# Motor Controllers
# DMPUC, DIN-Rail
# Motor Protection Unit


**DMPUC**

- **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

DMPU 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 data-logger.
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

| | |
|---|---|
| **DMPUC-PRB** | Main module + Profibus. |
| **DMPUC-MBT** | Main module + Modbus TCP/IP. |
| **DMPUC-05** | Currents and voltages module (pass-through holes). |
| **DMPUC-65** | Currents and voltages module. |
| **DMPUC-R2** | I/O module. |
| **DMPUC-EL** | 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 ±20% power supply input**
- **Dimensions: 2-DIN module**
- **Protection degree: IP20**

## LED Specification DMPUC-MBT and DMPUC-PRB

| | |
|---|---|
| **LED** | |
| Type | Dual color |
| Status and color | |
| Green fixed | Communication and power supply ok. |
| Green flashing | Power supply ok, configuration error. |
| Red fixed | Communication error, internal bus. |

## Input Secification DMPUC-MBT and DMPUC-PRB

| | |
|---|---|
| **Digital inputs** | |
| Number of input | Max 3, (no common reference), including the already used thermal inputs. |
| Working modes | Each input can be configured as a switch or as a toggle. |
| Switch | When the input is activated the value is ON; when the input is deactivated the value is OFF. |
| Toggle | Each time the input goes from de-activate to activate the value chages state. |
| 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. |
| Type | Contact resistence or NPN. |
| Contact reading voltage | 3.3VDC |
| Contact reading current | Max. 0.45mA |
| Contact resistence | ≤ 1kΩ, closed contact; ≥ 20kΩ, open contact. |
| NPN | $V_{ON}$ <1V, $V_{OFF}$> 2V. |
| Acquisition time | ≤ 200ms. |
| Insulation | See the table “Insulation between inputs and outputs”. |

| | |
|---|---|
| **Temperature** | |
| Number of input | Max 3, including the already used thermal inputs. |
| Temperature probe | PT100 or PTC (programmable via DMPU-PS software). |
| Number of wires | 2-wire connection |
| PT100 | Detecting short-circuit (<15Ω) and wire braking (>10kΩ). |
| Range | -50° to +850° |
| Resolution | 1°C/°F |
| Accuracy | ±(0.5% FS) |
| PTC (3 in series) | According to EN 60947-7-8 |
| PTC | Setpoint 3.1 kΩ , release 1.65 kΩ, Detecting short-circuits (<0.02 kΩ) and wire breaking (>10kΩ). |
| Temperature drift | <150 ppm/°C at 850°C FS |
| Engineering unit | Selectable °C or °F by software (the same in all the temperature inputs). |
| Insulation | See the table “insulation between inputs and outputs”. |

## Communication Specification

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

## Power Supply Specification

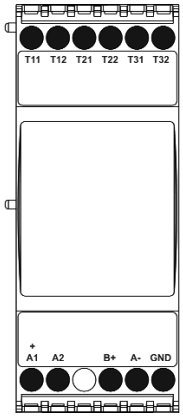
| | |
|---|---|
| **DMPUC-MBT and DMPUC-PRB** | |
| Power supply | 24VDC ± 20% from screw terminals. |
| Power consumption | 2W; startup peak current < 1.8A. |
| Suggested power supply | SPM3241 |

## Connections

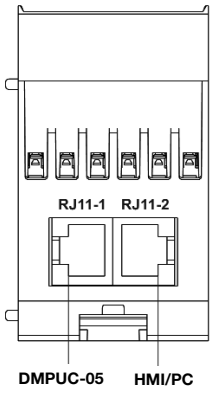
| | |
|---|---|
| **DMPUC-MBT and DMPUC-PRB** | |
| Power supply connections | Screw-type, 2 x 1.5 $mm^2$ terminal blocks. |
| Input connection | Screw-type, 6 x 1.5 $mm^2$ terminal blocks for 3 x P100/PTC (2 wires) or 3 digital inputs. |
| Communication connection RS485 | One port with two twins terminals: 1 x RJ11 (on the right of the bottom side) for PC connection and screw type 3x1.5 $mm^2$ Terminal box for DMPUC-HMI display connection. |
| Modbus TCP/IP | 1 x RJ45 (DMPUC-MBT) |
| Profibus | 1 x DB-9 (DMPUC-PRB) |
| Measurement module connection | 1 x RJ11 |
| Screw tightening torque | 0.4 Nm / 0.8 Nm (min./max.). |

