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- >> WATTMETERS
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Digital Metering

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### Models Available

**FPM482DCA** DIN48x24 DC Ammeter

**FPM964DCA** DIN96x48 DC Ammeter

**FPM482DCV** DIN48x24 DC Voltmeter

**FPM964DCV** DIN96x48 DC Voltmeter

### Product Features

- 3½ digit red LED display
- Available in two standard DIN sizes
- User adjustable scale and decimal point
- 4-20mA process monitor available
- Easy to wire screw type terminals

For dimensions see page 7

## DC Ammeters & Voltmeters

DC digital ammeters and voltmeters are available in two DIN sizes, 48x24mm and 96x48mm, both featuring a 3½ digit red LED display. The meters are panel mounting and offer a wide choice of input and display options making them suitable for a large range of industrial applications.

All DC digital panel meters can be powered by a large selection of self contained AC or DC auxiliary power supplies, which all offer isolation between the measured input signal and auxiliary supply voltage.

All DC digital panel meters are delivered fully calibrated, however adjustments to zero and span points can be made (see calibration data sheets). Optional terminal protection covers are also available.

## For digital measurement of DC current, DC voltage and process signals

### Specification

#### Accuracy:

- 0.1% ± 1 digit

#### Input Current, $I_n$ :

- 0-100µA to 0-10A direct connected
- DIN48x24 0-5A maximum direct
- > 10A use shunt and mV voltmeter
- 4-20mA process signal

#### Input Voltage, $U_n$ :

- 0-20mV to 0-800V direct connected
- DIN48x24 0-600V maximum
- 0-5V, 0-10V, 1-5V, 2-10V process signal

#### Overload:

- 2 x  $I_n$  or 1.2 x  $U_n$  continuous
- 10 x  $I_n$  or 2 x  $U_n$  for 5 seconds

#### Ammeter Voltage Drop:

- 20mV (direct connected)

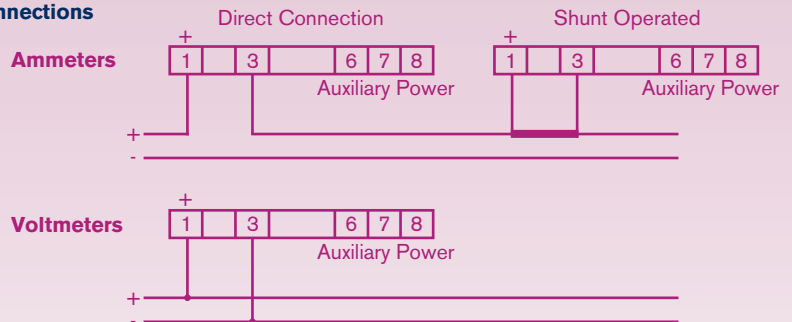
#### Impedance:

- Voltmeter 10kohm/Volt
- DIN48x24 4-20mA: 50ohms
- DIN96x48 4-20mA: 1ohm

#### Weight:

- DIN48x24 90g, DIN96x48 380g

### Connections



For auxiliary power connections see page 7

### Ordering information

Code	DIN Size & Meter Type	Input & Scaling	Auxiliary
FPM482DCA	48 x 24mm DC Ammeter	-	-
FPM964DCA	96 x 48mm DC Ammeter	-	-
FPM482DCV	48 x 24mm DC Voltmeter	-	-
FPM964DCV	96 x 48mm DC Voltmeter	-	-
Specify	-	0-100µA to 0-10A direct (DIN48x24 - 5A max.)	
Specify	-	> 10A use shunt & 50, 60, 75mV Voltmeter	
Specify	-	4-20mA (scaled as required)	-
Specify	-	0-20mV to 0-800V (DIN48x24 - 600V max.)	
110/230Vac	-	110/230Vac Dual Auxiliary (DIN96x48 only)	
Specify	-	12, 24, 48, 110, 230Vac	
415Vac	-	415Vac (96x48mm only)	
10-60Vdc	-	10-60Vdc (96x48mm only)	
Specify	-	12, 24 or 48Vdc (48x24mm only)	
<b>Example</b>	<b>FPM482DCV</b>	<b>0-10Vdc / 0-100.0%</b>	<b>24Vdc</b>

## AC Ammeters, Voltmeters & Frequency Meters

AC digital ammeters and voltmeters are available in two DIN sizes, 48x24mm and 96x48mm, and a digital frequency meter is available in the larger size, all featuring a 3½ digit red LED display. The meters are panel mounting and offer a wide choice of input and display options making them suitable for a large range of industrial applications.

