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I681 GB 04 24

(GB) INTERFACE PROTECTION SYSTEM

Operating manual

PMVF52

WARNING!
- Carefully read the manual before the installation or use.
- This equipment is to be installed by qualified personnel, complying to current standards, to avoid damages or safety hazards.
- Before any maintenance operation on the device, remove all the voltages from measuring and supply inputs and short-circuit the CT input terminals.
- The manufacturer cannot be held responsible for electrical safety in case of improper use of the equipment.
- Products illustrated herein are subject to alteration and changes without prior notice. Technical data and descriptions in the documentation are accurate, to the best of our knowledge, but no liabilities for errors, omissions or contingencies arising there from are accepted.
- A circuit breaker must be included in the electrical installation of the building. It must be installed close by the equipment and within easy reach of the operator. It must be marked as the disconnecting device of the equipment: IEC/EN/BS 61010-1 § 6.11.3.1.
- Clean the device with a soft dry cloth; do not use abrasives, liquid detergents or solvents.

ATTENTION !
- Lire attentivement le manuel avant toute utilisation et installation.
- Ces appareils doivent être installés par un personnel qualifié, conformément aux normes en vigueur en matière d'installations, afin d'éviter de causer des dommages à des personnes ou choses.
- Avant toute intervention sur l'instrument, mettre les entrées de mesure et d'alimentation hors tension et court-circuiter les transformateurs de courant.
- Le constructeur n'assume aucune responsabilité quant à la sécurité électrique en cas d'utilisation impropre du dispositif.
- Les produits décrits dans ce document sont susceptibles d'évoluer ou de subir des modifications à n'importe quel moment. Les descriptions et caractéristiques techniques du catalogue ne peuvent donc avoir aucune valeur contractuelle.
- Un interrupteur ou disjoncteur doit être inclus dans l'installation électrique du bâtiment. Celui-ci doit se trouver tout près de l'appareil et l'opérateur doit pouvoir y accéder facilement. Il doit être marqué comme le dispositif d'interruption de l'appareil : IEC/EN/BS 61010-1 § 6.11.3.1.
- Nettoyer l'appareil avec un chiffon doux, ne pas utiliser de produits abrasifs, détergents liquides ou solvants.

ACHTUNG!
- Dieses Handbuch vor Gebrauch und Installation aufmerksam lesen.
- Zur Vermeidung von Personen- und Sachschäden dürfen diese Geräte nur von qualifiziertem Fachpersonal und unter Befolgung der einschlägigen Vorschriften installiert werden.
- Vor jedem Eingriff am Instrument die Spannungszufuhr zu den Messeingängen trennen und die Stromwandler kurzschließen.
- Bei zweckwidrigem Gebrauch der Vorrichtung übernimmt der Hersteller keine Haftung für die elektrische Sicherheit.
- Die in dieser Broschüre beschriebenen Produkte können jederzeit weiterentwickelt und geändert werden. Die im Katalog enthaltenen Beschreibungen und Daten sind daher unverbindlich und ohne Gewähr.
- In die elektrische Anlage des Gebäudes ist ein Ausschalter oder Trennschalter einzubauen. Dieser muss sich in unmittelbarer Nähe des Geräts befinden und vom Bediener leicht zugänglich sein. Er muss als Trennvorrichtung für das Gerät gekennzeichnet sein: IEC/EN/BS 61010-1 § 6.11.3.1.
- Das Gerät mit einem weichen Tuch reinigen, keine Scheuermittel, Flüssigreiniger oder Lösungsmittel verwenden.

ADVERTENCIA
- Leer atentamente el manual antes de instalar y utilizar el regulador.
- Este dispositivo debe ser instalado por personal cualificado conforme a la normativa de instalación vigente a fin de evitar daños personales o materiales.
- Antes de realizar cualquier operación en el dispositivo, desconectar la tensión de las entradas de alimentación y medida, y cortocircuitar los transformadores de corriente.
- El fabricante no se responsabilizará de la seguridad eléctrica en caso de que el dispositivo no se utilice de forma adecuada.
- Los productos descritos en este documento se pueden actualizar o modificar en cualquier momento. Por consiguiente, las descripciones y los datos técnicos aquí contenidos no tienen valor contractual.
- La instalación eléctrica del edificio debe disponer de un interruptor o disyuntor. Éste debe encontrarse cerca del dispositivo, en un lugar al que el usuario pueda acceder con facilidad. Además, debe llevar el mismo marcado que el interruptor del dispositivo (IEC/EN/BS 61010-1 § 6.11.3.1).
- Limpiar el dispositivo con un trapo suave; no utilizar productos abrasivos, detergentes líquidos ni disolventes.

UPOZORNĚNÍ
- Návod se pozorně pročtěte, než začnete regulátor instalovat a používat.
- Tato zařízení smí instalovat kvalifikovaní pracovníci v souladu s platnými předpisy a normami pro předcházení úrazů osob či poškození věcí.
- Před jakýmkoli zásahem do přístroje odpojte měřicí a napájecí vstupy od napětí a zkratujte transformátory proudu.
- Výrobce nenese odpovědnost za elektrickou bezpečnost v případě nevhodného používání regulátoru.
- Výrobky popsané v tomto dokumentu mohou kdykoli projít úpravami či dalším vývojem. Popisy a údaje uvedené v katalogu nemají proto žádnou smluvní hodnotu.
- Spínač či odpojovač je nutno zabudovat do elektrického rozvodu v budově. Musejí být nainstalované v těsné blízkosti přístroje a snadno dostupné pracovníku obsluhy. Je nutno ho označit jako vypínací zařízení přístroje: IEC/EN/BS 61010-1 § 6.11.3.1.
- Přístroj čistěte měkkou utěrkou, nepoužívejte abrazivní produkty, tekutá čistidla či rozpouštědla.

AVERTIZARE!
- Citiţi cu atenţie manualul înainte de instalare sau utilizare.
- Acest echipament va fi instalat de personal calificat, în conformitate cu standardele actuale, pentru a evita deteriorări sau pericolele.
- Înainte de efectuarea oricărei operaţiuni de întreţinere asupra dispozitivului, îndepărtaţi toate tensiunile de la intrările de măsurare şi de alimentare şi scurtcircuitaţi bornele de intrare CT.
- Producătorul nu poate fi considerat responsabil pentru siguranţa electrică în caz de utilizare incorectă a echipamentului.
- Produsele ilustrate în prezentul sunt supuse modificărilor şi schimbărilor fără notificare anterioară. Datele tehnice şi descrierile din documentaţie sunt precise, în măsura cunoştinţelor noastre, dar nu se acceptă nicio răspundere pentru erorile, omiterile sau evenimentele nepreväzute care apar ca urmare a acestora.
- Trebuie inclus un disjunctor în instalaţia electrică a clădirii. Acesta trebuie instalat aproape de echipament şi într-o zonă uşor accesibilă operatorului. Acesta trebuie marcat ca fiind dispozitivul de deconectare al echipamentului: IEC/EN/BS 61010-1 § 6.11.3.1.
- Curăţaţi instrumentul cu un material textil moale şi uscat; nu utilizaţi substanţe abrazive, detergenţi lichizi sau solvenţi.

