AFCM

Universal
I/f converter

Model No. AFCM0001
Drawing No. LP1102
Version No. 101
Revision Date 19/06

UNIVERSAL I/f CONVERTER

AFCM

CONTENTS

WARNING

This device is designed for connection to hazardous electric voltages. Ignoring this warning can result in severe personal injury or mechanical damage. To avoid the risk of electric shock and fire, the safety instructions of this manual must be observed and the guidelines followed. The specifications must not be exceeded, and the device must only be applied as described in the following. Prior to the commissioning of the device, this manual must be examined carefully. Only qualified personnel (technicians) should install this device. If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

GENERAL

WARNING

Until the device is fixed, do not connect hazardous voltages to the device.
The following operations should only be carried out on a disconnected device and under ESD safe conditions:

General mounting, connection and disconnection of wires.
Troubleshooting the device.

HAZARDOUS VOLTAGE

Repair of the device must be done by Red Lion Controls only.

WARNING

The device must be mounted on a DIN rail according to DIN 46277.

INSTAL-LATION

WARNING

Do not open the front plate of the device as this will cause damage to the connector for the display / programming front PGM. This device contains no DIP-switches or jumpers.

SYMBOL IDENTIFICATION

⚠ **Triangle with an exclamation mark:** Warning / demand. Potentially lethal situations.

CE **The CE mark** proves the compliance of the device with the essential requirements of the directives.

▣ **The double insulation symbol** shows that the device is protected by double or reinforced insulation.

SAFETY INSTRUCTIONS

DEFINITIONS
Hazardous voltages have been defined as the ranges: 75 to 1500 Volt DC, and 50 to 1000 Volt AC.
Technicians are qualified persons educated or trained to mount, operate, and also troubleshoot technically correct and in accordance with safety regulations.
Operators, being familiar with the contents of this manual, adjust and operate the knobs or potentiometers during normal operation.

RECEIPT AND UNPACKING:
Unpack the device without damaging it. The packing should always follow the device until this has been permanently mounted. Check at the receipt of the device whether the type corresponds to the one ordered.

ENVIRONMENT
Avoid direct sunlight, dust, high temperatures, mechanical vibrations and shock, as well as rain and heavy moisture. If necessary, heating in excess of the stated limits for ambient temperatures should be avoided by way of ventilation.
All devices fall under Installation Category II, Pollution Degree 1, and Insulation Class II.

MOUNTING
Only technicians who are familiar with the technical terms, warnings, and instructions in the manual and who are able to follow these should connect the device. Should there be any doubt as to the correct handling of the device, please contact your local distributor or, alternatively,

Red Lion Controls
www.redlion.net

Mounting and connection of the device should comply with national legislation for mounting of electric materials, i.a. wire cross section, protective fuse, and location. Descriptions of input / output and supply connections are shown in the block diagram and side label.

The following apply to fixed hazardous voltages-connected devices:
  The max. size of the protective fuse is 10 A and, together with a power switch, it should be easily accessible and close to the device. The power switch should be marked with a label indicating that it will switch off the voltage to the device.

Year of manufacture can be taken from the first two digits in the serial number.

UL INSTALLATION REQUIREMENTS
Use 60/75°C copper conducters only.
For use only in pollution degree 2 or better.
Max. ambient temperature .... 60°C
Max. wire size.. AWG 26-14
UL file number E324843

CALIBRATION AND ADJUSTMENT
During calibration and adjustment, the measuring and connection of external voltages must be carried out according to the specifications of this manual. The technician must use tools and instruments that are safe to use.

NORMAL OPERATION
Operators are only allowed to adjust and operate devices that are safely fixed in panels, etc., thus avoiding the danger of personal injury and damage. This means there is no electrical shock hazard, and the device is easily accessible.

CLEANING
When disconnected, the device may be cleaned with a cloth moistened with distilled water.