## Wiring Diagrams DMPUC-MBT and DMPUC-PRB

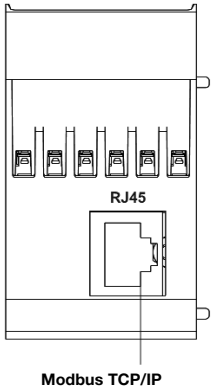
**Front view**



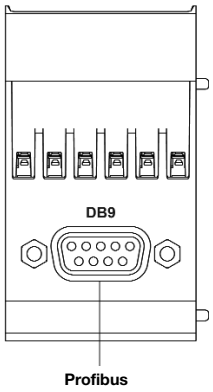

**Bottom view**



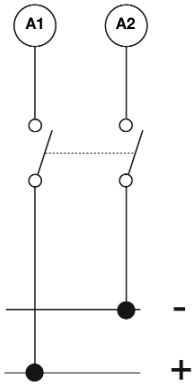

**Top view (DMPUC-MBT)**



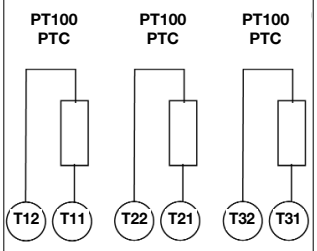

**Top view (DMPUC-PRB)**



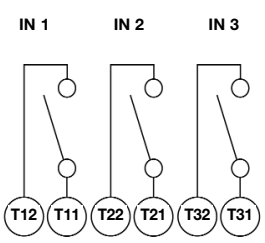

**Power supply**



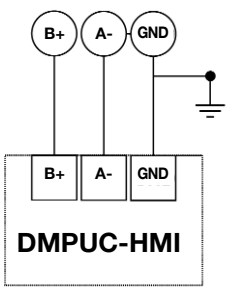

**Temperature inputs**




**Digital inputs**




**RS485 input**



## DMPUC-05 and DMPUC-65


- **Measures 3-phase current, 3-phase voltage with neutral**
- **RJ 11 connection to main module**
- **Pass-through version up to 5A or 65A**
- **2 relay outputs**
- **Split core housing for 5A version**
- **Dimensions: 3-DIN module**
- **Protection degree: IP20**

## Input Specification DMPUC-05 and DMPUC-65

| | | |
|---|---|---|
| **Measurement system** | | 3-phases (with or without neutral). Aron connection: only with DMPUC-05 and proper wiring. |
| **Working frequency** | | 45 to 65 Hz |
| **Current inputs** | | TRMS measurement of distorted waves. The sampling frequency is automatically calculated. |
| Connection type | (DMPUC-05) | 3-phase split-core pass-through. |
| | (DMPUC-65) | 3-phase pass-through |
| Current range | (DMPUC-05) | 100mA - 6A |
| | (DMPUC-65) | 600mA - 65A |
| Hole size | (DMPUC-05) | 9 mm |
| | (DMPUC-65) | 12 mm |
| Max selectable primary current | | CT programmable from 1 to 9999. |
| Harmonic distortion | | THD, up to 32nd harmonic. |
| **Voltage inputs** | | |
| Voltage range | | 3-phase, 100 to 690 VLL (±15%). |
| Max selectable voltage ratio | | VT programmable from 1 to 9999. |
| Neutral connetion | | Available |
| Harmonic distortion | | THD, up to 32nd harmonic. |
| Accuracy | | Relevant to control function, serial communication data (@25°C ±5°C, R.H. @60%, 48 to 62 Hz). |
| Current | | ±(0.5% FS) |
| Current resolution | | 0.2% FS |
| Phase-neutral voltage | | ±(0.5% FS) |
| Phase-phase voltage | | 1% FS |
| Voltage resolution | | 0.1% FS |
| Frequency | | ±0.1Hz (45 to 65Hz) |
| Active power | | ±(1% FS) |
| Active power resolution | | 0.5% FS |
| Power factor | | ±[0.002+1.5%(1.000 - "PF RDG")] |
| Reactive power | | ±(2% FS) |
| Reactive power resolution | | 1% FS |
| Harmonic distorsion | | ±1% FS (FS=100%) |
| Active Energy | | Class1 |
| Reactive Energy | | Class2 |
| Leakage current | | ±(1% FS) |
| Leakage current resolution | | 1mA |
| **Temperature drift** | | ≤ 200ppm/°C |
| **Sampling rate** | | 3200 samples/s @ 50Hz; 3840 samples/s @ 60Hz. |
| **Measurements refresh time** | | 100ms |
| **Measurements Method** | | TRMS |
| **Digital filter** | | |
| Filter operating range | | 0 to 99.9% of the input electrical scale |
| Filtering coefficient | | Filtering coefficient 1 to 255 |
| Filter action | | Display, alarm, analogue and serial outputs (all the variables). |
| **Crest factor** | | ≤ 3 |
| **Current overload** | | |
| Continuos | | |
| | DMPUC-05 | 6A |
| | DMPUC-65 | 65A |
| For 20s | | |
| | DMPUC-05 | 40A (accuracy 5%) |
| | DMPUC-65 | 400A (accuracy 5%) |
| For 500ms (DMPUC-05) | | 200A Max @50Hz |
| For 10ms (DMPUC-65) | | 1950A Max @50Hz |
| **Voltage overload** | | |
| Continuos | | 1.2 Un |
| For 500ms | | 2 Un |
| **Input impedance** | | |
| Volatge input | | > 1MΩ |

## Output Specification DMPUC-05 and DPMUC-65

| | |
|---|---|
| **Digital output** | |
| Number of outputs | 2 |
| Type | SPST NO relay (NE or ND programmable by software). |
| AC1 | 5AAC @ 250VAC |
| DC12 | 5ADC @ 24VDC |
| AC15 | 1.5AAC @ 250VDC |
| DC13 | 1.5ADC @ 24VDC |
| Function | Programmable by software |
| Activation delay | ≤100ms |
| Insulation | See the table “insulation between inputs and outputs”. |

## Power Supply Specification

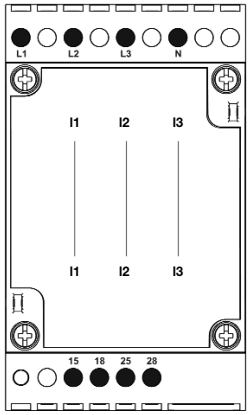
| | |
|---|---|
| **DMPUC-05 and DMPUC-65** | |
| Power supply | Self-power supplied through the communication bus. |
| Power consumption | 2W |