ATTENZIONE!
- Leggere attentamente il manuale prima dell'utilizzo e l'installazione.
- Questi apparecchi devono essere installati da personale qualificato, nel rispetto delle vigenti normative impiantistiche, allo scopo di evitare danni a persone o cose.
- Prima di qualsiasi intervento sullo strumento, togliere tensione dagli ingressi di misura e di alimentazione e cortocircuitare i trasformatori di corrente.
- Il costruttore non si assume responsabilità in merito alla sicurezza elettrica in caso di utilizzo improprio del dispositivo.
- I prodotti descritti in questo documento sono suscettibili in qualsiasi momento di evoluzioni o di modifiche. Le descrizioni ed i dati a catalogo non possono pertanto avere alcun valore contrattuale.
- Un interruttore o disgiuntore va compreso nell'impianto elettrico dell'edificio. Esso deve trovarsi in stretta vicinanza dell'apparecchio ed essere facilmente raggiungibile da parte dell'operatore. Deve essere marchiato come il dispositivo di interruzione dell'apparecchio: IEC/EN/BS 61010-1 § 6.11.3.1.
- Pulire l'apparecchio con panno morbido, non usare prodotti abrasivi, detergenti liquidi o solventi.

UWAGA!
- Przed użyciem i instalacją urządzenia należy uważnie przeczytać niniejszą instrukcję.
- W celu uniknięcia obrażeń osób lub uszkodzenia mienia tego typu urządzenia muszą być instalowane przez wykwalifikowany personel, zgodnie z obowiązującymi przepisami.
- Przed rozpoczęciem jakichkolwiek prac na urządzeniu należy odłączyć napięcie od wejść pomiarowych i zasilania oraz zewrzeć zaciski przekładnika prądowego.
- Producent nie przyjmuje na siebie odpowiedzialności za bezpieczeństwo elektryczne w przypadku niewłaściwego użytkowania urządzenia.
- Produkty opisane w niniejszym dokumencie mogą być w każdej chwili udoskonalone lub zmodyfikowane. Opisy oraz dane katalogowe nie mogą mieć w związku z tym żadnej wartości umownej.
- W instalacji elektrycznej budynku należy uwzględnić przełącznik lub wyłącznik automatyczny. Powinien on znajdować się w bliskim sąsiedztwie urządzenia i być łatwo osiągalny przez operatora. Musi być oznaczony jako urządzenie służące do wyłączania urządzenia: IEC/EN/BS 61010-1 § 6.11.3.1.
- Urządzenie należy czyścić miękką szmatką, nie stosować środkow ściernych, płynnych detergentow lub rozpuszczalnikow.

警告！
- 安装或使用前，请仔细阅读本手册。
- 本设备只能由合格人员根据现行标准进行安装，以避免造成损坏或安全危害。
- 对设备进行任何维护操作前，请移除测量输入端和电源输入端的所有电压，并短接 CT 输入端。
- 制造商不负责因设备使用不当导致的电气安全问题。
- 此处说明的产品可能会有变更，恕不提前通知。我们竭力确保本文档中技术数据和说明的准确性，但对于错误、遗漏或由此产生的意外事件概不负责。
- 建筑电气系统中必须装有断路器。断路器必须安装在靠近设备且方便操作员触及的地方。必须将断路器标记为设备的断开装置：IEC/EN 61010-1 § 6.11.3.1
- 请使用柔软的干布清洁设备；切勿使用研磨剂、洗涤液或溶剂。

ПРЕДУПРЕЖДЕНИЕ!
- Прежде чем приступать к монтажу или эксплуатации устройства, внимательно ознакомьтесь с одержанием настоящего руководства.
- Во избежание травм или материального ущерба монтаж должен существляться только квалифицированным персоналом в соответствии с действующими нормативами.
- Перед проведением любых работ по техническому обслуживанию устройства необходимо обесточить все измерительные и питающие входные контакты, а также замкнуть накоротко входные контакты трансформатора тока (TT).
- Производитель не несет ответственность за обеспечение электробезопасности в случае ненадлежащего использования устройства.
- Изделия, описанные в настоящем документе, в любой момент могут подвергнуться изменениям или усовершенствованиям. Поэтому каталожные данные и описания не могут рассматриваться как действительные с точки зрения контрактов
- Электрическая сеть здания должна быть оснащена автоматическим выключателем, который должен быть расположен вблизи оборудования в пределах доступа оператора. Автоматический выключатель должен быть промаркирован как отключающее устройство оборудования: IEC/EN/BS 61010-1 § 6.11.3.1.
- Очистку устройства производить с помощью мягкой сухой ткани, без применения абразивных материалов, жидких моющих средств или растворителей.

DİKKAT!
- Montaj ve kullanımdan önce bu el kitabını dikkatlice okuyunuz.
- Bu aparatlar kişilere veya nesnelere zarar verme ihtimaline karşı yürürlükte olan sistem kurma normlarına göre kalifiye personel tarafından monte edilmelidirler
- Aparata (cihaz) herhangi bir müdahalede bulunmadan önce ölçüm girişlerindeki gerilimi kesip akım transformatörlerinede kısa devre yaptırınız.
- Üretici aparatın hatalı kullanımından kaynaklanan elektriksel güvenliğe ait sorumluluk kabul etmez.
- Bu doküманda tarif edilen ürünler her an evrimlere veya değişimlere açıktır. Bu sebeple katalogdaki tarif ve değerler herhangi bir bağlayıcı değeri haiz değildir.
- Binanın elektrik sisteminde bir anahtar veya şalter bulunmalıdır. Bu anahtar veya şalter operatörün kolaylıkla ulaşabileceği yakın bir yerde olmalıdır. Aparatı (cihaz) devreden çıkartma görevi yapan bu anahtar veya şalterin markası: IEC/EN/BS 61010-1 § 6.11.3.1.
- Aparatı (cihaz) sıvı deterjan veya solvent kullanarak yumuşak bir bez ile siliniz aşındırıcı temizlik ürünleri kullanmayınız.

UPOZORENJE!
- Prije instalacije ili korištenja uređaja, pažljivo pročitajte upute.
- Ovaj uređaj mora instalirati, u skladu s važećim normama, obučena osoba kako bi se izbjegle štete ili sigurnosne opasnosti.
- Prije bilo kakvog zahvata na uređaju otpojite napajanje s mjernih i napajajućih ulaza i kratko spojite ulazne stezaljke strujnog transformatora.
- Proizvođač ne snosi odgovornost za električnu sigurnost u slučaju nepravilnog korištenja opreme.
- Ovdje prikazan uređaj predmet je stalnog usavršavanja i promjena bez prethodne najave. Tehnički podaci i opisi u ovim uputama su točni, ali ne preuzimamo odgovornost za možebitne nenamjerne greške.
- U električnu instalaciju zgrade mora biti instaliran prekidač. On mora biti instaliran blizu uređaja i na dohvat ruke operatera, te označen kao rastavljač u skladu s normom IEC/EN/BS 61010-1 § 6.11.3.1
- Uređaj čistite s mekom, suhom krpom bez primjene abraziva, tekućina, otapala ili deterdženta.

CONTENTS

INTRODUCTION

The PMVF52 equipment has been designed as an Interface Protection System (SPI) in accordance with the CEI 0-21 standard.
It can be applied to all LV micro-generation systems (photovoltaic, wind) where it is used to control the Interface Switch (IS) between generation system and public grid.
In the event of problems on the grid (e.g. due to maintenance), the system intervenes in a timely fashion, opening the Interface Switch (e.g. contactor) and isolating the generation system.
In the event of Interface Switch (IS) failure, it can also control a backup device to disconnect the generation system in any case.
The equipment features 5 digital inputs permitting the connection of the system to the signals provided by the network operator to meet the requirements of the current regulations.
The functions implemented and the possibility of further expansion ensure that it is prepared for any developments to the protection system.
The PMVF52 equipment is supplied already programmed and assembled. With the factory settings, once the connections have been made, it is already ready for operation in compliance with the requirements of the CEI without requiring any further settings to be made. It is nevertheless prepared for any future changes to the operating parameters. Changes to the settings are password protected, preventing tampering by unauthorised personnel.

