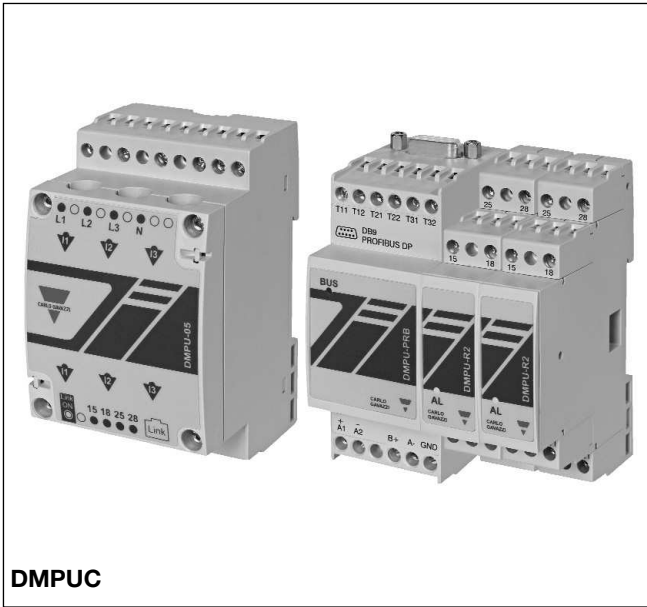


# Motor Controllers DMPUC, DIN-Rail Motor Protection Unit



- Controlling motor operation
- Motor thermal protection
- Phase sequence, phase loss, unbalance, locked rotor, stall, earth fault and earth leakage protection
- Alarm set-points adjustable by the user
- TRMS measurements of distorted sine waves (voltages/currents)
- 3-phase current range up to 2000A with external current transformers or pass-through 5A
- 3-phase voltage range up to 690V
- Electrical variables monitoring
- Monitoring of operating hours, down time, number of starts
- Communication port, included in the main module
- Modular motor management system
- DIN-rail mounting (expansion module mounted side by side from main module)
- Additional I/O expansion modules
- Easy connections management and installation
- Power Supply: 24 VDC
- Event datastamping
- Variable datalogging

## Ordering Key

**DMPUC-MBT**

Model \_\_\_\_\_  
Type \_\_\_\_\_

## Product Description

DMPUC is a modular electronic motor protection relay that provides protection, monitoring and metering functions for 3-phase, constant or dual speed, AC induction motors. The modular housing is for DIN-rail mounting with IP20 protection degree. The device, in its basic configuration, is able to measure the electrical motor variables (current, voltage, harmonic distortion, etc), to

control the thermal image of the motor, and also its load, operational status (start-stop, star-delta starting, 2 speeds, alarm set-point and other functions adjustable by the user), motor temperature and includes an event datalogger. The current measurement is carried out by means of 3 external current transformers, or by pass-through holes up to 5 A. Being provided with a serial

communication module, it is possible to gather all the relevant instantaneous values and transmit them to a host control system for data collection and process control. Profibus and Modbus TCP protocols are available for a high connectivity to the most used fieldbus systems. Through the optional remote display (for panel mounting) it is possible to see the instantaneous values and

status and also to modify the set-points and the values of other parameters. The whole programming of the unit is to be performed via configuration software. Additional optional modules allow the collection of additional PTC and PT100 values for coils and bearing temperature control, and additional input/outputs are used for some local on-board logic functions.

## Type Selection

<b>DMPUC-PRB</b>	Main module + Profibus.	<b>DMPUC-05</b>	Currents and voltages module (pass-through holes).
<b>DMPUC-MBT</b>	Main module + Modbus TCP/IP.	<b>DMPUC-R2</b>	I/O module.
		<b>DMPUC-EL</b>	Earth leakage current module

## DMPUC-MBT and DMPUC-PRB



- Main module for DMPUC
- Communication port for Profibus (DMPUC-PRB) or Modbus TCP (DMPUC-MBT)
- Auxiliary dual RS485 communication port (Modbus) to display or PC
- RJ 11 connection to measurement module
- Internal bus connecting additional modules
- 3 PTC or PT100 or digital inputs
- Data logging and event data stamping
- 24 VDC  $\pm 20\%$  power supply input
- Dimensions: 2-DIN module
- Protection degree: IP20

## LED Specification DMPUC-MBT and DMPUC-PRB

LED Type	Status and color	Color	Meaning
Green flashing		Green flashing	Power supply ok, configuration error.
Red fixed		Red fixed	Communication error, internal bus.
Green fixed		Green fixed	Communication and power supply ok.

## Input Specification DMPUC-MBT and DMPUC-PRB

Parameter	Specification	Parameter	Specification
<b>Digital inputs</b>		<b>Temperature</b>	
Number of input	Max 3, (no common reference), including the already used thermal inputs.	Number of input	Max 3, including the already used thermal inputs.
Working modes	Each input can be configured as a switch or as a toggle.	Temperature probe	PT100 or PTC (programmable via DMPUC-PS software).
Switch	When the input is activated the value is ON; when the input is deactivated the value is OFF.	Number of wires	2-wire connection
Toggle	Each time the input goes from de-activate to activate the value changes state.	PT100	Detecting short-circuit (<15 $\Omega$ ) and wire braking (>10k $\Omega$ ).
Activation mode	Each input is programmable to be considered active when the contact is closed or when it is open when used as a switch, while only at pressure when used as a button.	Range	-50° to +850°
Type	Contact resistance or NPN.	Resolution	1°C/°F
Contact reading voltage	3.3VDC	Accuracy	$\pm(0.5\% \text{ FS})$
Contact reading current	Max. 0.45mA	PTC (3 in series)	According to EN 60947-7-8
Contact resistance	$\leq 1\text{k}\Omega$ , closed contact; $\geq 20\text{k}\Omega$ , open contact.	PTC	Setpoint 3.1 k $\Omega$ , release 1.65 k $\Omega$ , Detecting short-circuits (<0.02 k $\Omega$ ) and wire braking (>10k $\Omega$ ).
NPN	$V_{\text{ON}} < 1\text{V}$ , $V_{\text{OFF}} > 2\text{V}$ .	Temperature drift	<150 ppm/°C at 850°C FS
Acquisition time	$\leq 200\text{ms}$ .	Engineering unit	Selectable °C or °F by software (the same in all the temperature inputs).
Insulation	See the table "Insulation between inputs and outputs".	Insulation	See the table "insulation between inputs and outputs".

## Communication Specification

<b>RS485 port</b>	<p>Bidirectional (static and dynamic variables and parameters).</p> <p>Configuring the device, modifying set-point parameter, digital virtual input and monitoring the measured variables by DMPU-PS software.</p> <p>1 x RJ11 socket on the bottom side (on the right) or 2-wires (to reduce the noise use a shielded cable and connect the shield to GND terminal and to the ground, in only one point).</p> <p>1, selectable by DMPU-PS software.</p> <p>Modbus RTU.</p> <p>Data bits “8”, parity “none”, stop bit “1”.</p> <p>Default: 9.6k.  Selectable by software: 9.6k, 19.2k, 38.4k, 115.2k.</p> <p>See the table “insulation between inputs and outputs”.</p> <p>During the connection by software (through RJ11 connector) the DMPU-HMI display must be disabled (see the display instruction to enable this mode).</p>	<p>Connection</p> <p>IP configuration</p> <p>Protocol</p> <p>Factory-defined values</p> <p>Insulation</p>	<p>1 x RJ45 socket on the top side.</p> <p>Fixed IP address (no DHCP), subnet mask, default gateway, port (selectable by DMPU-PS software).</p> <p>Modbus TCP/IP.</p> <p>IP address “192.168.1.2”, subnet mask “255.255.255.0”, default gateway “192.168.1.1”, port “502”.</p> <p>See the table “Insulation between inputs and outputs”.</p>
<b>Ethernet port (DMPUC-MBT)</b>	<p>Bidirectional (static and dynamic variables and parameters).</p> <p>Configuring the device, modifying set-point parameter, digital virtual input and monitoring the measured variables by DMPU-PS software or supervision system.</p>	<p><b>Profibus port (DMPUC-PRB)</b></p> <p>Function</p> <p>Connections</p> <p>Address</p> <p>Protocol</p> <p>Factory-defined address</p> <p>Baud-rate</p> <p>Telegram</p> <p>Physical layer</p> <p>Insulation</p>	<p>Digital virtual input and monitoring the measured variables by supervision system.</p> <p>1 x DB-9 socket on the top side.</p> <p>2-126, selectable by DMPU-PS.</p> <p>Profibus DP-V1.</p> <p>126</p> <p>9.6k, 19.2k, 45.45k, 93.75k, 187.5k, 500k, 1.5M, 3M, 6M, 12M. Auto baud rate identification.</p> <p>Max. 255 characters.</p> <p>RS485</p> <p>See the table “insulation between inputs and outputs”.</p>

## Power Supply Specification

### DMPUC-MBT and DMPUC-PRB

Power supply

Power consumption

24VDC  $\pm$  20% from screw terminals.  
2W; startup peak current < 1.8A.

