

USER MANUAL

CONFIGURABLE DIN RAIL CONVERTER

PCE-SCI-E

ENGLISH



User manuals in various languages (français, italiano, español, português, nederlands, türk, polski) can be found via our product search on:
www.pce-instruments.com

INTRODUCTION

Isolated signal converter for electrical signals. Accepts a wide range of AC and DC voltages, with ranges from 50 mVac/dc up to 600 Vac/dc, and a wide range of AC and DC current signals, from 5 mAac/dc up to 5 Aac/dc. The instrument can be configured to measure frequency from any of the AC voltage and AC current signals accepted. Unipolar and bipolar signals accepted for DC voltage and DC current signals.

Configurable output in 4/20 mA (active or passive) or 0/10 Vdc. Universal power supply from 18 to 265 Vac/dc. 3 way isolation between input, output and power circuits. Circuit isolation prevents ground loops and transient propagation, protecting remote equipment and signal integrity.

Predefined configuration codes available for fast and easy configuration. Advanced configuration menu available to customize input and output signal ranges to specific values required. Configuration through front push-button keypad. Front information displays available for configuration and system information (input signal value, output signal value, configured label, signal percentage and process value).

Built-in 'force' functions to manually generate low and high output signals, to validate remote instrumentation during installation. 'SOS' mode to help on critical maintenance and repairs. Configurable power frequency rejection filter. 'Password' function to block non-authorized access to 'configuration menu'. Designed for industrial use, with potential integration into a wide range of applications, reduced cost, excellent quality and available customization.



When the marks **Attention** or **Risk of electrical shock** appear, read the documentation for information about the nature of the risk.

INSTALLATION AND START-UP

If this is the first time you are configuring the instrument, below are the steps to follow during a first installation. Read all the manual sections in order to have a full and clear view of the characteristics of the instrument. Do not forget to read the installation precautions.

- » Install the instrument at the DIN rail
- » Read how to operate the instrument
- » Connect the input, the output and the power terminals
- » Configure the input and output signals
choose a predefined configuration code
introduce the code at the instrument
- » If needed, customize the input and output signal ranges
- » If needed, configure the display reading, the key UP force menu, and the key LE messages function,
- » If needed, block access to the configuration menu

TYPICAL APPLICATIONS

To measure electrical signals in AC and DC and provide a standard process signal in 4/20 mA or 0/10 Vdc. Accepts signals from current shunts, signals from DC batteries of 12 Vdc, 24 Vdc, 48 Vdc, ..., signals from tachometric dynamos of ± 60 Vdc, power lines of 230 Vac, 115 Vac, 48 Vac, 24 Vdc, AC leak currents of down to 5 mAac and below, 50 and 60 Hz frequency signals from AC power lines, signals from X/5 and X/1 current transformers.

SOS MODE

The instrument includes a configurable SOS mode function that provides a way to manually configure a fixed output signal. This output signal remains fixed, independent of the input signal value or sensor state. This function allows to perform urgent maintenance or repair tasks at the input section of the system, for example replacing damaged sensors, while the instrument still provides a controlled signal that allows the process to continue its activity, under human surveillance. When the maintenance or repair task has been performed, the instrument can be taken back to the standard working mode, where the output signal is proportional to the input.

When manually activated, the SOS mode generates the output signal configured, and the front display remains flashing with the message SoS. All other systems are disabled, which means that:

- » no error messages will be shown on display
- » no key UP fast access menu is accessible
- » no key LE messages function is accessible
- » no Eco mode activates

Only key SQ is accessible, to access the configuration menu (eventually this access can be password locked) in order to deactivate the SOS mode. Deactivation of SOS mode must be performed manually by configuring the function to oFF. To configure the SOS mode function, see section Tools menu.

MESSAGES

The instrument includes a configurable messages function that provides advanced information about the system, available to the operator with a single click at the front key LE.

This information is helpful during start-up, installation, system verification, routine maintenance and troubleshooting, as messages and values provide information on the actual input and output signal value, actual percentage of the input signal compared to the full scale, scaled process values and excitation voltage and excitation current provided to the load cell.

This information is available at any time, and is displayed sequentially when requested (except while on SOS mode). Access to this information reduces maintenance time, improves time invested in failure location, and helps for an easy resolution of the problem.

Additionally, each instrument can be assigned a custom label code of up to 8 characters, that can be displayed at the front display or at the messages sequence, making system identification of each instrument an easy task.

To configure the messages function, see section Key LE (messages function).

Letters		Numbers	Special
A	n	0	-
b	o	1	_
c	p	2	.
d	q	3	(blank)
E	r	4	
F	S	5	
G	t	6	
h	u	7	
I	V	8	
J	W	9	
K	X		
L	Y		
M	Z		

Labeling examples: for an application with multiple engine control, where voltage and frequency are being measured for three engines, and converted to 4/20 mA for retransmission to PLC or SCADA. Six PCE-SCI-E converters are being used, to measure 0/300 Vac and 45/55 Hz. Each PCE-SCI-E can be configured the following label for easy identification:

- » Label for engine 1 frequency measurement : Eng1.hZ
- » Label for engine 2 frequency measurement : Eng2.hZ
- » Label for engine 3 frequency measurement : Eng3.hZ
- » Label for engine 1 voltage measurement : Eng1.Vac
- » Label for engine 2 voltage measurement : Eng2.Vac
- » Label for engine 3 voltage measurement : Eng3.Vac

PREDEFINED CONFIGURATION CODES

Select the desired code for your application, and check the following sections for more information:

- » for information on how to activate a code
- » to customize the input and output signals
- » to configure input for bipolar DC signals

Input signal range	Output 4/20 mA Code	Output 0/10 Vdc Code	See section
0/600 Vac	010	110	AC Voltages
0/450 Vac	011	111	
0/300 Vac	012	112	
0/150 Vac	013	113	
0/100 Vac	014	114	
0/60 Vac	015	115	
0/30 Vac	016	116	
0/15 Vac	017	117	
0/10 Vac	018	118	
0/2 Vac	019	119	
0/1 Vac	020	120	
0/500 mVac	021	121	
0/300 mVac	022	122	
0/200 mVac	023	123	
0/150 mVac	024	124	
0/100 mVac	025	125	
0/75 mVac	026	126	
0/60 mVac	027	127	
0/50 mVac	028	128	
Reserved	029 ... 031	129 ... 131	