DESCRIPTION

- Modular construction for DIN rail, 4 units.
- LCD graphic 128x80 pixel, backlit, 4 grey levels.
- 4 display and setting buttons.
- Voltage measuring inputs three-phase + neutral.
- Possibility of operation in the following line configurations:
  - three-phase with neutral, VL-L voltage controls (default)
  - three-phase with neutral, VL-N voltage controls
  - three-phase without neutral, VL-L voltage controls
  - single-phase, VL-N voltage control.
- 2 switching-relay outputs and 1NO output (OUT3) to control:
  - OUT1: IS (Interface Switch) coil control
  - OUT2: Backup device control
  - OUT3: Global alarm (programmable).
- 5 contact digital inputs for:
  - INP1: IS feedback input (auxiliary closure indication contact)
  - INP2: local control input
  - INP3: remote frequency threshold selection input (external signal)
  - INP4: remote tripping control input
  - INP5: programmable (default OFF).
- Settings lock via 2-level changeable password.
- Setup for future installation of IEC/EN/BS 61850 interface module.
- Possibility to have 2 multifunction programmable outputs (OUT4 and OUT5) and 2 multifunction programmable inputs (INP6 and INP7) on additional EXM1001 expansion module.

TRIP THRESHOLDS

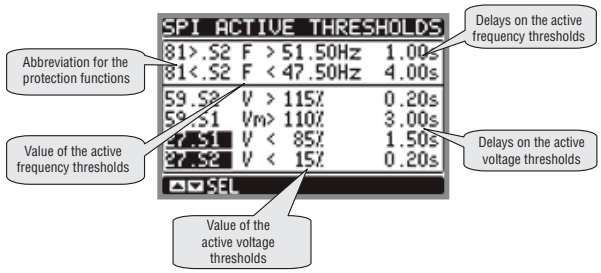
- Below are the voltage and frequency trip thresholds for which the equipment is Setup according to the factory defaults, which correspond to the default requirements of the CEI 0-21 standard.

Voltage measurement type	Voltage threshold	Default	Type	Trip	Trip delay	Default
INSTANTANEOUS	V > 59.S2	V > 115%	MAX	YES	DEL 59.S2	0.20s
MOVING AVERAGE 10min	Vmed > 59.S1	Vmed > 110%	MAX	YES	DEL 59.S1	3.00s
INSTANTANEOUS	27.S1 <= V <= 59.S1	85% <= V <= 110%	OK	NO	--	--
INSTANTANEOUS	27.S2 <= V < 27.S1	15% <= V < 85%	MIN	YES	DEL 27.S1	1.50s
INSTANTANEOUS	V < 27.S2	V < 15%	MIN	YES	DEL 27.S2	0.20s

- The frequency thresholds and corresponding delays may vary in accordance with the state of the input signals named Local Control and External Signal.
- A condition with both signals OFF is not envisaged/defined. Should it occur, the equipment will provide an alarm indication.
- The table indicating trip thresholds and times in the conditions envisaged follows:

External signal (INP3)	Local Control (INP2)	MIN F threshold	Default	MIN F delay	Default	MAX F threshold	Default	MAX F delay	Default
ON	OFF	81<.S2	47.50Hz	DEL C MIN F	0.10s	81>.S2	51.50Hz	DEL C MAX F	0.10s
OFF	ON	81<.S2	47.50Hz	DEL L MIN F	4.00s	81>.S2	51.50Hz	DEL L MAX F	1.00s
ON	ON	81<.S1	49.80Hz	DEL C MIN F	0.10s	81>.S1	50.20Hz	DEL C MAX F	0.10s

– The thresholds used during SPI operation and the corresponding delays are displayed in a dedicated video page:



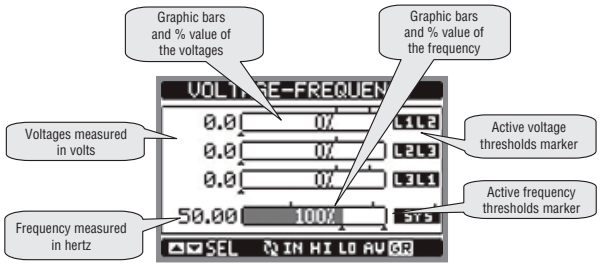
Note: for field testing of the thresholds via relay test kit, an Application Notes document has been drawn up containing useful information and suggestions for system installers and inspectors. The document can be requested from our Technical support (Tel. + 39 035 4282422; E-mail: service@LovatoElectric.com).

FRONT BUTTON FUNCTIONS

MENU button - Used to enter or exit the various display and Setup menus.
Buttons ▲ and ▼ - Used to scroll between screens, select from available options on the display and change (increase/decrease) settings.
Button ✔ - Used to scroll sub-pages, confirm selected options and switch between display modes.

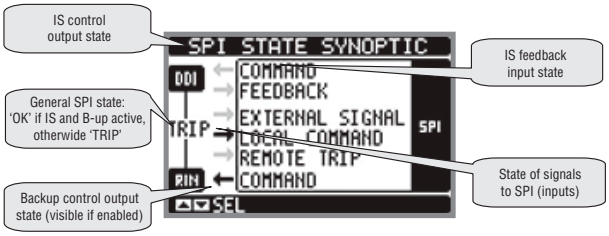
DISPLAYING MEASUREMENTS

– The ▲ and ▼ buttons allow the measurement display pages to be scrolled one at a time. The current page is shown on the title bar.
– The first page displayed (main page) contains all the most important information in both numerical and graphical form. The limit thresholds are indicated by a small marker above the graphic bar, while the arrows under the graphic bar indicate the measurement range (HI – LO).



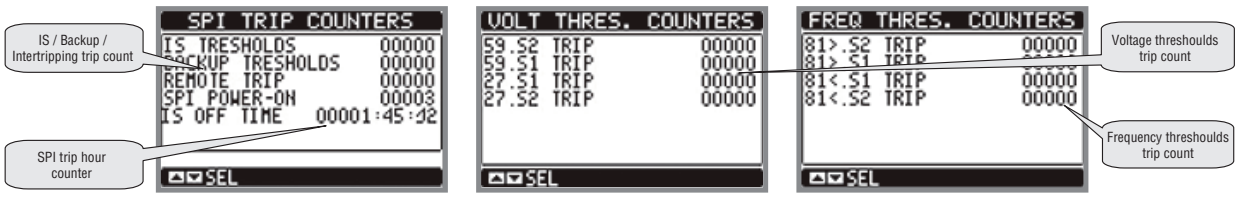
Example of main page

– The next page displays an overview of the state of the Interface Protection System, showing both the state of the outputs to the IS and backup and the state of the control inputs. The black arrows indicate an active state, the grey ones an inactive state.

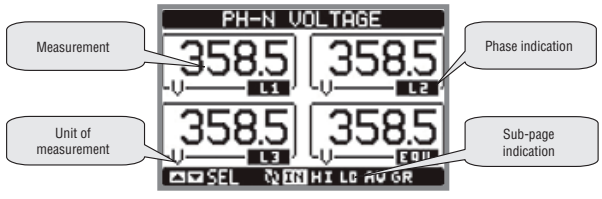


SPI overview page

– Three pages with trip protection counters follow, divided into total trip count, voltage threshold trip count and frequency threshold trip count.
The counters can be reset through the Commands Menu.