LIABILITY
To the extent that the instructions in this manual are not strictly observed, the customer cannot advance a demand against Red Lion Controls that would otherwise exist according to the concluded sales agreement.

HOW TO DISMANTLE THE DEVICE

First, remember to demount the connectors with hazardous voltages.
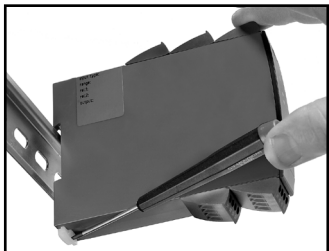
Picture 1:
Detach the device from the DIN rail by lifting the bottom lock.

UNIVERSAL I/f CONVERTER
AFCM

- *Input for RTD, TC, Ohm, potentiometer, mA and V*
- *Frequency output NPN, PNP and TTL*
- *Generates frequencies from 0.001...25000 Hz*
- *2-wire supply > 16 V*
- *Universal AC or DC supply*

Advanced features

- Programmable by way of detachable display front (PGM), process calibration, signal simulation, password protection, error diagnostics and help text available in several languages.

Application

- Linearised, electronic temperature measurement with RTD or TC sensor.
- Conversion of linear resistance variation to a frequency signal, e.g. from solenoids and butterfly valves or linear movements with attached potentiometer.
- Power supply and signal isolator for 2-wire transmitters.
- Process control by way of a frequency signal transmitted to e.g. a PLC or a process computer.
- Galvanic separation and conversion of analogue signals to frequency signals.

Technical characteristics

- When AFCM is used in combination with the PGM display / programmer front, all operational parameters can be modified to suit any application. As the AFCM is designed with electronic hardware switches, it is not necessary to open the device for setting of DIP-switches.
- A green front LED indicates normal operation.
- Continuous check of vital stored data for safety reasons.
- 3-port 2.3 kVAC galvanic isolation.

PGM DISPLAY / PROGRAMMER FRONT

• PGMMOD00 - Programming Module

• PGMMODC1 - Program/Comms Module

Functionality

The simple and easily understandable menu structure and the explanatory help texts guide you effortlessly and automatically through the configuration steps, thus making the product very easy to use. Functions and configuration options are described in the section "Configuration / operating the function keys".

PGMMOD00

Application

• Communications interface for modification of operational parameters in AFCM.

• Can be moved from one AFCM device to another and download the configuration of the first converter to subsequent converters.

• Fixed display for readout of process data and status.

Technical characteristics

• LCD display with 4 lines; line 1 (H = 5.57 mm) shows input signal, line 2 (H = 3.33 mm) shows units. Line 3 alternates between digital output value and scaling (kHz, Hz, mHz, P/m, P/h, P/d) or shows TAG no. Line 4 shows tendency readout for the input signal and communication status.

• Programming access can be blocked by assigning a password. The password is saved in the converter in order to ensure a high degree of protection against unauthorised modifications to the configuration.

Mounting / installation

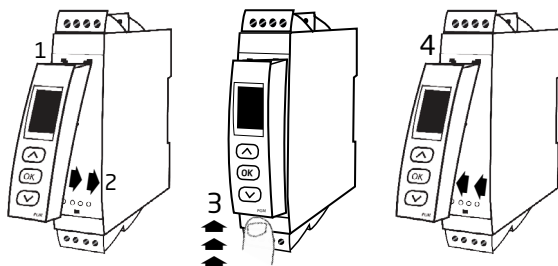• Click PGM onto the front of AFCM.

MOUNTING / DEMOUNTING THE PGMMOD

1: Insert the tabs of PGMMOD into the holes at the top of the device.

2: Swing PGMMOD into place.

Demounting of PGMMOD

3: Push the release button on the bottom of PGMMOD and swing PGMMOD up.

PGMMOD00 shown, PGMMODC1 connects and disconnects in the same way.

