNIT

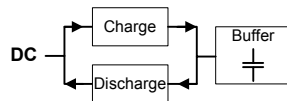
- Buffering with electrolytic capacitors instead of lead batteries
- Buffering of 48V loads
- Minimum hold-up time 0.1s at 20A and 0.2s at 10A
- Longer hold-up time at lower loads
- Clear status indication by status LED and signaling terminals
- Quick-connect spring-clamp terminals
- 3 Year warranty

## 1. GENERAL DESCRIPTION

The buffer unit is a supplementary device for regulated DC48V power supplies. It buffers load currents during typical mains faults and load peaks.

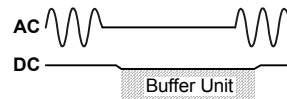
### Working principle

In times when the power supply provides sufficient voltages, the buffer unit stores energy in integrated electrolytic capacitors. In case of mains voltage fault, this energy is released again in a regulated process.



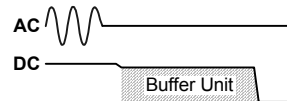
### Bridges mains faults without interruption

Statistic show that 80% of all mains fault lasts less than 0.2s. These mains faults are completely bridged by the buffer unit. This increases the reliability of the system as a whole.



### Extended hold-up time

Once mains power fails or is switched off, the buffer unit will continue to provide the load current for a defined period of time. Process data can be saved and processes can be terminated before the DC power switches off. Controlled restarts are subsequently possible.

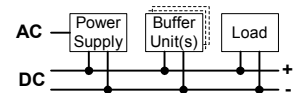


## 2. SHORT-FORM DATA

|                   |                      |                                |
|-------------------|----------------------|--------------------------------|
| Rated voltage     | DC 48V               |                                |
| Voltage range     | 48-56V               |                                |
| Output voltage    | 45V or $V_{IN} - 2V$ | Buffer mode select with jumper |
| Output current    | 0 to 20A             |                                |
| Hold-up time      | min 0.1s             | 45V, 20A                       |
|                   | typ 0.15s            | 45V, 20A                       |
|                   | min 13.4s            | 45V, 0.1A                      |
|                   | typ 21s              | 45V, 0.1A                      |
| Charging current  | max 500mA            |                                |
| Charging time     | typ. 21s             |                                |
| Input current     | typ 40mA             | standby mode                   |
| Power dissipation | typ 1.9W             | standby mode                   |
| Temperature range | -25°C to +70°C       | operational                    |
| Dimensions        | 64x124x102mm         | WxHxD                          |

### Easy to handle, expandable and maintenance-free

The buffer unit does not require any control wiring. It can be added parallel to the load circuit at any given point. Buffer units can be switched in parallel to increase the output ampacity or the hold-up time.



## 3. ORDER NUMBERS

|             |                 |                                     |
|-------------|-----------------|-------------------------------------|
| Buffer Unit | <b>UF20.481</b> | 48V, 20A, 100ms                     |
| Accessory   | ZM1.WALL        | Wall mounting bracket               |
|             | ZM14.SIDE       | Side mounting bracket               |
|             | XF-1x4s/270-60  | Mating connector, Part of derlivery |

## 4. MARKINGS



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## INSTALLATION NOTES

### Mounting Orientation:

The power terminal shall be located on top of the unit.

### Cooling

Convection cooled, no forced air cooling required. Do not obstruct air flow!

### Installation clearances:

No special clearances necessary

### Intended use

This buffer unit has been designed for use in panel board installations or other building-in applications where a suitable mechanical enclosure shall be provided to fulfil local requirements.

### Service parts:

The unit does not contain any service parts. If damage or malfunctioning should occur during operation, immediately turn power off and send unit for inspection to factory!

## DISCLAIMER

The information presented in this document is believed to be accurate and reliable and may change without notice.