– In the pages that follow these pages, on the other hand, the measurements are in standard numerical format.
– Some measurements may not be displayed, depending on the programming and the connection for the device (for example, if programmed for a system without neutral, the measurements relating to neutral are not displayed).



Example of page with numerical indications

– For many pages, the ✔ button permits access to sub-pages (for example, to display the maximum and minimum values recorded).
– The sub-page displayed currently is indicated at the bottom left by one of the following icons:
  • **IN = instantaneous value** – Current instantaneous value of the measurement, displayed by default every time the page is changed
  • **HI = maximum instantaneous value** – Highest value measured by the SPI for the corresponding measurement. HIGH values are stored and preserved even in the absence of a power supply. They can be reset through a dedicated command (see COMMANDS MENU on page 8)
  • **AV = average value** – Average value of the measurements, with slowed variations (average of the last minute)
  • **LO = minimum instantaneous value** – Lowest value measured by the SPI from the moment voltage is applied. It is reset with the same command used for the HI values
  • **GR = graphic bars** – Display of measurements through graphic bars.
– The user can specify the page and sub-page to return to automatically after no buttons have been pressed for a given time.
– It is also possible to program the PMVF52 so that the display always remains that which was last selected.
– For the Setup of these functions, see MENU M02 – UTILITY on page 7.

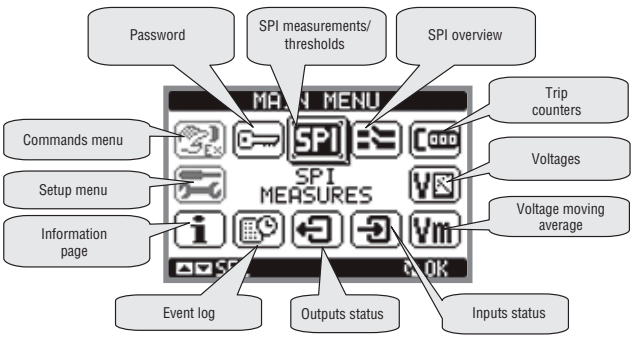
TABLE OF DISPLAY PAGES

No.	Selection via ▲ and ▼ PAGES	Selection via ✔ SUB-PAGES			
1	**VOLTAGES, FREQUENCY** V(L1-L2), V(L2-L3), V(L3-L1), F(Hz)	HI	LO	AV	GR
2	**SPI STATE OVERVIEW** STATE OF IS/BACKUP CONTROL OUTPUTS, FEEDBACK INPUTS, EXTERNAL SIGNAL, INTERTRIPPING				
3	**ACTIVE THRESHOLDS – DELAYS IN USE** V/F THRESHOLDS AND DELAYS CURRENTLY ACTIVE				
4	**SPI TRIP COUNTER** IS TRIP CNT, BACKUP TRIP CNT				
5	**VOLTAGE THRESHOLD TRIP COUNTERS** CNT 59.S2,CNT 59.S1,CNT 27.S1,CNT 59.S2				
6	**FREQUENCY THRESHOLD TRIP COUNTERS** CNT 81>.S2, CNT 81>.S1, CNT 81<.S1, CNT 81<.S2				
7	**PHASE-TO-PHASE VOLTAGES** V(L1-L2), V(L2-L3), V(L3-L1), V(LL)EQV	HI	LO	AV	GR
8	**PHASE-TO-NEUTRAL VOLTAGES** V(L1-N), V(L2-N), V(L3-N), V(L-N)EQV	HI	LO	AV	GR
9	**MOVING AVERAGE VOLTAGE** VM(L1-L2), VM(L2-L3), VM(L3-L1)	HI	LO		
10	**INPUTS STATUS**				
11	**OUTPUTS STATUS**				
12	**EVENTS LOG**				
13	**EXPANSION MODULES**				
14	**INFO-REVISION-SERIAL NO.** MODEL, REV SW, REV HW, SER. No.				
15	**LOGO**				

– **Note:** the moving average voltage measurement is not available for the first 10 minutes after switching on or resetting the system. During this time, dashes and a countdown indicating the time left before measurement display are shown.

MAIN MENU

– The main menu consists of a set of graphic icons which allow rapid access to measurements and settings.
– Starting from the normal measurement display, press the **MENU** button. The display shows the quick menu (see figure below).
– Press ▲ or ▼ to select the desired function. The selected icon is highlighted and the message in the middle of the display indicates the description of the function.
– Press ✔ to activate the selected function.
– If some functions are not available, the corresponding icon will be deactivated, i.e. greyed out.
–  etc. - Operate as shortcuts which allow quicker access to pages for displaying measurements, going directly to the selected group of measurements, from which it is possible to move forwards and backwards as usual.
–  – Setting the numeric code which permits access to protected functions (setting parameters, executing commands).
–  – Parameter programming access point. See the Setting Parameters (Setup) section on page 5.
–  – Commands Menu access point, where authorised users can perform a number of resetting and restoring operations.



PASSWORD-PROTECTED ACCESS

– For new (default) equipment, the password is enabled with the default 1000 (user access) and 2000 (advanced access) codes.
– To modify the access codes, refer to the Setting Parameters (Setup) section on page 5.
– There are two access levels, depending on the code entered:
  • **User-level access** – Permits resetting of the recorded values and the display, but not changing, of the equipment's settings.
  • **Advanced-level access** – The same rights as user, with the addition of being able to change the settings.
– In the normal measurements display, press **MENU** to recall the main menu, then select the password icon and press ✔.
– The password setting window shown below will appear:

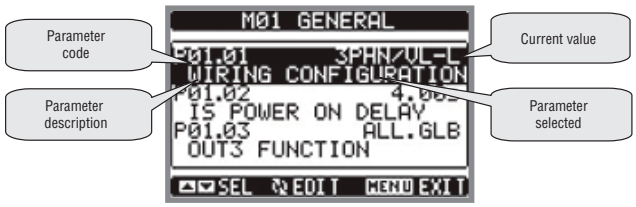
– Press the ▲ ▼ buttons to change the value of the selected digit.
– Press the ✔ button to confirm the digit and cycle to the next ones.
– Enter the password, then go to the key icon.
– When the password entered corresponds to the User-level or Advanced-level password, the appropriate unlock message appears.
– After the password is unlocked, access will remain enabled until:
  • the equipment is disconnected
  • the equipment is reset after exiting the Setting Parameters (Setup) menu
  • 2 minutes elapse without the operator touching any button.
– Pess the **MENU** button to stop setting the password and exit.

SETTING PARAMETERS (SETUP)

– From the standard measurement display, press **MENU** to call up the main menu, then select the  icon and press ✔ to access the Setting Parameters (Setup) menu.
– The table in the figure is displayed, for selecting the Setup sub-menus, in which all the parameters are grouped according to their function.
– Press the ▲ ▼ buttons to select the desired menu and press ✔ to confirm.
– Press MENU to exit and return to the measurement display.
– The available sub-menus are listed in the following table:

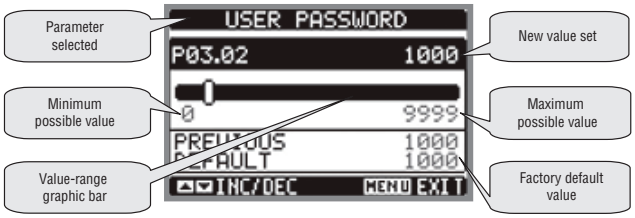
CODE	MENU	DESCRIPTION
M01	GENERAL	Specifications of the system
M02	UTILITY	Language, brightness, display pages, etc.
M03	PASSWORD	Enablement of protected access
M04	SPI THRESHOLDS	SPI trip thresholds and delays
M05	COMMUNICATION (COM)	Communication ports
M06	ALARMS	Alarm enablement

– Select the sub-menu and press the ✔ button to display the parameters.
– All parameters are displayed with code, description, current value.