APPLICATIONS

Input signals:
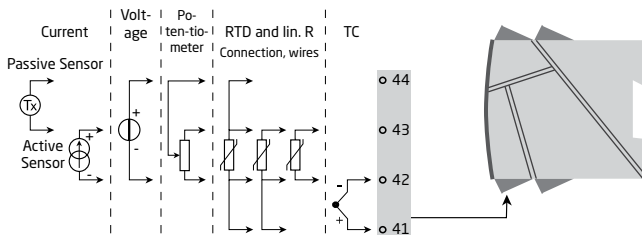
Output signals:
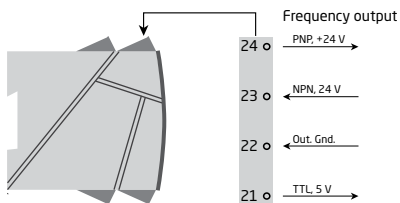
Supply:
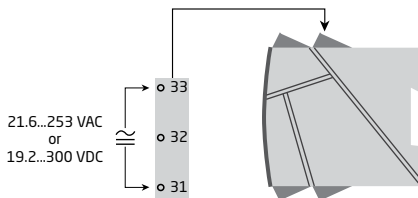
Electrical specifications

Specifications range	-20°C to +60°C
Calibration temperature	20...28°C
Relative humidity..	< 95% RH (non-cond.)
Protection degree...	IP20

Mechanical specifications

Dimensions (HxBxD)	109 x 23.5 x 104 mm
Dimensions, with PGMMOD (HxBxD)	109 x 23.5 x 116 / 131 mm
Weight	155 g
Weight with PGMMOD..	170 g / 255 g
Max. wire size..	1 x 2.5 mm² stranded wire
Screw terminal torque	0.5 Nm

Common specifications

Supply voltage, universal	21.6...253 VAC, 50...60 Hz or 19.2...300 VDC
Max. consumption..	≤ 2.5 W
Fuse...	400 mA SB / 250 VAC
Isolation voltage, test / operation	2.3 kVAC / 250 VAC
Communications interface	Communication enabler PGMMODC1
Signal / noise ratio	Min. 60 dB (0...100 kHz)

Response time (0...90%, 100...10%), programmable:

Temperature input...	1...60 s
mA / V input..	0,4...60 s

Accuracy, the greater of the general and basic values:

General values		
Input type	Absolute accuracy	Temperature coefficient
All	≤ ±0.1% of span	≤ ±0.01% of span / °C

Basic values		
Input type	Basic accuracy	Temperature coefficient
mA	$\leq \pm 4$ µA	$\leq \pm 0.4$ µA / °C
Volt	$\leq \pm 20$ µV	$\leq \pm 2$ µV / °C
Pt100	$\leq \pm 0.2$°C	$\leq \pm 0.01$°C / °C
Linear resistance	$\leq \pm 0.1$ Ω	$\leq \pm 0.01$ Ω / °C
Potentiometer	$\leq \pm 0.1$ Ω	$\leq \pm 0.01$ Ω / °C
TC type: E, J, K, L, N, T, U	$\leq \pm 1$°C	$\leq \pm 0.05$°C / °C
TC type: B, R, S, W3, W5, LR	$\leq \pm 2$°C	$\leq \pm 0.2$°C / °C

EMC immunity influence .... < ± 0.5% of span
Extended EMC immunity:
NAMUR NE 21, A criterion, burst .... < ± 1% of span

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Auxiliary supplies:
2-wire supply (terminal 44...43) .... 25...16 VDC / 0...20 mA
RTD, linear resistance and potentiometer input:
Input for RTD types:
   Pt10, Pt20, Pt50, Pt100, Pt200, Pt250, Pt300, Pt400, Pt500, Pt1000
   Ni50, Ni100, Ni120, Ni1000

Input type	Min. value	Max. value	Standard
Pt100	-200°C	+850°C	IEC60751
Ni100	-60°C	+250°C	DIN 43760
Lin. resistance	0 Ω	10000 Ω	-
Potentiometer	10 Ω	100 kΩ	-