### 5. STANDBY MODE

|                   |      |              |
|-------------------|------|--------------|
| Input voltage     | nom. | DC 48V       |
| Voltage range     | nom. | 48-56Vdc     |
| Input current     | typ. | 40mA         |
| Power dissipation | typ. | 1.9W         |
| Status lamp       |      | permanent on |
| Active signal     |      | high ohmic   |
| Ready signal      |      | low ohmic    |

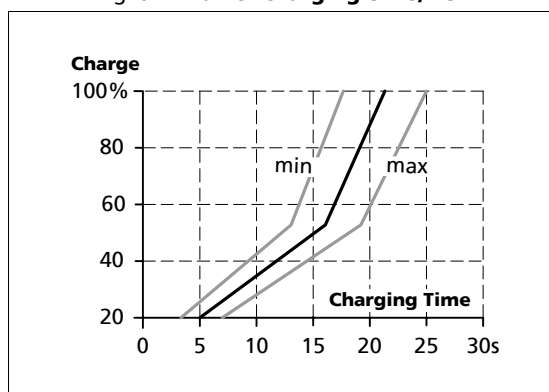
### 6. CHARGING MODE

|               |      |                |  |
|---------------|------|----------------|--|
| Input current | min. | 0.3A           | Charging mode  |
|               | max. | 0.5A           | Charging mode  |
| Charging time | min. | 22s / 17s      | Initial charge <sup>1)</sup> / Re-charging <sup>2)</sup> |
|               | max. | 32s / 25s      | Initial charge <sup>1)</sup> / Re-charging <sup>2)</sup> |
| Status lamp   |      | flashes 1.25Hz |  |
| Active signal |      | high ohmic     |  |
| Ready signal  |      | high ohmic     |  |

1) Initial charging is the first charge after voltage is applied to the buffer unit.

2) Re-charging is the charging of the internal capacitors after voltage interruptions shorter than 2minutes.