Input signal range	Output 4/20 mA Code	Output 0/10 Vdc Code	See section
0/600 Vdc	032	132	DC Voltages
0/450 Vdc	033	133	
0/300 Vdc	034	134	
0/150 Vdc	035	135	
0/100 Vdc	036	136	
0/60 Vdc	037	137	
0/30 Vdc	038	138	
0/15 Vdc	039	139	
0/10 Vdc	040	140	
0/2 Vdc	041	141	
0/1 Vdc	042	142	
0/500 mVdc	043	143	
0/300 mVdc	044	144	
0/200 mVdc	045	145	
0/150 mVdc	046	146	
0/100 mVdc	047	147	
0/75 mVdc	048	148	
0/60 mVdc	049	149	
0/50 mVdc	050	150	
Reserved	051 ... 054	151 ... 154	

Input signal range	Output 4/20 mA Code	Output 0/10 Vdc Code	See section
0/5 Aac	055	155	AC Currents
0/4 Aac	056	156	
0/3 Aac	057	157	
0/2 Aac	058	158	
0/1 Aac	059	159	
0/500 mAac	060	160	
0/300 mAac	061	161	
0/75 mAac	062	162	
0/50 mAac	063	163	
0/20 mAac	064	164	
0/10 mAac	065	165	
0/5 mAac	066	166	
Reserved	067 ... 071	167 ... 171	
0/5 Adc	072	172	DC Currents
0/4 Adc	073	173	
0/3 Adc	074	174	
0/2 Adc	075	175	
0/1 Adc	076	176	
0/500 mAdc	077	177	
0/300 mAdc	078	178	
0/75 mAdc	079	179	
0/50 mAdc	080	180	
0/20 mAdc	081	181	
0/10 mAdc	082	182	
0/5 mAdc	083	183	
Reserved	084 ... 088	184 ... 188	

Input signal range	Output 4/20 mA Code	Output 0/10 Vdc Code	See section
0/100 Hz (Vac)	089	189	Frequency AC
45/55 Hz (Vac)	090	190	
55/65 Hz (Vac)	091	191	
0/100 Hz (Aac)	092	192	
45/55 Hz (Aac)	093	193	
55/65 Hz (Aac)	094	194	
Reserved	091 ... 099	191 ... 199	
(End of list)	---		see notes below
(Custom selection)	uSEr		see notes below

Notes

- » Code uSEr indicates that a user custom configuration is active, and it does not match any of the listed codes This code is non-selectable, for information only.
- » **Example:** select code 011 for 0/450 Vac=4/20 mA, the instrument reads code 011. Later, configure the input to 0/350 Vac=4/20 mA, this does not match a listed code, and the instrument reads uSEr. Or change the output to 0/450 Vac=1/5 Vdc, this does not match a listed code, and the instrument reads uSEr.
- » Code --- identifies the end of the list, it follows code 199 and the list continues with code 010. Select --- to exit the list without applying changes.

CONNECTIONS AND DIMENSIONS (MM /INCH)

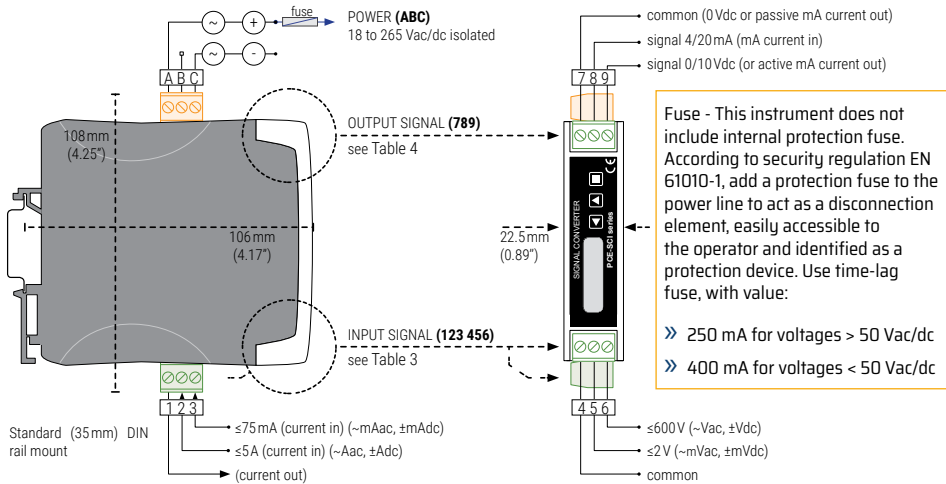
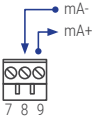
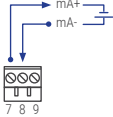
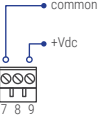


Table 3 - INPUT signal connections

INPUT signal	Input terminals						Section
	1	2	3	4	5	6	
≤600 Vac				~Vac		~Vac	AC Voltages
≤600 Vdc				comm.		±Vdc	DC Voltages
≤2 Vac				~mVac	~mVac		AC Voltages
≤2 Vdc				comm.	±mVdc		DC Voltages
≤5 Aac	~Aac	~Aac					AC Currents
≤5 Adc	-Adc (out)	+Adc (in)					DC Currents
≤75 mAac	~mAac		~mAac				AC Currents
≤75 mAdc	-mAdc (out)		+mAdc (in)				DC Currents
Frequency	Connect to the Aac, mAac, Vac or mVac terminals, according to the signal measured (AC voltage or AC current)						Frequency AC

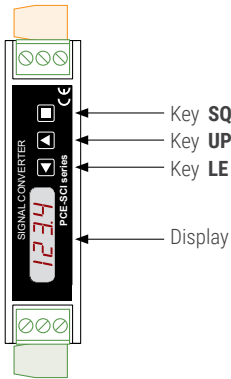
Table 4 - OUTPUT signal connections

OUTPUT signal	Output terminals			Connections
	7	8	9	
4/20 mA active output		mA- (in)	mA+ (out)	
4/20 mA passive output* (*external loop power needed)	mA+ (out)	mA- (in)		
0/10 Vdc	common		+Vdc	

HOW TO OPERATE THE INSTRUMENT

Configuration system

The instrument is fully configurable from the 3 push button keypad and the 4 red digit led display at the front of the instrument.