Cable resistance per wire (max.), RTD .... 50 Ω
Sensor current, RTD .... Nom. 0.2 mA
Effect of sensor cable resistance
(3- / 4-wire), RTD .... < 0.002 Ω / Ω
Sensor error detection, RTD .... Yes
Short circuit detection, RTD .... < 15 Ω

TC input

Type	Min. value	Max. value	Standard
B	+400°C	+1820°C	IEC 60584-1
E	-100°C	+1000°C	IEC 60584-1
J	-100°C	+1200°C	IEC 60584-1
K	-180°C	+1372°C	IEC 60584-1
L	-200°C	+900°C	DIN 43710
N	-180°C	+1300°C	IEC 60584-1
R	-50°C	+1760°C	IEC 60584-1
S	-50°C	+1760°C	IEC 60584-1
T	-200°C	+400°C	IEC 60584-1
U	-200°C	+600°C	DIN 43710
W3	0°C	+2300°C	ASTM E988-90
W5	0°C	+2300°C	ASTM E988-90
LR	-200°C	+800°C	GOST 3044-84

Cold junction compensation (CJC)
   via internally mounted sensor .... < ±1.0 °C
Sensor error detection, all TC types .... Yes
Sensor error current:
   when detecting .... Nom. 2 µA
   else .... 0 µA

Current input

Measurement range .... -1...25 mA
Programmable measurement ranges .... 0...20 and 4...20 mA
Input resistance .... Nom. 20 Ω + PTC 50 Ω
Sensor error detection:
   loop break 4...20 mA .... Yes

Voltage input:

Measurement range .... -20 mV...12 VDC
Programmable measurement ranges .... 0...1 / 0.2...1 / 0...2.5 / 0.5...2.5 /
                                                      0...5 / 1...5 / 0...10 and 2...10 VDC
Input resistance .... Nom. 10 MΩ

Output

Frequency output

Frequency range .... 0...25000 Hz
Min. frequency (span) .... 0.001 Hz
Duty cycle (0...25000 Hz) .... 50% or
Programmable pulse time (f ≤ 500 Hz) .... 1...1000 ms (max. 90% duty cycle)

PNP output

I_{out} max.	30 mA
V_{out}	24 VDC $\pm$ 10%
C_{out}	10 nF
R_{out} typ.	20 Ω
Electromechanical counter	24 V / 135 mA / 20 ms / $\leq$ 10 Hz

NPN output

I_{sink} max.	150 mA
I_{sink} max. peak	300 mA
External voltage (terminal 23) max.	55 VDC
C_{out}	10 nF
R_{out} typ.	10 Ω

TTL output

$I_{sink/source}$ max.	15 mA
$I_{sink/source}$ peak	100 mA
V_{out}	5 V $\pm$5%
C_{out}	10 nF
R_{out} typ.	55 Ω

Sensor error detection

Programmable	0...26250 Hz

Ex / I.S. approval

FM, applicable in	Class I, Div. 2, Group A, B, C, D
	Class I, Div. 2, Group IIC
	Zone 2
Max. ambient temperature for T5	60°C

Observed authority requirements	**Standard**
EMC 2014/30/EU	EN 61326-1
LVD 2014/35/EU	EN 61010-1
FM	3600, 3611, 3810 and ISA 82.02.01
UL, Standard for Safety	UL 6101-1, 3rd Edition

of span = of the currently selected measurement range

Configuration of sensor error detection

Module:	Configuration	Sensor error detection:
AFCM	OUT.ERR=NO	OFF
	Else:	ON

Display readout on the PGM
Display outside range

Display readout below min. / above max. (-1999, 9999):			
Input	Range	Flashing readout	Limit
All	All	-1999	Display readout <-1999
		9999	Display readout >9999