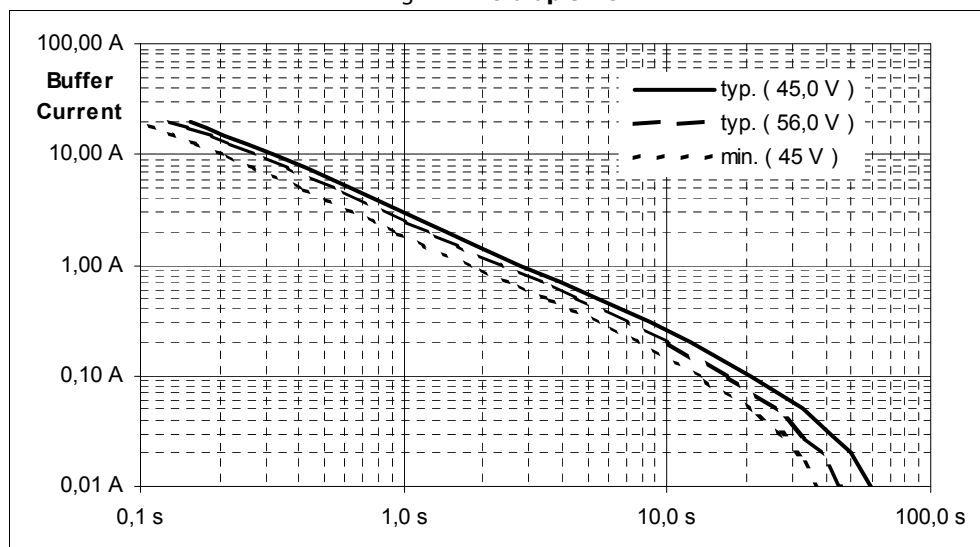
Fig. 6-1 Buffer charging time, 48V



### 7. BUFFER MODE

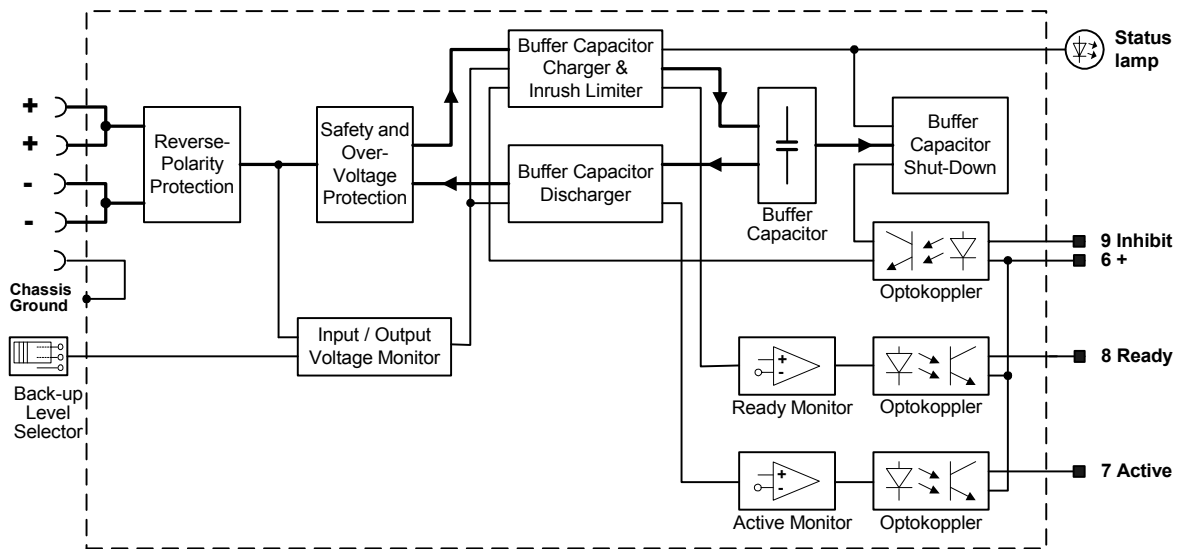
|   |      |                            |   |
|---|------|----------------------------|---|
| Rated output current  | nom. | 20A                        |   |
| Current limitation  | min. | 20A                        | Electronically limited  |
| Output voltage  | typ. | 45V                        | Jumper in position "45V fixed"  |
|   | typ. | 2V below the input voltage | Jumper in position "Vin -2V"  |
| Ripple and noise voltage  | max. | 250mVpp                    | 5A, 20Hz to 20MHz, 50Ohm  |
|   | max. | 400mVpp                    | 10A, 20Hz to 20MHz, 50Ohm   |
|   | max. | 600mVpp                    | 20A, 20Hz to 20MHz, 50Ohm<br>may increase below -10°C   |
| Hold-up time  | min. | 0.1s                       | 45V, 20A  |
|   | typ. | 0.15s                      | 45V, 20A  |
|   | min. | 13.4s                      | 45V, 0.1A   |
|   | typ. | 21s                        | 45V, 0.1A   |
| To increase buffer current or extend hold-up time any given number of buffer units can be put in parallel |      |                            |   |
| Activation threshold  | typ. | 45V                        | Jumper in position "45V fixed"<br>Buffering starts if terminal voltage falls below 45V  |
|   | typ. | Vin -2V                    | Jumper in position "Vin -2V"<br>Buffering starts if the terminal voltage decreases by more than 2V. Buffering ends when terminal voltage increases by more than 2V<br>Voltage changes slower than 1.1V/s will be ignored unless the voltage is above 45V. Below 45V buffering starts immediately. |
| Status lamp   |      | flashes 10Hz               |   |
| Active signal   |      | low ohmic                  |   |
| Ready signal  |      | high ohmic                 |   |

