



PM174/5  
RPM074/5  
Power Quality Analyzer

## Interfacing ABB MV Sensors

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### Application Note

Medium Voltage Power Metering via ABB  
KEVA/KECA/KEVCY/KEVCD MV sensors

#### REVISION HISTORY

A1	July 2021	Initial Release
A2	January 2023	Added information about harmonic measurement limitation for PM17X-ABB. Same CT primary for 50 and 60Hz, because of using build-in integrator
A3	August 2023	Added information about additional type of supported sensors: KEVA 36Bxx and KEVA 36Cxx, and KECA 250B1

# Table of Contents

- 1 GENERAL..... 4**
  - 1.1 Advantage ..... 4
  - 1.2 Selecting Analyzer Model by Sensor Current Rating ..... 4
  - 1.3 Wiring the inputs..... 5
  - 1.4 Grounding..... 6
- 2 CONFIGURING THE PM17X ANALYZER ..... 7**
  - 2.1 Configuring CT / PT ratio ..... 7
  - 2.2 Configuring Correction Parameters ..... 8
  - 2.3 Sensors tested and approved by ABB ..... 9

# 1 General

SATEC offers a new version of the PM17X, designed to interface with ABB's KEVA/KECA/KEVCY medium voltage sensors.

The PM17X includes all following versions: PM175, PM174, RPM075, and RPM074

## 1.1 Advantage

This unique family of products is a range of extremely compact sensors. The range includes potential transformers and current transducers, and some products offer both functionalities combined. All products feature RJ45 3VAC outputs, designed for interfacing ABB digital protection relays.

SATEC's concept utilizes this interface to piggyback on these existing sensors and their output for highly accurate power metering. By standard, readings provided by protection equipment do not come near the PM17X's accuracy (Class 0.2S for kWh, per IEC 62053-22) and do not provide a power quality profile of the network\*.

\* - When using current ABB sensors there is a limitation on the measurement of individual harmonics in current. Maximum measurable harmonic is 21st for 50HZ and 18 for 60HZ (1050Hz)

Adopting this concept also saves considerably on the need for erecting extra expensive metering cubicles, with all involved equipment (MV CT and PT).

## 1.2 Selecting Analyzer Model by Sensor Current Rating

The ABB MV sensors have been tested under two current categories (see detailed groups in table 1 at the bottom of this document):

1. Up to 650A
2. Up to 4,000A

The PM17X is accordingly available in two corresponding versions specified in you're the order-string as follows:

1. PM175-ABB MVS-ABB **C650**-50HZ-ACDC
2. PM175-ABB MVS-ABB **C4000**-50HZ-ACDC

[above model, frequency and power supply options are illustrative only]

A corresponding marking will appear on the device sticker, as below in figure 1.

(18) 1	(19) 2	(20)	(21) 1	(22) 2	(23) 3	(24) 4	(25)	(26) 1	(27) 2	(28) 3	(29) 4
DIGITAL INPUTS			ANALOG INPUTS					RELAYS			
			ANALOG OUTPUTS					DIG. OUT.			

PM174/PM175 FOR ABB SENSOR

BL0677 REV.A2

S/N

POWER SUPPLY

85-264VAC

50/60Hz

85-290VDC

POLL. DEG.2

INST.CAT II

STANDARD ☐ 10W

(12) 9.6-19VDC ☐

(24) 19-37VDC ☐ LOW DC

(48) 37-72VDC ☐

ATTENTION  
Static-Sensitive  
Devices  
Handle Only at  
Static-Safe  
Workstations

COM.1 :

RS-232/422/485 ☐

ETHERNET ☐

PROFIBUS ☐

COM.1

5 6 7 8 9 10 11 12

COM.2

RS-422/RS-485

-TX -RX +TX +RX

13 14 15 16 17

VOLTAGE INPUT:

ABB MVS

CALIBRATED AT

50Hz ☐

60Hz ☐

ANALOG IN/OUT

±1mA ☐

0-20mA ☐

0-1mA ☐

4-20mA ☐

CURRENT INPUT:

ABB C650 ☐

ABB C4000 ☐

Figure 1: PM17X label

### 1.3 Wiring the inputs

The PM17X versions for interfacing the ABB sensors are equipped with 6 RJ45 inputs (figure 2, below), two for each phase: current + voltage, or making use of just one socket, in case of a combined PT/CT sensor.

The sockets for each phase are interchangeable between voltage and current, identifying the nature of the input.

In case of combined PT/CT sensor, either socket (per phase) will read the combined outputs. However, phases are NOT interchangeable and must be kept separate.