Sensor error detection limits

Sensor error detection (SE.BR, SE.SH):			
Input	Range	Readout	Limit
CURR	Loop break (4...20 mA)	SE.BR	<= 3.6 mA; > = 21 mA
POTM	All, SE.BR on all 3-wire	SE.BR	> ca. 126 kΩ
LIN.R	0...800 Ω	SE.BR	> ca. 875 Ω
	0...10 kΩ	SE.BR	> ca. 11 kΩ
TEMP	TC	SE.BR	> ca. 750 kΩ / (1,25 V)
	RTD: 2-, 3- and 4-wire	SE.BR	> ca. 15 kΩ
	No SE.SH for Pt10, Pt20 and Pt50	SE.SH	< ca. 15 Ω

Signal conditioning limits

Outside range readout (IN.LO, IN.HI): If the valid range of the A/D converter or the polynomial is exceeded.			
Input	Range	Readout	Limit
VOLT	0...1 V / 0.2...1 V	IN.LO	< -25 mV
		IN.HI	> 1.2 V
	0...2.5 / 0.5...2.5 / 0...5 V / 1...5 V / 0...10 V / 2...10 V	IN.LO	< -25 mV
		IN.HI	> 12 V
CURR	0...20 mA / 4...20 mA	IN.LO	< -1.05 mA
		IN.HI	> 25.05 mA
LIN.R	0...800 Ω	IN.LO	< 0 Ω
		IN.HI	> 1075 Ω
	0...10 kΩ	IN.LO	< 0 Ω
		IN.HI	< 110 kΩ
POTM	Min. readout = 0%, Max. readout = 100%	IN.LO	< -0.5 %
		IN.HI	> 100.5 %
TEMP	TC / RTD	IN.LO	< temperature range -2°C
		IN.HI	> temperature range +2°C

Error indications

Readout at hardware error		
Error search	Readout	Cause
Test of internal CJC sensor	CJ.ER	CJC sensor defect or temperature outside range
Checksum test of the configuration in FLASH	FL.ER	Error in FLASH
Communications test PGM / AFCM	NO.CO	Connection error
Check that input signal matches input configuration	IN.ER	1) Error levels on input
Check that saved configuration in PGM matches module	TY.ER	Configuration is not AFCM
All error indications flash once per second. The help text explains the error. 1) The error is reset by switching off and then switching on the supply voltage to the module.		

CONNECTIONS

Supply:
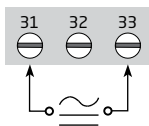
Polarity is reversible.

Inputs

RTD, 2-wire

RTD, 3- / 4-wire

TC

Resistance, 2-wire

Resistance, 3- / 4-wire

Potentiometer

2-wire transmitter

Passive Sensor

Current

Active Sensor

Voltage

Outputs

TTL

+5 V   Gnd.