Fig. 7-1 Hold-up time



### 8. FUNCTIONAL DIAGRAM

Fig. 8-1 Functional diagram



### 9. FRONT SIDE AND USER ELEMENTS

Fig. 9-1 Front side

**I/O Power Port**  
Quick-connect spring-clamp terminals,

- + Positive terminal
- Negative terminal

**Chassis Ground**  
to bond the housing

**Status lamp**

**OFF:** Buffer is discharged, or terminal voltage is below 44V

**ON:** Unit is fully charged

**Flashes 1,25Hz:**

Unit is in charging mode

**Flashes 10Hz:**

Unit is in discharging mode

**Signal Port**

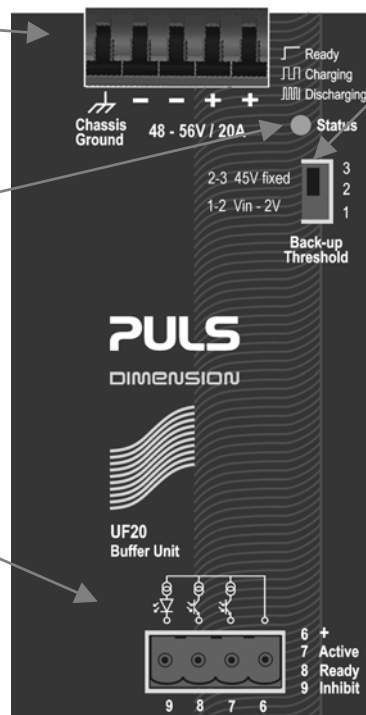
Plug Connector

**6 common + pole**

**7 Active:** unit is buffering

**8 Ready:** unit is on stand-by

**9 Inhibit:** initiates buffer discharging and inhibits recharging of capacitors



**Back-up threshold jumper**

**1-2:** Fixed mode, (factory setting)

Unit switches to buffer mode as soon as the voltage falls below 45V

**2-3:** Variable mode

Unit switches to buffer mode when terminal voltage decreases by 2V within 1.1V/s or the input voltage falls below 45V.

Missing jumper = 45V fixed

**Set the unit to fixed mode:**

- when power supplies other than the Dimension Q-Series are used
- with back-feeding loads
- when the buffer unit is placed close to the load
- whenever in doubt

**Set the unit to variable mode:**

- for 48V applications
- when the buffer unit is placed close to the power supply

### 10. OPERATING DIAGRAM

Fig. 10-1 Operating diagram

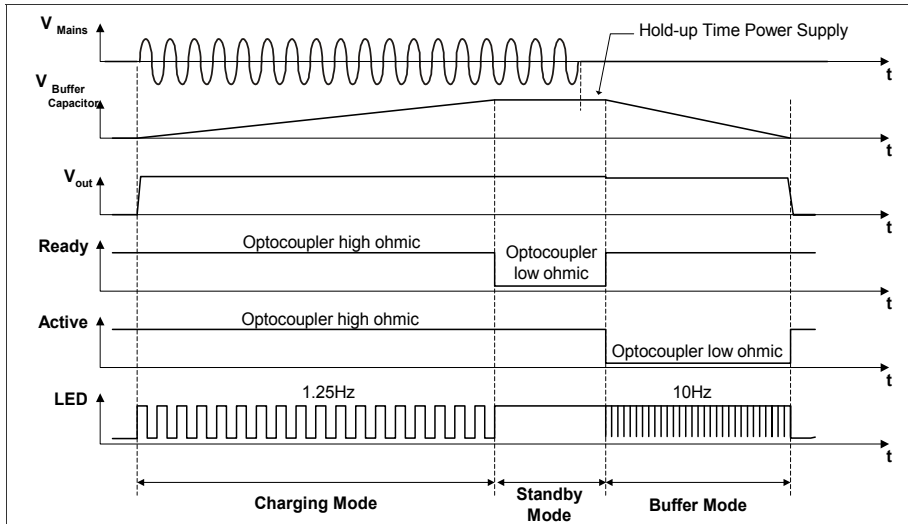
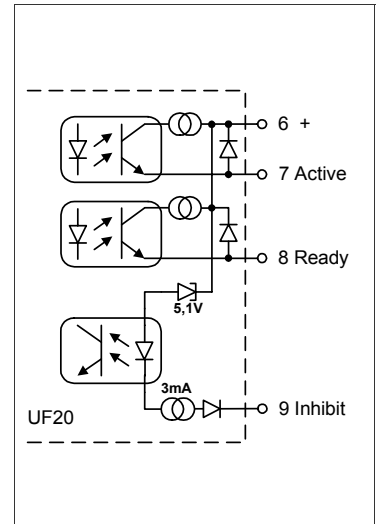