Normal mode of operation

AT POWER-UP

When the power supply is connected, the instrument applies the following sequence :

- » the display shows the firmware code A6.xx.
- » the display shows the configured units and input range (for example: Vac and 600V).
- » the instrument is now in normal mode of operation and the display shows the information configured at Display information

FROM NORMAL MODE OF OPERATION

From normal mode of operation, the operator can access the following functions:

- » key SQ gives access to the configuration menu.
- » key UP gives access to the force menu.
- » key LE activates the messages function.

ECO FUNCTION (DISPLAY POWERED OFF)

The Eco function powers off the display under the following conditions:

- » the instrument is in normal mode of operation.
- » and there is no interaction from the operator for 60 seconds.

The decimal point remains active (flashing), indicating that the instrument is working correctly. This is a configurable function, enabled by default.

How to operate the Configuration menu

HOW TO ENTER THE CONFIGURATION MENU

With the instrument in normal mode of operation, press the SQ key and maintain for 1 second. The horizontal leds light from bottom to top. When the upper led lights, the instrument enters into the configuration menu.

When entering the configuration menu, the first menu entry Function code (codE) is displayed.

If the SQ key is released before entering into the configuration menu, the horizontal leds light downwards from top to bottom, and the instrument returns to normal mode of operation.

HOW TO OPERATE INSIDE THE CONFIGURATION MENU

Inside the configuration menu, use the front keypad to move through menu entries, parameters, and select configuration values:

- » Key SQ functions as the ENTER key. It selects the menu entry currently displayed. At numerical value entries, it validates the number displayed.
- » Key UP moves vertically through the different menu entries. At numerical value entries, it modifies the selected digit by increasing its value to 0, 1, 2, 3, 4, 5, 6, 7, 8, 9.
- » Key LE functions as the ESCAPE key. It leaves the selected menu entry, and eventually, will leave the configuration menu.

When leaving the configuration menu, the changed parameters are activated. At numerical value entries, the LE key allows to select the active digit. To modify a numeric value press the UP key to increase the value +1. Press the SQ key to validate the value.

WHEN EXITING THE CONFIGURATION MENU

When exiting the configuration menu without changes (either by rollback activation or because there are no changes in the configuration), the horizontal leds light down from top to bottom, and the instrument returns to normal mode of operation.

When exiting the configuration menu with changes, the display leds light a round shape while the new configuration is stored. When the round shape is finished, a start-up is applied. After start-up, the new configuration is active and the instrument is in normal mode of operation.

ROLLBACK FUNCTION

If there is no interaction from the operator for 60 seconds, the instrument exits the configuration menu discarding changes, and returns to normal mode of operation.



When the operator is inside the configuration menu, the output signal will remain overranged at maximum signal. Additional configurations are available at the On error parameter.



When the operator exits the configuration menu, the output signal is temporarily set to minimum value for a time <5 seconds, while the instrument restarts.

How to operate the Force menu

HOW TO ENTER THE FORCE MENU

With the instrument in normal mode of operation, press and hold the UP key for 1 second. The horizontal leds light from bottom to top. When the upper led lights, the instrument enters into the force menu. If the UP key is released before entering into the force menu, the horizontal leds light downwards from top to bottom, and the instrument returns to normal mode of operation.

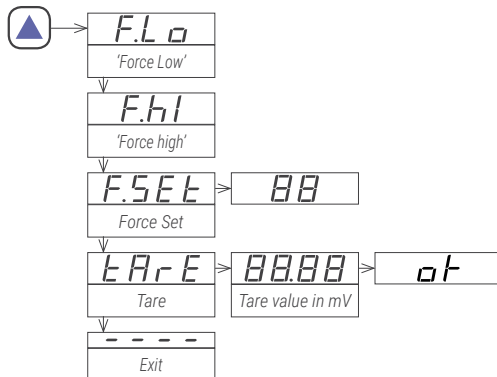
HOW TO OPERATE INSIDE THE FORCE MENU

The available functions inside the force menu can be configured. By default, Force High, Force Low, Force Set and Tare are available. Inside the force menu:

- » press the UP key to move to the next function.
- » press the SQ key to activate the selected function.

When the function is active, the display will remain flashing. Press the SQ key to deactivate the function (display stops flashing), or wait for the rollback to activate.

Example of Force menu with all functions set to on



DESCRIPTION OF FORCE FUNCTIONS

The force functions allow to manually force the output signal to the low and high levels of the output signal selected. These functions allow to easily validate the correct function of remote elements connected to the instrument output, such as PLC, HMI's, SCADAs, etc.

- » The force low function sets the output signal to the minimum value of the selected range (4 mA or 0 Vdc or the value configured at the output_low parameter).
- » The force high function sets the output signal to the maximum value of the selected range (20 mA or 10 Vdc or the value configured at the output_high parameter).
- » The force set function sets the output signal to a value between 0 and 100% of the maximum selected range (4 to 20 mA or 0 to 10 Vdc or the range configured at the output_low and output_high parameters). When entering the force set function, the display reads 50 (the output is forced to 50% of the configured range). Use keys UP and LE to move up to 100% or down to 0% of the configured range.

HOW TO EXIT FORCE MENU

To exit the force menu, press the LE key, or press the key UP key until the parameter ---- appears, and select by pressing the SQ key, or wait without pressing any key until the automatic rollback activates. When exiting the force menu, the horizontal leds light down from top to bottom, and the instrument returns to normal mode of operation.

ROLLBACK FUNCTION

If there is no interaction from the operator for 60 seconds, the instrument exits the force menu and returns to normal mode of operation.

How to activate the Messages function

With the instrument in normal mode of operation, press the LE key to activate the messages function. The messages function displays information about the instrument status. The information available is configurable.

The messages function ends when all the information has been displayed or front keys UP or SQ are pressed. The display returns to normal mode of operation.

Fast and advanced configurations

FAST CONFIGURATION

The fastest way to configure the instrument is to activate one of the predefined configuration codes.

Access the configuration menu and enter the Function code (codE) menu entry. The code displayed is the current active input - output range.

Select the new code and validate. Selecting a code automatically exits the configuration menu and activates the new configuration.



There are different codes for 4/20 mA and 0/10 Vdc output signals.

To customize the input and output signals, see the Advanced scaling section of the configuration menu.

