OMEGA™
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USER'S GUIDE

DR-I4F

Signal Converter for Impulses and Frequency Signals, Isolated, for Industrial Applications

1 YEAR WARRANTY

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Signal converter for impulses and frequency signals, isolated, for industrial applications

Isolated signal converter for frequency signals. Configurable to work with NPN, PNP, pick-up, Namur, mechanical contact, reed contact and other types of sensors. Dedicated input to measure frequency from AC voltage signals up to 600 V AC. Accepts a wide range of frequency ranges, from 1 Hz up to 1 MHz, with minimum workable signal of 100 mHz and resolution of 1 mHz.

Configurable output in 4/20 mA (active or passive) or 0/10 V DC. Universal power supply from 18 to 265 V AC/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, and different sensor parameters. Configuration through front push-button keypad. Front information displays 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.

1. How to Order

Reference	Description
DR-I4F	Signal converter for frequency signals

2. Material Included

The instrument is provided with the following elements:

- 1 x instrument **DR-I4F**
- 4 x plug-in screw terminals
- 1 x quick installation guide"

3. Additional Information

To view the DR-I4F spec sheet and manuals visit us at: https://www.omega.com/

4. Installation and Start-Up

Important: 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 at section 20.

Step 1: Install the instrument at the DIN rail

Step 2: Read how to operate the instrument (see section 12)

Step 3: Connect the input, the output and the power terminals (see section 11).

Step 4: Configure the sensor
- choose one of the predefined sensors (see section 9)
- configure the sensor at the instrument (see section 16.1)

Step 5: Configure the input and output signals
- choose a predefined configuration code (see section 8)
- introduce the code at the instrument (see section 16.1)

Step 6: If needed, customize the input and output signal ranges (see section 16.5)

Step 7: If needed, configure the display reading (see section 16.6), the key '**UP**' (▲) 'force' menu (see section 16.7), and the key '**LE**' (◀) 'messages' function (see section 16.8),

Step 8: If needed, block access to the 'configuration menu' (see section 16.9)

5. Typical Applications

To measure frequency signals from low voltage sensors such as NPN, PNP, Namur, pick-up and similar. To measure frequency signals from flow meters. To measure frequency signals from AC power networks up to 600 V AC. Signal acquisition, linearization and transmission to remote acquisition devices. Isolation between circuits provided. Ranges can be scaled to the desired range.

6. 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 sensors, shunts, or deactivating power lines, while the instrument still provides a controlled signal that allows for 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 16.9.

7. Messages

The instrument includes a configurable 'messages' function that provides advanced system information on the display, 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 and scaled process values.

This information is available at any time, and is displayed sequentially when requested. 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 (see Table 1), 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 16.8.

Table 1 | **Available label codes ('Label' parameter)**

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 ('Label' parameter): for an application with multiple engine control, where RPM is being measured for three engines, and converted to 4/20 mA for retransmission to PLC or SCADA. Three DR-I4F

converters are being used, to measure 0/1000 Hz. Each DR-I4F 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

8. Predefined Configuration Codes

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

- for information on how to activate a code, see section 16.1
- to customize the input and output signals, see section 16.5

Table 2 I **Predefined configuration codes - Input / Output**

Input Signal Range	Output 4/20 mA Code	Output 0/10 V DC Code	
0/1 Hz	010	110	
0/2 Hz	011	111	
0/4 Hz	012	112	
0/6 Hz	013	113	
0/8 Hz	014	114	
0/10 Hz	015	115	
0/20 Hz	016	116	
0/40 Hz	017	117	
0/60 Hz	018	118	
0/80 Hz	019	119	
0/100 Hz	020	120	
0/200 Hz	021	121	
0/400 Hz	022	122	
0/600 Hz	023	123	
0/800 Hz	024	124	
0/1 KHz	025	125	
0/2 KHz	026	126	
0/4 KHz	027	127	
0/6 KHz	028	128	
0/8 KHz	029	129	
0/10 KHz	030	130	
0/20 KHz	031	131	
0/40 KHz	032	132	
0/60 KHz	033	133	
0/80 KHz	034	134	
0/100 KHz	035	135	
0/1 MHz	036	136	
Reserved	037 to 099	137 to 199	
(End of list)	'---'		(see notes below)
(Custom selection)	'uSEr'		(see notes below)

Notes:

- Predefined configuration codes do no affect the sensor configuration.
- 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 '**025**' for 0/100 Hz=4/20 mA, the instrument reads code '**025**'. Later, configure the input to 0/950 Hz = 4/20 mA, this does not match a listed code, and the instrument reads '**uSEr**'. Or change the output to 0/100 Hz = 1/5 V DC, 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 with code '**010**'. Select '---' exits the 'configuration menu' without applying changes.

9. Predefined Sensors

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

- for information on how to select a predefined sensor, see section 16.1
- to customize the sensor configuration, see section 16.2

Table 3 | **Predefined sensors and associated configuration**

Sensor	Pull resistors	Gain	Trigger level	Anti rebound	Vexc	Reading channel	Max. Frequency
NPN	pull-up	x1	25	0 mS	+15 V	B	100 KHz
PNP	pull-down	x1	15	0 mS	+15 V	B	100 KHz
Mechanical	pull-up	x1	25	100 mS	+15 V	B	500 Hz
Reed	pull-up	x1	25	100 mS	+15 V	B	500 Hz
Pick-up	none	x100	15	0 mS	+15 V	A	50 KHz
Namur	pull-down	x1	15	0 mS	+8.2 V	B	1 MHz
TTL	none	x1	15	0 mS	+5 V	B	1 MHz
V AC	none	x1	15	0 mS	Off	A	1 KHz

10. Reading Channels

Reading channels '**A**' and '**B**' have different frequency bandwidths and different detection levels. Each 'Predefined sensor' has a channel, assigned by default, although the channel can also be manually configured (see section 16.2). Below are the characteristics of each channel.

Channel 'A'

- has a 'zero crossing' type of detection
- has a bandwidth limit of 80 KHz (with gain 'x1') and 30 KHz (with gain 'x100'). Maximum frequencies for each type of sensor are listed at 'Table 3'.
- has a configurable gain of 'x1' or 'x100', available to signals connected at terminals '1, 2, 3'. Use the 'x100' gain to work with pick-up signals with at least 10 mVpp.

Channel 'B'

- has signal detection levels at approximately '<1 V' and '>2 V', which provides a higher noise immunity when compared to channel '**A**'.
- has a bandwidth limit of 1 MHz.
- is the default channel for all sensors, except V AC and pick-up.