Fig. 10-2 Signals schematic



### 11. ACTIVE AND READY SIGNAL, INHIBIT INPUT

|                                  |      |  |
|----------------------------------|------|--|
| <b>Active signal (Pin 7)</b>     |      | low ohmic while buffer capacitors are discharging                |
| Signal voltage                   | max. | 60Vdc  |
| Signal current                   | max. | 6mA  |
| Voltage drop across opto-coupler | typ  | 1.2V / 3.3V at 1mA / 5mA, while opto-coupler is low ohmic        |
| Leakage current                  | max. | 50µA while opto-coupler is high ohmic                            |
| Isolation                        | nom. | 500Vac signal port to power port                                 |
| <b>Ready signal (Pin 8)</b>      |      | low ohmic when buffer is fully charged                           |
| Signal voltage                   | max. | 60Vdc  |
| Signal current                   | max. | 6mA  |
| Voltage drop across opto-coupler | typ  | 1.2V / 3.3V at 1mA / 5mA, while opto-coupler is low ohmic        |
| Leakage current                  | max. | 50µA while opto-coupler is high ohmic                            |
| Isolation                        | nom. | 500Vac signal port to power port                                 |
| <b>Inhibit input (Pin 9)</b>     |      | "High" input signal initiates unit shutdown and buffer discharge |
| Signal voltage                   | max. | 60Vdc  |
| Signal current                   | max. | 4mA current limited  |
| Shut-down threshold              | min. | 6Vdc unit is in shut-down mode above this threshold level        |
|                                  | max. | 10Vdc  |
| Isolation                        | nom. | 500Vac signal port to power port                                 |

Wiring diagrams can be found in section 21.

## 12. TERMINALS AND WIRING

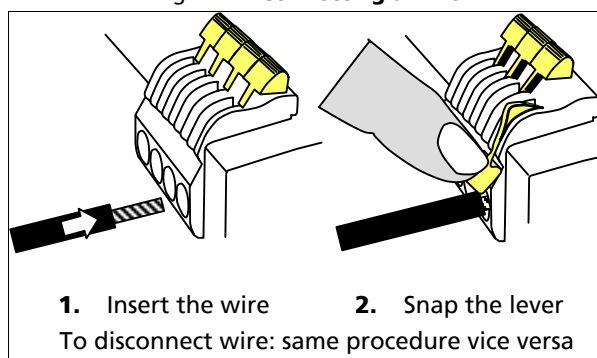
### Power terminal

|                       |   |
|-----------------------|---|
| Type                  | Bi-stable, quick-connect spring clamp terminals. IP20 Finger-safe construction. Suitable for field- and factory installation. Shipped in open position. |
| Solid wire            | 0.5-6mm <sup>2</sup>  |
| Stranded wire         | 0.5-4mm <sup>2</sup>  |
| AWG                   | 20-10AWG  |
| Ferrules              | Allowed, but not required   |
| Pull-out force        | 10AWG:80N, 12AWG:60N, 14AWG:50N, 16AWG:40N (according to UL486E)  |
| Wire stripping length | 10mm / 0.4inch  |

### Instructions:

- Use appropriate copper cables, that are designed for an operating temperature of 60°C
- Follow national installation codes and regulations!
- Ensure that all strands of a stranded wire enter the terminal connection!
- Up to two stranded wires with the same cross section are permitted in one connection point