ADVANCED CONFIGURATION

Additional configuration parameters are available at the configuration menu. The operator can customize the input and output signal ranges, the messages seen on display, the functions available at the force menu, the messages associated to the LE key, activate filters, password function, etc.



All Vdc and Adc input signal ranges can be customized to read bipolar ranges. Check the Advanced scaling section of the configuration menu.

INPUT SIGNALS



AC Voltages

INPUT RANGES FOR AC VOLTAGES

The instrument can be configured to measure AC voltages, with pre-configured ranges from 50 mVac up to 600 Vac. Measure is performed in True RMS value. Accepts phase-to-neutral and phase-to-phase connections. See connections below.

PREDEFINED CONFIGURATION CODES

See Table 9 for a list of predefined input-output configuration codes. To activate a code see section Function codes.

CUSTOMIZED SIGNAL RANGES

To customize the input and / or output signal ranges, access the Advanced scaling menu.

MAXIMUM OVERSIGNAL

Maximum oversignal is the maximum signal accepted by the instrument. Higher signal values may damage the instrument. Lower signal values are non destructive but may be out of accuracy specifications.

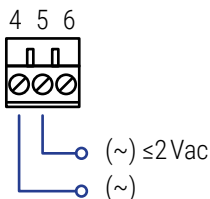
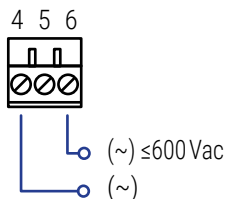


Table 9 - Input signal ranges for AC voltage signals

Input range	Output 4/20 mA Code	Output 0/10 Vdc Code	Accuracy (% FS)	Max. oversignal	Zin
0/600 Vac	010	110	<0.30 %	800 Vac	13 MOhm
0/450 Vac	011	111	<0.30 %		
0/300 Vac	012	112	<0.30 %		
0/150 Vac	013	113	<0.30 %		
0/100 Vac	014	114	<0.30 %		
0/60 Vac	015	115	<0.30 %		
0/30 Vac	016	116	<0.30 %		
0/15 Vac	017	117	<0.30 %		
0/10 Vac	018	118	<0.30 %		
0/2 Vac	019	119	<0.30 %	50 Vac	81 KOhm
0/1 Vac	020	120	<0.30 %		
0/500 mVac	021	121	<0.30 %		
0/300 mVac	022	122	<0.30 %		
0/200 mVac	023	123	<0.30 %		
0/150 mVac	024	124	<0.30 %		
0/100 mVac	025	125	<0.30 %		
0/75 mVac	026	126	<0.30 %		
0/60 mVac	027	127	<0.30 %		
0/50 mVac	028	128	<0.30 %		



DC Voltages

INPUT RANGES FOR DC VOLTAGES

The instrument can be configured to measure DC voltages with pre-configured ranges from 50 mVdc up to 600 Vdc. See connections below. Bipolar ranges from ± 50 mVdc up to ± 600 Vdc can also be configured.

PREDEFINED CONFIGURATION CODES

See Table 11 for a list of predefined input-output configuration codes. To activate a code see section Function codes.

CUSTOMIZED SIGNAL RANGES

To customize the input and / or output signal ranges, access the Advanced scaling menu.

MAXIMUM OVERSIGNAL

Maximum oversignal is the maximum signal accepted by the instrument. Higher signal values may damage the instrument. Lower signal values are non destructive but may be out of accuracy specifications.

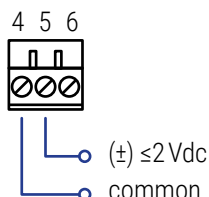
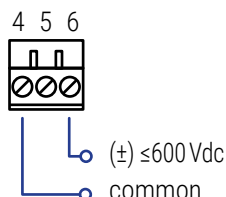


Table 11 - Input signal ranges for DC voltage signals

Input range	Output 4/20 mA Code	Output 0/10 Vdc Code	Accuracy (% FS)	Max. oversignal	Zin
0/600 Vdc	032	132	<0.20 %	800 Vdc	13 MOhm
0/450 Vdc	033	133	<0.20 %		
0/300 Vdc	034	134	<0.20 %		
0/150 Vdc	035	135	<0.20 %		
0/100 Vdc	036	136	<0.20 %		
0/60 Vdc	037	137	<0.20 %		
0/30 Vdc	038	138	<0.20 %		
0/15 Vdc	039	139	<0.20 %		
0/10 Vdc	040	140	<0.20 %		
0/2 Vdc	041	141	<0.20 %	50 Vdc	81 KOhm
0/1 Vdc	042	142	<0.20 %		
0/500 mVdc	043	143	<0.20 %		
0/300 mVdc	044	144	<0.20 %		
0/200 mVdc	045	145	<0.20 %		
0/150 mVdc	046	146	<0.20 %		
0/100 mVdc	047	147	<0.20 %		
0/75 mVdc	048	148	<0.20 %		
0/60 mVdc	049	149	<0.20 %		
0/50 mVdc	050	150	<0.20 %		



AC Currents

INPUT RANGES FOR AC CURRENTS

The instrument can be configured to measure AC currents with pre-configured ranges from 5 mAac up to 5 Aac. Measure is performed in True RMS value. Accepts phase-to-neutral and phase-to-phase connections. See connections below.

PREDEFINED CONFIGURATION CODES

See Table 13 for a list of predefined input-output configuration codes. To activate a code see section Function codes.

CUSTOMIZED SIGNAL RANGES

To customize the input and / or output signal ranges, access the Advanced scaling menu.

MAXIMUM OVERSIGNAL

Maximum oversignal is the maximum signal accepted by the instrument. Higher signal values may damage the instrument. Lower signal values are non destructive but may be out of accuracy specifications.