## Connections

### DMPUC-MBT and DMPUC-PRB

Power supply connections

Input connection

Communication connection  
RS485

Modbus TCP/IP

Profibus

Measurement module connection

Screw tightening torque

Screw-type, 2 x 1.5 mm<sup>2</sup> terminal blocks.

Screw-type, 6 x 1.5 mm<sup>2</sup> terminal blocks for 3 x P100/PTC (2 wires) or 3 digital inputs.

One port with two twins terminals: 1 x RJ11 (on the right of the bottom side) for PC connection and screw type 3x1.5 mm<sup>2</sup> Terminal box for DMPUC-HMI display connection.

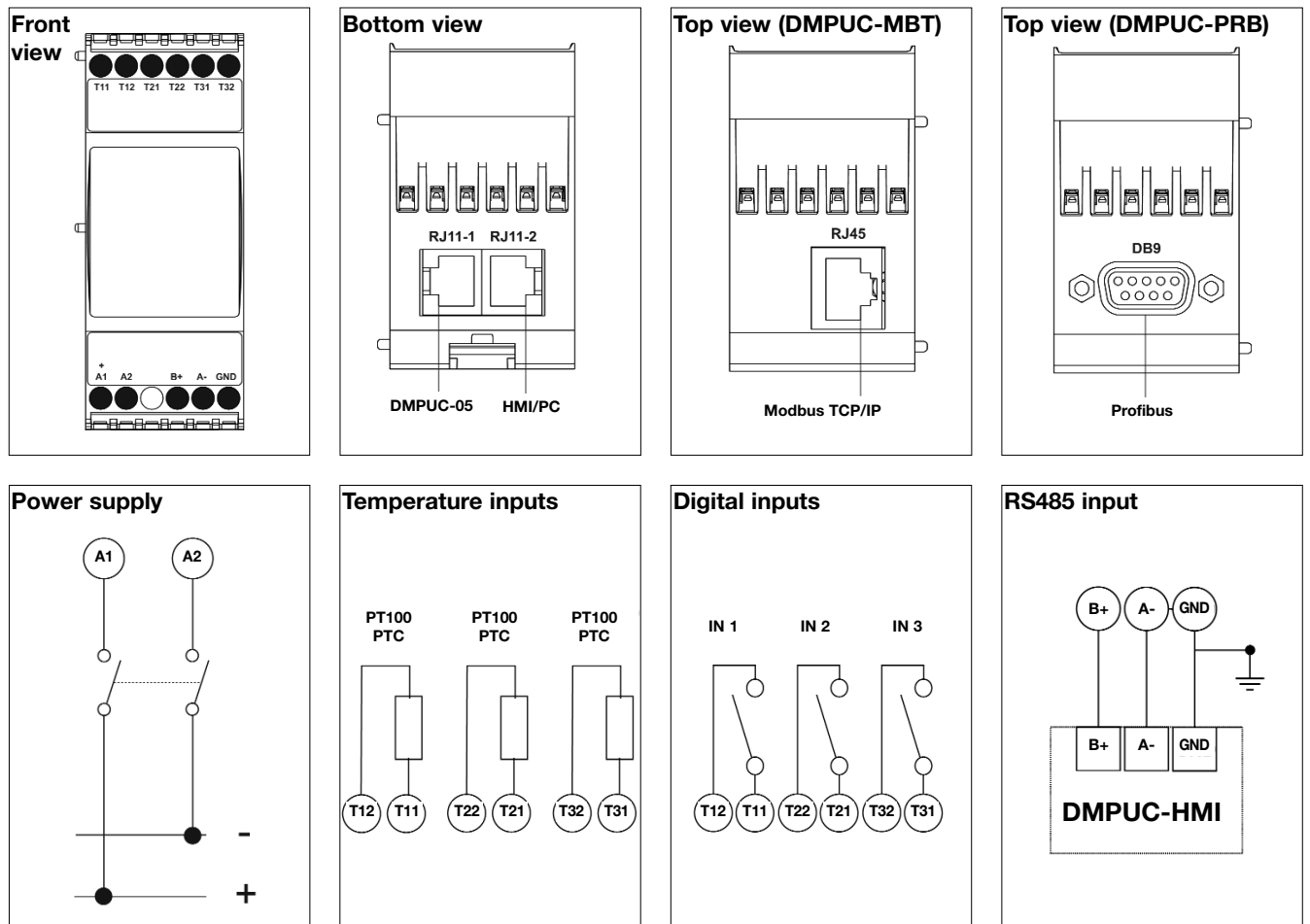
1 x RJ45 (DMPUC-MBT)

1 x DB-9 (DMPUC-PRB)

1 x RJ11

0.4 Nm / 0.8 Nm (min./max.).

## Wiring Diagrams DMPUC-MBT and DMPUC-PRB



## DMPUC-05



- Measures 3-phase current, 3-phase voltage with neutral
- RJ 11 connection to main module
- Pass-through version up to 5A
- 2 relay outputs
- Split core housing for 5A version
- Dimensions: 3-DIN module
- Protection degree: IP20

### Input Specification DMPUC-05

<b>Measurement system</b>	3-phases (with or without neutral). Aron connection: only with DMPUC-05 and proper wiring.	Active power resolution	0.5% FS
<b>Working frequency</b>	45 to 65 Hz	Power factor	$\pm[0.002+1.5\%(1.000 - \text{"PF RDG"})]$
<b>Current inputs</b>	TRMS measurement of distorted waves. The sampling frequency is automatically calculated.	Reactive power	$\pm(2\% \text{ FS})$
Connection type	3-phase split-core pass-through.	Reactive power resolution	1% FS
Current range	Up to 6 A	Harmonic distortion	$\pm 1\% \text{ FS (FS=100\%)}$
Hole size	9 mm	Active Energy	Class1
Max selectable primary current	CT programmable from 1 to 9999.	Reactive Energy	Class2
Harmonic distortion	THD, up to 32 <sup>nd</sup> harmonic.	Leakage current	$\pm(1\% \text{ FS})$
<b>Voltage inputs</b>		Leakage current resolution	1mA
Voltage range	3-phase, 100 to 690 VLL ( $\pm 15\%$ ).	<b>Temperature drift</b>	$\leq 200\text{ppm}/^\circ\text{C}$
Max selectable voltage ratio	VT programmable from 1 to 9999.	<b>Sampling rate</b>	3200 samples/s @ 50Hz; 3840 samples/s @ 60Hz.
Neutral connection	Available	<b>Measurements refresh time</b>	100ms
Harmonic distortion	THD, up to 32 <sup>nd</sup> harmonic.	<b>Measurements Method</b>	TRMS
Accuracy	Relevant to control function, serial communication data (@25°C $\pm 5^\circ\text{C}$ , R.H. @60%, 48 to 62 Hz).	<b>Digital filter</b>	
Current	$\pm(0.5\% \text{ FS})$	Filter operating range	0 to 99.9% of the input electrical scale
Current resolution	0.2% FS	Filtering coefficient	Filtering coefficient 1 to 255
Phase-neutral voltage	$\pm(0.5\% \text{ FS})$	Filter action	Display, alarm, analogue and serial outputs (all the variables).
Phase-phase voltage	1% FS	<b>Crest factor</b>	$\leq 3$
Voltage resolution	0.1% FS	<b>Current overload</b>	
Frequency	$\pm 0.1\text{Hz}$ (45 to 65Hz)	Continuos	6 A
Active power	$\pm(1\% \text{ FS})$	For 20s	40A (accuracy 5%)
		For 500ms	200A Max @50Hz
		<b>Voltage overload</b>	
		Continuos	1.2 Un
		For 500ms	2 Un
		<b>Input impedance</b>	
		Voltage input	$> 1\text{M}\Omega$

## Output Specification DMPUC-05

### Digital output

Number of outputs

Type

AC1

DC12

AC15

DC13

2

SPST NO relay (NE or ND programmable by software).