## Connections

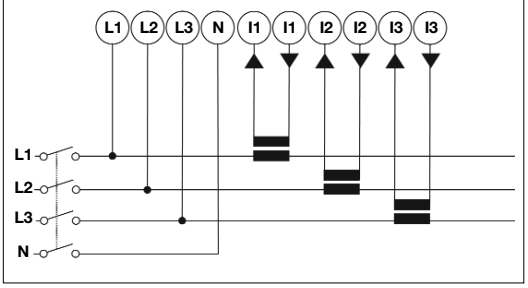
| | |
|---|---|
| **DMPUC-05 and DMPUC-65** | |
| Connection to main module | Supplied cable (60 cm), 1 x RJ11 for power supply and communication of measured data. |
| Output connection | Screw-type, 4 x 1.5 $mm^2$ terminal blocks. |
| Screw tightening torque | 0.4 Nm / 0.8 Nm (min./max.) |

## Wiring Diagrams DMPUC-05 and DMPUC-65

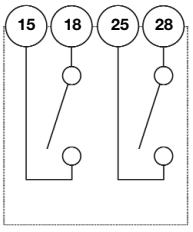
**Front view**




**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 ±20% power supply input via internal bus**

## LED Specification DMPUC-R2

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

## Input Specification DMPUC-R2

| | | | |
|---|---|---|---|
| **Digital inputs** | | **Temperature** | |
| 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 (<15Ω) and wire breaking (>10kΩ). |
| 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°C |
| | | Resolution | 1°C/°F |
| | | Accuracy | ±(0.5%FS) |
| | | PTC (3 in series) | According to EN 60847-7-8 |
| | | PTC | Setpoint 3.1kΩ, release 1.65kΩ. Detecting short-circuits (<0.02kΩ) and wire breaking (>10kΩ). |
| Type | Voltage free contact or PNP. | Temperature drift | <150 ppm/°C at 850°C FS. |
| Contact reading voltage | 3.3VDC | Engineering unit | Selectable °C or °F by software (the same in all the temperature inputs). |
| Contact reading current | Max. 0.45mA | Insulation | See table “insulation between inputs and outputs”. |
| Contact resistance | ≤1kΩ closed contact ≥20kΩ open contact | | |
| NPN | $V_{ON}$ <1V, $V_{OFF}$>2V | | |
| Acquisition time | ≤200ms | | |
| Insulation | See the table “insulation between inputs and outputs”. | | |

## Output Specification DMPUC-R2

| | |
|---|---|
| **Digital output** | |
| Number of output | 2 |
| Type | SPST NO relay (NE or ND programmable by software). |
| AC1 | 5 AAC@250VAC |
| AC15 | 1 AAC@250VAC |
| DC12 | 5 ADC@30VDC |
| Function | Programmable by software |
| Activation delay | <500ms |
| Insulation | See the table “insulation between inputs and outputs”. |

## Power Supply Specification

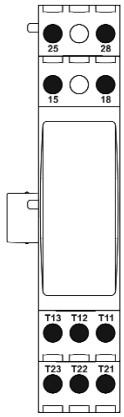
| | |
|---|---|
| **DMPUC-R2** | |
| Power supply | Self-power supplied through the communication bus. |
| Power consumption | 0.8W |

## Connections

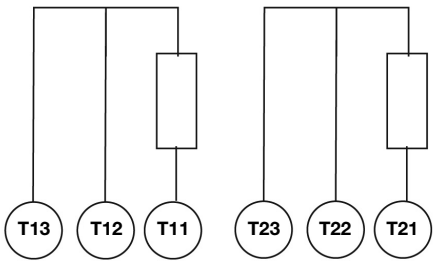
| | |
|---|---|
| **DMPU-R2** | |
| Connection to main module | By internal bus. |
| Input-output connection | Screw-type, 4 x 1.5 $mm^2$ terminal blocks. |
| Screw tightening torque | All outputs 0.4 Nm / 0.8 Nm (min./max.). |

## Wiring Diagrams DMPUC-R2

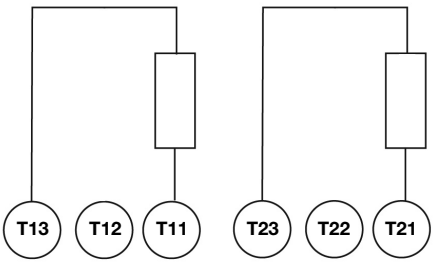
**Front view**



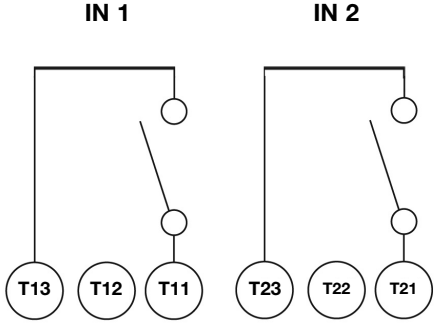

**Temperature inputs**



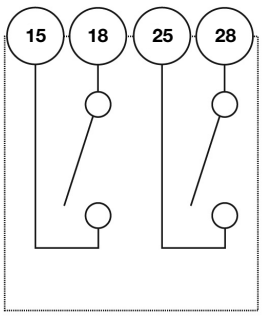

**Temperature inputs**




**Digital inputs**




**Relay outputs**



# 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 ±20% power supply input via internal bus**

## LED Specification DMPUC-EL

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

## Input Specification DMPUC-EL

| | |
|---|---|
| **Digital inputs** | |
| Number of inputs | Max 3 (no common reference). |
| Working modes | Each input can be configured as a switch or as a toggle. |
| Switch | When the input is activated the value is ON; when the input is deactivated the value is OFF. |
| Toggle | Each time the input goes from de-activate to activate the value changes state. |
| 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. |
| Type | Voltage free contact or NPN. |
| Contact reading voltage | 3.3VDC |
| Contact reading current | Max. 2mA |
| Contact resistance | ≤300kΩ closed contact<br>≥10kΩ open contact |
| NPN | $V_{ON}$ <1V, $V_{OFF}$>2V |
| Acquisition time | ≤200ms |
| Activation delay | ≤1s |