11. Connections and Dimensions (mm (inch)))

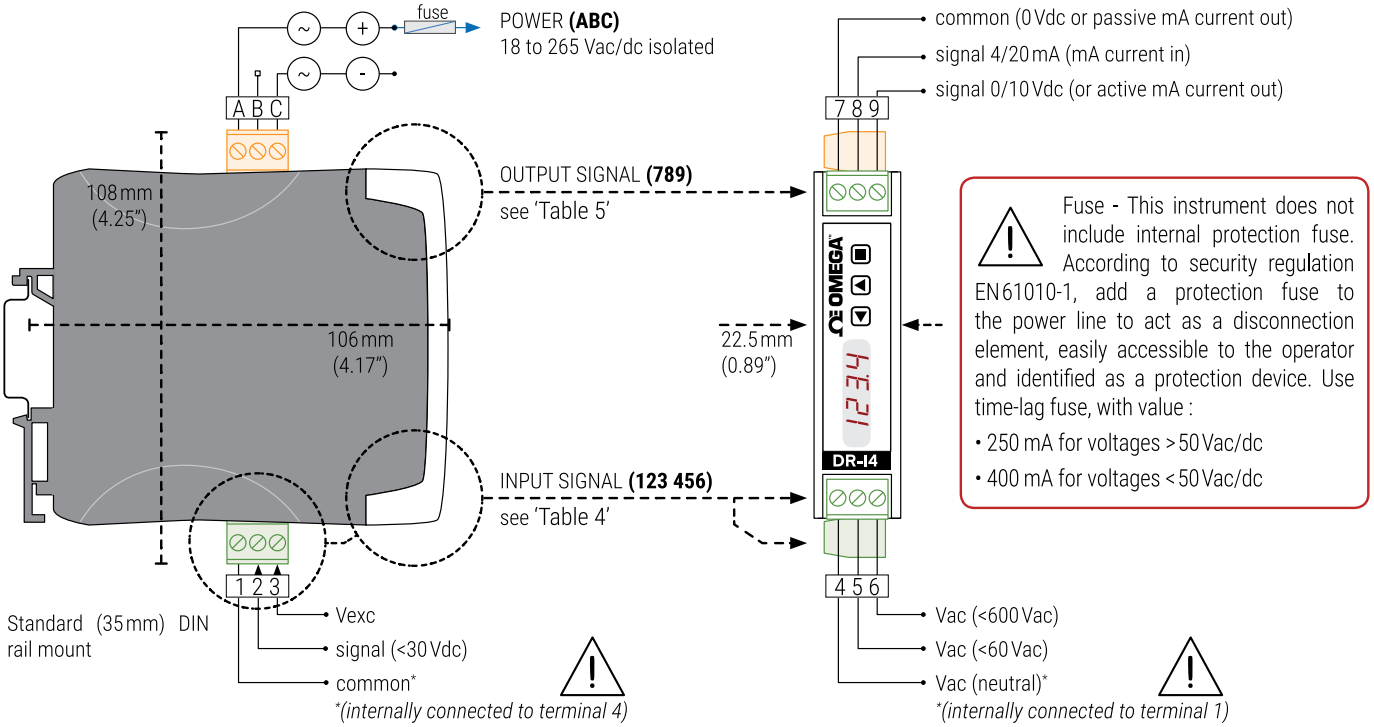
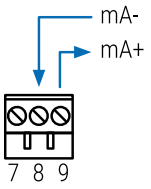
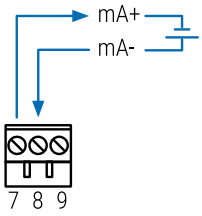
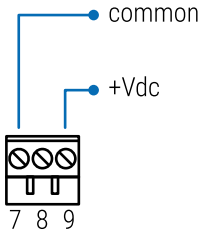


Table 4 I **INPUT signal connections**

INPUT signal	Input terminals					
	1	2	3	4	5	6
V AC (<600 V AC)				~V AC		~V AC
V AC (<60 V AC)				~V AC	~V AC	
NPN (2 wires)	common	signal				
PNP (2 wires)		signal	Vexc			
NPN, PNP (3 wires)	common	signal	Vexc			
Pick-up	common	signal				
Namur		signal	Vexc			
Mechanical contact	common	signal				
Reed contact	common	signal				
Others	common	signal	Vexc			

Caution: Terminal 4 and terminal 1 are internally connected. Connecting dangerous voltages to terminal 4 makes terminal 1 a terminal with dangerous voltage.

Table 5 | **Output Signal Connections**

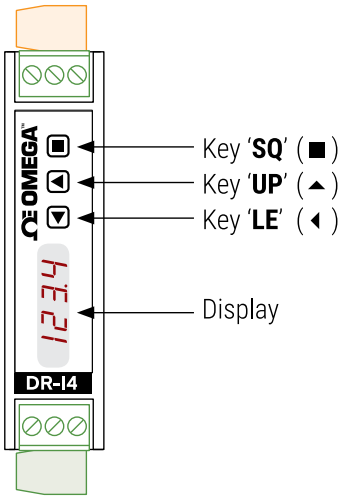
OUTPUT signal	Output terminals			Connections
	7	8	9	
4/20 mA active output		mA- (in)	mA+ (out)	
4/20 mA passive output* (*external loop power needed)	mA+ (out)	mA- (in)		
0/10 V DC	common		+V DC	

12. How to Operate the Instrument

12.1. Configuration System

The instrument is fully configurable from the 3 push button keypad a the 4 red digit led display at the front of the instrument (see Table 6).

Table 6 | **Configuration System**



12.2. '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 '**b4.xx**'.
- the 'display' shows the configured 'sensor', 'input range' and 'units', (for example: '**SEnSor nPn**', '**1.000**' and '**KHz**').
- the instrument is now in 'normal mode' of operation and the 'display' shows the 'information' configured at section 16.6.

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' (see section 12.3).
- key '**UP**' (▲) gives access to the 'force' menu (see section 12.4).

- key '**LE**' (◀) activates the 'messages' function (see section 12.5).

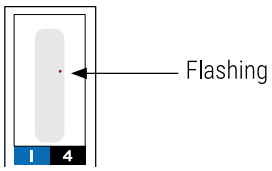
'ECO' FUNCTION ('DISPLAY' POWERED OFF)

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

- the instrument is in 'normal mode' of operation.
- 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. To configure the 'Eco' function, see section 16.9.

Table 7 I **'ECO' Decimal Point**



12.3. How to Operate the Configuration Menu

HOW TO ENTER THE 'CONFIGURATION MENU'
With the instrument in 'normal mode' of operation (see section 12.2), 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. See section 17 for a full view of the 'configuration menu'.

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. The most significant digit has additional values '-' and '-1'.

• **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 (see section 12.2). 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.

Important: When the operator is inside the 'configuration menu', the output signal will remain overranged at maximum signal. Additional configurations are available at the '**On 'Sq''** parameter (see section 16.9).
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.

12.4. How to Operate the 'Force' Menu

HOW TO ENTER THE 'FORCE' MENU

With the instrument in 'normal mode' of operation (see section 12.2), 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.

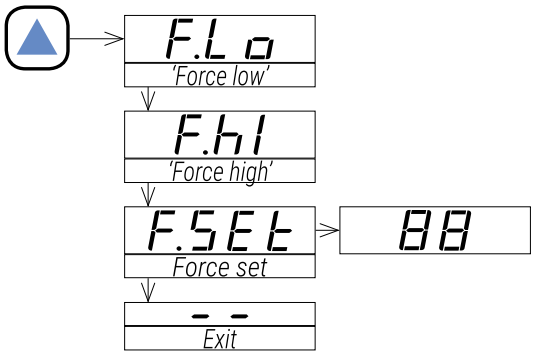
HOW TO OPERATE INSIDE THE 'FORCE' MENU

The available functions inside the 'force' menu can be configured (see section 16.7). By default, 'Force high', 'Force low' and 'Force set' 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.

Table 8 | **Example of 'Force' menu with all functions set to 'on'**



See section 16.7 for a list and a description of available functions

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 V DC 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 V DC 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 V DC 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."

12.5. How to Activate the 'Messages' Function

HOW TO ACTIVATE 'MESSAGES' FUNCTION

With the instrument in 'normal mode' of operation (see section 12.2), press the '**LE**' (◀) key to activate the 'messages' function. The 'messages' function displays information about the instrument. The information available is configurable (see section 16.8).

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.

12.6. Fast and Advanced Configurations

FAST CONFIGURATION

The fastest way to configure the instrument is to activate one of the predefined configuration codes (see section 8) and predefined sensors (see section 9).

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 automat exits the 'configuration menu' and activates the new configuration.

Important: There are different codes for 4/20 mA and 0/10 V DC output signals.

Access the 'configuration menu' and enter the '**Predefined sensors**' (**SnSr**) menu entry. The sensor displays the actual configured sensor. Select the desired sensor and validate.

To customize the input and output signals, see the 'Advanced scaling' section of the 'configuration menu' (see section 16.5).

To customize the sensor parameters, see the 'Sensor configuration' section of the 'configuration menu' (see section 16.2).

ADVANCED CONFIGURATION

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

See section 16 for a detailed explanation on the 'configuration menu'."

13. Input Signals

13.1. Low Voltage Frequency Signals

SIGNALS ACCEPTED

The instrument can be configured to measure frequency from typical impulse sensors, such as NPN, PNP, pick-up, push-pull, mechanical contact, reed contact, Namur and similar.