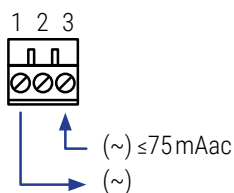
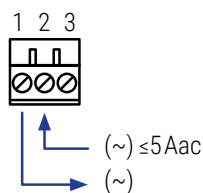


Table 13 - Input signal ranges for AC current signals

Input range	Output 4/20 mA Code	Output 0/10 Vdc Code	Accuracy (% FS)	Max. oversignal	Zin
0/5 Aac	055	155	<0.30 %	7 Aac (max. 7 sec.)	20 mOhm
0/4 Aac	056	156	<0.30 %		
0/3 Aac	057	157	<0.30 %		
0/2 Aac	058	158	<0.30 %		
0/1 Aac	059	159	<0.30 %		
0/500 mAac	060	160	<0.30 %		
0/300 mAac	061	161	<0.30 %		
0/75 mAac	062	162	<0.30 %	150 mAac	3.33 Ohm
0/50 mAac	063	163	<0.30 %		
0/20 mAac	064	164	<0.30 %		
0/10 mAac	065	165	<0.30 %		
0/5 mAac	066	166	<0.30 %		



DC Currents

INPUT RANGES FOR DC CURRENTS

The instrument can be configured to measure DC currents with pre-configured ranges from 5 mAdc up to 5 Adc. See connections below. Bipolar ranges from ± 5 mAdc up to ± 5 Adc can also be configured.

PREDEFINED CONFIGURATION CODES

See Table 15 for a list of predefined input-output configuration codes. To activate a code see Function codes.

CUSTOMIZED SIGNAL RANGES

To customize the input and / or output signal ranges, access the Advanced scaling menu.

MAXIMUM OVERSIGNAL

Maximum oversignal is the maximum signal accepted by the instrument. Higher signal values may damage the instrument. Lower signal values are non destructive but may be out of accuracy specifications.

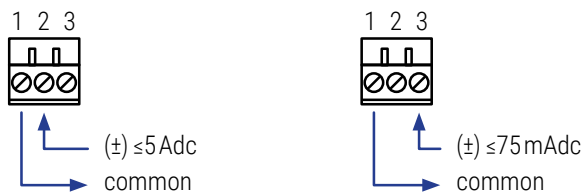


Table 15 - Input signal ranges for DC current signals

Input range	Output 4/20 mA Code	Output 0/10 Vdc Code	Accuracy (% FS)	Max. oversignal	Zin
0/5 Adc	072	172	<0.20 %	7 Aac (max. 7 sec.)	20 mOhm
0/4 Adc	073	173	<0.20 %		
0/3 Adc	074	174	<0.20 %		
0/2 Adc	075	175	<0.20 %		
0/1 Adc	076	176	<0.20 %		
0/500 mAdc	077	177	<0.20 %		
0/300 mAdc	078	178	<0.20 %	150 mAac	3.33 Ohm
0/75 mAdc	079	179	<0.20 %		
0/50 mAdc	080	180	<0.20 %		
0/20 mAdc	081	181	<0.20 %		
0/10 mAdc	082	182	<0.20 %		
0/5 mAdc	083	183	<0.20 %		



Frequency AC

INPUT RANGES FOR FREQUENCY AC

The instrument can be configured to measure frequency from AC voltages and AC currents, for typical power network frequency of 50 and 60 Hz, and up to 100 Hz.

PREDEFINED CONFIGURATION CODES

See Table 18 for a list of predefined configuration codes for input-output signal ranges. To activate a code see section Function codes.

CUSTOMIZED SIGNAL RANGES

To customize the input and / or output signal ranges, access the Advanced scaling menu.

CONNECTIONS

The frequency signal is measured from Vac or Aac signals. Use the Vac or Aac signal connections according to the input signal connected. See connections below.

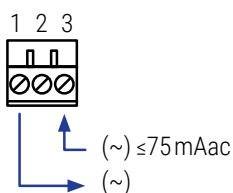
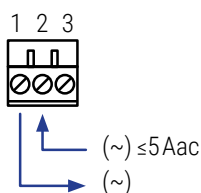
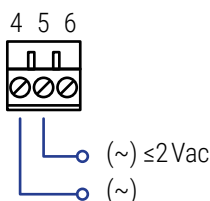
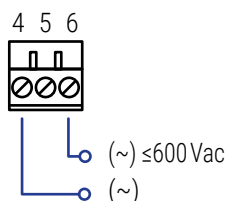


Table 18 - Input signal ranges for AC frequency signals

Input signal range	Output 4/20 mA Code	Output 0/10 Vdc Code	Accuracy (% FS)
0/100 Hz (Vac)	089	189	<0.20 %
45/55 Hz (Vac)	090	190	<0.20 %
55/65 Hz (Vac)	091	191	<0.20 %
0/100 Hz (Aac)	092	192	<0.20 %
45/55 Hz (Aac)	093	193	<0.20 %
55/65 Hz (Aac)	094	194	<0.20 %

TECHNICAL SPECIFICATIONS

INPUT SIGNAL RANGES VAC	
ranges	50 mVac ... 600 Vac
type of measure	True RMS
connections accepted	phase-to-phase phase-to-neutral
category of measure	CAT-II ... 300 Vac
INPUT SIGNAL RANGES VDC	
ranges unipolar	0/50 mVdc ... 0/600 Vdc
ranges bipolar	±50 mVdc ... ±600 Vdc
INPUT SIGNAL RANGES AAC	
ranges	5 mAac ... 5 Aac
type of measure	True RMS
connections accepted	phase-to-neutral phase-to-phase
INPUT SIGNAL RANGES ADC	
ranges unipolar	0/5 mAdc ... 0/5 Adc
ranges bipolar	±5 mAdc ... ±5 Adc
FREQUENCY AC	
ranges	< 100 Hz
measured from	measured from existing Vac and Aac signal ranges
ACCURACY AT 25 °C	see for each type of signal at section Input signals
THERMAL DRIFT	150 ppm/°

STEP RESPONSE	
AC signals	<350 mSec. typ. (0 ... 99%)
DC signals* (*see Power filter at section Tools menu)	<90 mSec. typ. (0 ... 99%) no filter
	<175 mSec. typ. (0 ... 99%) 50 Hz filter or 60 Hz filter
	<350 mSec. typ. (0 ... 99%) 50 and 60 Hz filter
OUTPUT SIGNAL RANGES	
active current output	4/20 mA active max. <22 mA, min. 0 mA maximum load <400 Ohm
passive current output	4/20 mA passive max. 30 Vdc on terminals
voltage output	0/10 Vdc, max. <11 Vdc, min. -0.05 Vdc (typ.) minimum load > 10 KOhm
CONFIGURATION SYSTEM	
key pad + display	accessible at the front of the instrument
configuration	configuration menu and predefined codes
scalable units	scalable input ranges scalable output ranges scalable process display
POWER SUPPLY	
voltage range	18 ... 265 Vac/dc isolated (20 ... 240 Vac/dc $\pm 10\%$)
AC frequency	45 ... 65 Hz
consumption	<1.5 W
power wires	1 mm ² ... 2.5 mm ² (AWG17 ... AWG14)
overvoltage category	2
ISOLATION	
input - output	3000 Veff (60 seconds)
power - input	3000 Veff (60 seconds)
power - output	3000 Veff (60 seconds)