Fig. 12-1 Connecting a wire



### Signal terminal

|                       |  |
|-----------------------|--|
| Type                  | Plug connector with screw terminal mechanism. Finger-touch-proof terminal with captive screws for 3.5mm slotted screwdriver. |
| Solid / stranded wire | 0.2-2.5mm <sup>2</sup>   |
| AWG                   | 22-14AWG   |
| Ferrules              | up to 1.5 mm <sup>2</sup> wire gauge   |
| Wire stripping length | 6mm / 0.24inch   |
| Tightening torque     | 0.4Nm, 3.5lb.in  |

## 13. RELIABILITY

|                          |      |            |   |
|--------------------------|------|------------|---|
| Lifetime expectancy      | min. | 41 000h    | 40°C, stand-by mode                     |
|                          | min. | 116 000h   | 25°C, stand-by mode                     |
| MTBF SN 29500, IEC 61709 |      | 2 348 000h | 40°C, stand-by mode                     |
|                          |      | 4 062 000h | 25°C, stand-by mode                     |
| MTBF MIL HDBK 217F       |      | 405 000h   | 40°C, stand-by mode, ground benign GB40 |
|                          |      | 555 000h   | 25°C, stand-by mode, ground benign GB25 |

The **Lifetime expectancy** shown in the table indicates the operating hours (service life) and is determined by the lifetime expectancy of the built-in electrolytic capacitors. Lifetime expectancy is specified in operational hours. Lifetime expectancy is calculated according to the capacitor's manufacturer specification.

**MTBF** stands for **Mean Time Between Failure**, which is calculated according to the statistically device failures, and indicates reliability of a device. It is the statistical representation of the likelihood of a unit to fail and does not necessarily represent a life of a product.

### 14. EMC

The unit is suitable for applications in industrial environment as well as in residential, commercial and light industry environment without any restrictions. CE mark is in conformance with EMC guideline 89/336/EEC and 93/68/EEC and the low-voltage directive (LVD) 73/23/EWG.

A detailed EMC Report is available on request

| EMC Immunity               | EN 61000-6-1 EN 61000-6-2 |                                    | Generic standards |                            |
|----------------------------|---------------------------|------------------------------------|-------------------|----------------------------|
| Electrostatic discharge 1) | EN 61000-4-2              | Contact discharge<br>Air discharge | 8kV<br>15kV       | Criterion A<br>Criterion A |
| Electromagnetic RF field   | EN 61000-4-3              | 80MHz-1GHz                         | 10V/m             | Criterion A                |
| Fast transients (Burst)    | EN 61000-4-4              |                                    | 2kV               | Criterion A                |
| Surge voltage              | EN 61000-4-5              | + → -<br>+ / - → housing           | 500V<br>500V      | Criterion A<br>Criterion A |
| Conducted disturbance      | EN 61000-4-6              | 0,15-80MHz                         | 10V               | Criterion A                |

1) Din-Rail earthed

| EMC Emission       | EN 61000-6-3 and EN 61000-6-4 |  | Generic standards |  |
|--------------------|-------------------------------|--|-------------------|--|
| Conducted emission | EN 55022                      |  | Class B           |  |
| Radiated emission  | EN 55011, EN 55022            |  | Class B           |  |

This device complies with FCC Part 15 rules.

Operation is subjected to following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

### 15. ENVIRONMENT

|                         |                                     |                                      |
|-------------------------|-------------------------------------|--------------------------------------|
| Operational temperature | -25°C to +70°C                      | full power                           |
| Storage temperature     | -40 to +85°C                        | storage and transportation           |
| Humidity                | 5 to 95% r.H.                       | no condensation allowed              |
| Vibration sinusoidal    | 2-17.8Hz: ±1.6mm; 17.8-500Hz: 2g    | IEC 60068-2-6                        |
| Vibration random        | 0.5m <sup>2</sup> (s <sup>3</sup> ) | IEC 60068-2-64                       |
| Shock                   | 30g 6ms, 20g 11ms                   | IEC 60068-2-27                       |
| Altitude                | 0 to 6000m                          | All approvals apply only up to 2000m |
| Over-voltage category   | III                                 | EN 50178                             |
|                         | II                                  | EN 50178 above 2000m altitude        |
| Degree of pollution     | 2                                   | EN 50178, not conductive             |

The ambient temperature is defined 2cm below the unit.