The instrument parameters allow to configure pull-up and pull-down resistors, apply signal amplification for very low voltage signal, modify the trigger level, apply anti-rebound filters, and configure the voltage to power the sensor.

Although there is a dedicated menu entry for most popular sensor types, the operator can manually configure the mentioned parameters as needed, as explained in section '16.2'.

PREDEFINED CONFIGURATION CODES

See 'Table 2' for a list of predefined configuration codes for input-output signal ranges. To activate a code see section 16.1.

CUSTOMIZED SIGNAL RANGES

To customize the input and / or output signal ranges, access the 'Advanced scaling' menu (see section 16.5).

ACCURACY AND FREQUENCY LIMITS

Accuracy depends on the calculation mode (see section 15). Maximum frequency depends on the sensor (see Table 3).

TRIGGER LEVELS

When directed through reading channel '**B**' (see section 10), a typical value for level detection is '0' below 1 V DC, and '1' above 2 V DC. Operate the 'Trigger level' parameter (see section 16.2) to empirically move up and down the trigger levels. The limit trigger level are approximately 0.5 V DC and 3 V DC.

Pick-up signals are typically channeled through channel '**A**' and signal is detected as a '0 crossing.' Trigger levels can help improve noise immunity.

13.2. V AC Frequency Signals

SIGNALS ACCEPTED

The instrument has a dedicated input to read frequency from voltages up to 600 V AC and voltages up to 60 V AC. Phase-to-phase and phase-to-neutral connections are accepted.

PREDEFINED CONFIGURATION CODES

See 'Table 2' for a list of predefined configuration codes for input-output signal ranges. To activate a code see section 16.1.

CUSTOMIZED SIGNAL RANGES

To customize the input and / or output signal ranges, access the 'Advanced scaling' menu (see section 16.5).

ACCURACY AND MAXIMUM FREQUENCY

Accuracy depends on the calculation mode (see section 15). Maximum frequency depends on the sensor (see Table 3).

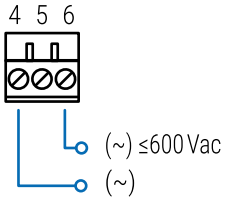
TRIGGER LEVELS

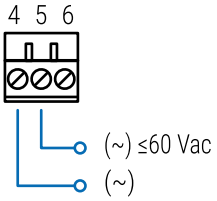
AC signals are channeled through channel '**A**' and signal is detected as a '0 crossing'. Trigger levels can help improve noise immunity around '0'.

MINIMUM AMPLITUDE LEVELS

The minimum voltage levels recommended are 30 V AC for the 600 V AC range, and 6 V AC for the 60 V AC range. Signals with amplitude levels below 6 V AC, should be channeled as 'low voltage' input signals (see section 13.1).

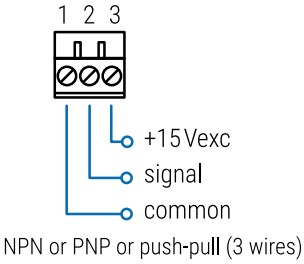
Table 9 | **Connection Examples for V AC <600 V AC and < 60 V AC Signals**



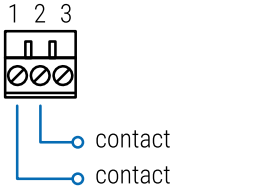


Important: Terminal 4 and terminal 1 are internally connected. Connecting dangerous voltages to terminal 4 makes terminal 1 a terminal with dangerous voltage.

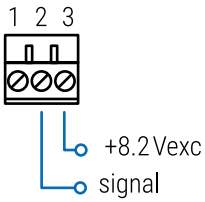
Table 10 | **Connection Examples**



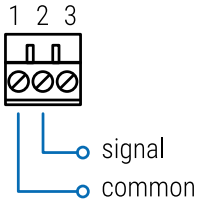
NPN or PNP or push-pull (3 wires)



mechanical contact, reed contact (with internal pull-up)



NAMUR



Pick-up

14. Technical Specifications

SENSORS	
types of sensor	NPN, PNP, pick-up, push-pull, mechanical contact, reed contact, V AC, ...
see the 'Advanced sensor' menu (see section 16.2) for sensor configuration	
max. voltage at terminals	(see Table 3)
input impedance	(see Table 11)
maximum frequency	(see Table 11)
excitation voltage	15 V DC @50 mA 8.2 V DC @50 mA 5 V DC @50 mA
typical detection levels	(see Table 3)
detection levels are changeable through the 'trigger' parameter	
ACCURACY AT 25°C	
'slow' mode error	f2 x 0.5 x 10-6 Hz.
'fast' mode error	1/gate (see 'gate' parameter at section 16.2) (typical error 2 Hz for 'gate' of 0.5 seconds)
quartz accuracy	±50 ppm
mA output accuracy	0.05 % FS
V DC output accuracy	0.10 % FS
thermal drift	50 ppm/°C
min. detectable frequency	100 mHz (signals below 100 mHz are considered 0 Hz)
resolution	1 mHz
STEP RESPONSE	
in 'fast' mode	'Gate' parameter + 50 mSec.
in 'slow' mode	1/frequency + 50 mSec.
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 V DC on terminals
voltage output	0/10 V DC, max. <11 V DC, min. -0.05 V DC (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

Table 11 | **Sensor types and specifications**

Sensor	Zin	Max. voltage at terminals	Minimum detectable signal / detection levels
NPN	5.1 KOhms	±30 V DC	'0' level <1 V, '1' level >2 V
PNP	5.1 KOhms	±30 V DC	'0' level <1 V, '1' level >2 V
Mechanical	5.1 KOhms	±30 V DC	'0' level <1 V, '1' level >2 V
Reed	5.1 KOhms	±30 V DC	'0' level <1 V, '1' level >2 V
Pick-up	100 KOhms	±30 V DC	>10 mVpp
Namur	5.1 KOhms	±30 V DC	---
TTL	5.1 KOhms	±30 V DC	'0' level <1 V, '1' level >2 V
<600 V AC	900 KOhms	800 V AC	---
<60 V AC	340 KOhms	200 V AC	---

POWER SUPPLY	
voltage range	18 to 265 V AC/DC isolated (20 to 240 V AC/DC ±10 %)
AC frequency	45 to 65 Hz
consumption	<3.5 W
power wires	1 mm^2 to 2.5 mm^2 (AWG17 to 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	from 0 to +50 °C
storage temperature	from -20 to +70 °C
'warm-up' time	15 minutes
humidity	0 to 95 % non-condensing
altitude	up to 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

15. Frequency Calculation Modes

The instrument calculates the frequency applying the 'slow' mode or the 'fast' mode.

Fast mode
'Fast' mode activates when the 'input high signal' parameter (see section 16.5) is higher or equal than 500 Hz.

The frequency calculated is the number of impulses received during a time window, divided by the time window value in seconds. The time window is configured at the '**Gate**' (**GAtE**) parameter (see section 16.2) with available values '0.5', '1.0', '2.0 and '4.0' seconds.

The frequency value is calculated at the end of each time window.

Slow mode
'Slow' mode activates when the 'input high signal' parameter is below 500 Hz.

The frequency calculated is the inverse of the time between impulses. The value is calculated and updated every time an impulse is detected.

Measured frequency is '0' when the time between impulses is higher than the value configured at the '**time_to_0**' (**tt0**) parameter (values between '1.0' and '10.0' seconds). Once the reading has dropped to '0 ', the instrument needs 2 impulses to measure a new frequency.

Ranges below 500 Hz can also be manually set to 'fast' mode if needed (see section 16.2). Parameters not available in the active mode ill show '**-nA-**' when accessing their value at the configuration menu.

16. Configuration Menu

16.1. Function Codes and Sensor

The fastest way to configure the instrument, is to select a predefined configuration code (see Table 2) and a predefined sensor (see Table 3). 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 (see section 12.2).