5AAC @ 250VAC

5ADC @ 24VDC

1.5AAC @ 250VDC

1.5ADC @ 24VDC

Function

Activation delay

Insulation

Programmable by software

≤100ms

See the table “insulation between inputs and outputs”.

## Power Supply Specification

### DMPUC-05

Power supply

Power consumption

Self-power supplied through the communication bus.  
2W

## Connections

### DMPUC-05

Connection to main module

Output connection

Screw tightening torque

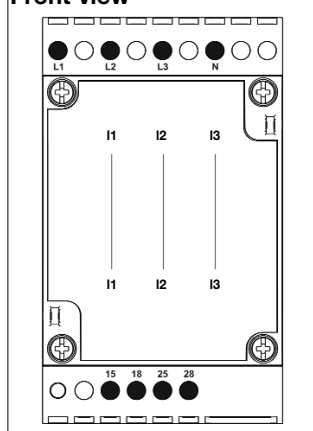
Supplied cable (60 cm), 1 x RJ11 for power supply and communication of measured data.

Screw-type, 4 x 1.5 mm<sup>2</sup> terminal blocks.

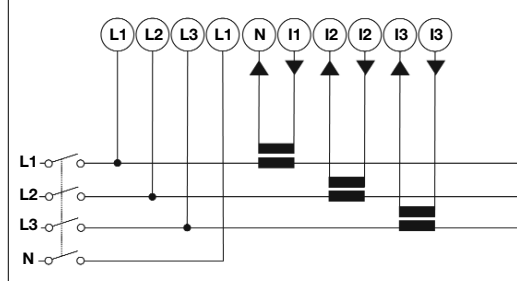
0.4 Nm / 0.8 Nm (min./max.)

## Wiring Diagrams DMPUC-05

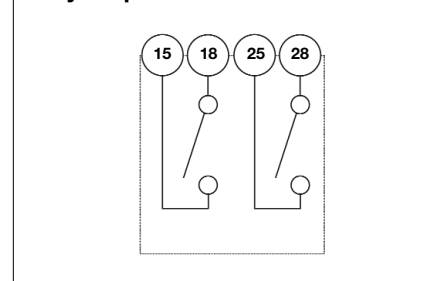
### Front view



### Measurement connection



### Relay outputs



## DMPUC-R2



- 2 PTC or PT100 or digital inputs
- 2 relay outputs
- Dimensions: 1-DIN module
- Protection degree: IP20
- Internal bus connecting main and additional modules
- 24 VDC  $\pm 20\%$  power supply input via internal bus

## LED Specification DMPUC-R2

LED Type	Dual color	Status and color	Communication and power supply OK. Communication error.
		Green fixed	
		Red fixed	

## Input Specification DMPUC-R2

<b>Digital inputs</b>		<b>Temperature</b>	
Number of inputs	Max 2 (no common reference), including the already used thermal inputs.	Input	Max 2, including the already used thermal inputs.
Working modes	Each input can be configured as a switch or as a toggle.	Temperature probe	PT100 or PTC (programmable via DMPUC-PS software).
Switch	When the input is activated the value is ON; when the input is deactivated the value is OFF.	Number of wires	2 or 3-wire connection.
Toggle	Each time the input goes from de-activate to activate the value changes state.	PT100	Detecting short-circuits ( $<15\Omega$ ) and wire breaking ( $>10k\Omega$ ).
Activation mode	Each input is programmable to be considered active when the contact is closed or when it is open when used as a switch, while only at pressure when used as a button.	Range	$-50^{\circ}$ to $+850^{\circ}\text{C}$
Type	Voltage free contact or PNP.	Resolution	$1^{\circ}\text{C}/^{\circ}\text{F}$
Contact reading voltage	3.3VDC	Accuracy	$\pm(0.5\%)\text{FS}$
Contact reading current	Max. 0.45mA	PTC (3 in series)	According to EN 60847-7-8
Contact resistance	$\leq 1k\Omega$ closed contact $\geq 20k\Omega$ open contact	PTC	Setpoint $3.1k\Omega$ , release $1.65k\Omega$ . Detecting short-circuits ( $<0.02k\Omega$ ) and wire breaking ( $>10k\Omega$ ).
NPN	$V_{\text{ON}} < 1\text{V}$ , $V_{\text{OFF}} > 2\text{V}$	Temperature drift	$<150$ ppm/ $^{\circ}\text{C}$ at $850^{\circ}\text{C}$ FS.
Acquisition time	$\leq 200\text{ms}$	Engineering unit	Selectable $^{\circ}\text{C}$ or $^{\circ}\text{F}$ by software (the same in all the temperature inputs).
Insulation	See the table "insulation between inputs and outputs".	Insulation	See table "insulation between inputs and outputs".

## Output Specification DMPUC-R2

### Digital output

Number of output

Type

AC1

AC15

DC12

2

SPST NO relay (NE or ND programmable by software).

5 AAC@250VAC

1 AAC@250VAC

5 ADC@30VDC

Function

Activation delay

Insulation

Programmable by software

<500ms

See the table "insulation between inputs and outputs".