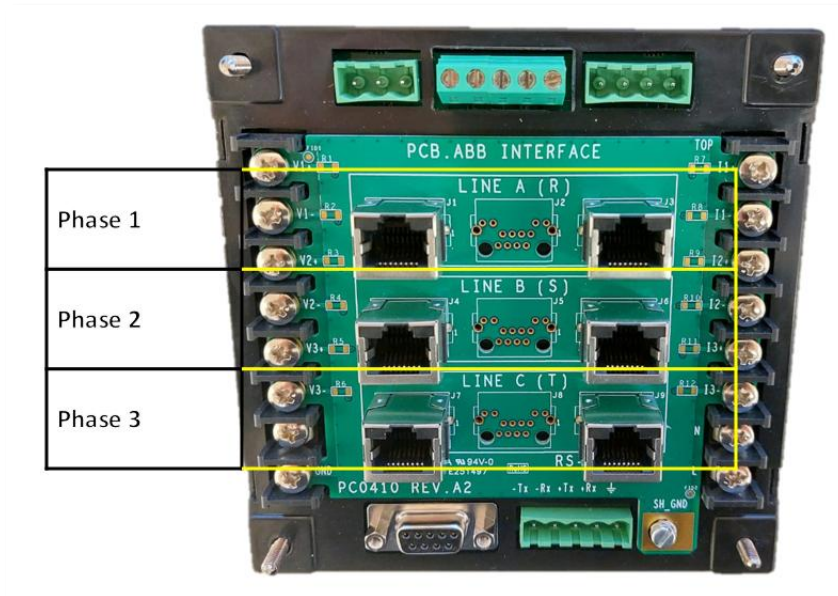


Figure 2 (adapter panel color may be green or black)

## 1.4 Grounding

For reasons of safety and accuracy, both the meter and sensors MUST be grounded as illustrated below (figure 3).

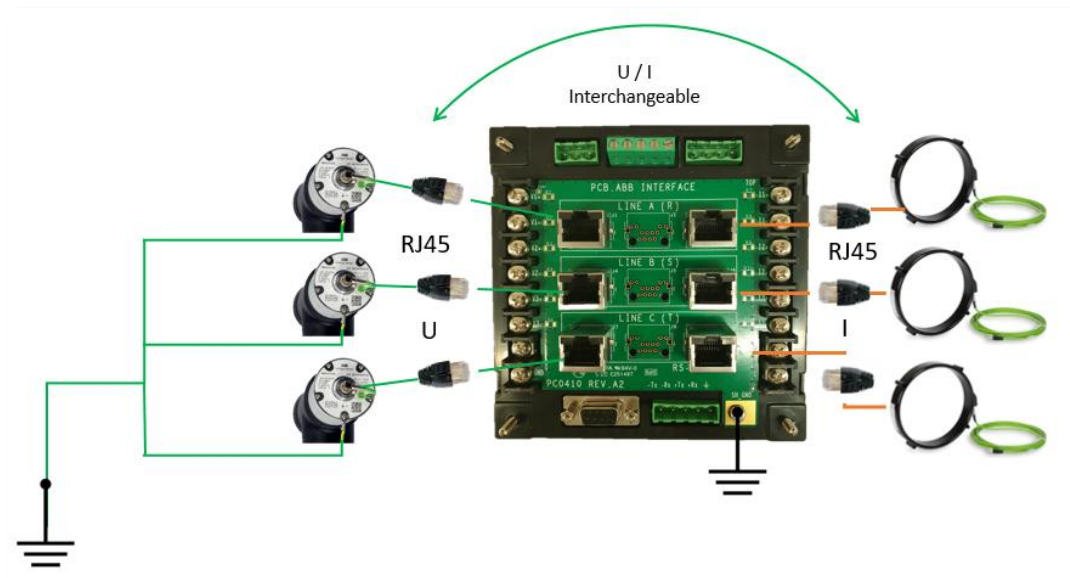


Figure 3 Grounding scheme

## 2 Configuring The PM17X Analyzer

The ABB MV sensor are characterized by PT and CT ratio that must be configured in the analyzer to afford correct readings.

Likewise, each individual sensor is characterized and marked with correction parameters for amplitude and angle (figure 5) which must be set as well in the analyzer.

Please download SATEC's PAS engineering software for easy device configuration. The download and the most recent .exe file, and other related material can be found in the following link: <https://www.satec-global.com/power-analysis-software>

### 2.1 Configuring CT / PT ratio

Open PAS software, connect to the meter and then go to

Meter Setup -> General Setup -> Basic Setup

where you will find the needed parameters (figure 4)

**PT ratio:** set **PT ratio** at 57.5

**CT ratio:** set **Primary Current, A** in accordance with the sensor type (table 1) being interfaced:

1. For sensors up to **650A**: @ 50Hz and @60Hz: set at 372;
2. For sensors up to **4,000A**: @50Hz and @60Hz: set at 2317;