All AC digital panel meters can be powered by a large selection of self contained AC or DC auxiliary power supplies, which all offer isolation between the measured input signal and auxiliary supply voltage.

All AC digital panel meters are delivered fully calibrated, however adjustments to zero and span points can be made (see calibration data sheets). Optional terminal protection covers are also available.



### Models Available

- FPM482ACA** DIN48x24 AC Ammeter
- FPM964ACA** DIN96x48 AC Ammeter

- FPM482ACV** DIN48x24 AC Voltmeter
- FPM964ACV** DIN96x48 AC Voltmeter

- FPM964F** DIN96x48 Frequency meter

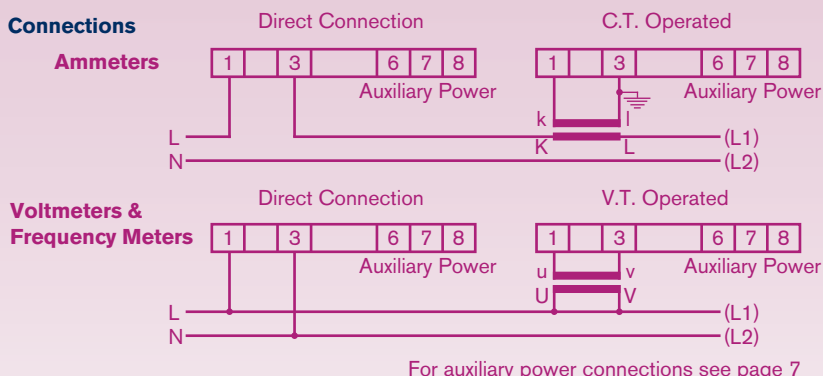
### Product Features

- 3½ digit red LED display
- Available in two standard DIN sizes
- User adjustable scale and decimal point
- Easy to wire screw type terminals

For dimensions see page 7

## For digital measurement of AC current, AC voltage and frequency signals

### Connections



### Specification

- Accuracy:**
- DIN48x24 0.1% ± 1 digit
  - DIN96x48 0.25% ± 1 digit
- Input Current,  $I_n$ :**
- 0-100µA~ to 0-10A~ direct connected
  - DIN48x24 0-5A~ maximum direct
  - 1A or 5A CT operated
- Input Voltage,  $U_n$ :**
- 0-20mV~ to 0-800V~ direct connected
  - DIN48x24 0-600V~ maximum
- Overload:**
- 2 x  $I_n$  or 1.2 x  $U_n$  continuous
  - 10 x  $I_n$  or 2 x  $U_n$  for 5 seconds
- Ammeter Burden:**
- DIN48x24 1A: 0.2VA, 5A: 1VA
  - DIN96x48 1A: 1VA, 5A: 0.5VA
- Voltmeter Impedance:**
- 10kohm/Volt (DIN48x24)
  - 1kohm/Volt (DIN96x48)
- Weight:**
- DIN48x24 90g, DIN96x48 400g

### Ordering information

Code	DIN Size & Meter Type	Input & Scaling	Auxiliary
FPM482ACA	48 x 24mm AC Ammeter	-	-
FPM964ACA	96 x 48mm AC Ammeter	-	-
FPM482ACV	48 x 24mm AC Voltmeter	-	-
FPM964ACV	96 x 48mm AC Voltmeter	-	-
FPM964F	96 x 48mm Frequency meter	-	-
Specify	-	0-100µA~ to 0-10A~ direct (48x24mm - 5A~ max.)	
Specify	-	1A or 5A from a CT (scaled as required)	
Specify	-	0-20mV~ to 0-800V~ (48x24mm - 600V~ max.)	
Specify	-	0-199.9Hz or 0-1999Hz @ 30-600Vac (FPM964F)	
110/230Vac	-	110/230Vac Dual Auxiliary (96x48mm only)	
Specify	-	12, 24, 48, 110, 230Vac	
415Vac	-	415Vac (96x48mm only)	
10-60Vdc	-	10-60Vdc (96x48mm only)	
Specify	-	12, 24 or 48Vdc (48x24mm only)	
<b>Example</b>	<b>FPM964ACA</b>	<b>800/5A</b>	<b>110/230Vac</b>