## Power Supply Specification

### DMPUC-R2

Power supply

Power consumption

Self-power supplied through the communication bus.  
0.8W

## Connections

### DMPU-R2

Connection to main module

Input-output connection

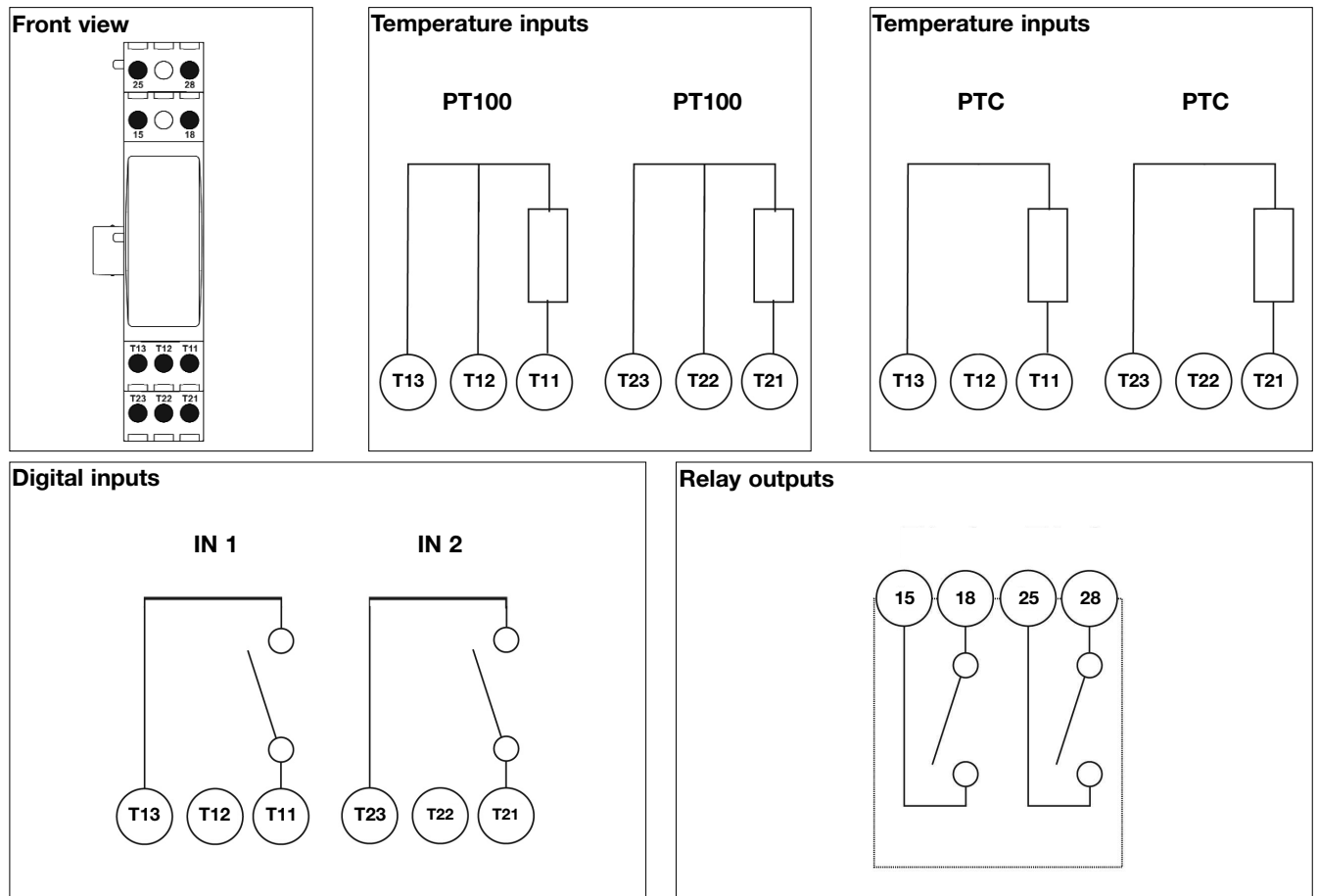
Screw tightening torque

By internal bus.

Screw-type, 4 x 1.5 mm<sup>2</sup> terminal blocks.

All outputs 0.4 Nm / 0.8 Nm (min./max.).

## Wiring Diagrams DMPUC-R2





## DMPUC-EL



- Core balance transformer input 1/250 to 1/1000 ratio
- 1 relay output dedicated to earth leakage alarm
- 3 digital inputs
- 0.03A to 30A set-point
- AC and A type protection (50/60Hz)
- Dimensions: 1-DIN module
- 24 VDC  $\pm 20\%$  power supply input via internal bus

## LED Specification DMPUC-EL

LED Type	Dual color	Status and color	Communication and power supply OK.
		Green fixed	
		Red fixed	Communication error.

## Input Specification DMPUC-EL

<b>Digital inputs</b>		<b>Earth current input</b>	
Number of inputs	Max 3 (no common reference).	Earth current set points	30mA, 50mA, 100mA, 300mA, 500mA, 1A, 3A, 5A, 10A, 30A.
Working modes	Each input can be configured as a switch or as a toggle.	External toroid CT ratio	From 250 to 1000
Switch	When the input is activated the value is ON; when the input is deactivated the value is OFF.	Input impedance	51 $\Omega$ (with C-C1 terminals); 1 $\Omega$ (with C-C2 terminals).
Toggle	Each time the input goes from de-activate to activate the value changes state.	System frequency	50Hz or 60Hz; measured by measurement module. If voltage measurement is not available it must be set via programming software.
Activation mode	Each input is programmable to be considered active when the contact is closed or when it is open when used as a switch, while only at pressure when used as a button.	Time of non-intervention	60 ms
Type	Voltage free contact or NPN.	Current overload	On terminals C-C1: 50mA On terminals C-C2: 430mA On terminals C-C1: 150mA On terminals C-C2: 1A
Contact reading voltage	3.3VDC	Continuous	
Contact reading current	Max. 2mA	For 1 s	
Contact resistance	$\leq 300k\Omega$ closed contact $\geq 10k\Omega$ open contact	Accuracy	Relevant to control function, serial communication data (@25°C $\pm$ 5° C R.H. $\leq 60\%$ , 48 to 62 Hz).
NPN	$V_{ON} < 1V$ , $V_{OFF} > 2V$	Earth leakage current	$\pm 2.5\%$ of the set-point
Acquisition time	$\leq 200ms$	Current resolution	0.1 $\mu A$ with C-C1 terminals, 0.01mA with C-C2 terminals.
Activation delay	$\leq 1s$		

## Output Specification DMPUC-EL

### Digital output

Number of output  
Type

AC1  
AC15  
DC12

1  
SPST NO relay (NE or ND programmable by software).  
5 AAC@250VAC  
1 AAC@250VAC  
5 ADC@30VDC

Function  
Activation delay  
Insulation

Programmable by software  
<0.150ms  
4kV against inputs and internal bus.

## Power Supply Specification

### DMPUC-EL

Power supply  
Power consumption

Self-power supplied through the communication bus.  
0.8W

## Connections

### DMPUC-EL

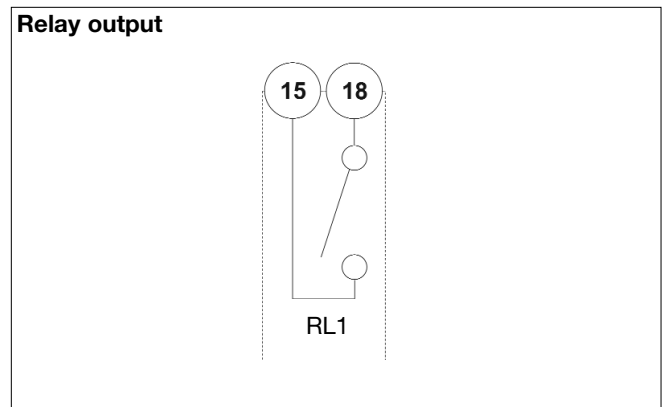
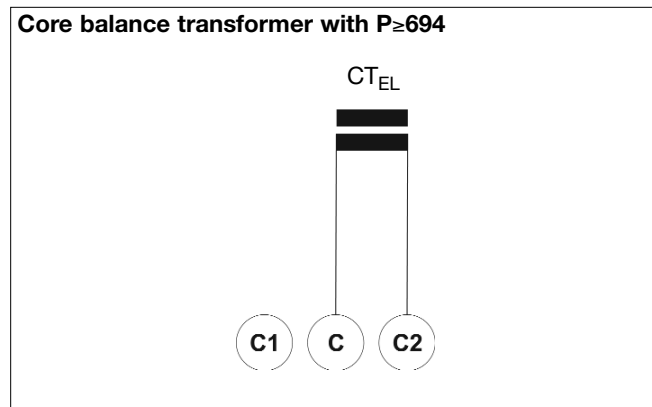
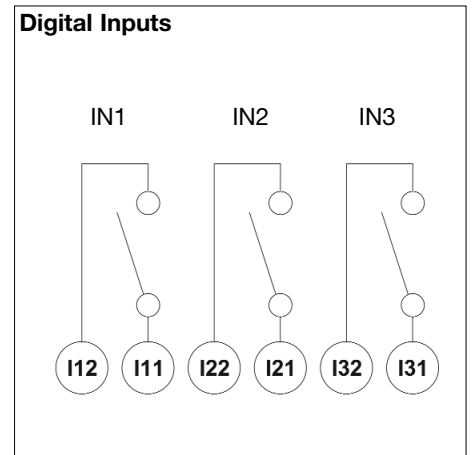
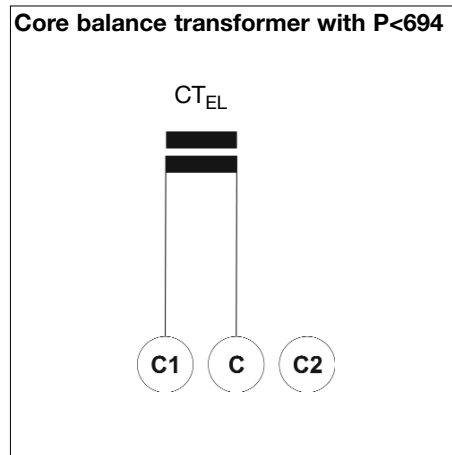
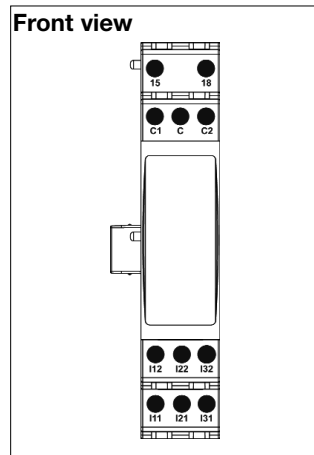
Connection to main module  
Input-output connection  
Screw tightening torque

By internal bus.  
Screw-type, 8 x 1.5 mm<sup>2</sup> terminal blocks.  
All outputs 0.4 Nm / 0.8 Nm (min./max.).