NPN

Gnd.   +
Passive Sensor

PNP

Gnd.   +24 V
Active Output
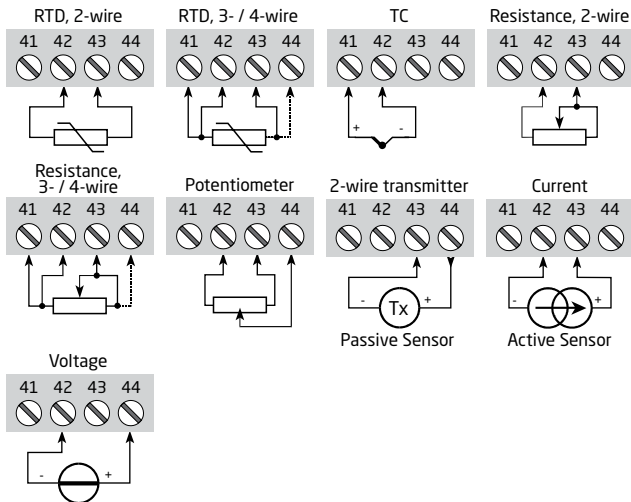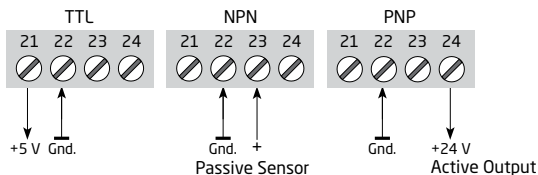
BLOCK DIAGRAM
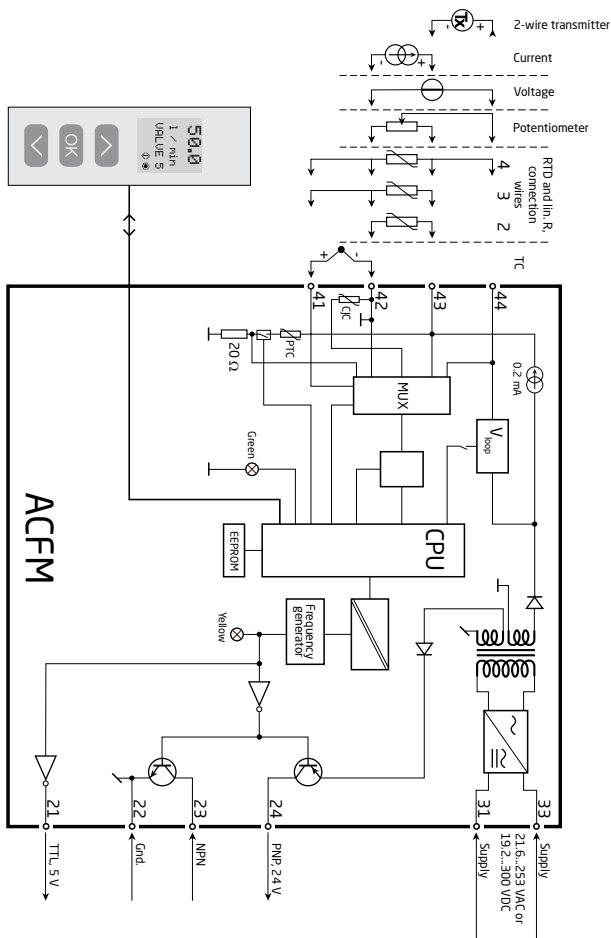
CONFIGURATION / OPERATING THE FUNCTION KEYS

Documentation for routing diagram.

In general

When configuring the AFCM, you will be guided through all parameters and you can choose the settings which fit the application. For each menu there is a scrolling help text which is automatically shown in line 3 on the display.

Configuration is carried out by using the 3 function keys:

$\otimes$ will increase the numerical value or choose the next parameter

$\odot$ will decrease the numerical value or choose the previous parameter

$\circledast$ will save the chosen value and proceed to the next menu

When configuration is completed, the display will return to the default state 1.0. See the reference diagram beginning on page 23.

Pressing and holding $\circledast$ will return to the previous menu or return to the default state (1.0) without saving the changed values or parameters.

If no key is activated for 1 minute, the display will return to the default state (1.0) without saving the changed values or parameters.

Further explanations

Password protection: Programming access can be blocked by assigning a password. The password is saved in the converter in order to ensure a high degree of protection against unauthorised modifications to the configuration. Default password 2008 allows access to all configuration menus.

Signal and sensor error info via display front PGM

Sensor error (see limits in the table) is displayed as SE.BR (sensor break) or SE.SH (sensor short). Signals outside the selected range (not sensor error, see table for limits) are displayed as IN.LO indicating low input signal or IN.HI indicating high input signal. The error indication is displayed in line 3 as text and at the same time the backlight flashes. Line 4 of the display is a status line which displays COM (flashing bullet) indicating correct functioning of PGM and arrow up/down which indicates tendency readout of the input signal.

Signal and sensor error indication without display front

Status of the unit can also be read from the green LED in the front of the device.
Green flashing LED 13 Hz indicates normal operation.
Green flashing LED 1 Hz indicates sensor error.
Steady green LED indicates internal error.