**Models Available**

- FPM482W** DIN48x24 Digital Wattmeter
- FPM964W** DIN96x48 Digital Wattmeter

- FPM482V** DIN48x24 Digital Varmeter
- FPM964V** DIN96x48 Digital Varmeter

**Product Features**

- Active Power (Watts) or Reactive Power (Vars)
- 3½ digit red LED display
- Available in two standard DIN sizes
- Easy to wire screw type terminals

For dimensions see page 7

## Wattmeters & Varmeters

Digital Wattmeters and Varmeters are available in two DIN sizes, 48x24mm and 96x48mm, for the measurement of active power (Watts) or reactive power (Vars). The meters are panel mounting and are connected to a separate DIN rail mounted converter unit and calibrated as a complete unit to individual requirements.

All digital Wattmeters and Varmeters can be powered by a large selection of self contained AC or DC auxiliary power supplies, which all offer isolation between the measured input signal and auxiliary supply voltage. The converter unit has finger-proof terminal covers.

The converter unit has finger-proof terminal covers.

**Notes:**

- Ensure that current transformers are mounted such that K faces the supply and L faces the load.
- Secondary windings of the current transformers should be earthed.
- No isolation is provided between input AC voltage and DC output on converter unit.

## Digital Wattmeters & Varmeters - for measurement of active or reactive power

**Specification**

**Accuracy:**

- Class 1.0 ( $\pm 1.0\%$  max. error)

**Input Current,  $I_n$ :**

- 0-0.2A to 0-10A direct connected
- 1A or 5A CT operated

**Input Voltage,  $U_n$ :**

- 110, 230 or 415V (-15% to +10%)
- (50 to 600V upon request)

**Frequency:**

- 50/60Hz

**Scales:**

- 0-1.000 to 0-1999 W/Var, kW/kVar or MW/MVar

**Overload:**

- 1.2 x  $I_n$  or  $U_n$  for 2 hours
- 6 x  $I_n$  for 5 seconds

**Burden:**

- Voltage circuit < 2VA per phase
- Current circuit < 1VA per phase

**Response Time:**

- < 1 second

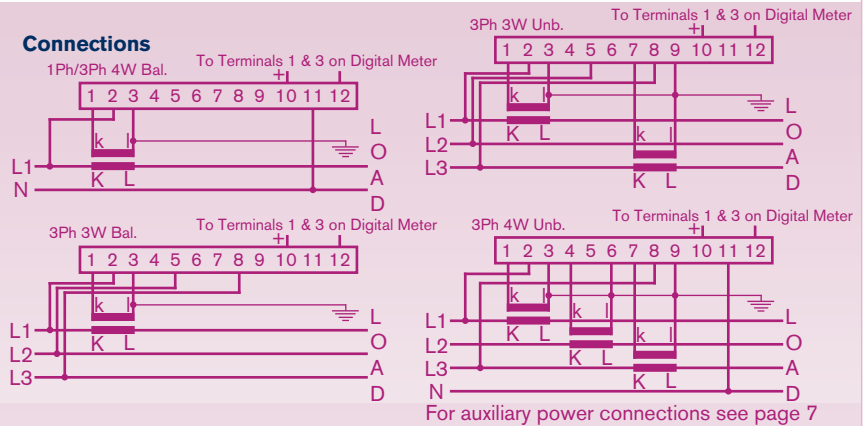
**Weight:**

- DIN48x24 90g, DIN96x48 380g
- Converter Unit 200g

**Converter Unit Enclosure:**

- 55mm wide grey ABS
- Case IP40, terminals IP20
- Fixes to 35mm DIN rail (DIN-EN 50022)