## Wiring Diagrams DMPUC-EL

The wiring diagram for core balance transformer depends on the earth leakage current setpoint ( $I_{SEL}$ ) and the transformer ratio ( $R_{CTEL}$ ); calculate the P value according of the following formula to define when to use the wiring diagram ( $P < 694$ ) or ( $P \geq 694$ ).

$$P = \frac{I_{SEL}}{R_{CTEL}} \times 5 \times 10^5$$



## General Specifications

<b>Operating temperature</b>	-25° to +55°C (-13°F to 131°F) (R.H. < 90% non-condensing @ 40°C).	<b>Standard compliance</b>	IEC60664, IEC61010-1 IEC60664, EN61010-1 EN62052, EN61000-6-2 EN60255-26, EN5002 IEC947 IEC60947-2 parts related to the tripping characteristic of DMPUC-EL output.
<b>Storage temperature</b>	-30° to +70°C (-22° to 140°F) (R.H. <90% non-condensing @ 40°C).	Safety	
<b>Installation category</b>	Cat. III (IEC60664, EN60664)	Thermal protection	CE, cUL (UL508) [UL up to 600 V], C-TIC.
<b>Insulation (for 1 minute)</b>	See the table "Insulation between inputs and outputs".	Earth leakage	
<b>EMC</b>	According to EN62052-11	<b>Approvals</b>	IP20
Electrostatic discharges	15kV air discharge.	<b>Housing</b>	
Immunity to irradiated	Test with current: 10V/m from 80 to 2000MHz.	Dimensions (WxHxD)	DMPUC-MBT 35.5 x 90 x 63.2 mm DMPUC-PRB 35.5 x 90 x 63.2 mm DMPUC-05 53.5 x 90 x 63.2 mm DMPUC-R2 17.5 x 90 x 63.2 mm DMPUC-EL 17.5 x 90 x 63.2 mm
Elettromagnetic fields	Test without current: 30V/m from 80 to 2000MHz.	Material	
Immunity to burst	On current and voltage measuring inputs circuit: 4kV.	Mounting	
Immunity to conducted disturbances	10V/m from 150kHz to 80MHz.	<b>Protection degree</b>	
Surge	On current and voltage measuring inputs circuit: 4kV.	<b>Weight</b>	
Radio frequency suppression	According to CISPR 22	DMPUC-MBT	(carton box included)
		DMPUC-PRB	Approx. 172g
		DMPUC-05	Approx. 176g
		DMPUC-R2	Approx. 280g
		DMPUC-EL	Approx. 119g
			Approx. 120g

## Insulation Between Inputs and Outputs

Module	Type of input/output	DMPUC-05			DMPUC-PRB/MBT					DMPUC-R2				
		Measuring Input	Internal bus	Relay	Power supply	RS485 port	Profibus	Ethernet	Digital Input/Temperature	Internal bus	Digital Input/Temperature	Relay	Internal bus	
DMPUC-05	Measuring input	-	2.7kV	4kV	2.7kV	2.7kV	2.7kV	2.7kV	2.7kV	2.7kV	2.7kV	4kV	2.7kV	
	Internal bus	2.7kV	-	4kV	0V	0.5V	0.5V	0.5V	0V	0V	0V	4kV	0V	
	Static output	4kV	4kV	-	4kV	4kV	4kV	4kV	4kV	4kV	4kV	4kV	4kV	
DMPUC-PRB/MBT	Power supply	2.7kV	0V	4kV	-	0.5V	0.5V	0.5V	0V	0V	0V	4kV	0V	
	RS485 port	2.7kV	0.5V	4kV	0.5V	-	0V	0.5V	0.5V	0.5V	0.5V	4kV	0.5V	
	Conn	Profibus	2.7kV	0.5V	4kV	0.5V	0V	-	-	0.5V	0.5V	0.5V	4kV	0.5V
		Ethernet	2.7kV	0.5V	4kV	0.5V	0.5V	-	-	0.5V	0.5V	0.5V	4kV	0.5V
	Digital Input/Temperature	2.7kV	0V	4kV	0V	0.5V	0.5V	0.5V	-	0V	0V	4kV	0V	
Internal bus	2.7kV	0V	4kV	0V	0.5V	0.5V	0.5V	0V	-	0V	4kV	0V		
DMPUC-R2	Digital Input/Temperature	2.7kV	0V	4kV	0V	0.5V	0.5V	0.5V	0V	0V	-	4kV	0V	
	Relay	4kV	4kV	4kV	4kV	4kV	4kV	4kV	4kV	4kV	4kV	-	4kV	
	Internal bus	2.7kV	0V	4kV	0V	0.5V	0.5V	0.5V	0V	0V	0V	4kV	-	

## Functions Description (cont.)

<b>Block management</b>		Each variable defined as "Block" in the table "Variable List" is associated with a monitoring variable function. This function defines the ON or OFF block status. Each block can be connected to each other if the function depends on other block status. The function parameters are set through the DPMU-PS software configuration. Up to 32 blocks defined as "Block status" are available.	ANSI64	Measures the vector sum of the three phase current (neutral isn't present). The sum is earth fault current.
			ANSI66 <sub>SH</sub>	Monitors that the number of starts during the last set time period is lower than max starts set point.
			ANSI66 <sub>MTBS</sub>	Monitors the time since previous start.
			ANSI66 <sub>MTFLS</sub>	Monitors the time since previous stop.
			ANSI64EL	Monitors if the earth leakage current is above the set-point during a set-point time.
<b>Monitoring functions</b>				
<b>Input</b>				
	Digital input	Monitors the contact or PTC status. Each input is programmable to be considered active when the contact is closed or when it is open when used as a switch, while only at pressure when used as a button.	ANSI48	Prevents the locked rotor condition at motor start by monitoring the current.
			ANSI51LR	Prevents the locked rotor condition during motor running by monitoring the current.
	Temperature input	Monitors the PT100 temperature. It is based on two set-point. 4 different configuration with under /over level (with hysteresis) or in/out window (without hysteresis) are available.	ANSI37	Monitors if any of the phase currents measured is below the set-point current during a set point time.
			ANSI27S	Monitors if any of the phase - phase voltages is too low during the set time.
			ANSI59	Monitors if any of the phase - phase voltage is too high during a set-point time.
	Istantaneous variables	Monitors the selected instantaneous variable. It is based on two set-point. 4 different function configuration with under /over level (with hysteresis) or in/out window (without hysteresis) are available.	ANSI47	Monitors if the phase sequence is L1-L2-L3 or L1-L3-L2.
			ANSI27D	Monitors if at least one phase - phase voltage drops below the 70% of mains voltage.
	ANSI functions		Counters/timers	Based on one set-point (in seconds with the timer, in counts with the counter). This function depends on other blocks status. Connect two blocks to start/increase the timer/counter and reset it.
	ANSI49	Allows to protect the motor against damage due to thermal effects wich take place in overload conditions, starting from current measurement. The protection function trips when motor heating, i.e. the heat quantity in the motor, (represented by the TCU parameter - Thermal Capacity Used) reaches 100% of the maximum one for that specific motor.	Internal counter	It is based on one set- point. The block status is activated when the internal counter goes above the set-point.
	ANSI46	Monitors inverse current which is one of the main causes of motor heating.	Output	
	ANSI50	Monitors if any of the phase currents measured is too high.	Relay output	This function depends on other blocks status. Connect one or more blocks to open / close the relay (the output is activated when at least one of the selected block status is activated). NE or ND programmable.