| | |
|---|---|
| **Earth current input** | |
| Earth current set points | 30mA, 50mA, 100mA, 300mA, 500mA, 1A, 3A, 5A, 10A, 30A. |
| External toroid CT ratio | From 250 to 1000 |
| Input impedance | 51Ω (with C-C1 terminals);<br>1Ω (with C-C2 terminals). |
| System frequency | 50Hz or 60Hz; measured by measurement module.<br>If voltage measurement is not available it must be set via programming software. |
| Time of non-intervention | 60 ms |
| Current overload | |
| Continuous | On terminals C-C1: 50mA<br>On terminals C-C2: 430mA |
| For 1 s | On terminals C-C1: 150mA<br>On terminals C-C2: 1A |
| Accuracy | Relevant to control function, serial communication data (@25°C ± 5° C R.H. ≤60%, 48 to 62 Hz). |
| Earth leakage current | ±2.5% of the set-point |
| Current resolution | 0.1uA with C-C1 terminals,<br>0.01mA with C-C2 terminals. |

## Output Specification DMPUC-EL

| | |
|---|---|
| **Digital output** | |
| Number of output | 1 |
| Type | SPST NO relay (NE or ND programmable by software). |
| AC1 | 5 AAC@250VAC |
| AC15 | 1 AAC@250VAC |
| DC12 | 5 ADC@30VDC |
| Function | Programmable by software |
| Activation delay | <0.150ms |
| Insulation | 4kV against inputs and internal bus. |

## Power Supply Specification

| | |
|---|---|
| **DMPUC-EL** | |
| Power supply | Self-power supplied through the communication bus. |
| Power consumption | 0.8W |

## Connections

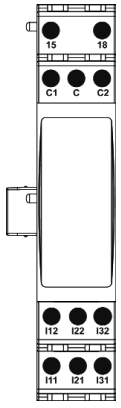
| | |
|---|---|
| **DMPUC-EL** | |
| Connection to main module | By internal bus. |
| Input-output connection | Screw-type, 8 x 1.5 $mm^2$ terminal blocks. |
| Screw tightening torque | All outputs 0.4 Nm / 0.8 Nm (min./max.). |

## Wiring Diagrams DMPUC-EL

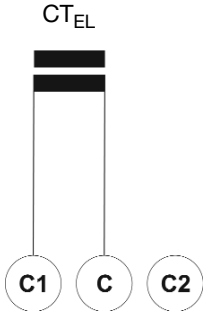
The wiring diagram for core balance transformer depends on the earth leakage curren setpoint ($I_{SEL}$) and the transformer ratio ($R_{CTEL}$); calculate the P value according of the following formula to define when to use the wiring diagram (P<694) or (P≥694).

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

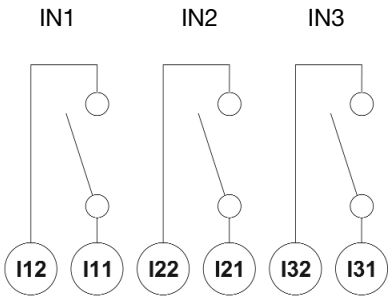
**Front view**



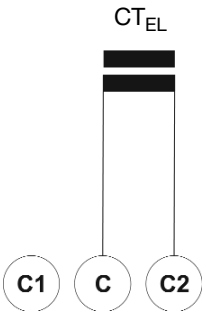

**Core balance transformer with P<694**



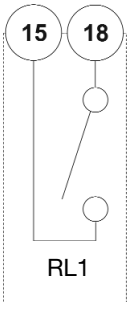

**Digital Inputs**




**Core balance transformer with P≥694**




**Relay output**



## General Specifications

| | |
|---|---|
| **Operating temperature** | -25° to +55°C (-13°F to 131°F) (R.H. < 90% non-condensing @ 40°C). |
| **Storage temperature** | -30° to +70°C (-22° to 140°F) (R.H. <90% non-condensig @ 40°C). |
| **Installation category** | Cat. III (IEC60664, EN60664) |
| **Insulation (for 1 minute)** | See the table "Insulation between inputs and outputs". |
| **EMC** | According to EN62052-11 |
| Electrostatic discharges | 15kV air discharge. |
| Immunity to irradiated Elettromagnetic fields | Test with current: 10V/m from 80 to 2000MHz. Test without current: 30V/m from 80 to 2000MHz. |
| Immunity to burst | On current and voltage measuring inputs circuit: 4kV. |
| Immunity to conducted disturbances | 10V/m from 150kHz to 80MHz. |
| Surge | On current and voltage measuring inputs circuit: 4kV. |
| Radio frequency suppression | According to CISPR 22 |