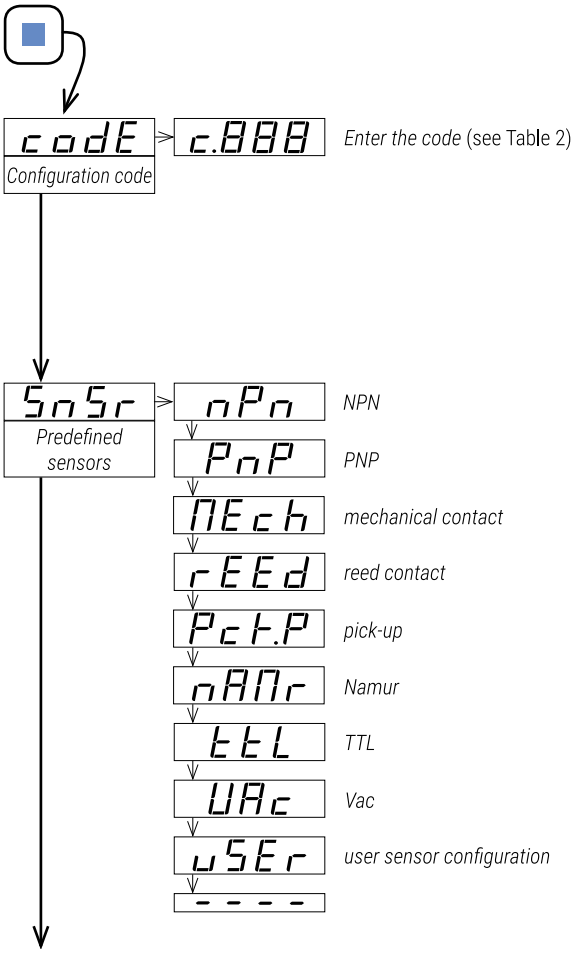
Selecting a 'reserved' code performs no action. Selecting '---' exits the 'configuration menu' without applying changes.

When checking 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 V DC output (codes from 110 to 199) (see section 8).

To customize the input signal range, see the 'Advanced scaling' section of the 'configuration menu' (see section 16.5).

At the '**Predefined sensors**' (**SnSr**) menu, select one of the predefined sensors. Once the sensor is configured, the instrument is ready to work. The selection configures the sensor according to 'Table 3' (see section 14) and updates the parameters at the '**Advanced sensor configuration**' (**Ad. Sn**) menu. The actual sensor is displayed, and when the actual configuration does not match any of the predefined sensors, then '**uSEr**' is displayed.



Important: If the output signal is fixed to 4 mA or 0 V DC, and does not change according to the frequency at the input, then the input frequency detected is 0 Hz, and probably the predefined sensor configuration is not suitable for your sensor. A manual configuration of the sensor may be needed. See section 16.2 on how to manually configure the sensor parameters.

16.2. Sensor Configuration

Sensor configuration is a critical part of the configuration. If the sensor is correctly configured, the instrument will be able to read impulses. If the sensor is not correctly configured, the instrument will not be able to read any impulse signal and it will be considered a 0 Hz signal.

- Parameters at the '**Advanced sensor configuration**' (**Ad.Sn**), reflect the configuration of the '**Predefined sensors**' (**SnSr**) selection.
- Changing the parameters at the '**Advanced sensor configuration**' (**Ad. Sn**) menu, will set the '**Predefined sensors**' (**SnSr**) value to '**uSEr**' ('**User sensor configuration**') meaning that the actual configuration does not match any of the predefined sensor configurations (see Table 3).
- At the '**Pull resistors**' (**PuL.r**) parameter select the activation or deactivation of pull-up and pull-down resistors.

  - select '**P.uP**' to activate the pull-up resistor
  - select '**P.dn**' to activate the pull-down resistor
  - select '**nonE**' to deactivate the pull-up and pull-down resistors

- At the '**Gain amplification**' (**GAIn**) parameter select the gain of the input signal . Gain applies only to signals through channel '**A**' and connected to terminals '123'.

  - select '**G__1**' to activate the gain '1'. Usual gain for V DC signals, that are correctly detected operating the 'trigger level'.
  - select '**G100**' to activate the gain '100'. Use this gain for low voltage signals, in the range of mV, that can not be detected by operating the 'trigger level' parameter to its lower value.

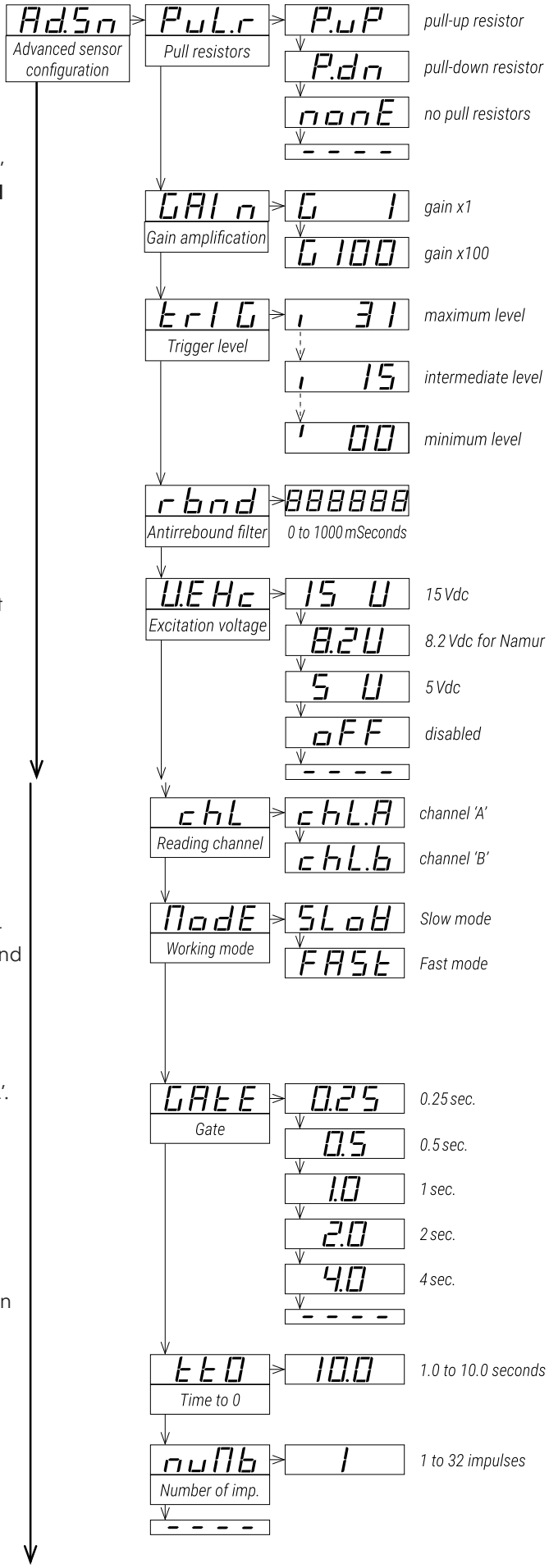
At the '**Trigger level**' (**trIG**) parameter select empirically the 'trigger level' at a level between '0' and '31'. Default value is '15'. Press key '**UP**' (▲) to increase the value, and key '**LE**' (◀) to decrease the value.

- to help you identify the appropriate trigger level, the vertical led at the left of the display is placed at the bottom when the signal detected is '0', and is placed at the top when the signal detected is '1'. Change the state of your input signal, and check the status of the led to know if the instrument is detecting the changes at the input.

At the '**Antirrebound filter**' (**rbnd**) parameter select a time value from '0' to '1000' expressed in milliseconds. After a valid impulse has been detected, the detection of new impulses is disables for the duration of the configured time. Use this parameter to prevent detection of rebounds. A '100' milliseconds value is considered a standard value to prevent rebounds when working with mechanical contacts. Applies only in 'slow mode' (see section 15).