ENVIRONMENTAL	
IP protection	IP30
impact protection	IK06
operation temperature	0 ... +50 °C
storage temperature	-20 ... +70 °C
warm-up' time	15 minutes
humidity	0 ... 95% non condensing
altitude	> 2000 meters
MECHANICAL	
size	106 x 108 x 22.5 mm
mounting	standard DIN rail (35 x 7.5 mm)
connections	plug-in screw terminal (pitch 5.08 mm)
housing material	polyamide V0
weight	<150 grams
packaging	120 x 115 x 30 mm, cardboard

CONFIGURATION MENU

Function codes

The fastest way to configure the instrument, is to select a predefined configuration code. At the Configuration code (codE) parameter use keys UP and LE to move up and down through the list of codes. Locate the desired code, and press SQ. The instrument shows the codE parameter. Press LE to exit the configuration menu. The instrument stores the new configuration, applies a power-up routine and returns to the normal mode of operation.

Selecting a reserved code or ---- returns to the previous menu without changes.

When entering the Function code (codE) parameter, the active configuration code is displayed. If the actual configuration does not match any of the configuration codes, code uSEr is displayed.

There are different codes for 4/20 mA output (codes from 010 to 099) and 0/10 Vdc output (codes from 110 to 199).

Custom input and output signal ranges can be configured at the Advanced scaling section of the configuration menu.

Input range

At the Input range (InP) menu entry select the input signal range to activate.



If you have already selected a configuration code, the input range has been already selected and there is no need to manually configure again at the Input range (InP) menu entry.

Enter the AC voltages (VAc) parameter for a list of voltage AC input ranges, DC voltages (Vdc) for a list of voltage DC input ranges, AC currents (AAc) for a list of AC current input ranges, DC currents (Adc) for a list of DC current input ranges, Frequency VAc (Frq.V) for AC voltage frequency or Frequency Aac (Frq.A) for AC current frequency measurement.

- » AC voltage ranges available are 600 Vac, 300 Vac, 150 Vac, 60 Vac, 30 Vac, 2 Vac, 1 Vac, 500 mVac, 300 mVac and 200 mVac.
- » DC voltage ranges available are 600 Vdc, 300 Vdc, 150 Vdc, 60 Vdc, 30 Vdc, 2 Vdc, 1 Vdc, 500 mVdc, 300 mVdc and 200 mVdc.
- » AC current ranges available are 5 Aac, 2 Aac, 500 mAac, 75 mAac, 50 mAac, 20 mAac, 10 mAac and 5 mAac.
- » DC current ranges available are 5 Adc, 2 Adc, 500 mAdc, 75 mAdc, 50 mAdc, 20 mAdc, 10 mAdc and 5 mAdc.
- » frequency from AC voltages. Single range up to 100 Hz. Measured from the AC voltage signal.
- » frequency from AC currents. Single range up to 100 Hz. Measured from the AC current signal.

Input signal ranges are also accessible as predefined configuration codes. The predefined configuration codes include some additional input - output ranges that are not available at the Input range (InP) list of ranges.

All DC input ranges activate the unipolar range by default.

Example: select the 60 Vdc input range activates the 0/60 Vdc=4/20 mA or 0/60 Vdc=0/10 Vdc configuration.

- » To customize to a smaller range (for example 0/45 Vdc) or a bipolar range (for example ± 45 Vdc) see section Advanced scaling.
- » To manually select the output signal see section Output range.
- » To customize the output range for a smaller range (for example ± 45 Vdc=6/15 mA or ± 45 Vdc=1/5 Vdc) see section Advanced scaling.

Output range

At the Output range (out) menu entry, select the output signal range to 4/20 mA (value 420) or to 0/10 Vdc (value 010).

The output signal range selected can be later customized to operate in a reduced range of signal.

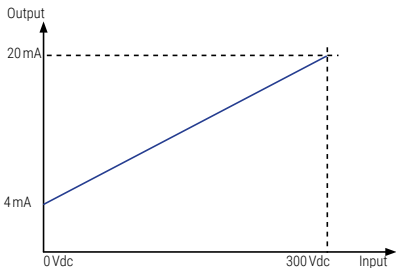
Advanced scaling

At the Advanced scaling (Ad.Sc) menu, the input and output signal ranges can be customized. The parameters inside this menu represent the real input and output signal ranges configured at the instrument. When selecting a predefined configuration code, these parameters are configured according to the code selected. The parameters listed below, are accessible for manual configuration:

- » at the **Input low signal (In.Lo)** parameter configure the low input signal value.
- » at the **Input high signal (In.hi)** parameter configure the high input signal value.
- » at the **Output low signal (ou.Lo)** parameter configure the low output signal value.
- » at the **Output high signal (ou.hi)** parameter configure the high output signal value.

These four parameters define the relation between the input and the output signal (see Table 19) and can be modified independently, to match the specific input-output relation for your application (see Table 20).

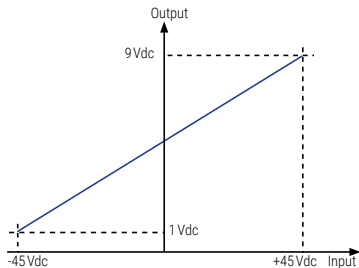
Table 19 - EXAMPLE FOR CODE 034 (0/300 VDC=4/20 mA)



Selecting the predefined code 034 configures a range of 0/300 Vdc=4/20 mA, and the values configured are as indicated below:

input_low = 0 Vdc	output_low = 4.00 mA
input_high = 300 Vdc	output_high = 20.00 mA

Table 20 - EXAMPLE FOR BIPOLAR RANGE



To configure a ± 45 Vdc=1/9 Vdc application, select code 137 (0/60 Vdc=0/10 Vdc) and then configure the parameters below:

input_low = -45.0 Vdc	output_low = +1.00 Vdc
input_high = +45.0 Vdc	output_high = +9.00 Vdc

Additionally, a process value can be scaled using the last three parameters of the Advanced Scaling (Ad.Sc) menu entry. The scaled process value can be accessed through the display information function or the messages function.