| | |
|---|---|
| **Standard compliance** | |
| Safety | IEC60664, IEC61010-1<br>IEC60664, EN61010-1<br>EN62052, EN61000-6-2<br>EN60255-26, EN5002 |
| Termal protection | IEC947 |
| Earth leakage | IEC60947-2 parts related to the tripping characteristic of DMPUC-EL output. |
| **Approvals** | CE, cUL (UL508)<br>[UL up to 600 V], C-TIC. |
| **Housing** | |
| 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-65 | 53.5 x 90 x 92 mm |
| DMPUC-R2 | 17.5 x 90 x 63.2 mm |
| DMPUC-EL | 17.5 x 90 x 63.2 mm |
| Material | Noryl, self-extinguishing: UL 94 V-0 |
| Mounting | DIN-rail |
| **Protection degree** | IP20 |
| **Weight** | (carton box included) |
| DMPUC-MBT | Approx. 172g |
| DMPUC-PRB | Approx. 176g |
| DMPUC-05 | Approx. 280g |
| DMPUC-65 | Approx. 350g |
| DMPUC-R2 | Approx. 119g |
| DMPUC-EL | Approx. 120g |

## Insulation Between Inputs and Outputs

| Module | | DMPUC-05 / 65 | | | DMPUC-PRB/MBT | | | | | | DMPUC-R2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Type of input/output | Measuring Input | Internal bus | Relay | Power supply | RS485 port | Profibus | Ethernet | Digital Input/Temperature | Internal bus | Digital Input/Temperature | Relay | Internal bus |
| DMPUC-05 / 65 | 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 | 0.5kV | 0.5kV | 0.5kV | 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 | - | 0.5kV | 0.5kV | 0.5kV | 0V | 0V | 0V | 4kV | 0V |
| | RS485 port | 2.7kV | 0.5kV | 4kV | 0.5kV | - | 0V | 0.5kV | 0.5kV | 0.5kV | 0.5kV | 4kV | 0.5kV |
| | Conn Profibus | 2.7kV | 0.5kV | 4kV | 0.5kV | 0V | - | - | 0.5kV | 0.5kV | 0.5kV | 4kV | 0.5kV |
| | Conn Ethernet | 2.7kV | 0.5kV | 4kV | 0.5kV | 0.5kV | - | - | 0.5kV | 0.5kV | 0.5kV | 4kV | 0.5kV |
| | Digital Input/Temperature | 2.7kV | 0V | 4kV | 0V | 0.5kV | 0.5kV | 0.5kV | - | 0V | 0V | 4kV | 0V |
| | Inernal bus | 2.7kV | 0V | 4kV | 0V | 0.5kV | 0.5kV | 0.5kV | 0V | - | 0V | 4kV | 0V |
| DMPUC-R2 | Digital Input/Temperature | 2.7kV | 0V | 4kV | 0V | 0.5kV | 0.5kV | 0.5kV | 0V | 0V | - | 4kV | 0V |
| | Relay | 4kV | 4kV | 4kV | 4kV | 4kV | 4kV | 4kV | 4kV | 4kV | 4kV | - | 4kV |
| | Internal bus | 2.7kV | 0V | 4kV | 0V | 0.5kV | 0.5kV | 0.5kV | 0V | 0V | 0V | 4kV | - |

CARLO GAVAZZI

## Functions Description (cont.)

| | | |
|---|---|---|
| **Block management** | | 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. |
| **Monitoring functions** | | |
| Input | | |
| | 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. |
| | 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. |
| 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. |
| ANSI functions | | |
| | 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. |
| | ANSI46 | Monitors inverse current which is one of the main causes of motor heating. |
| | ANSI50 | Monitors if any of the phase currents measured is too high. |
| | ANSI64 | Measures the vector sum of the three phase current (neutral isn't present). The sum is earth fault current. |
| | ANSI66$_{SH}$ | Monitors that the number of starts during the last set time period is lower than max starts set point. |
| | ANSI66$_{MTBS}$ | Monitors the time since previous start. |
| | ANSI66$_{MTFLS}$ | Monitors the time since previous stop. |
| | ANSI64EL | Monitors if the earth leakage current is above the set-point during a set-point time. |
| | 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. |
| | 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. |
| | 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. |
| 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. |
| Internal counter | | It is based on one set- point. The block status is activated when the internal counter goes above the set-point. |
| Output | | |
| | 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. |
| 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). |
| **Variable monitoring** | 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). |
| **Label** | A label (defined by user) could be associated at each variable defined as ”label” in the table “variable list”. |

## Data Logger Functions

| | |
|---|---|
| **Data base logging** | |
| 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. |
| **Fast data logger** | |
| 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. |
| **Data event logging** | |
| 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 correc sequence isn’t guaranteed). |

## Data Event Variable List

| Variables | Description |
|---|---|
| START | Start up Motor |
| RUN/STOP | Run/Stop Motor |
| $ERR_{CONF}$ | Module configuration Error |
| $RST_{DB}$ | Data base logging reset |
| $RST_{FS}$ | Fast data logger reset |
| $RST_{EV}$ | Data event logging reset |
| RST | Reset command (latch) |
| $PW_{ON}$ | Power OFF |
| $PW_{OFF}$ | Power ON |
| $IN_1$ to $IN_{23}$ | Digital input (23 available) |
| $OUT_1$ to $OUT_{22}$ | Relay outputs (22 available) |
| $BLK_1$ to $BLK_{32}$ | Used blocks status (32 available) |