At the '**Excitation voltage**' (**V.Exc**) parameter select the value of the excitation voltage. Select +15 V DC (**15 V**), select +8.2 V DC (**8.2V**) for Namur sensors, select +5 V DC (**5 V**) for TTL or select oFF (**oFF**) to disable the excitation voltage.

At the '**Reading channel**' (**chL**) parameter select the channel '**A**' or '**B**' to read the signal (see section 10).



At the '**Working mode**' (**ModE**) parameter select the frequency calculation mode (see section 15).

At the '**Gate**' (**GAtE**) parameter configure the value to '**0.25**', '**0.50**', '**1.0**', '**2.0**' or '**4.0**' seconds. Applies only in 'fast' mode (see section 15).

At the '**Time to 0**' (**tt0**) parameter configure a value between '**1.0**' and '**10.0**' seconds. Applies only in 'slow mode' (see section 15). Default value is 1 second.

At the '**Number of imp.**' (**nUMb**) parameter configure a value between '**1**' and '**32**'. Applies only in 'slow mode' (see section 15). Define the number of impulses needed to calculate the frequency (default value '1'). ' to wait for 4 impulses, and then calculate the mean frequency value of the set of 4 impulses.

16.3. Input Range

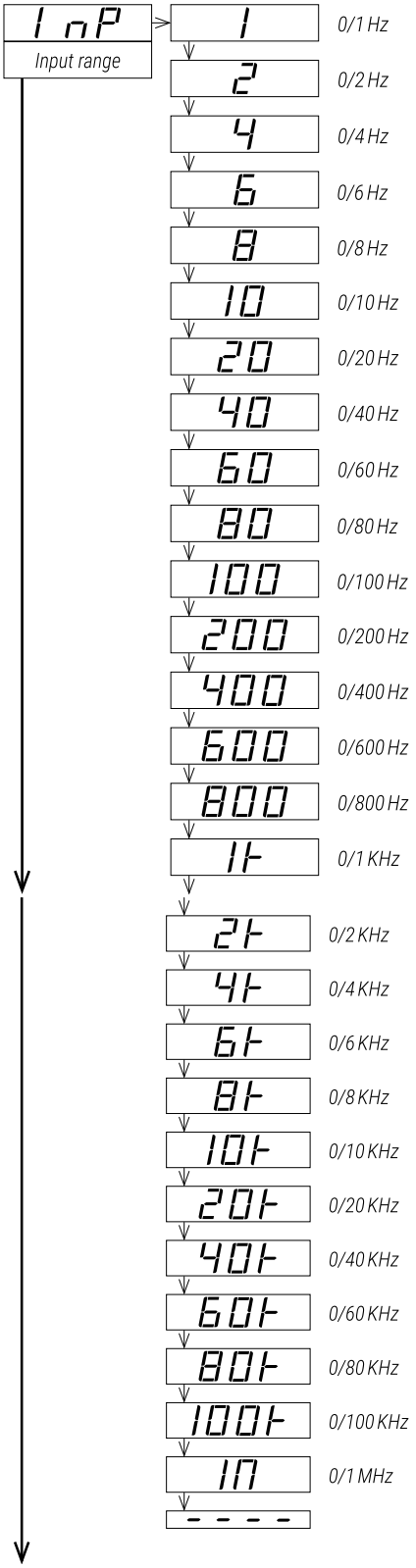
At the '**Input range**' (**InP**) menu entry select the input signal range to activate.

Important: If you have already selected a configuration code (see section 16.1), the input range has been already selected and there is no need to manually configure again at the '**Input range**' (**InP**) menu entry.

Input signal ranges can also be activated through the 'predefined configuration codes' (see Table 2).

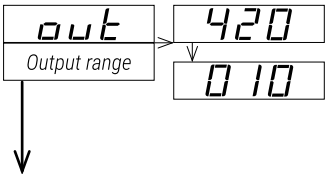
All input signal ranges can be configured to a reduced input signal range by configuring the '**Advanced scaling**' (**Ad.Sc**) parameters (see section 16.5).

- Example: select the '1 KHz ' input range and to customize to a smaller example 0/750 Hz or 250/750 Hz) see section 16.5 and operate each parameter.



16.4. Output Range

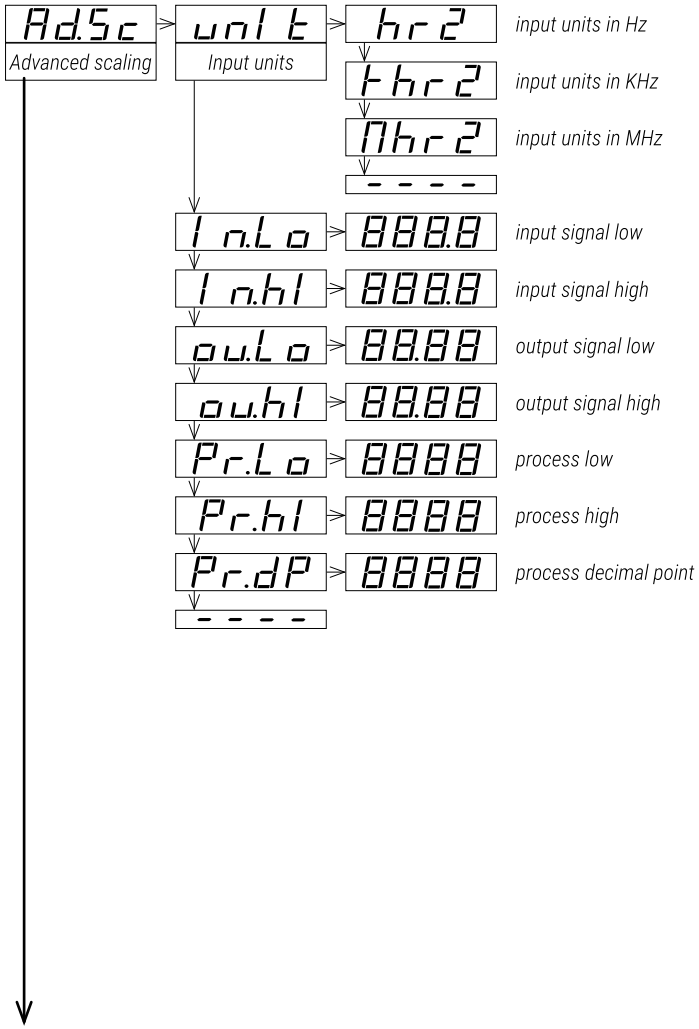
At the '**Output range**' (**out**) menu entry, select the output signal range to 4/20 mA (value '**420**') or to 0/10 V DC (value '**010**').



The output signal range selected can be later customized to operate in a reduced range of signal (see section 16.5).

16.5. 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:



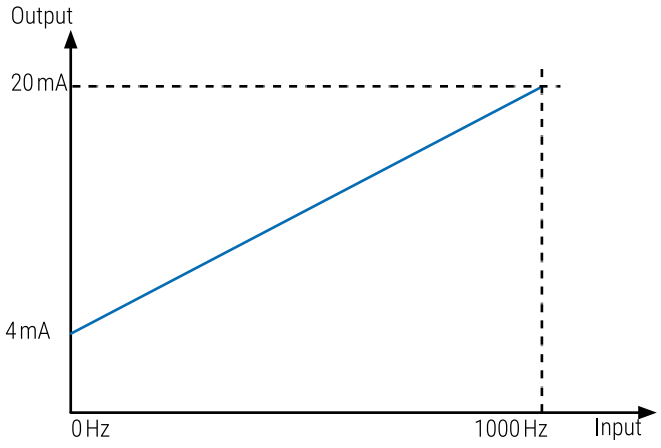
- at the '**Input units**' (**unIt**) parameter configure the units for the input signal parameters, between '**Input units in Hz**' (**hrZ**), '**Input units in KHz**' (**KhrZ**) and '**Input units in MHz**' (**MhrZ**).
- at the '**Input low signal**' (**In.Lo**) parameter configure the low input signal value. Units expressed as configured at the '**Input units**' (**unIt**) parameter, with 1 decimal point.
- at the '**Input high signal**' (**In.hI**) parameter configure the high input signal value. Units expressed as configured at the '**Input units**' (**unIt**) parameter, with 1 decimal point.
- at the '**Output low signal**' (**ou.Lo**) parameter configure the low output signal value. Units expressed in V DC o mA, , with 2 decimal points.
- at the '**Output high signal**' (**ou.hI**) parameter configure the high output signal value. Units expressed in V DC o mA, , with 2 decimal points.