Setup: parameter selection

– To change the value of a parameter, select it then press ✔.
– If the Advanced-level password has not been entered, it will not be possible to access the modification page, and an access denied message will be displayed.
– If access has been granted, on the other hand, the modification page will be displayed.



Setup: modification page

– In modification mode, the value can be changed with the ▲ and ▼ buttons. Also displayed are a graphic bar indicating the setting range, the minimum and maximum values possible, the previous value and the default value.
– Pressing ▲ and ▼ simultaneously restores the factory default value.
– Press **MENU** to return to parameter selection. The value entered is stored.
– Press **MENU** again to save the changes and exit Setup. The SPI resets and resumes normal operation.
  ATTENTION: when restarting following a change to the parameters or commands, the output relays are temporarily de-energised.
– If no buttons are pressed for 2 minutes, the Setup menu is abandoned automatically and the SPI returns to the standard display.

PARAMETER TABLE

M01 - GENERAL		UoM	Default	Range
P01.01	Nominal Voltage	V	400	100-480
P01.02	Voltage connection / control		Three-phase+N / VLL	Three-phase+N / VL-L Three-phase+N / VL-N Three-phase / VL-L Single-phase / VL-N
P01.03	IS activation delay time after switching on SPI	s	4.00	4.00 – 300.00
P01.04	OUT3 output function		Global Alarm	OFF IS BACKUP Global Alarm Threshold 59.S1 Threshold 59.S2 Threshold 27.S1 Threshold 27.S2 Threshold 81>.S1 Threshold 81>.S2 Threshold 81<.S1 Threshold 81<.S2 Alarm A01 Alarm A02 Alarm A03 Alarm A04 Alarm A05 Alarm A06
P01.05	OUT4 output function		OFF	OFF IS BACKUP Global Alarm Threshold 59.S1 Threshold 59.S2 Threshold 27.S1 Threshold 27.S2 Threshold 81>.S1 Threshold 81>.S2 Threshold 81<.S1 Threshold 81<.S2 Alarm A01 Alarm A02 Alarm A03 Alarm A04 Alarm A05 Alarm A06
P01.06	OUT5 output function		OFF	OFF IS BACKUP Global Alarm Threshold 59.S1 Threshold 59.S2 Threshold 27.S1 Threshold 27.S2 Threshold 81>.S1 Threshold 81>.S2 Threshold 81<.S1 Threshold 81<.S2 Alarm A01 Alarm A02 Alarm A03 Alarm A04 Alarm A05 Alarm A06
P01.07	INP5 input function		OFF	OFF Feedback Backup Inhibition Remote tripping C01 command C02 command Autotest (C16)
P01.08	INP6 input function		OFF	OFF Feedback Backup Inhibition Remote tripping C01 command C02 command Autotest (C16)
P01.09	INP7 input function		OFF	OFF Feedback Backup Inhibition Remote tripping C01 command C02 command2 Autotest (C16)

P01.10	Backup command mode		MODE A	OFF MODE A MODE B MODE C
P01.11	Backup control pulse duration	s	3.0	1.0 - 60.0
P01.12	Normal state remote tripping		NOR	NOR - REV
P01.13	Normal state IS feedback		NOR	NOR - REV
P01.14	Normal state backup feedback		NOR	NOR - REV

P01.01 – Nominal voltage of the system. For a system with VL-L voltage control set line voltage, for a system with VL-N voltage control set phase voltage.
P01.02 – Type of connection and type of voltage control. Program in line with the wiring.
P01.03 – IS energising delay time after applying voltage to PMVF52.
P01.04 – Defines the function of the OUT3 output from those listed. The output is understood to be activated when conditions are normal (threshold not exceeded, alarm not active, etc.).
P01.05 – Defines the function of the OUT4 output (on EXM module, if mounted) from those listed. The output is understood to be activated when conditions are normal (threshold not exceeded, alarm not active, etc.).
P01.06 – Defines the function of the OUT5 output (on EXM module, if mounted) from those listed. The output is understood to be activated when conditions are normal (threshold not exceeded, alarm not active, etc.).
P01.07 – Defines the function of the INP5 input from those listed.
P01.08 – Defines the function of the INP6 input (on EXM module, if mounted) from those listed.
P01.09 – Defines the function of the INP7 input (on EXM module, if mounted) from those listed.
P01.10 – Defines the backup control mode, according to the logic in the Backup Activation Modes diagram on the final pages of this manual. If the backup is not used, set to OFF.
P01.11 – Backup opening pulse duration, when used in MODE C.
P01.12 – Defines the logic of normal status of the remote tripping if normal (NOR) or inverted (REV) with respect to the contact. For compliance with CEI 0-21 use NOR.
P01.13 – Defines the logic of normal status of the IS feedback if normal (NOR) or inverted (REV) with respect to the contact. For compliance with CEI 0-21 use NOR.
P01.14 – Defines the logic of normal status of the backup feedback if normal (NOR) or inverted (REV) with respect to the contact. For compliance with CEI 0-21 use NOR.

M02 – UTILITY		UoM	Default	Range
P02.01	Language		Italiano	English Italiano
P02.02	LCD contrast	%	60	0-100
P02.03	Display backlighting intensity HIGH	%	100	0-100
P02.04	Display backlighting intensity LOW	%	30	0-50
P02.05	Low backlight delay	s	30	5-600
P02.06	Default page return	s	60	OFF / 10-600
P02.07	Default page		SPI measurements	SPI – SYN – EVE ...
P02.08	Default sub-page		GR	IN / HI / LO / AV / GR
P02.09	Display update time	s	0.5	0.1 – 5.0

P02.06 – If set to OFF, the display always remains on the page where the user left it. If set to a value, after this time the display returns to the page set with P02.07.
P02.07 – Abbreviation for the start page on switching on and that the display returns to automatically once the time P02.06 since a button was last pressed has elapsed.
P02.08 – Type of sub-page that the display returns to after P02.06 has elapsed.

M03 – PASSWORD		UoM	Default	Range
P03.01	Enable passwords		ON	OFF-ON
P03.02	User-level password		1000	0-9999
P03.03	Advanced-level password		2000	0-9999

P03.01 – If set to OFF, password management is disabled.
P03.02 – With P03.01 active, value to specify to activate user-level access. See Password-Protected Access section on page 5.
P03.03 – As P03.02, with reference to Advanced-level access.