CARLO GAVAZZI

# Variable List

| Variables | Block | Block status | Latch function | Label | Data logger functions | Monitor | | Description |
|---|---|---|---|---|---|---|---|---|
| | | | | | | Value | Block status | |
| **Inputs** | | | | | | | | |
| $IN_1$ to $IN_{23}$ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Digital input (up to 23 available) |
| $TIN_1$ to $TIN_{23}$ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Temperature input (up to 23 available) |
| $VIN_1$ to $VIN_9$ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Virtual digital input (up to 9 available) |
| **Istantaneous variable** | | | | | | | | |
| $V_{1-N}$ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | L1-N voltage |
| $V_{2-N}$ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | L2-N voltage |
| $V_{3-N}$ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | L3-N voltage |
| $V_{L-N}\Sigma$ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Average value of phase-neutral voltages |
| $V_{1-2}$ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | L1-L2 voltage |
| $V_{2-3}$ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | L2-L3 voltage |
| $V_{3-1}$ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | L3-L1 voltage |
| $V_{L-L}\Sigma$ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Average value of phase-phase voltages |
| $I_1$ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Phase 1 current |
| $I_2$ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Phase 2 current |
| $I_3$ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Phase 3 current |
| $I_{Earth}$ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Calculated neutral current |
| $W_1$ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Phase 1 active power |
| $W_2$ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Phase 2 active power |
| $W_3$ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Phase 3 active power |
| $W_{TOT}$ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Total active power |
| $VA_1$ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Phase 1 apparent power |
| $VA_2$ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Phase 2 apparent power |
| $VA_3$ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Phase 3 apparent power |
| $VA_{TOT}$ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Total apparent power |
| $VAR_1$ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Phase 1 reactive power |
| $VAR_2$ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Phase 2 reactive power |
| $VAR_3$ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Phase 3 reactive power |
| $VAR_{TOT}$ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Total reactive power |
| $PF_1$ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Phase 1 power factor |
| $PF_2$ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Phase 2 power factor |
| $PF_3$ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Phase 3 power factor |
| $PF_{TOT}$ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Total power factor |
| HZ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Frequency |
| $AsyV_{L-N}$ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Asymmetry L-N% |
| $AsyV_{L-L}$ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Asymmetry L-L% |
| PSQ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Phase sequence |
| $I_{IMB}$ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Current Imbalance |
| $I_+$ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Positive Sequence Component of Motor Current |
| $I_-$ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Negative Sequence Component of Motor Current |
| THD $V_{1-N}$ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Total harmonic distortion of $V_{1-N}$ |
| THD $V_{2-N}$ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Total harmonic distortion of $V_{2-N}$ |
| THD $V_{3-N}$ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Total harmonic distortion of $V_{3-N}$ |
| THD $V_{1-2}$ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Total harmonic distortion of $V_{1-2}$ |
| THD $V_{2-3}$ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Total harmonic distortion of $V_{2-3}$ |
| THD $V_{3-1}$ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Total harmonic distortion of $V_{3-1}$ |

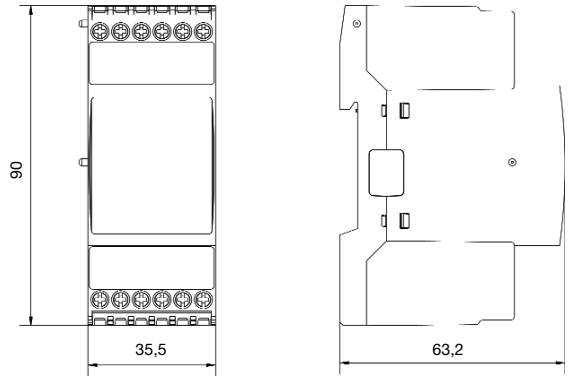
CARLO GAVAZZI

## Variable List

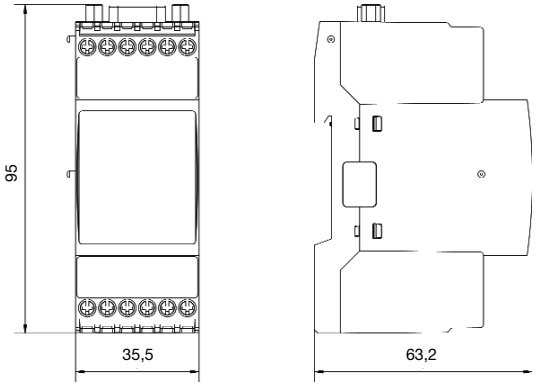
| Variables | Block | Block status | Latch function | Label | Data logger functions | Monitor | | Description |
|---|---|---|---|---|---|---|---|---|
| | | | | | | Value | Block status | |
| THD $I_1$ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Total harmonic distortion of $I_1$ |
| THD $I_2$ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Total harmonic distortion of $I_2$ |
| THD $I_3$ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Total harmonic distortion of $I_3$ |
| TCU | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Thermal Capacity Used [%] |
| **ANSI functions** | | | | | | | | |
| ANSI 49 | ✓ | ✓ | ✓ | ✓ | ✓ | ● | ✓ | Thermal Image ANSI |
| ANSI 46 | ✓ | ✓ | ✓ | ✓ | ✓ | ● | ✓ | Max inverse sequence current ANSI |
| ANSI 50 | ✓ | ✓ | ✓ | ✓ | ✓ | ● | ✓ | Overcurrent ANSI |
| ANSI 64 | ✓ | ✓ | ✓ | ✓ | ✓ | ● | ✓ | Earth fault ANSI |
| ANSI $66_{SH}$ | ✓ | ✓ | ✓ | ✓ | ✓ | ● | ✓ | Starts per hours ANSI |
| ANSI $66_{MTBS}$ | ✓ | ✓ | ✓ | ✓ | ✓ | ● | ✓ | Minimum time between starts ANSI |
| ANSI $66_{MTFLS}$ | ✓ | ✓ | ✓ | ✓ | ✓ | ● | ✓ | 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 |
| **Counters/timers** | | | | | | | | |
| $CT_1$ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Counter #1 |
| $CT_2$ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Counter #2 |
| $TM_1$ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Timer #1 |
| $TM_2$ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Timer #2 |
| **Internal counter** | | | | | | | | |
| $kWh_{TOT}$ | ● | ● | ● | ● | ● | ✓ | ● | Active energy [kWh] |
| $kVARh_{TOT}$ | ● | ● | ● | ● | ● | ✓ | ● | Reactive energy [kVARh] |
| $N_S$ | ● | ● | ● | ● | ✓ | ● | ● | Number of Starts |
| $N_{SH}$ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Starts per hour (ANSI 66) |
| $T_{RTOT}$ | ● | ● | ● | ● | ✓ | ✓ | ● | Total running hours |
| $T_{RPAR}$ | ● | ● | ● | ● | ✓ | ✓ | ● | Partial running hours |
| $T_{BT}$ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Estimated time before trip (associated with ANSI 49) |
| $T_{BR}$ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Estimated time before restart (associated with ANSI 66) |
| **Outputs** | | | | | | | | |
| $OUT_1$ to $OUT_{22}$ | ✓ | ● | ● | ✓ | ● | ● | ● | Relay outputs (up to 22 available) |
| TLC | ✓ | ● | ● | ● | ● | ● | ● | Latch reset |
| **Logic functions** | | | | | | | | |
| $TT_1$ to $TT_9$ | ✓ | ✓ | ✓ | ✓ | ✓ | ● | ✓ | 6IN/1OUT Truth table (up to 9 available) |