- » at the **Process low (Pr.Lo)** parameter, configure the process value associated to the low input signal value.
- » at the **Process high (Pr.hi)** parameter, configure the process value associated to the high input signal value.
- » at the **Process decimal point (Pr.dP)** parameter, configure the decimal point position for the process value.
- » **Example:** a 0/60 mVdc signal from a shunt is associated to a 0/150.0 Adc process value. Configure the process value to 0 and 150.0 (Process low = 0, Process high=1500, Process decimal point=xxx.x).

Display information

At the Display information (dISP) menu select one parameter to read on display when the instrument is in normal mode of operation. If you need access to more than one information, see the messages function associated to front key LE.

- » select **Input signal value (InP.S)** to read the input signal value and the measurement units (for example: Inp mV 8.52).
- » select **Output signal value (out.S)** to read the output signal value and the measurement units (for example : Out mA 12.40).
- » select **Label (LABL)** to read the value configured at the label parameter.
- » select **Process value (Proc)** to read the process value as scaled at the process parameters (for example: Proc 150.0).
- » select **Percentage (Prct)** to read the percentage of input signal, where 0 is the value assigned to the input signal low parameter, and 100 is the value assigned to the input signal high parameter (for example: Prct 23.5).

Key UP (force menu)

The key UP at the front of the instrument gives access to a configurable list of functions.

At the Key UP (force menu) (K.uP) menu select which functions will be available when pressing the front key UP. Select on to activate the desired functions.

- » configure **Force Low (F.Lo)** to on to activate the Force low function menu entry.
- » configure **Force High (F.hi)** to on to activate the Force high function menu entry.
- » configure **Force Set (F.SET)** to on to activate the Force set function menu entry.

The functions configured to on are available at the force menu.

Key LE (messages function)

The key LE at the front of the instrument gives access to a configurable set of information messages.

At the Key LE (messages function) (K.LE) menu, select the informations to be displayed when the front key LE is pressed. Select on to activate each information.

- » configure **Input signal value (InP.5)** to on to see the actual input signal value and units (for example: Inp Vac 48.7).
- » configure **Output signal value (out.5)** to on to see the actual output signal value and units (for example : Out mA 12.40).
- » configure **Label (LAbL)** to on to see the value configured at the label parameter
- » configure **Process value (Proc)** to on to see the process value as configured at the process parameters (for example: Proc 150.0).
- » configure **Percentage (Prct)** to on to see the actual percentage of input signal, where 0 is the value assigned to the input signal low parameter, and 100 is the value assigned to the input signal high parameter (for example: Prct 23.5).

When more than one parameter is set to on, values will be displayed sequentially, in the same order as they are listed in the menu, with a middle dash - between them. When all information has been displayed, the instrument returns to normal mode of operation.

Tools menu

The **Tools (tool)** menu groups several functions.

- » at the **Eco mode (Eco)** parameter, define the time to wait before the display is powered off (while in normal mode of operation). Default value is 60 seconds. Configure 0 to disable the function and maintain the display always on.
- » at the **SOS mode (SoS)** parameter select on to activate the output signal to a predefined value. Select the value from 0 to 100 % of the active output range (4/20 mA or 0/10 Vdc). To deactivate the SOS mode select off.
- » at the **Label (LAbL)** parameter, define an alphanumerical value to be displayed on the display, when the instrument is in normal mode of operation, or at the messages function when the key LE is pressed. The label can be used to identify the instrument with its own internal factory code. If more than four characters are needed, configure the **Label 2 (LbL.2)** parameter. The total label value is the characters at label followed by the characters at label2.
- » at the **On error (on.Er)** parameter, configure the behavior of the output signal, in case of error at the input signal.
- » select **Output to high (to.hI)** to force the output signal to overrange to maximum value
- » select **Output to low (to.Lo)** to force the output signal to underrange to minimum value
- » select **Standard output (Stdr)** to overrange output signal to maximum value in case of input signal overrange, and to underrange output signal to minimum value in case of input signal underrange.
- » at the **On SQ (on.Sq)** parameter, configure the behavior of the output signal when the operator is inside configuration menu.
- » select **Output to high (to.hI)** to force the output signal to overrange to maximum value
- » select **Output to low (to.Lo)** to force the output signal to underrange to minimum value

- » at the **Power filter (P.Flt)** parameter, select a filter for specific power frequency rejection. The filter selection has an effect on the response times. Applies only to DC signal ranges. AC signal ranges automatically configure this parameter to 50 and 60 Hz filter and this value can not be changed.
- » select **No filter (nonE)** to disable frequency rejection filters. This enables the fastest response time.
- » select **50 Hz filter (50.hZ)** to enable rejection to 50 Hz frequency.
- » select **60 Hz filter (60.hZ)** to enable rejection to 60 Hz frequency.
- » select **50 and 60 Hz filter (both)** to enable rejection to both 50 Hz and 60 Hz frequencies. This is the slowest response time.
- » at the **Average filter (AVr)** parameter, configure the recursive filter to be applied to measured input signal. The filter can be used to reduce oscillations on noisy signals. Configure the filter strength between 0 and 100. The filter is stronger with higher values. Increasing the strength of the filter slows the response speed of the instrument. Value 0 disables the filter.
- » at the **Dead band (d.bnd)** parameter set a value between 0.0 % and 100.0 %. This is a percentage of the input signal high parameter configured at the Advanced scaling section. Input signals below this value, are treated as a 0. This parameter applies to all measuring ranges. For bipolar ranges, the dead-band is bipolar and centered at 0.
- » **Example:** instrument configured with code 012 ($0/300\text{Vac} = 4/20\text{ mA}$) and input signal high parameter modified to 250Vac for an effective input - output relation of $0/250\text{Vac} = 4/20\text{ mA}$. Configure the Dead band parameter to 1.0 to set a dead band value of 2.5Vac . All signals below 2.5Vac will be treated as 0 Vac, and the output will be 4 mA.
- » the **Version (VEr)** parameter informs about the firmware version running in the instrument.
- » at the **Password (PASS)** parameter define a 4 digit code to block access to the configuration menu. Activate the password to prevent access to the instrument configuration by non authorized personnel. To activate the Password function select on, enter the code and validate. The password will be requested when accessing the configuration menu. The password does not block access to the force menu. To deactivate the password, set the parameter to off.
- » at the **Factory reset (FAct)** parameter select yes to activate the default factory configuration