These five parameters define the relation between the input and the output signal (see Table 12), and can be modified independently, to match the specific input-output relation for your application (see Table 12). 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 (see section 16.6) or the 'messages' function (see section 16.8).

- 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 0/1000 Hz signal from is associated to a 0/150.0 RPM process value. Configure the process value to '0' and '150.0' ('Process low' = '0', 'Process high'='1500', 'Process decimal poin process value in RPM can be displayed at the front display.

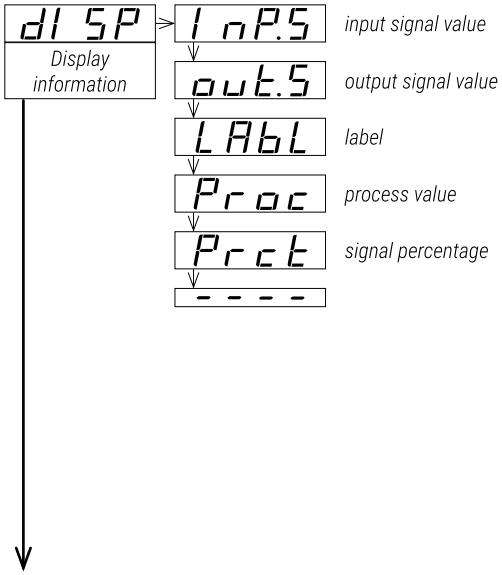
Table 12 I **Example for Code '025' (0/1000 Hz = 4/20 mA**



Selecting the predefined code '025' configures a range of 0/1000 Hz = 4/20 mA, and the values configured are as indicated below:

input units = hertz (Hz)	
input signal low = 0 Hz	output signal low = 4.00 mA
input signal high = 1000 Hz	output signal high = 20.00 mA

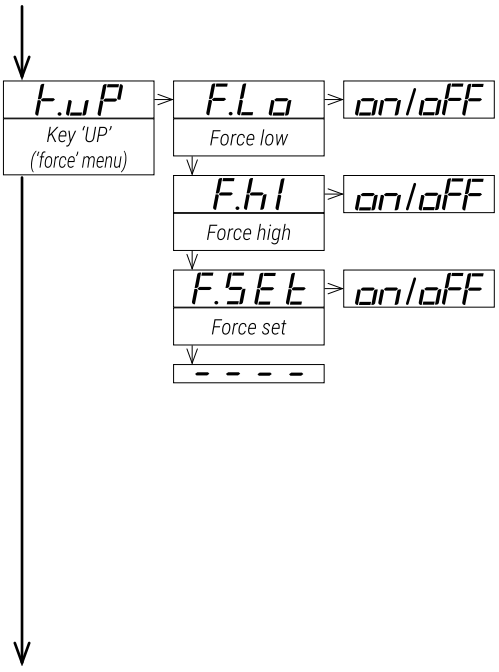
16.6. Display Information



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 (see section 16.8) associated to front key '**LE**' (◀).

- select '**Input signal value**' (**InP.S**) to read the input signal value and the measurement units (for example : '**Inp hz 235**', '**Inp Kh 235**', '**Inp Mh 235**', ...).
- 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 (see section 16.9).
- select '**Process value**' (**Proc**) to read the process value as scaled at the process parameters (see section 16.5) (for example: '**Proc 1500**').
- select '**Percentage**' (**Prct**) to read the percentage of 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 (see section 5) (for example : '**Prct 23.5**' when the reading is 23.5% of the full scale).

16.7. Key 'UP' ('Force' menu)



The key '**UP**' (▲) at the front of the instrument gives access to a configurable list of functions (see section 12.4).

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. See section 12.4 for a description on each function and how to operate them.

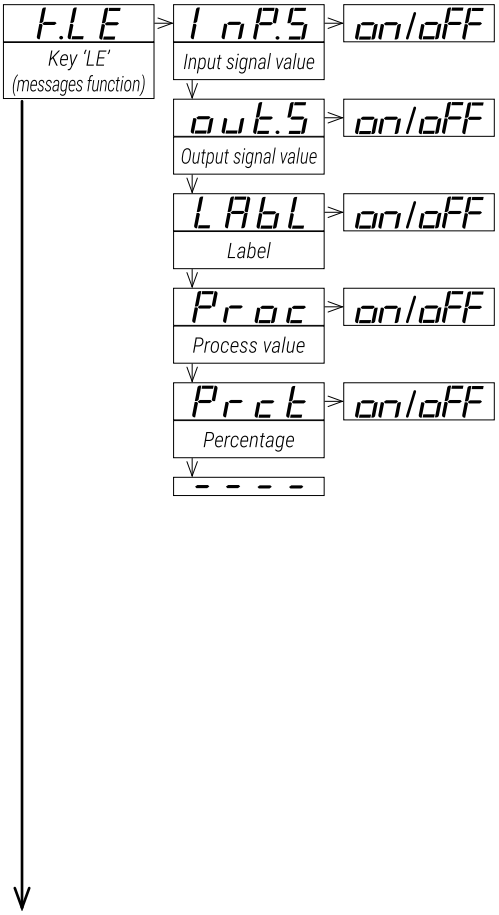
16.8. Key 'LE' ('Messages' function)

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 (see section 12.5). Select '**on**' to activate each information.

- configure '**Input signal value**' (**InP.S**) to '**on**' to see the actual input signal value and units (for example: '**Inp hz 480**')
- configure '**Output signal value**' (**out.S**) to '**on**' to see the actual output signal value and units (for example: '**Out mA 08.3**')
- configure '**Label**' (**LAbL**) to '**on**' to read the value configured at the 'label' parameter (see section 16.9).
- configure '**Process value**' (**Proc**) to '**on**' to read the process value as configured at the process parameters (see section 16.5) (for example: '**Proc 1500**').
- configure '**Percentage**' (**Prct**) to '**on**' to see the actual percentage of 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 (see section 16.5) (for example: '**Prct 23.5**').

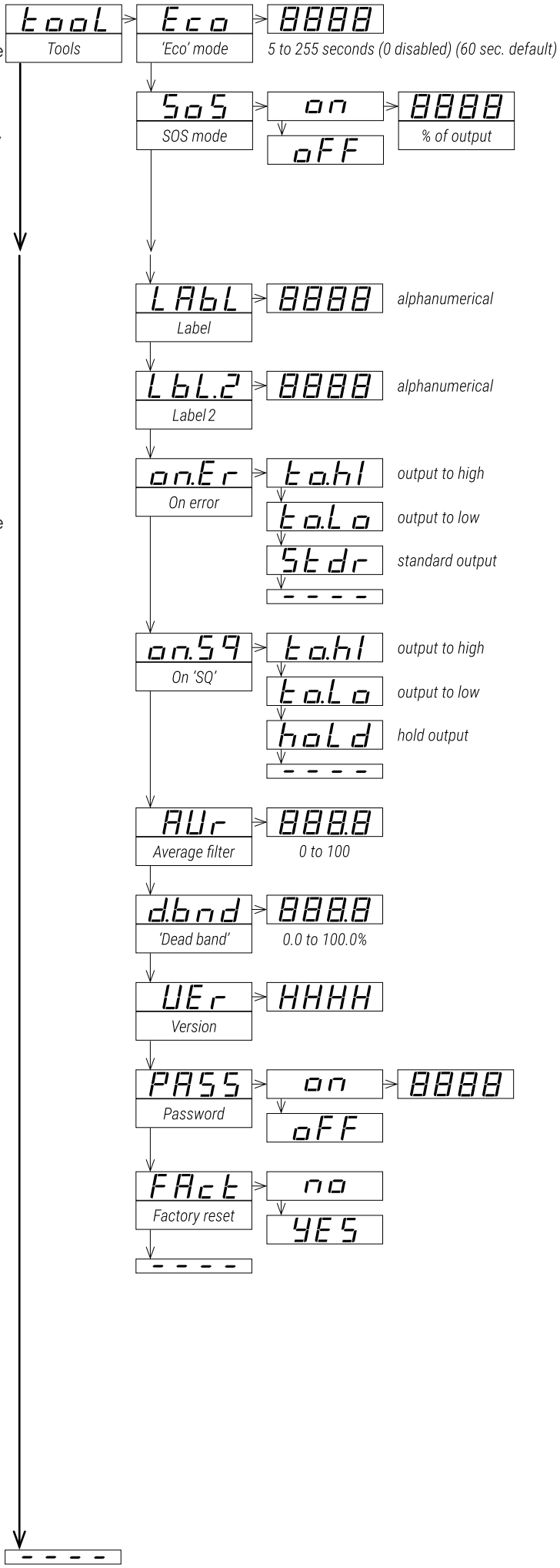
When more than one parameter is set to '**on**', values will be displayed sequentially, in the same order as they are listed in the menu, with a middle dash '-' between them. When all information has been displayed, the instrument returns to 'normal mode' of operation."