M04 –SPI THRESHOLDS		UoM	Default	Range
P04.01	MAX V threshold 59.S2	%	115	100 - 130
P04.02	MAX V threshold 59.S1	%	110	100 - 120
P04.03	MIN V threshold 27.S1	%	85	20 - 100
P04.04	MIN V threshold 27.S2	%	15	5 - 100
P04.05	MAX V delay 59.S2	s	0.20	0.05 - 5.00
P04.06	MAX V delay 59.S1	s	3.00	0.20 - 10.00
P04.07	MIN V delay 27.S1	s	1.5	0.05 - 5.00
P04.08	MIN V delay 27.S2	s	0.20	0.05 - 5.00
P04.09	MAX F threshold 81>.S2	Hz	51.50	50.0 - 52.0
P04.10	MAX F threshold 81>.S1	Hz	50.20	50.0 - 52.0
P04.11	MIN F threshold 81<.S1	Hz	49.80	47.0 - 50.0
P04.12	MIN F threshold 81<.S2	Hz	47.50	47.0 - 50.0
P04.13	Long MAX F delay	s	1.00	0.05 - 5.00
P04.14	Short MAX F delay	s	0.10	0.05 - 5.00
P04.15	Short MIN F delay	s	0.10	0.05 - 5.00
P04.16	Long MIN F delay	s	4.00	0.05 - 5.00
P04.17	Backup activation delay	s	0.5	0.1 – 10.0
P04.18	Local control		OFF	OFF - ON
P04.19	SPI restore time (reset)	s	0.08	0.04 – 300.00

P04.01…P04.16 – Adjustment of trip thresholds and delay times defined by the CEI 0-21 standard.
P04.17 – Maximum IS opening waiting time, before IS locking is recognised with consequent backup opening command.
P04.18 – Local control setting via parameter. Operates in OR with the input of the corresponding function.
P04.19 – IS restore (reset) time. IS reclosing delay time after all thresholds are ok again.

M05 – COMMUNICATION		UoM	Default	Range
P05.01	Serial node address		01	01-255
P05.02	Serial speed	bps	9600	1200 2400 4800 9600 19200 38400
P05.03	Data format		8 bit – n	8 bit, no parity 8 bit, odd 8bit, even 7 bit, odd 7 bit, even
P05.04	Stop bits		1	1-2
P05.05	Protocol		Modbus-RTU	Modbus-RTU Modbus-ASCII Modbus-TCP
P05.06	IP address		192.168.001.001	000.000.000.000 - 255.255.255.255
P05.07	Subnet mask		255.255.255.000	000.000.000.000 - 255.255.255.255
P05.08	IP port		502	0-32000
P05.09	Client/Server		Server	Client-Server
P05.10	Remote IP address		000.000.000.000	000.000.000.000 - 255.255.255.255
P05.11	Remote IP port		1001	0-32000
P05.12	Gateway IP address		000.000.000.000	000.000.000.000 - 255.255.255.255

P05.01 – Serial address (node) for the communication protocol.
P05.02 – Communication port bitrate.
P05.03 – Data format. 7 bit setting position for ASCII protocol only.
P05.04 – Number of stop bits.
P05.05 – Communication protocol selection.
P05.06, P05.07, P05.08 – TCP-IP details for applications with Ethernet interface. Not used with other communication module types.
P05.09 – Activation of TCP-IP connection.
Server: waits for connection from a remote client.
Client: connection to a remote server at the address specified by P05.10.
P05.10, P05.11 – Coordinates for the connection to the remote server when P05.09 is set to client.
P05.12 – IP address of network gateway, if it is present.

M06 – ALARMS		UoM	Default	Range
P06.01	Alarm A01 enablement		ON	ON - OFF
P06.02	Alarm A02 enablement		ON	ON - OFF
P06.03	Alarm A03 enablement		ON	ON - OFF
P06.04	Alarm A04 enablement		OFF	ON - OFF
P06.05	Alarm A05 enablement		OFF	ON - OFF
P06.06	Alarm A06 enablement		ON	ON - OFF

P06.01…P06.06 – Enables or disables the corresponding alarm.
Note: the use of the auxiliary feedback contact on the IS is recommended even in applications where the backup device is not used. If not even the feedback contact is used however, it will be necessary to deactivate alarm A03 by setting P06.03 to OFF.

COMMANDS MENU
– The Commands Menu is used to perform occasional operations, like resetting measurements, counters, alarms, etc.
– If the Advanced-level access password was entered, the Commands Menu can also be used to perform automatic operations useful for configuring the instrument.
– The following table shows the functions which are available with the Commands Menu, divided according to the required access level.

CODE	COMMAND	ACCESS LEVEL	DESCRIPTION
C.01	RESET HI-LO	User / Advanced	Resets the HI and LO values of all measurements
C.02	RESET TRIP COUNTERS	User / Advanced	Resets the trip counters
C.12	PARAMETERS TO DEFAULT	Advanced	Restores all settings to factory default values
C.13	PARAMETER BACKUP	Advanced	Saves a backup copy of the settings
C.14	PARAMETERS RESTORE	Advanced	Reloads the settings from the backup copy
C.15	TEST THRESHOLD 27.S2	Advanced	Temporarily shifts threshold 27.S1 to permit testing of threshold 27.S2 ❶.
C.16	AUTOTEST	Advanced	PMVF52 performs the self-test function according to the procedure described in the standard
C.17	RESET EVENTS LOG	Advanced	Reset of events log
C.18	ALARM INHIBITION	Advanced	Temporarily disables alarms A02 to A05 ❷.

❶ The purpose of command C.15 is to permit testing of threshold 27.S2 via relay test kit. This threshold is normally "covered" by 27.S1 and consequently cannot be tested according to the procedures indicated by the standard. Giving this command sets threshold 27.S1 temporarily to the minimum permitted value (20% Un), lower than the default value of 27.S2 (40%Un) so as to permit it to be tested. This shift in the threshold lasts for a maximum of 5 minutes, during which the shifted value is visible on the Active Thresholds page. Switching the PMVF52 off then on or waiting for the period to elapse (sufficient for performing the test) brings threshold 27.S1 back to its normal set value.
❷ The purpose of command C.18 is to temporarily disable the alarms A02-A05 to facilitate the initial commissioning phase, without having to disconnect the PMVF52 each time.
Disabling lasts up to 120 min. and is canceled by switching off the device.
The count can be viewed on the synoptic page.

ALARM INDICATIONS

– In the event of an anomaly, the PMVF52 indicates the situation with a pop-up window.
– If the user presses buttons on the front, the alarm is hidden temporarily to permit consultation of the screens.
– The alarm remains while the anomaly is present.

CODE	ALARM / INDICATION	DESCRIPTION / POSSIBLE CAUSES
A01	EXTERNAL SIGNAL / LOCAL CONTROL COMBINATION NOT PERMITTED	External Signal and Local Control both OFF (combination not envisaged by the standard). The Local Control must be ON (shunted) if required by the operating regulations. If the Local Control is OFF, then the External Signal must be ON.
A02	IS OPENING FAILURE	The SPI sends the opening command to the IS, but the auxiliary (feedback) contact is closed, so the SPI sends an opening command to the backup. Check the operation of the IS and of its auxiliary (feedback) contact.
A03	IS CLOSING FAILURE	– The SPI has ordered the closing of the IS but it does not close (check OUT1 wiring and/or IS coil). – The auxiliary IS contact (feedback) is not working. – The auxiliary IS contact (feedback) is not connected correctly to terminal INP1. – The auxiliary IS contact (feedback) is not fitted since it is not envisaged in the scheme. Disable alarm A03 by setting P06.03 to OFF. Note: LOVATO Electric recommends the use of the feedback input.
A04	BACKUP OPENING FAILURE	The IP sends the opening command to the back-up but the auxiliary contact (feedback) is closed. Check the functionality of the support and its auxiliary contact (feedback).
A05	BACKUP CLOSING FAILURE	The IP has commanded the closing of the backup but it does not close (check wiring OUT1 and / or IS coil). – The auxiliary contact of the backup (feedback) does not work. – The auxiliary contact of the backup (feedback) is not correctly connected to the relative programmed terminal as "Backup feedback". – The auxiliary contact of the backup (feedback) is not mounted because it is not foreseen in the diagram.
A06	AUTOTEST	The autotest function has failed.