## Functions Description (cont.)

Latch reset	Internal output to reset all the active block status which have been set for latching. Each variable defined as "variable list" could be set for latching.	<b>Variable monitoring</b>	The software allows to monitor in real time the variables value or/and the used blocks status of the listed variables in the "Variable list" table (see the "Monitor" columns).
Logic functions	This function depends on other blocks status (up to 6). This block status depends on the state of up to 6 other blocks. This dependence is set through elementary logic functions (OR, AND and NOT).	<b>Label</b>	A label (defined by user) could be associated at each variable defined as "label" in the table "variable list".

## Data Logger Functions

<b>Data base logging</b>	
Available variables	See table "Variable List".
Max number of variables	Up to 20.
Memory capacity	Max 9999 data with date/hour reference based on FIFO storage.
Variable type	Average values on time windows.
Time window	Programmable, from 60s to 3600s.
<b>Fast data logger</b>	
Available variables	See table "Variable List".
Max number of variables	Up to 20
Memory capacity	Max 9999 data with progressive number based on STACK storage.
Variable type	Instantaneous values from the start event.
Time window	Fixed, 100 ms.
<b>Data event logging</b>	
Available variables	See table "Dataevent variable list"; each listed variable can be enabled or disabled for data-event storing.
Memory capacity	Max 9999 data with date/hour reference based on FIFO storage.
Trigger	By event.
Event timing resolution	<1s (if more than one event take place in 1s they are registered but the correct sequence isn't guaranteed).

## Data Event Variable List

Variables	Description
START	Start up Motor
RUN/STOP	Run/Stop Motor
ERR <sub>CONF</sub>	Module configuration Error
RST <sub>DB</sub>	Data base logging reset
RST <sub>FS</sub>	Fast data logger reset
RST <sub>EV</sub>	Data event logging reset
RST	Reset command (latch)
PW <sub>ON</sub>	Power OFF
PW <sub>OFF</sub>	Power ON
IN <sub>1</sub> to IN <sub>23</sub>	Digital input (23 available)
OUT <sub>1</sub> to OUT <sub>22</sub>	Relay outputs (22 available)
BLK <sub>1</sub> to BLK <sub>32</sub>	Used blocks status (32 available)

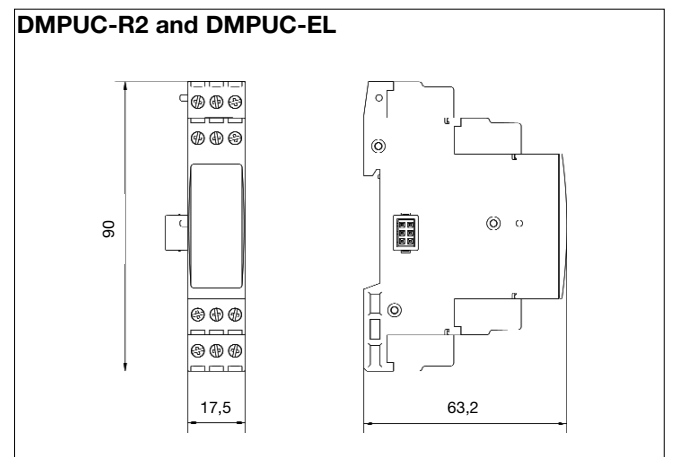
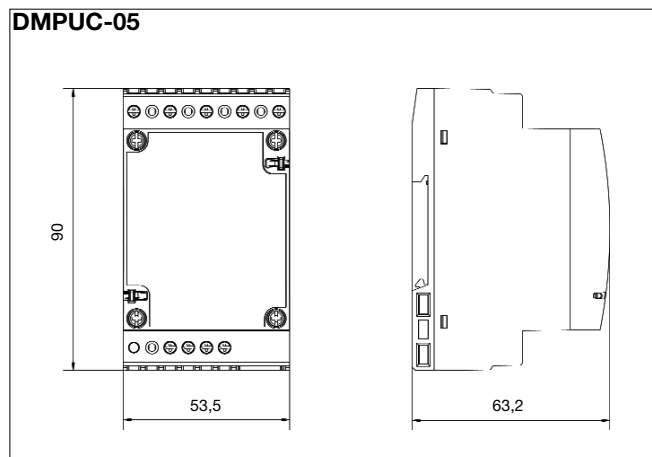
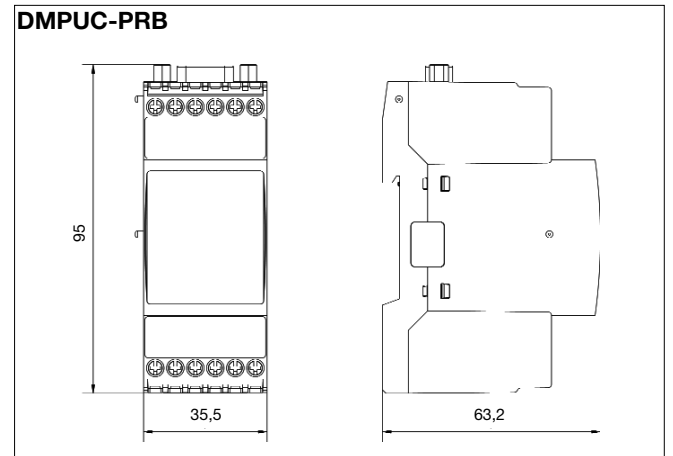
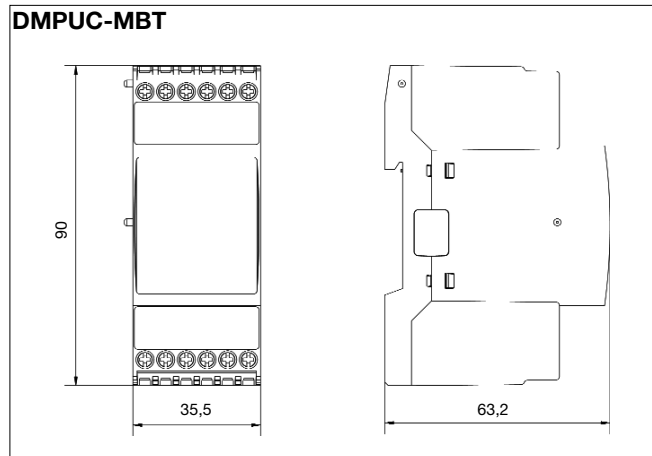
## Variable List