**Connections**



**Ordering information**

Code	DIN Size & Meter Type	Input & Scaling	Auxiliary
FPM482W	48 x 24mm Digital Wattmeter	-	-
FPM964W	96 x 48mm Digital Wattmeter	-	-
FPM482V	48 x 24mm Digital Varmeter	-	-
FPM964V	96 x 48mm Digital Varmeter	-	-
/1	Single Phase	-	-
/2	3 Phase 3 Wire Balanced	-	-
/3	3 Phase 3 Wire Unbalanced	-	-
/4	3 Phase 4 Wire Balanced	-	-
/5	3 Phase 4 Wire Unbalanced	-	-
Specify	-	Voltage (L-N or L-L), Current (CT Ratio)	-
		and/or Full Scale Watts/Vars	-
110/230Vac	-	110/230Vac Dual Auxiliary (96x48mm only)	-
Specify	-	12, 24, 48, 110, 230Vac	-
415Vac	-	415Vac (96x48mm only)	-
10-60Vdc	-	10-60Vdc (96x48mm only)	-
Specify	-	12, 24 or 48Vdc (48x24mm only)	-
<b>Example</b>	<b>FPM964W/5</b>	<b>230VL-N, 100/5A</b>	<b>10-60Vdc</b>

## Power Factor (cosØ) Meters

Digital power factor meters are available in the DIN 96x48mm size, for the measurement of power factor (cosØ). These self contained meters are panel mounting and are calibrated bi-directionally from 0.30 lag to 0.30 lead.

All digital power factor meters can be powered by a large selection of self contained AC or DC auxiliary power supplies, which all offer isolation between the measured input signal and auxiliary supply voltage. Optional terminal protection covers are also available.

**Notes:**

1. Ensure that current transformers are mounted such that K faces the supply and L faces the load.
2. Secondary windings of the current transformers should be earthed.



**Models Available**

**FPM964PF1** DIN96x48 1ph/3ph4w cosØ

**FPM964PF3** DIN96x48 3ph3w cosØ

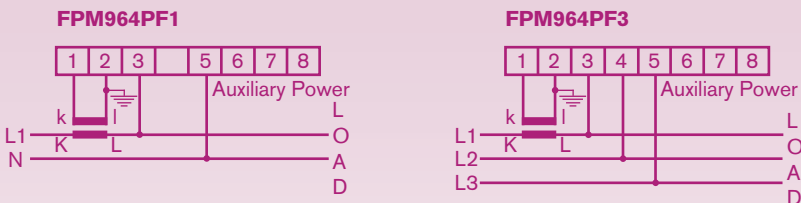
**Product Features**

- Power Factor (cosØ) measurement
- 3 digit red LED display
- DIN 96x48mm size
- Easy to wire screw type terminals

For dimensions see page 7

## Digital Power Factor Meters - for measurement of power factor (cosØ)

**Connections**



For auxiliary power connections see page 7

**Ordering information**

Code	DIN Size & Meter Type	Input	Auxiliary
FPM964PF	96 x 48mm Digital CosØ meter	-	-
1	Single Phase / 3 Phase 4 Wire Balanced	-	-
3	3 Phase 3 Wire Balanced	-	-
Specify	-	Voltage (L-N or L-L) and Current -	-
110/230Vac	-	-	110/230Vac Dual Auxiliary
Specify	-	-	12, 24, 48, 415Vac
10-60Vdc	-	-	10-60Vdc
<b>Example</b>	<b>FPM964PF1</b>	<b>230VL-N, 5A</b>	<b>110/230Vac</b>

**Specification**

**Accuracy:**

- Class 1.0 (±1.0% max. error)

**Input Current, *I<sub>n</sub>*:**

- 0-0.2A to 0-10A direct connected
- 1A or 5A CT operated

**Input Voltage, *U<sub>n</sub>*:**

- 110, 230 or 415V (-30% to +10%)
- (50 to 600V upon request)

**Frequency:**

- 50/60Hz

**Scale:**

- 0.3 lag to 0.3 lead
- Lag denoted by minus sign (-)

**Overload:**

- 1.2 x *I<sub>n</sub>* or *U<sub>n</sub>* for 2 hours
- 6 x *I<sub>n</sub>* for 5 seconds

**Burden:**

- Voltage circuit < 2VA per phase
- Current circuit < 1VA per phase

**Response Time:**

- < 1 second

**Weight:**

- 420g



## Digital Trip Unit

The digital trip unit is an electronic monitoring and protection unit consisting of a digital meter and a remote DIN rail mounting relay unit. It offers increased reliability and accuracy over the traditional analogue meter relay and is available to measure all the same electrical parameters as the standard digital meters - AC Voltage, AC Current, DC Voltage, DC Current, Frequency and Power (Watts or Vars).