Basic Configuration	
Wiring Mode	4LN3
PT Ratio	57.5
PT Ratio Multiplier	x1
PT4 Ratio	----
CT Primary Current, A	2317
I4 CT Primary Current, A	----
Nominal Secondary L-N/L-L Voltage, Un, V	120.0
Maximum Demand Load Current, A	CT
Nominal Frequency, Hz	50
Phase Order	ABC
Demand Setup	
Power Block Demand Period, min	15
Number of Blocks in Sliding Demand	1
Power Thermal Time Constant, s	----
Volt/Ampere/THD Demand Period, s	900

Figure 4: CT/PT Setup

## 2.2 Configuring Correction Parameters

Correction parameters for PTs may be found on the sensor label (figure 5) as follows:

1. **Amplitude correction:** marked **Cfs**
2. **Phase/Angle correction**, marked **pU** or **pI**

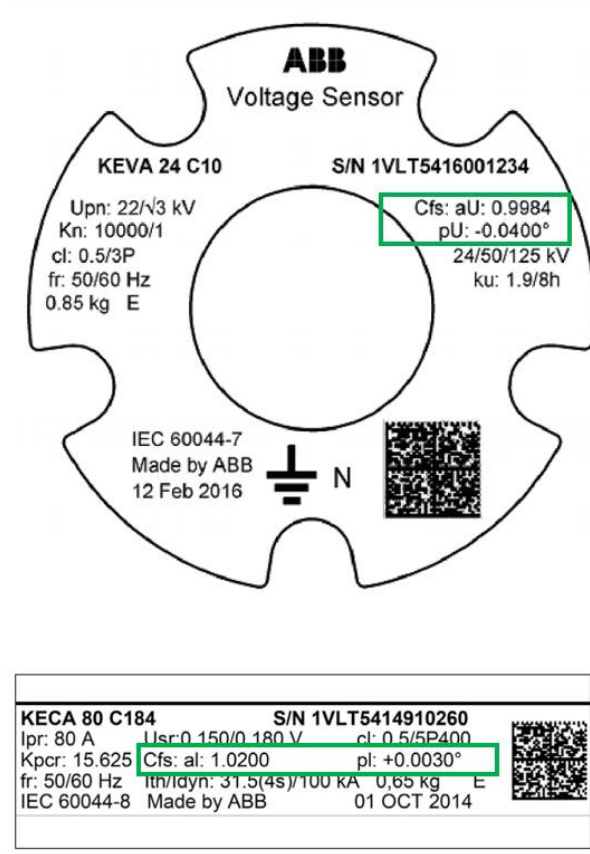


Figure 5: examples for correction parameters on sensor labels

To set these parameters, access the Transformer Correction tab, nested under General Setup (figure 6). Enter per correct phase as follows:

1. **Amplitude correction (Cfs):** enter the parameter displayed on the label in Ratio Correction Factor
2. **Angle correction (pU/pI):** enter the parameter displayed on the label in Phase Angle Error, (+/- minutes)

NOTE!: angle correction is stated on sensor in degrees. Make sure to translate this to minutes (the parameter required by PAS) by multiplying the pU/pI parameter by 60.



PM175 TEST - General Setup

Basic Setup | Control/Alarm Setpoints | Analog Inputs | Analog Outputs | Analog Expander | Relay Outputs  
 Digital Inputs | Pulse/Event Counters | Periodic Timers | Device Options | Local Settings | Transformer Correction

Instrument Transformer Correction			
Channel	Ratio Correction Factor	Phase Angle Error, (+/-) minutes	Select a transformer type to preset a CT
V1	1.000	0	----
V2	1.000	0	----
V3	1.000	0	----
V4	----	----	----
I1	1.000	0	----
I2	1.000	0	----
I3	1.000	0	----
	----	----	----
	----	----	----
	----	----	----
	----	----	----
	----	----	----
	----	----	----
	----	----	----
	----	----	----
	----	----	----
	----	----	----

Figure 6: Entering Correction Parameters

## 2.3 Sensors tested and approved by ABB

	Tested rating	Sensor Models
Current sensors	Up to 650A	KECA 80 Cxxx (C104, C184, C260) KECA 80 D85 KECA 250 B1
	Up to 4,000A	KECA 80 C85 KECA 80 C216 KECA 80 C165
Voltage sensors		KEVA 17 5B20, 5B21 KEVA 24 B20, 24B21 KEVA 24 Cxx (C10, C21, C22, C23, C24, C25, C26, C30) KEVA 24 Cxxc (C21c, C22c, C23c, C24c, C25c, C26c) KEVA 24 C2 4.1 KEVA 24 C2 4.1 KEVA 36 C2 4.1 KEVA 36 C2 4.1c KEVA 36 B20, B21 "c" stands for Metal coated (conductive surface)
Combined sensors		KEVCY 24 RE1 KEVCD xx AE3 (12 AE3, 7.5 AE3, 24 AE3)

Table 1: approved sensors