Advanced functions

The unit gives access to a number of advanced functions which can be reached by answering "Yes" to the point "adv.set".

Display setup: Here you can adjust the brightness contrast and the backlight. Setup of TAG numbers with 6 alphanumerics. Selection of readout in line 3 of the display. This line can either show the digital output or the TAG number.

Two-point process calibration: The unit can be process-calibrated in 2 points to fit a given input signal . A low input signal (not necessarily 0%) is applied and the actual value is entered. Then a high signal (not necessarily 100%) is applied and the actual value is entered. If you accept to use the calibration, the unit will work according to this new adjustment. If you later reject this menu point or choose another type of input signal the unit will return to factory calibration.

Process simulation function: If you say "Yes" to the point "EN.SIM" it is possible to simulate an input signal by means of the arrow keys and thus control the output signal up and down. When you finalise the point with ⊙, the unit returns to normal mode.

Password: Here you can choose a password between 0000 and 9999 in order to protect the unit against unauthorised modifications to the configuration. The unit is delivered default without password. If you have locked the unit with a password by mistake, you can always open the menu by using the master password 2008.

Language: In the menu "lang.setup" you can choose between 7 different language versions of help texts that will appear in the menu. You can choose between UK, DE, FR, IT, ES, SE and DK.

Auto diagnosis

The unit performs an advanced auto diagnosis of the internal circuits.

The following possible errors can be displayed in the front unit PGMMOD00.

CJ.ER - CJC sensor defect or CJC temperature outside range
FL.ER - Flash error
NO.CO - Connection error
IN.ER - Error levels on input
TY.ER - Configuration in PGM does not match this product type

Selection of units

After choosing the input signal type you can choose the process units which will be shown in the display (see table). By selection of temperature input the process value is always displayed in Celsius or Fahrenheit. This is selected in the menu point after selection of temperature input.

ROUTING DIAGRAM

(Power up)

If no key is activated for 1 minute, the display will return to the default state 1.0 without saving configuration changes.
- ⊘ Increase value / choose next parameter
- ⊘ Decrease value / choose previous parameter
- ⊛ Save the chosen value and proceed to the next menu