The digital trip unit has 'HI' and 'LO' trip points which can easily be set by the user with the aid of a small screwdriver and can be verified by pressing one of two push-buttons on the front of the meter. The FPM964 digital meter constantly displays the measured parameter so if a system is approaching its trip point it can be observed and action taken. Optional terminal protection covers are also available.

### Models Available

#### FPM964DTU DIN96x48 Digital Trip Unit

### Product Features

- User Adjustable HI and LO setpoints
- 3½ digit red LED display
- DIN 96x48mm size
- User adjustable scale and decimal point
- Wide range of AC and DC inputs
- Easy to wire screw type terminals

For dimensions see page 7

## For digital measurement with user adjustable high and low setpoints

### Specification

For Digital Meter Specification see relevant page (pages 2 to 4)

#### Differential:

- < 10 digits

#### Repeatability:

- < 3 digits

### Relay Unit

#### Enclosure:

- 55mm wide grey ABS
- Case IP40, terminals IP20
- Fixes to 35mm DIN rail (DIN-EN 50022)

#### Auxiliary Power Supply:

- 110 or 230V 50/60Hz (standard)
- 12, 24, 48V 50/60Hz or 10-60Vdc

#### Auxiliary Power Supply Variation:

- ±15%

#### Auxiliary Burden:

- < 3VA

#### Output Contacts:

- 2 single pole changeover contacts
- 8A at 250Vac/30Vdc

#### Operating Temperature:

- 0°C to 60°C

#### Contact Life:

- 1,000,000 operations at 5A
- 10,000,000 operations at 1A

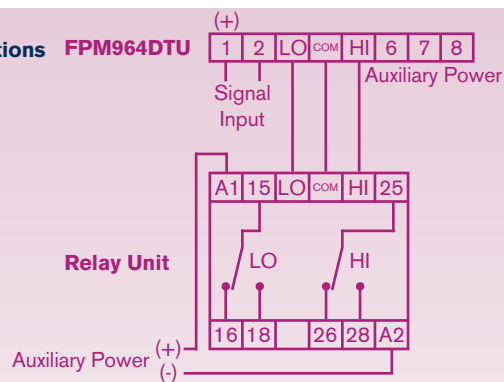
#### Reset Time:

- 100msec

#### Weight:

- 290g

### Connections FPM964DTU



For auxiliary power connections see page 7

### Ordering information

Code	Meter Type	Input & Scaling	Auxiliary
FPM964DTUDCA	DC Ammeter Trip Unit	-	-
FPM964DTUDCV	DC Voltmeter Trip Unit	-	-
FPM964DTUACA	AC Ammeter Trip Unit	-	-
FPM964DTUACV	AC Voltmeter Trip Unit	-	-
FPM964DTUF	Frequency Meter Trip Unit	-	-
FPM964DTUW*	Wattmeter Trip Unit	-	-
FPM964DTUV*	Varmeter Trip Unit	-	-
Specify	-	See Individual Specifications	
Specify	-	12, 24, 48, 110, 230, 415Vac	
10-60Vdc	-		10-60Vdc
<b>Example</b>	<b>FPM964DTUDCV</b>	<b>0-10Vdc / 0-100.0%</b>	<b>230Vac</b>

\* Wiring system information required e.g. 3 phase 4 wire unbalanced

# General Specification

## Environmental

Operating Temperature: 0°C to 60°C (Calibration temperature 23°C)  
 Storage Temperature: -10°C to 70°C  
 Temperature Coefficient: < 100ppm/°C  
 Relative Humidity: 0 - 85% non-condensing  
 Warm Up Time: 1 minute

## Display

Digit & Display: 3½ digit (1999) red LED (cosØ meter 3 digit)  
 Digit Height: 10.2mm high (FPM482), 14.2mm high (FPM964)  
 Decimal Point: Internally selectable  
 Sampling Time: Approx 0.4 sec (FPM482), 1 sec (FPM964)  
 Over Input Indication: '1'  
 Polarity: Automatic with (-) indicating negative inputs  
 Measuring Mode: Dual slope  
 Input Mode: Floating  
 Noise Elimination Ratio: CMRR over 86dB 50/60Hz