16.9. '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 V DC). To deactivate the 'SOS mode' select '**oFF**.' See section 6 for more information on the 'SOS mode'."
- 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'. For additional information and a list of available characters, see section 7.
- at the '**On error**' (**on.Er**) parameter, configure the behavior of the output signal, in case of hardware error at the input (see section 19).
  - 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' (see section 12.3).
  - 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 '**Hold output**' (**hoLd**) to hold the output signal while the operator remains inside 'configuration menu'.
- 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

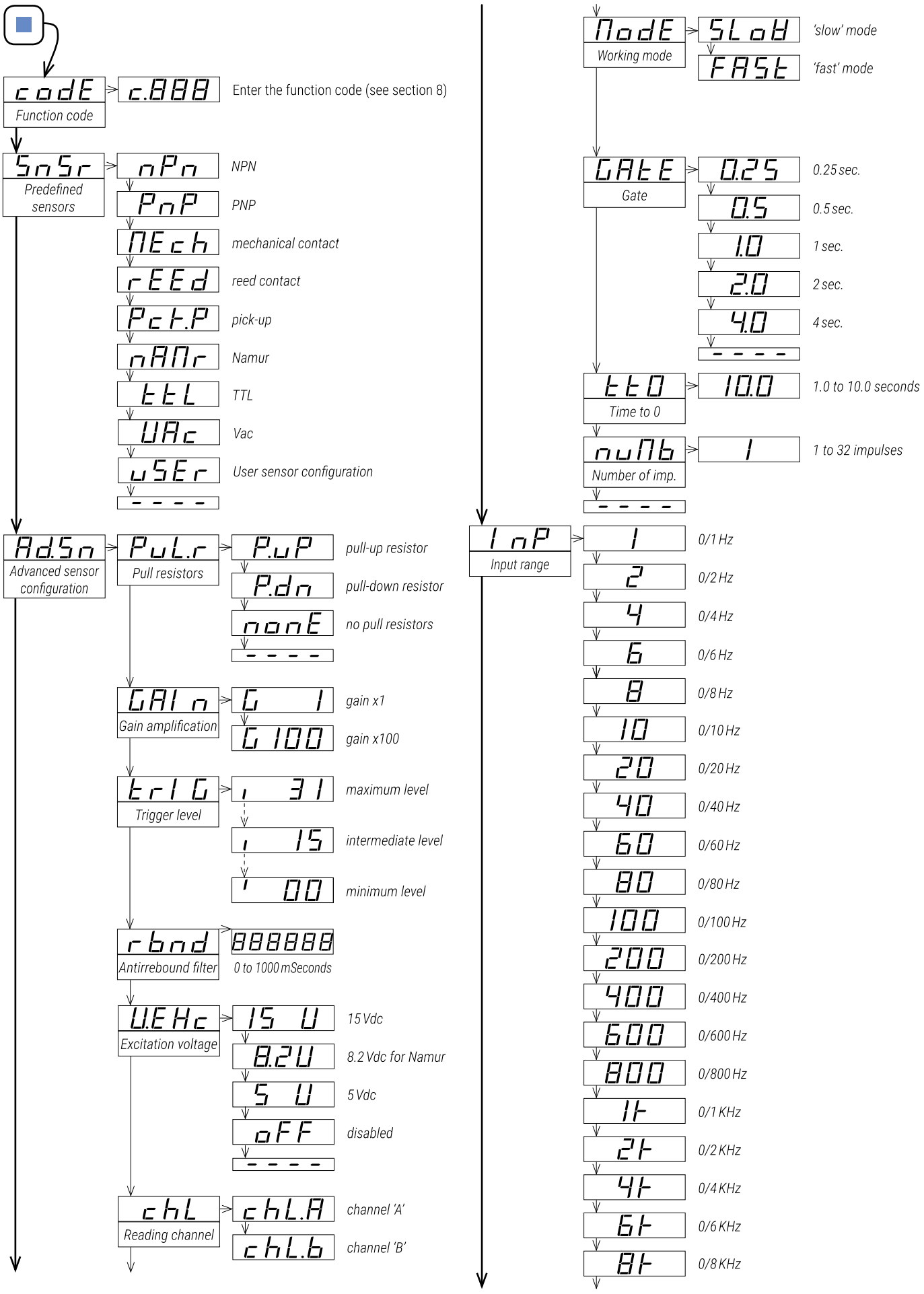


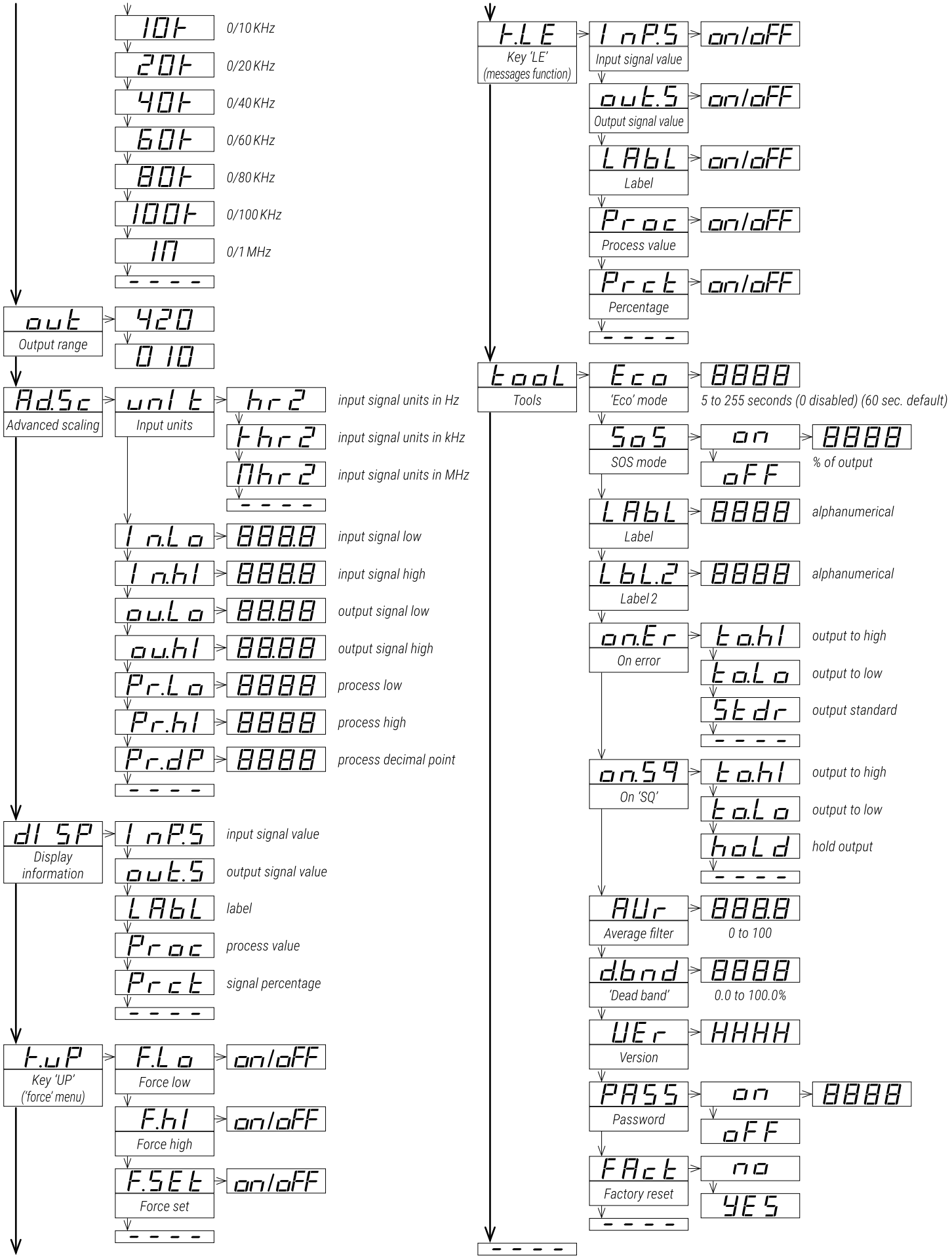
value, are treated as a '0'. This parameter applies to all measuring ranges.