# Dimensions

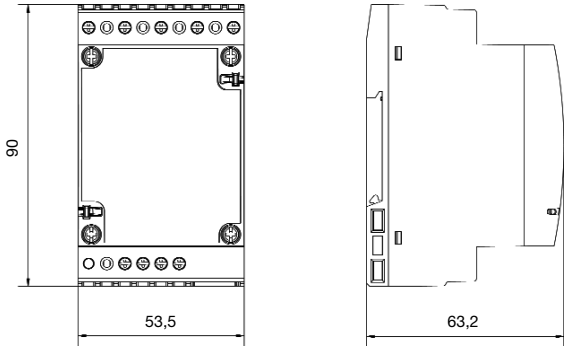
**DMPUC-MBT**



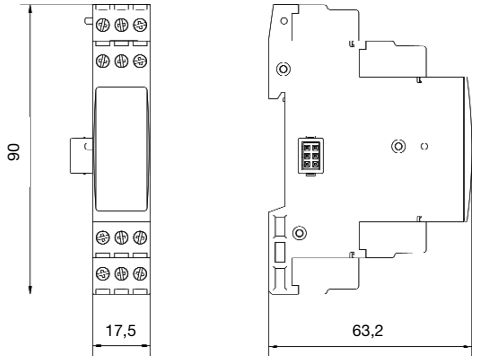

**DMPUC-PRB**



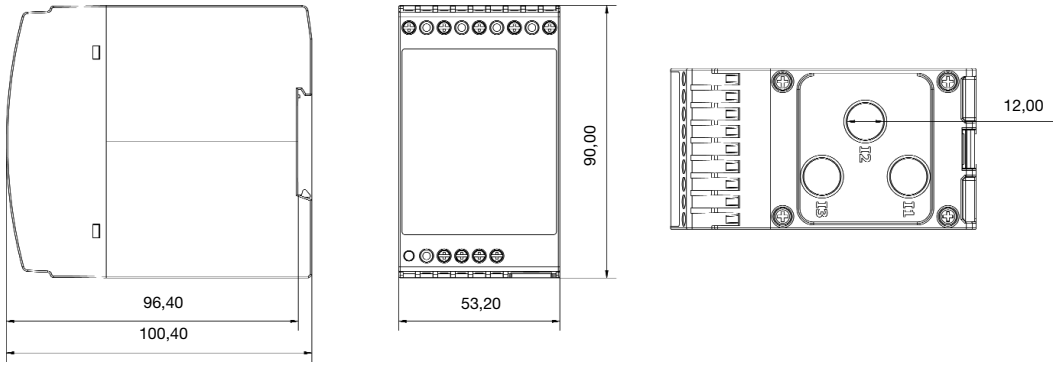