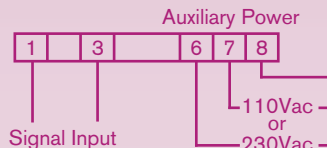
## Enclosure

Enclosure: Flame retardant black ABS plastic case  
 Enclosure Code: Case IP54 (IP65 with gasket optional) to IEC529  
 Insulation Test: 2kV rms 50Hz 1min input/auxiliary (to IEC 414)  
 2kV rms 50Hz 1min terminals/case (FPM482)  
 4kV rms 50Hz 1min terminals/case (FPM964)  
 Markings: CE marked

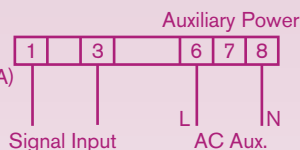
Specification subject to change without notice.

## Auxiliary Power Connections

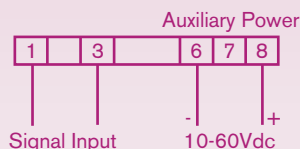
**FPM964 Standard Dual AC Auxiliary Supply**  
 110/230Vac ±20% (Burden < 3VA)



**FPM964 Non Standard AC Auxiliary Supply**  
 12Vac, 24Vac, 48Vac, 110Vac, 230Vac ±20% (Burden < 3VA)

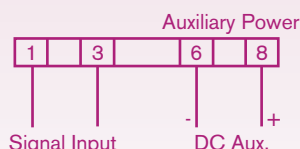


**FPM482 Standard AC Auxiliary Supply**  
 12Vac (±10%)  
 24Vac, 48Vac, 110Vac, 230Vac ±20% (Burden < 3VA)



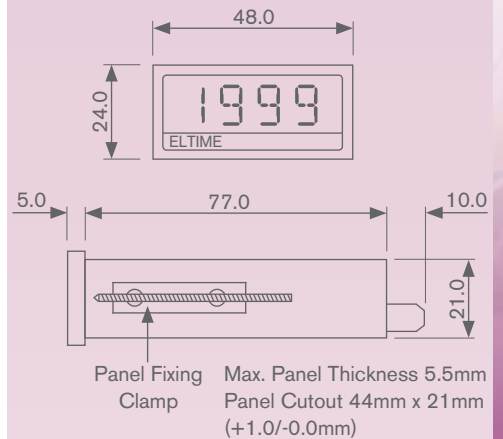
**FPM964 DC Auxiliary Supply**  
 10-60Vdc (Burden < 2W)

**FPM482 DC Auxiliary Supply**  
 12Vdc (±10%), 24Vdc, 48Vdc ±20% (Burden < 2W)

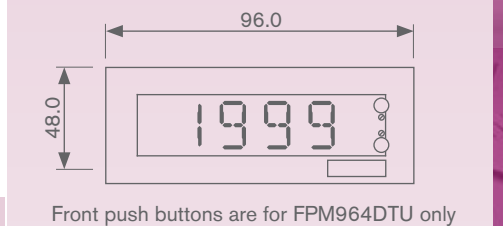


## Dimensions

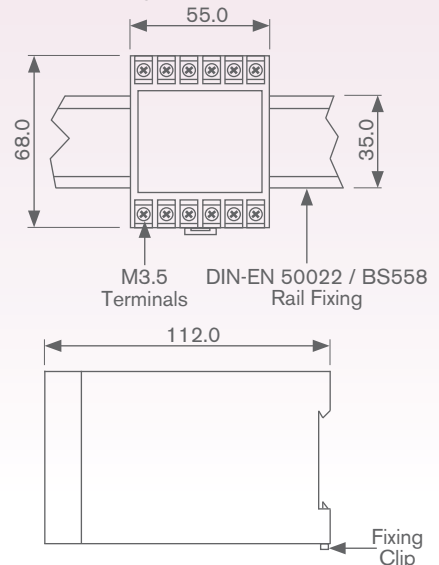
### FPM482 Enclosure



### FPM964 Enclosure



### Watt/Var/CosØ Converter Unit and DTU Relay Unit Enclosure



All dimensions in mm



GENERATOR  
NO. 3

100 200 300



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