- 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 entering the 'configuration menu'. The password does not block access to the 'force' menu. To deactivate the password, select '**oFF**'.
- at the '**Factory reset**' (**FAct**) parameter select '**yes**' to activate the ctory configuration (see section 18 for a list of factory default parameters).

17. Full Configuration Menu

Press '**SQ**' (■) for 1 second to access the 'configuration menu'. For a description on how to operate inside the menus see section 12. For a full vision of the 'configuration menu' structure see section 16.




10F
0/10 KHz
20F
0/20 KHz
40F
0/40 KHz
60F
0/60 KHz
80F
0/80 KHz
100F
0/100 KHz
1M
0/1 MHz
- - - -
out
Output range
420
010
Ad.Sc
Advanced scaling
unit
Input units
hr2
input signal units in Hz
Khr2
input signal units in kHz
Mhr2
input signal units in MHz
- - - -
In.Lo
8888
input signal low
In.hI
8888
input signal high
ou.Lo
88.88
output signal low
ou.hI
88.88
output signal high
Pr.Lo
8888
process low
Pr.hI
8888
process high
Pr.dP
8888
process decimal point
- - - -
dISP
Display information
InP.S
input signal value
out.S
output signal value
LAbL
label
Proc
process value
Prct
signal percentage
- - - -
t.uP
Key 'UP' ('force' menu)
F.Lo
Force low
on/oFF
F.hI
Force high
on/oFF
F.SEt
Force set
on/oFF
- - - -
t.LE
Key 'LE' (messages function)
InP.S
Input signal value
on/oFF
out.S
Output signal value
on/oFF
LAbL
Label
on/oFF
Proc
Process value
on/oFF
Prct
Percentage
on/oFF
- - - -
tooL
Tools
Eco
'Eco' mode
8888
5 to 255 seconds (0 disabled) (60 sec. default)
SoS
SOS mode
on
8888
% of output
oFF
LAbL
Label
8888
alphanumerical
LbL.2
Label 2
8888
alphanumerical
on.Er
On error
to.hI
output to high
to.Lo
output to low
Stdr
output standard
- - - -
on.SQ
On 'SQ'
to.hI
output to high
to.Lo
output to low
hoLd
hold output
- - - -
AUr
Average filter
888.8
0 to 100
d.bnd
'Dead band'
8888
0.0 to 100.0%
UEr
Version
HHHH
PASS
Password
on
8888
oFF
FAct
Factory reset
no
YES
- - - -
- - - -

18. Factory Default Parameters

Function code (**codE**)	025	(**c.025**)
Predefined sensors (**SnSr**)	npn	(**nPn**)
Advanced sensor configuration (**Ad.Sn**)		
Pull resistors (**PuL.r**)	pull-up	(**P.uP**)
Gain amplification (**GAIn**)	x1	(**G 1**)
Trigger level (**TrIG**)	25	
Antirrebound filter (**rnbd**)	0	[milliseconds]
Excitation voltage (**V.EXc**)	15 V DC	(**15 V**)
Reading channel (**chL**)	'B'	
Calculation mode (**ModE**)	fast	(**FASt**)
Gate (**GAtE**)	0.5	[seconds]
Time to 0 (**tt0**)	1.0	[seconds]
Number of impulses (**nuMb**)	1	
Input range (**InP**)	0/1K Hz	(**1K**)
Output range (**out**)	4/20 mA	(**420**)
Advanced scaling (**Ad.Sc**)		
Units (**unIt**)	kHertz	(**khrZ**)
Input signal low (**In.Lo**)	0.0	[kHz]
Input signal high (**In.hI**)	1.0	[kHz]
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**)	1000	
Process decimal point (**Pr.dP**)	xxxx	
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)
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**' (■)

- press key '**UP**' (▲) to locate 'Factory reset' and press '**SQ**' (■)
- value 'no' appears on display, press key '**UP**' (▲) and 'Yes' appears
- 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 ('**SEnSor nPn 1.000 kHz**')
- the actual signal input value is displayed
- the instrument is in 'normal mode' of operation

19. Error Codes and Messages

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

While on error, the output can be configured to overrange (to 21 mA, 10.4 V DC), to underrange (to 3 mA or -0.05 V DC) or to hold value. See the '**On error**' (**on.Er**) parameter at section 16.9.

Table 13 | **Error Codes**

Error	Description
'Er.01'	Password error. The password code entered is not correct.
'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.08'	Scaled input slope not valid. The value at 'Input signal high' (**In.hI**) has to be higher than the value at 'Input signal low' (**In.Lo**). Enter a different value to validate the parameter (see section 16.5).
'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 (see section 16.5).
'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 (see section 16.5).

The instrument can show 'messages', which are not 'errors' and do not affect the output signal, and do not trigger the '**On error**' (**on.Er**) function. Below is a list of possible 'messages'.

Table 14 | **Messages**

Error	Description
'd.oVr'	Display overrange. The display value should be higher than the maximum value that can be displayed.
'd.udr'	Display underrange. The display value should be lower than the minimum value that can be displayed.
'-nA-'	Function not available. For the actual configuration, the function is not available.

20. Precautions on Installation

Important: Risk of electrical shock. Instrument terminals can be connected to dangerous voltage. Instrument protected with double isolation. No earth connection required.

CE 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.

Important: 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."

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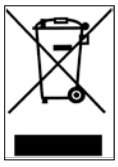
21. CE Declaration of Conformity

Products	**DR-I4F**
The manufacturer declares that the instruments indicated comply with the directives and rules indicated below.	
Electromagnetic compatibility directive 2014/30/EU	
Low voltage directive 2014/35/EU	
ROHS directive 2011/65/EU	
WEEE directive 2012/19/EU	
Security rules EN-61010-1	
Instrument	Fixed, Permanently connected
Pollution degree	1 and 2 (without condensation)
Isolation	Double
Overvoltage category 2	
Category of measure CAT-II 300V,	
Electromagnetic compatibility rules EN-61326-1	
EM environment	Industrial
CISPR 11	Instrument Class A & Class B Group 1



According to directive 2012/19/EU, electronic equipment cycled in a selective and controlled way at the end of its useful life.

WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components in which wear is not warranted, include but are not limited to contact points, fuses, and triacs.

OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by the company will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive, and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.

CONDITIONS: Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY/DISCLAIMER language, and, additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

RETURN REQUESTS/INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

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