**DMPUC-05**




**DMPUC-R2 and DMPUC-EL**



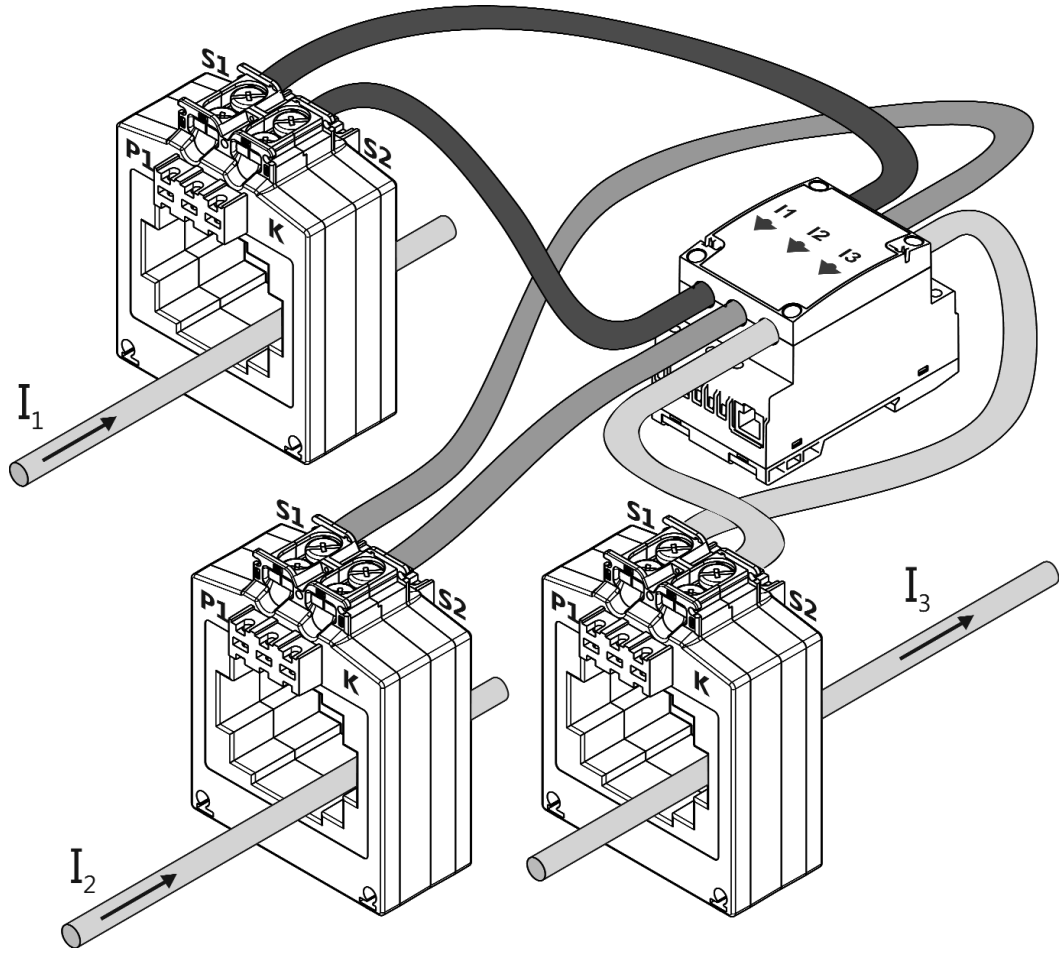

**DMPUC-65**



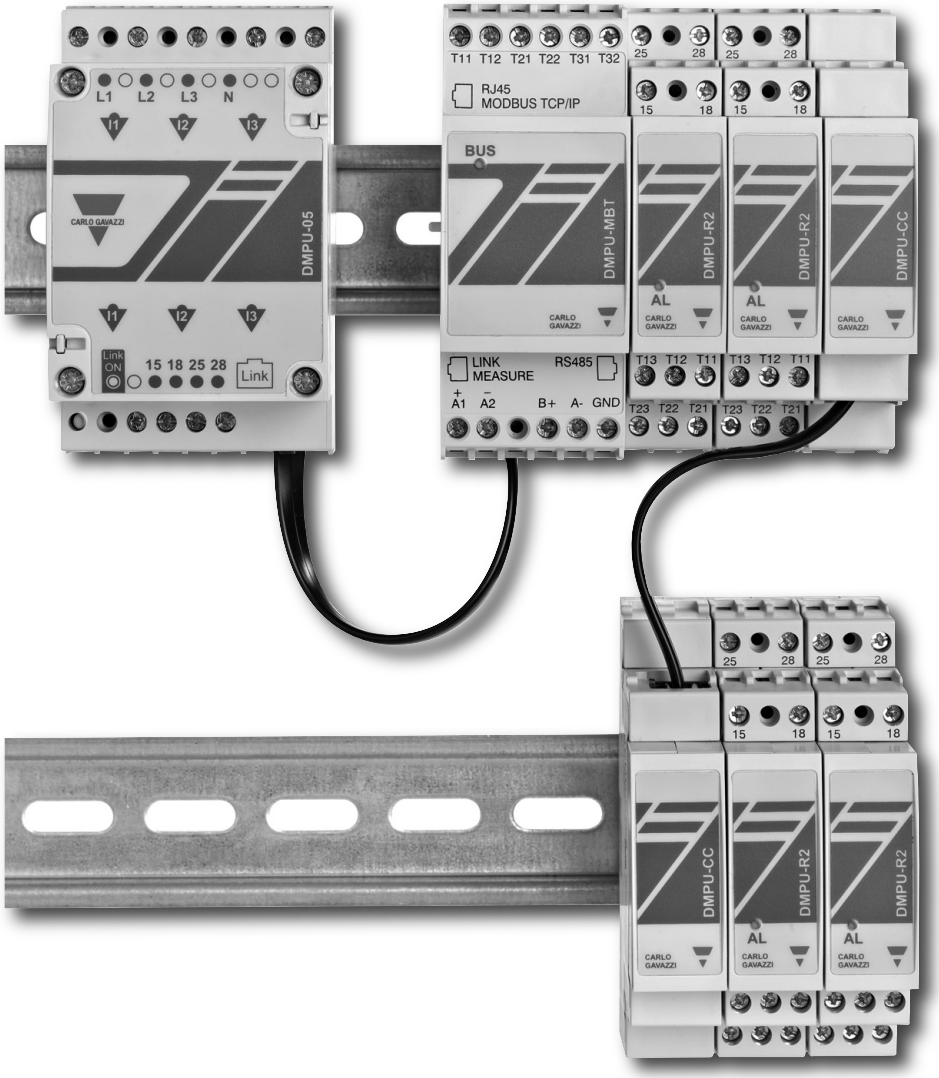
## Current Transformer Selection

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