### 16. PROTECTION FEATURES

|   |   |   |
|---|---|---|
| Buffer protection                             | Electronically protected against overload, no-load and short-circuits |   |
| Output over-voltage protection in buffer mode | typ. 58Vdc<br>max. 60Vdc  | In case of an internal defect, a redundant circuitry limits the maximum output voltage. The output shuts-down and makes restart attempts automatically. |
| Degree of protection                          | IP 20   | EN/IEC 60529  |
| Penetration protection                        | > 3.5mm   | e.g. screws, small parts  |
| Reverse polarity protection                   | yes   | max. -60Vdc   |
| Input over-voltages protection                | yes   | max. 60Vdc, no harm or defect of the unit   |
| Internal fuse                                 | not included  |   |

### 17. SAFETY

|                      |              |  |
|----------------------|--------------|--|
| Output voltage       | SELV<br>PELV | IEC/EN 60950-1<br>EN 60204-1, EN 50178, IEC 60364-4-41 |
| Class of protection  | II           |  |
| Isolation resistance | > 5MΩ        | Power-port to housing, 500Vdc                          |
| PE resistance        | < 0.1Ω       | between housing and chassis ground terminal            |
| Dielectric strength  | 500Vac       | Power-port to signal-port                              |
|                      | 500Vac       | Power-port / signal-port to housing                    |

### 18. APPROVALS

|             |   |  |
|-------------|---|--|
| UL 508      |  | LISTED E198865 listed for use in U.S.A. (UL 508) and Canada (C22.2 No. 14-95)<br>Industrial Control Equipment                              |
| UL 60950-1  |  | RECOGNIZED E137006 recognized for the use in U.S.A. (UL 60950-1) and Canada (C22.2 No. 60950)<br>Information Technology Equipment, Level 5 |
| IEC 60950-1 |  | CB Scheme,<br>Information Technology Equipment   |

### 19. FULFILLED STANDARDS

|                |   |
|----------------|---|
| EN/IEC 60204-1 | Safety of Electrical Equipment of Machines  |
| EN/IEC 61131   | Programmable Controllers                    |
| EN 50178       | Electronic Equipment in Power Installations |

### 20. PHYSICAL DIMENSIONS AND WEIGHT

|          |  |
|----------|--|
| Width    | 64mm / 2.51"   |
| Height   | 124mm / 4.88"  |
| Depth    | 102mm / 4.02" plus depth of DIN-rail and depth of signal connector           |
| Weight   | 740g / 1.63lb  |
| DIN-Rail | Use DIN-rails according to EN 60715 or EN 50022 with a height of 7.5 or 15mm |