– **All the alarms/warnings except A01 are retentive, i.e. they reset when the anomaly ceases and after having disconnected and subsequently powered up the device again. Retentive alarms always open the OUT1 IS output.**
ATTENTION: If the autotest is performed and it has a negative outcome, it will show the relevant alarm A06. This alarm is retentive and it's not reset until the autotest is successfully passed.
– In the presence of a non-retentive alarm, the equipment continues to operate in any case.
– Exit OUT3, OUT4 and OUT5 can be programmed to indicate the presence of any alarm (global alarm function).

SELF-DIAGNOSIS

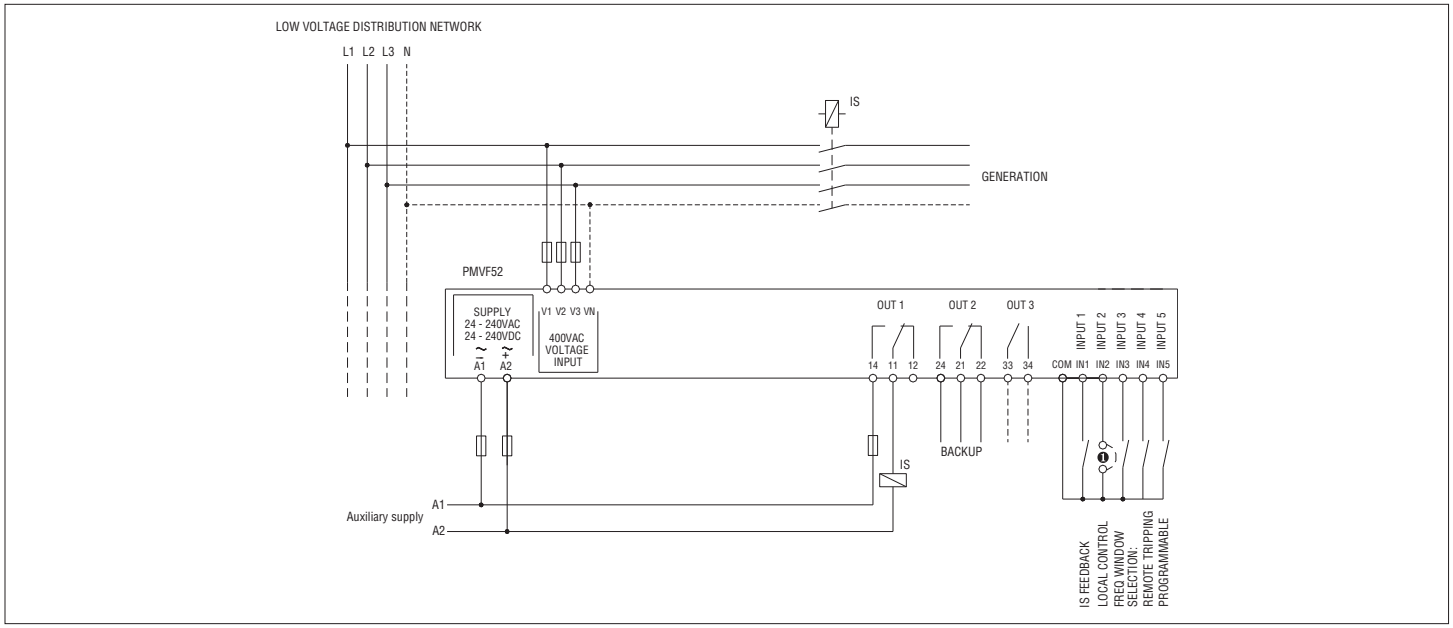
– The PMVF52 features a series of self-diagnosis checks. If any of these checks is unsuccessful, a window displaying the text System Error Exx is displayed, where xx indicates the reason for malfunction. Should this indication occur, contact our Technical support (Tel. + 39 035 4282422; E-mail: service@LovatoElectric.com), stating the code indicated.

COMMUNICATION

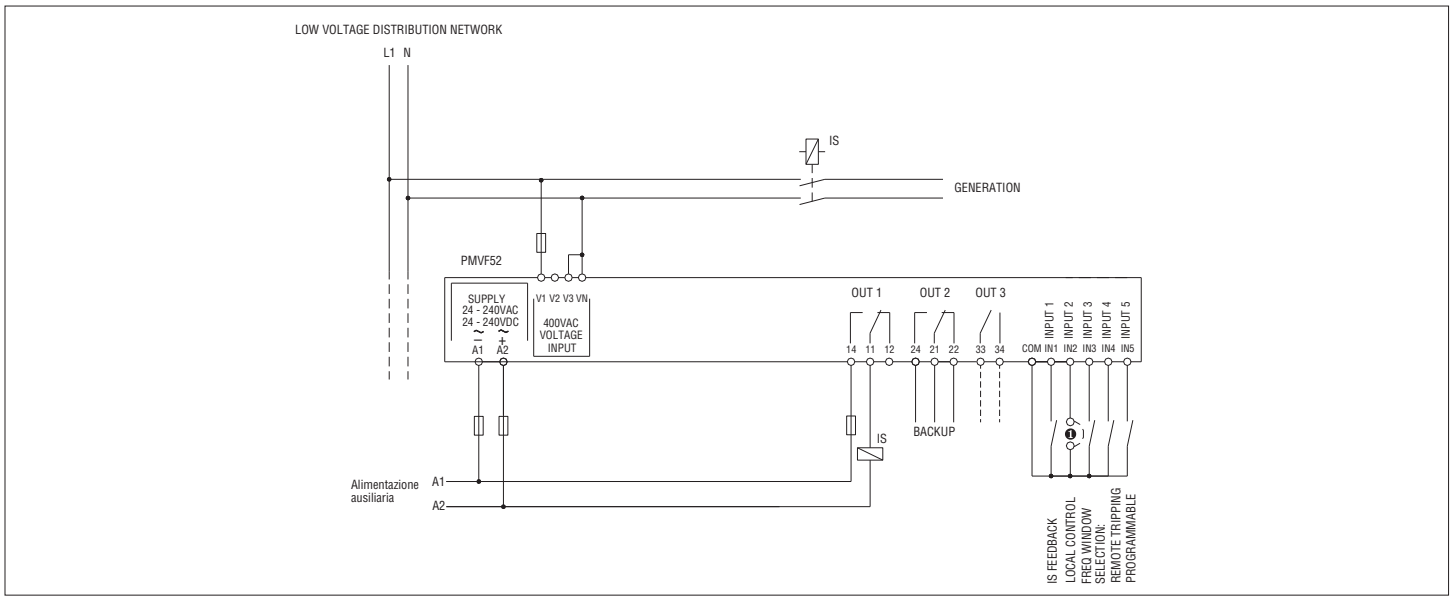
– The PMVF52 can be fitted with an optional standard communication module from those listed below. When a communication module is installed, it must be configured through the dedicated M05 - COMMUNICATION Menu on page 8.
– The protocol currently supported is Modbus in the RTU, ASCII and TCP variants.
– The equipment is already prepared for communication in accordance with the IEC/EN/BS 61850, possible via installation of a dedicated module.