Variables	Block	Block status	Latch function	Label	Data logger functions	Monitor		Description
						Value	Block status	
<b>Inputs</b>								
IN <sub>1</sub> to IN <sub>23</sub>	✓	✓	✓	✓	✓	✓	✓	Digital input (up to 23 available)
TIN <sub>1</sub> to TIN <sub>23</sub>	✓	✓	✓	✓	✓	✓	✓	Temperature input (up to 23 available)
VIN <sub>1</sub> to VIN <sub>9</sub>	✓	✓	✓	✓	✓	✓	✓	Virtual digital input (up to 9 available)
<b>Istantaneous variable</b>								
V <sub>1-N</sub>	✓	✓	✓	✓	✓	✓	✓	L1-N voltage
V <sub>2-N</sub>	✓	✓	✓	✓	✓	✓	✓	L2-N voltage
V <sub>3-N</sub>	✓	✓	✓	✓	✓	✓	✓	L3-N voltage
V <sub>L-NΣ</sub>	✓	✓	✓	✓	✓	✓	✓	Average value of phase-neutral voltages
V <sub>1-2</sub>	✓	✓	✓	✓	✓	✓	✓	L1-L2 voltage
V <sub>2-3</sub>	✓	✓	✓	✓	✓	✓	✓	L2-L3 voltage
V <sub>3-1</sub>	✓	✓	✓	✓	✓	✓	✓	L3-L1 voltage
V <sub>L-LΣ</sub>	✓	✓	✓	✓	✓	✓	✓	Average value of phase-phase voltages
I <sub>1</sub>	✓	✓	✓	✓	✓	✓	✓	Phase 1 current
I <sub>2</sub>	✓	✓	✓	✓	✓	✓	✓	Phase 2 current
I <sub>3</sub>	✓	✓	✓	✓	✓	✓	✓	Phase 3 current
I <sub>Earth</sub>	✓	✓	✓	✓	✓	✓	✓	Calculated neutral current
W <sub>1</sub>	✓	✓	✓	✓	✓	✓	✓	Phase 1 active power
W <sub>2</sub>	✓	✓	✓	✓	✓	✓	✓	Phase 2 active power
W <sub>3</sub>	✓	✓	✓	✓	✓	✓	✓	Phase 3 active power
W <sub>TOT</sub>	✓	✓	✓	✓	✓	✓	✓	Total active power
VA <sub>1</sub>	✓	✓	✓	✓	✓	✓	✓	Phase 1 apparent power
VA <sub>2</sub>	✓	✓	✓	✓	✓	✓	✓	Phase 2 apparent power
VA <sub>3</sub>	✓	✓	✓	✓	✓	✓	✓	Phase 3 apparent power
VA <sub>TOT</sub>	✓	✓	✓	✓	✓	✓	✓	Total apparent power
VAR <sub>1</sub>	✓	✓	✓	✓	✓	✓	✓	Phase 1 reactive power
VAR <sub>2</sub>	✓	✓	✓	✓	✓	✓	✓	Phase 2 reactive power
VAR <sub>3</sub>	✓	✓	✓	✓	✓	✓	✓	Phase 3 reactive power
VAR <sub>TOT</sub>	✓	✓	✓	✓	✓	✓	✓	Total reactive power
PF <sub>1</sub>	✓	✓	✓	✓	✓	✓	✓	Phase 1 power factor
PF <sub>2</sub>	✓	✓	✓	✓	✓	✓	✓	Phase 2 power factor
PF <sub>3</sub>	✓	✓	✓	✓	✓	✓	✓	Phase 3 power factor
PF <sub>TOT</sub>	✓	✓	✓	✓	✓	✓	✓	Total power factor
HZ	✓	✓	✓	✓	✓	✓	✓	Frequency
AsyV <sub>L-N</sub>	✓	✓	✓	✓	✓	✓	✓	Asymmetry L-N%
AsyV <sub>L-L</sub>	✓	✓	✓	✓	✓	✓	✓	Asymmetry L-L%
PSQ	✓	✓	✓	✓	✓	✓	✓	Phase sequence
I <sub>IMB</sub>	✓	✓	✓	✓	✓	✓	✓	Current Imbalance
I <sub>+</sub>	✓	✓	✓	✓	✓	✓	✓	Positive Sequence Component of Motor Current
I <sub>-</sub>	✓	✓	✓	✓	✓	✓	✓	Negative Sequence Component of Motor Current
THD V <sub>1-N</sub>	✓	✓	✓	✓	✓	✓	✓	Total harmonic distortion of V <sub>1-N</sub>
THD V <sub>2-N</sub>	✓	✓	✓	✓	✓	✓	✓	Total harmonic distortion of V <sub>2-N</sub>
THD V <sub>3-N</sub>	✓	✓	✓	✓	✓	✓	✓	Total harmonic distortion of V <sub>3-N</sub>
THD V <sub>1-2</sub>	✓	✓	✓	✓	✓	✓	✓	Total harmonic distortion of V <sub>1-2</sub>
THD V <sub>2-3</sub>	✓	✓	✓	✓	✓	✓	✓	Total harmonic distortion of V <sub>2-3</sub>
THD V <sub>3-1</sub>	✓	✓	✓	✓	✓	✓	✓	Total harmonic distortion of V <sub>3-1</sub>

## Variable List

Variables	Block	Block status	Latch function	Label	Data logger functions	Monitor		Description
						Value	Block status	
THD I <sub>1</sub>	✓	✓	✓	✓	✓	✓	✓	Total harmonic distortion of I <sub>1</sub>
THD I <sub>2</sub>	✓	✓	✓	✓	✓	✓	✓	Total harmonic distortion of I <sub>2</sub>
THD I <sub>3</sub>	✓	✓	✓	✓	✓	✓	✓	Total harmonic distortion of I <sub>3</sub>
TCU	✓	✓	✓	✓	✓	✓	✓	Thermal Capacity Used [%]
<b>ANSI functions</b>								
ANSI 49	✓	✓	✓	✓	✓	●	✓	Thermal Image ANSI
ANSI 46	✓	✓	✓	✓	✓	●	✓	Max inverse sequence current ANSI
ANSI 50	✓	✓	✓	✓	✓	●	✓	Overcurrent ANSI
ANSI 64	✓	✓	✓	✓	✓	●	✓	Earth fault ANSI
ANSI 66 <sub>SH</sub>	✓	✓	✓	✓	✓	●	✓	Starts per hours ANSI
ANSI 66 <sub>MTBS</sub>	✓	✓	✓	✓	✓	●	✓	Minimum time between starts ANSI
ANSI 66 <sub>MTFLS</sub>	✓	✓	✓	✓	✓	●	✓	Minimum time from last stop ANSI
ANSI 64EL	✓	✓	✓	✓	✓	●	✓	Leakage current ANSI
ANSI 48	✓	✓	✓	✓	✓	●	✓	Locked rotor at start-up ANSI
ANSI 51LR	✓	✓	✓	✓	✓	●	✓	Stalled rotor ANSI
ANSI 37	✓	✓	✓	✓	✓	●	✓	Undercurrent ANSI
ANSI 27S	✓	✓	✓	✓	✓	●	✓	Undervoltage ANSI
ANSI 59	✓	✓	✓	✓	✓	●	✓	Overvoltage ANSI
ANSI 47	✓	✓	✓	✓	✓	●	✓	Phase sequence ANSI
ANSI 27D	✓	✓	✓	✓	✓	●	✓	Phase loss ANSI
<b>Counters/timers</b>								
CT <sub>1</sub>	✓	✓	✓	✓	✓	✓	✓	Counter #1
CT <sub>2</sub>	✓	✓	✓	✓	✓	✓	✓	Counter #2
TM <sub>1</sub>	✓	✓	✓	✓	✓	✓	✓	Timer #1
TM <sub>2</sub>	✓	✓	✓	✓	✓	✓	✓	Timer #2
<b>Internal counter</b>								
kWh <sub>TOT</sub>	●	●	●	●	●	✓	●	Active energy [kWh]
kVARh <sub>TOT</sub>	●	●	●	●	●	✓	●	Reactive energy [kVARh]
N <sub>S</sub>	●	●	●	●	✓	●	●	Number of Starts
N <sub>SH</sub>	✓	✓	✓	✓	✓	✓	✓	Starts per hour (ANSI 66)
T <sub>RTOT</sub>	●	●	●	●	✓	✓	●	Total running hours
T <sub>RPAR</sub>	●	●	●	●	✓	✓	●	Partial running hours
T <sub>BT</sub>	✓	✓	✓	✓	✓	✓	✓	Estimated time before trip (associated with ANSI 49)
T <sub>BR</sub>	✓	✓	✓	✓	✓	✓	✓	Estimated time before restart (associated with ANSI 66)
<b>Outputs</b>								
OUT <sub>1</sub> to OUT <sub>22</sub>	✓	●	●	✓	●	●	●	Relay outputs (up to 22 available)
TLC	✓	●	●	●	●	●	●	Latch reset
<b>Logic functions</b>								
TT <sub>1</sub> to TT <sub>9</sub>	✓	✓	✓	✓	✓	●	✓	6IN/10OUT Truth table (up to 9 available)