Fig. 20-1 Side view

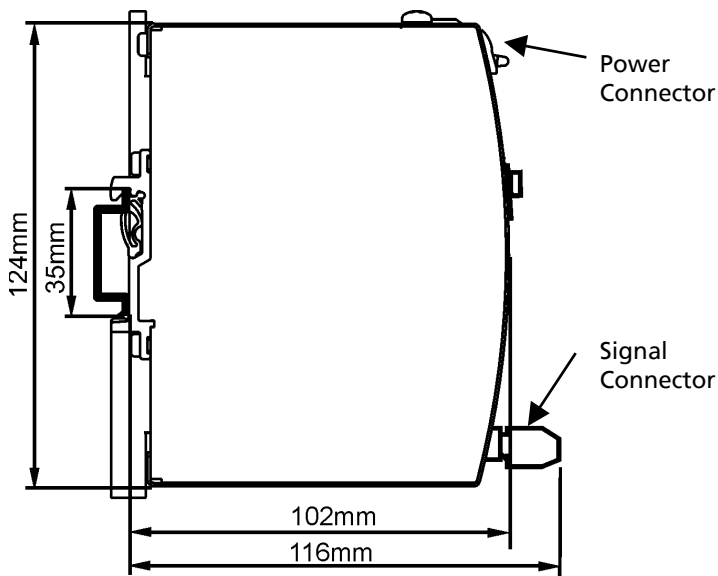
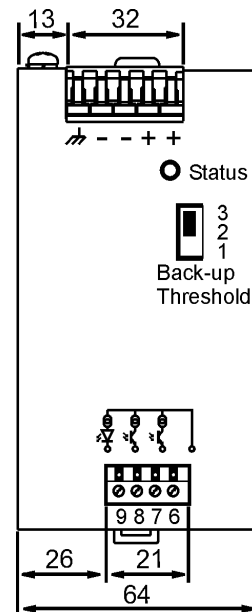
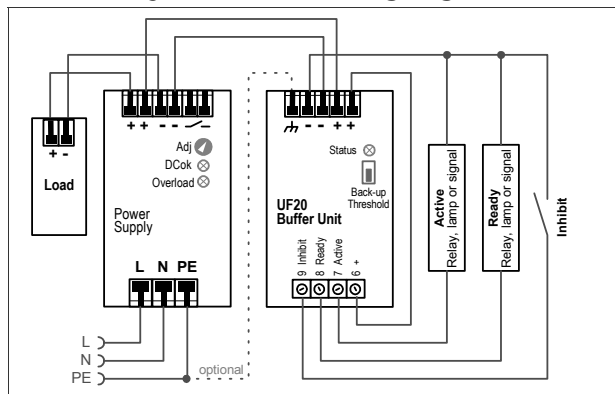


Fig. 20-2 Front view

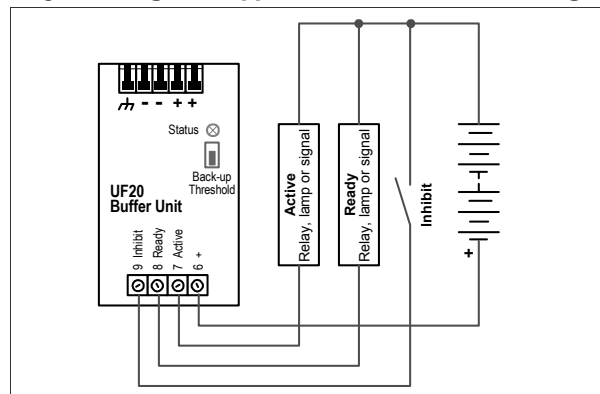


### 21. WIRING DIAGRAMS

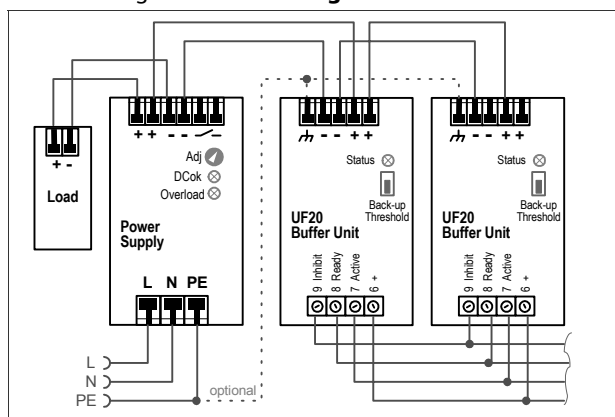
**Fig. 21-1 General wiring diagram**



**Fig. 21-2 Signals supplied from an external voltage**



**Fig. 21-3 Paralleling of buffer units**



**Fig. 21-4 Decoupling of buffered branches**