MODULE TYPE	CODE	FUNCTION	MAX. No.
COMMUNICATION	EXM1010	USB	1
	EXM1011	RS232	
	EXM1012	RS485	
	EXM1013	ETHERNET	

WIRING DIAGRAM
Three-phase connection with or without neutral
P01.02 = Three-phase



Single-phase connection
P01.02 = Single-phase

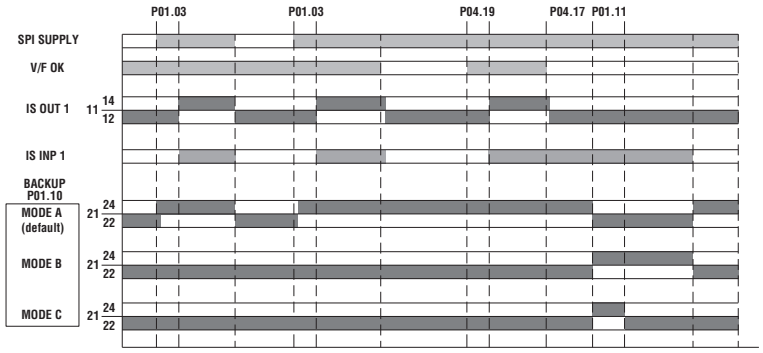


Notes
❶ Local control selection.

- Recommended fuses:
  - auxiliary supply and voltage measurement input: F1A (fast)
  - contactor control: MAX F5A (fast).
- The auxiliary IS contact (feedback) must of necessity be connected.
- In the case of multiple ISs, the IS feedback contact must be a parallel connection of all the ISs' auxiliary contacts.
- In single-phase wiring, connect terminal V3 to VN.

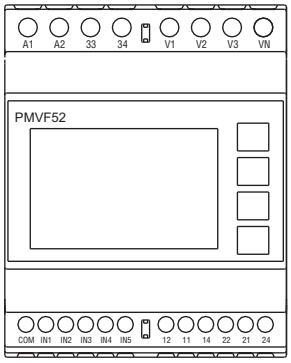
External signal (INP3)	Local Control (INP2)	MIN F threshold	Default	MIN F delay	Default	MAX F threshold	Default	MAX F delay	Default
ON	OFF	81<.S2	47.50Hz	DEL C MIN F	0.10s	81>.S2	51.50Hz	DEL C MAX F	0.10s
OFF	ON	81<.S2	47.50Hz	DEL L MIN F	4.00s	81>.S2	51.50Hz	DEL L MAX F	1.00s
ON	ON	81<.S1	49.80Hz	DEL C MIN F	0.10s	81>.S1	50.20Hz	DEL C MAX F	0.10s

BACKUP ACTIVATION MODES

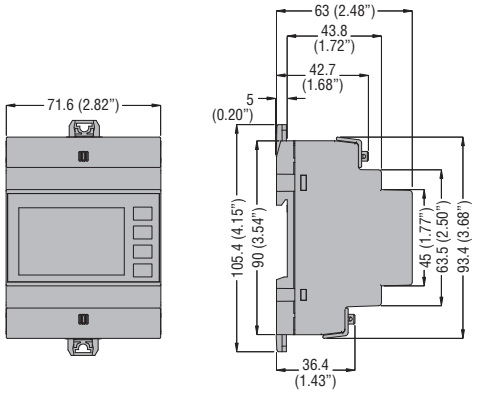


Note: the default backup control mode is A. See parameter P01.14 (M01 - GENERAL MENU on page 6).
MODE A: mode to be selected if a device such as a contactor or a switch with undervoltage trip release is used as backup.
MODE B: mode to be selected if a device such as a switch with continuous shunt trip release is used as backup.
MODE C: mode to be selected if a device such as a switch with impulsive shunt trip release is used as backup.

TERMINAL LAYOUT



MECHANICAL DIMENSIONS [mm (in)]



TECHNICAL CHARACTERISTICS

Auxiliary supply		
Rated voltage Us		24 - 240V~ 24 - 240V=
Operating range		0.9-1.1 Us
Frequency		45 - 55Hz
Power consumption/dissipation		Us 24V~ 2.5VA 1.6W max Us 240V~ 6.2VA 2W max Us 24V= 60mA 1.5W Us 240V= 7mA 1.7W
Immunity time for microbreakings		240VAC 50Hz ≤2000ms 240VDC ≤1000ms 24VAC 50Hz ≤30ms 24VDC ≤15ms
Rated insulation voltage Ui		300V~
Overvoltage category		III
Insulation		Single❶
Voltmeter inputs		
Input type		Three-phase + neutral
Rated voltage Ue		400V~ phase-to-phase 230V~ phase-to-neutral
Measuring range		40 – 480V~ phase-to-phase 23 – 277V~ phase-to-neutral
Rated frequency		50Hz
Frequency range		45 – 55Hz
Measurement type		True root mean square (TRMS)
Connection method		Three-phase with or without neutral, single-phase
Rated insulation voltage Ui		300V~ phase-to-neutral
Overvoltage category		IV
Insulation		Single❶
Accuracy		
Measuring conditions Temperature		+23°C ±2°C
Phase voltage		± 0.5% (46...277V~) ±0.5 digit
Phase-to-phase voltages		± 0.5% (80...480V~) ±0.5 digit
Additional errors		
Temperature		0.01%/°K per V
Relay outputs OUT1-OUT2		
Output type		2 switching contacts
Rated operating voltage		250V~
IEC/EN/BS 60947-5-1 designation		C300 / OUT1 AC1 8A 250V~ - 8A 30V= OUT2 AC1 5A 250V~ - 5A 30V=
Electrical endurance	NO contact	$2x10^4$ operations
Mechanical life		10^7 operations
Overvoltage category		III
Rated insulation voltage Ui		300V~
Insulation		Single❶❷
Relay outputs OUT3		
Output type		1 NO output
Rated operating voltage		250V~
IEC/EN/BS 60947-5-1 designation		C300 / NO contact AC1 2A 250V~ - 2A 30V=
Electrical endurance	NO contact	$2x10^4$ operations
Mechanical life		10^7 operations
Overvoltage category		II
Rated insulation voltage Ui		300V~
Insulation		Single❶

Digital inputs	
Number of inputs	5
Input type	To be used with dry contact with common terminal
Output voltage from the common terminal	5V=
Input current	6mA
Contact closed: max. voltage	2V
Contact open: min. voltage	3.7V
Rated insulation voltage Ui	12V=
Insulation	Single, CAT IV❸
Ambient conditions	
Operating temperature	-20...+60°C
Storage temperature	-30...+80°C
Relative humidity	<80% (IEC/EN/BS 60068-2-78)
Maximum degree of ambient pollution	2
Altitude	≤2000m
Voltage measurement/power supply circuit connections	
Terminal type	Screw-type (fixed)
Cable cross section (min...max)	$0.2...4.0mm^2$ (24...12AWG)
Tightening torque	0.8Nm (7lb.in)
Relay output connection	
Terminal type	Screw-type (fixed)
Cable cross section (min...max)	$0.2...2.5mm^2$ (24...12AWG)
Tightening torque	0.44Nm (4lb.in)
Digital input connection	
Terminal type	Screw-type (removable)
No. of terminals	6
Cable cross section (min...max)	$0.2...2.5mm^2$ (24...12AWG)
Tightening torque	0.44Nm (4lb.in)
Housing	
Version	4 modules (DIN 43880)
Fitting	35 mm rail (IEC/EN/BS 60715) or screw-type by means of clips removable
Material	Polyamide RAL 7035
Degree of protection	IP40 front IP20 housing and terminals
Weight	326g
Certifications and compliance	
Compliance with standards	CEI 0-21, IEC/EN/BS 60255-27, IEC/EN/BS 60255-26

❶ Double insulation towards the front
❷ The relay outputs must be used with the same voltage unit.
❸ To ensure double insulation towards the front, provide CAT IV insulated input contacts at 300V.