## Dimensions

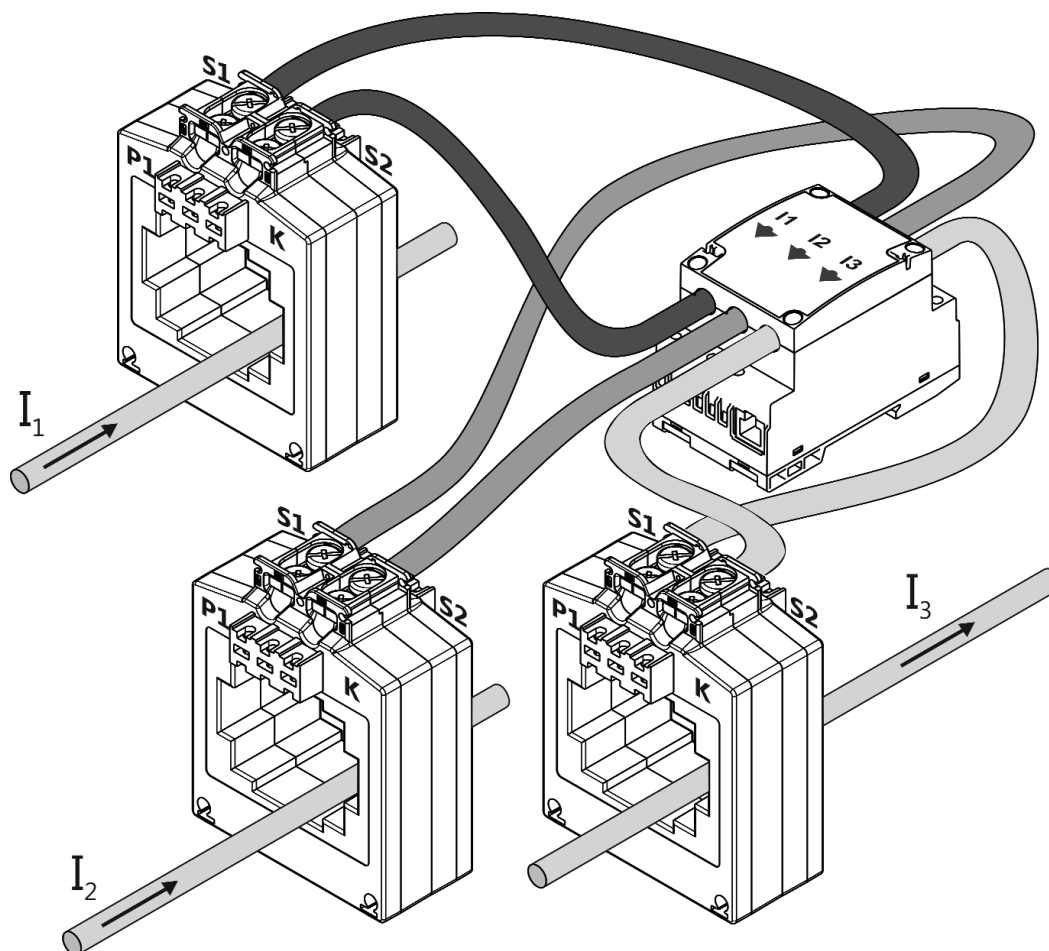




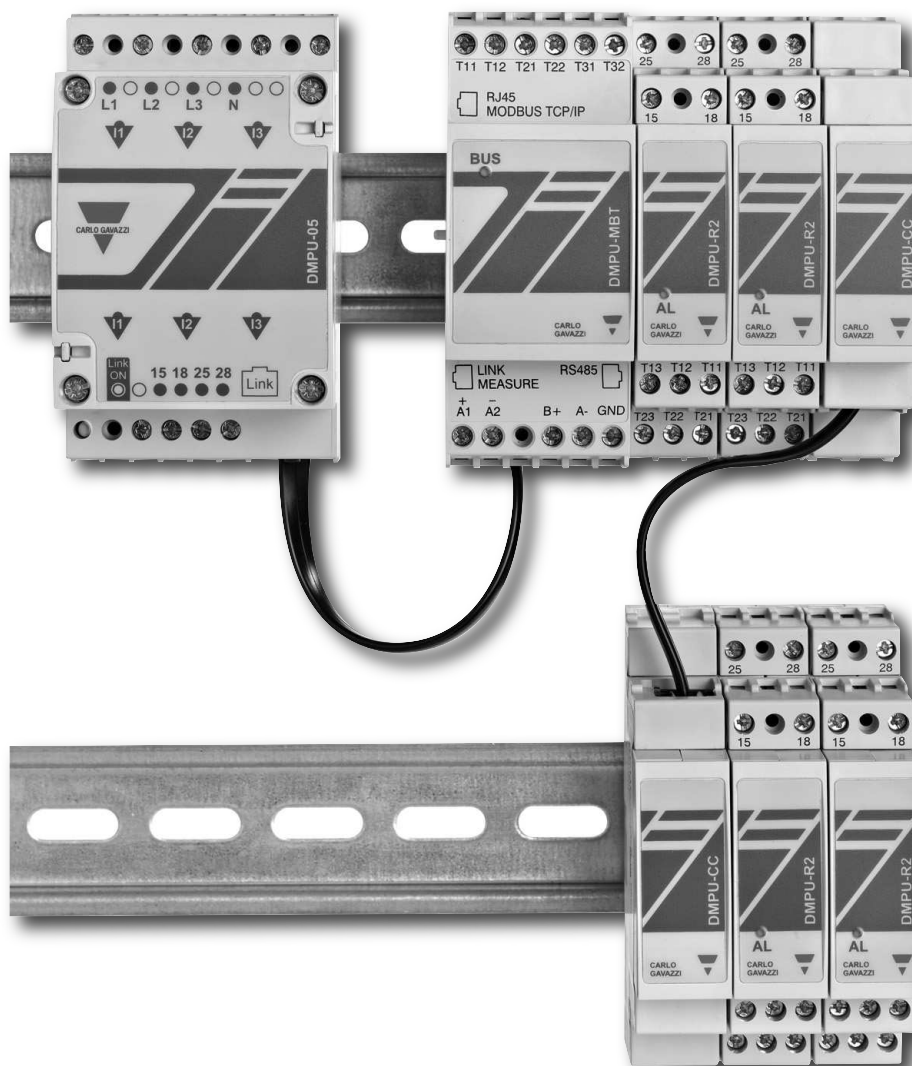
## Current Transformer Selection

Motor power [kW]	Items			
	@230V	@400V	@480V	@600V
1.5	CTD3X1505A	-	-	-
2.2	CTD3X1505A	-	-	-
3.7	CTD3X1505A	CTD3X1505A	CTD3X1505A	-
5.5	CTD3X1505A	CTD3X1505A	CTD3X1505A	CTD3X1505A
7.5	CTD3X2005A	CTD3X1505A	CTD3X1505A	CTD3X1505A
11	CTD3X2005A	CTD3X1505A	CTD3X1505A	CTD3X1505A
15	CTD3X4005A	CTD3X2005A	CTD3X1505A	CTD3X1505A
18.5	CTD3X5005A	CTD3X2505A	CTD3X2005A	CTD3X1505A
22	CTD3X6005A	CTD3X3005A	CTD3X2505A	CTD3X2005A
30	CTD3X7005A	CTD3X4005A	CTD3X3005A	CTD3X2505A
37	CTD3X10005A	CTD3X5005A	CTD3X4005A	CTD3X3005A
45	CTD3X12005A	CTD3X6005A	CTD3X5005A	CTD3X4005A
55	CTD4X15005A	CTD3X7005A	CTD3X6005A	CTD3X5005A
75	CTD8V20005A	CTD3X10005A	CTD3X7505A	CTD3X6005A
90	CTD8V25005A	CTD4X15005A	CTD3X10005A	CTD3X7505A
110	CTD8V30005A	CTD4X16005A	CTD4X15005A	CTD3X10005A

These current transformers are suggested according to the nominal and locked rotor currents; for particular needs see the other current transformer types provided by Carlo Gavazzi (eg. current transformers with different mounting or housing).



## Mounting and Positioning



Connect all module (except DMPUC-05) side by side according to the order defined while configuring the device. The first module must be DMPUC-MBT or DMPUC-PRB (main module). If it's used more than one DIN-rail use the internal bus adaptor DMPUC-CC to connect the different groups of modules.

## Accessories

Code	Description
<b>DMPUC-PS</b>	DMPUC-MBT/DMPUC-PRB programming software (included with DMPUC-CPC cable or downloadable from the WEB)
<b>DMPUC-HMI</b>	DMPUC programmable display interface
<b>DMPUC-PSHMI</b>	DMPUC-HMI programming software (included with DMPUC-PS software)
<b>DMPUC-CC</b>	DMPUC Adaptor to internal bus-to-RJ connector
<b>DMPUC-CPAN</b>	DMPUC cable for panel connector
<b>DMPUC-CPC</b>	DMPUC cable for PC connection (included with the DMPUC-PS software)