FACTORY DEFAULT PARAMETERS

Function code (codE)	10 [c.010]
Input range (InP)	0/600 Vac
Output range (out)	4/20 mA
Advanced scaling (Ad.Sc)	
Input signal low (In.Lo)	0 [Vac]
Input signal high (In.hI)	600 [Vac]
Output signal low (ou.Lo)	4.00 [mA]
Output signal high (ou.hI)	20.00 [mA]
Process low (Pr.Lo)	0
Process high (Pr.hI)	600
Process decimal point (Pr.dP)	xxx
Display information (dISP)	Input signal value (InP.S)
Key UP (force menu) (K.uP)	
Force low (F.Lo)	on
Force high (F.hI)	on
Force set (FSEt)	on
Key LE (messages function) (K.LE)	
Input signal value (InP.S)	off
Output signal value (out.S)	on
Label (LAbL)	off
Process value (Proc)	off
Percentage (Prct)	off
Tools (tool)	
Eco mode (Eco)	60 [seconds]
SOS mode (SoS)	off
Label (LAbL)	LAbL
Label 2 (LbL.2)	---- (disabled)
On error (on.Er)	to.hI (output to maximum value)
On SQ (on.Sq)	to.hI (output to maximum value)
Power filter (P.FLt)	both (50 and 60 Hz filter)
Average filter (AVr)	0 (disabled)
Dead band (d.bnd)	0.0 (disabled)
Password (PASS)	off (disabled)

RESET TO DEFAULT FACTORY PARAMETERS

To recover the instrument to default factory parameters, enter into configuration menu and go to Tools/Factory reset and select yes

- » access the configuration menu (press key SQ for 1 second)
- » press key UP to locate tools and press SQ
- » parameter Eco mode appears on display
- » press key UP to locate Factory reset and press SQ
- » value no appears on display
- » press key UP and Yes appears on display
- » press key SQ to apply the factory reset
- » the leds light a round shape while the new configuration is applied
- » the start up message appears (Vac 600)
- » the actual signal input value is displayed
- » the instrument is in normal mode of operation

ERROR CODES

In case of error, the error code is shown flashing on the digits. The error code is not visible inside configuration mode or inside the force menu.

The error code remains active on display until the problem that caused the error is solved. In case of multiple error codes, solve the first problem to see the next active error code.

In case of error, the output can be configured to overrange or underrange.

See the On error (on.Er) parameter.

Error	Description
Er.01	Password error. The password code entered is not correct.
Er.02	Input hardware overrange. The input signal is higher than the maximum signal that can be measured.
Er.03	Input hardware underrange. The input signal is lower than the minimum signal that can be measured.
Er.04	Output hardware overrange. The output signal should be higher than the maximum output signal that can be generated.
Er.05	Output hardware underrange. The output signal should be lower than the minimum output signal that can be generated.
Er.06	Display overrange. The display value should be higher than the maximum value that can be displayed.
Er.07	Display underrange. The display value should be lower than the minimum value that can be displayed.
Er.08	Scaled input slope not valid. The values for Input signal low (In.Lo) and Input signal high (In.hi) can not be the same. Enter a different value to validate the parameter
Er.09	Scaled output slope not valid. The values for Output signal low (ou.Lo) and Output signal high (ou.hi) can not be the same. Enter a different value to validate the parameter
Er.10	Scaled process display slope not valid. The values for Process low (Pr.Lo) and Process high (Pr.hi) can not be the same. Enter a different value to validate the parameter

PRECAUTIONS ON INSTALLATION



Check the documentation when you find this symbol, to know the nature of a potential danger and actions to prevent it.



Risk of electrical shock. Instrument terminals can be connected to dangerous voltage.



Instrument protected with double isolation. No earth connection required.



Instrument conforms to CE rules and regulations.

This instrument has been designed and verified conforming to the 61010-1 CE Security Regulation, for industrial applications. Installation of this instrument must be performed by qualified personnel only. This manual contains the appropriate information for the installation. Using the instrument in ways not specified by the manufacturer may lead to a reduction of the specified protection level. Disconnect the instrument from all external circuits before starting any maintenance and / or installation action.

The instrument does not have a general switch and will start operation as soon as power is connected. The instrument does not have protection fuse, the fuse must be added during installation.

The instrument is designed to be DIN rail mounted, inside a closed cabinet, protected from direct impacts. An appropriate ventilation of the instrument must be assured. Do not expose the instrument to excess of humidity. Maintain clean by using a humid rag and do NOT use abrasive products such as alcohols, solvents, etc. General recommendations for electrical installations apply, and for proper functionality we recommend: if possible, install the instrument far from electrical noise or magnetic field generators such as power relays, electrical motors, speed variators, ... If possible, do not install along the same conduits power cables (power, motor controllers, electrovalves, ...) together with signal and/or control cables. The use of shielded cables is recommended to prevent the coupling of environmental electromagnetic noise, connected to earth only one cable end side. Before proceeding to the power connection, verify that the voltage level available matches the power levels indicated in the label on the instrument. In case of fire, disconnect the instrument from the power line, fire alarm according to local rules, disconnect the air conditioning, attack fire with carbonic snow, never with water.



Conformity with security regulations EN-61010-1 requires a closed front cover. There is no need to open the front cover under normal usage or configuration. The output terminal prevents the front cover from opening. An open front cover may expose areas with dangerous voltages. Remove connections with dangerous voltages before opening. Only to be performed by qualified operators.

DISPOSAL

For the disposal of batteries in the EU, the (EU) 2023/1542 directive of the European Parliament applies. Due to the contained pollutants, batteries must not be disposed of as household waste. They must be given to collection points designed for that purpose. In order to comply with the EU directive 2012/19/EU we take our devices back. We either re-use them or give them to a recycling company which disposes of the devices in line with law. For countries outside the EU, batteries and devices should be disposed of in accordance with your local waste regulations. If you have any questions, please contact PCE Instruments.

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