Hold ⊛ Back to previous menu / return to menu 1.0 without saving

50.0 ⊛
%
12.0
⇕⊛

1.0

0000 9999 ∧∨
0000 —⊛
PASSW.
Txt 1

1.1

NO YES ∧∨
NO —⊛
ADV.SET
Txt 2

VOLT CURR LIN.R POTM TEMP ∧∨
VOLT —⊛
IN TYPE
Txt 3

0-10 2-10
0-5 1-5
0-2.5
0.5-2.5
0-1
0.2-1 ∧∨
2-10 —⊛
V.RANGE
Txt 4

°C
mA
rpm
69 units
(see pg 24 for units list)
UNIT —⊛
%
Txt 11

1111
111.1
11.11
1.111 ∧∨
111.1 —⊛
DEC.P
Txt 12

999.9
-199.9 ∧∨
0.0 ⊛
DISP.LO
Txt 13
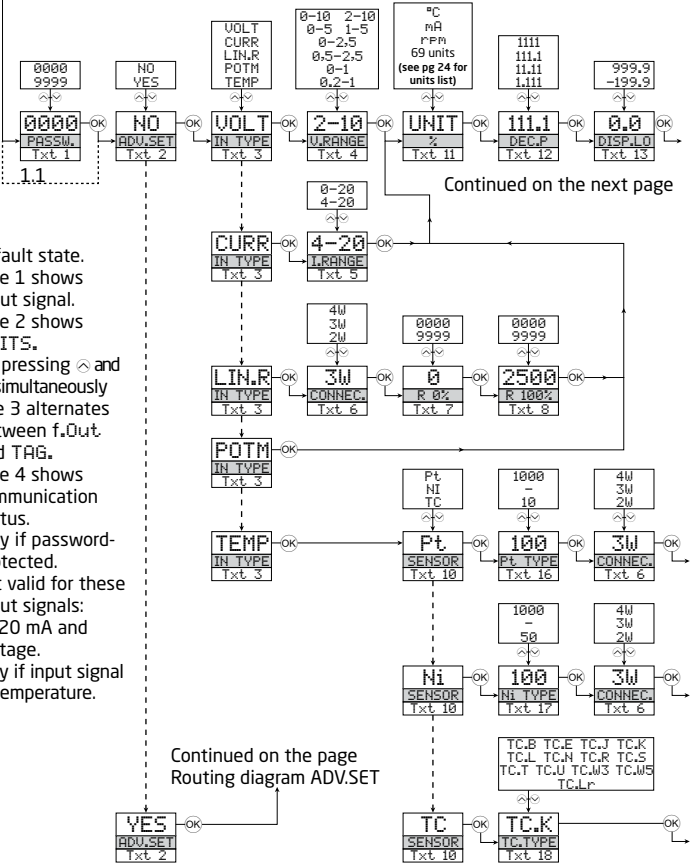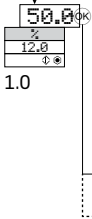
Continued on the next page

0-20
4-20 ∧∨
CURR —⊛ **4-20** —⊛
IN TYPE   I.RANGE
Txt 3   Txt 5

4W 3W 2W ∧∨
LIN.R —⊛ **3W** —⊛
IN TYPE   CONNEC.
Txt 3   Txt 6

0000 9999 ∧∨
0 —⊛
R 0%
Txt 7

0000 9999 ∧∨
2500 —⊛
R 100%
Txt 8

POTM —⊛
IN TYPE
Txt 3

Pt NI TC ∧∨
TEMP —⊛ **Pt** —⊛
IN TYPE   SENSOR
Txt 3   Txt 10

1000 - 10 ∧∨
100 —⊛
Pt TYPE
Txt 16

4W 3W 2W ∧∨
3W —⊛
CONNEC.
Txt 6

1000 - 50 ∧∨
Ni —⊛ **100** —⊛
SENSOR   Ni TYPE
Txt 10   Txt 17

4W 3W 2W ∧∨
3W —⊛
CONNEC.
Txt 6

TC.B TC.E TC.J TC.K
TC.L TC.N TC.R TC.S
TC.T TC.U TC.W3 TC.W5
TC.Lr ∧∨
TC —⊛ **TC.K** —⊛
SENSOR   TC.TYPE
Txt 10   Txt 18

1.0 = Default state.
Line 1 shows input signal.
Line 2 shows UNITS.
By pressing ⊘ and ⊘ simultaneously line 3 alternates between f.Out and TAG.
Line 4 shows communication status.
1.1 = Only if password-protected.
1.2 = Not valid for these input signals: 0...20 mA and voltage.
1.3 = Only if input signal is temperature.

Continued on the page Routing diagram ADV.SET

YES —⊛
ADV.SET
Txt 2

LP1102   23

Top flow row

```
         ┌──────┐
         │  Hz  │
         │  P/m │
┌──────┐ │  P/h │  ┌───────┐  ┌───────┐  ┌───────┐  ┌───────┐  ┌───────┐
│999.9 │ │  P/d │  │  0    │  │  0    │  │  0    │  │50%DC  │  │  1    │
│-199.9│ └──────┘  │25000  │  │25000  │  │25000  │  │Prg P  │  │1000   │
└──────┘    △▽     └───────┘  └───────┘  └───────┘  └───────┘  └───────┘
   △▽                 △▽         △▽         △▽         △▽         △▽
┌──────┐   ┌──────┐  ┌──────┐  ┌───────┐  ┌──────┐  ┌──────┐  ┌──────┐
│100.0 │OK │  Hz  │OK│  0   │OK│ 25.00 │OK│  1   │OK│ 50%  │OK│  20  │OK
│DISP.HI│   │OU.UN │  │f.min │  │ f.max │  │CUT.OFF│  │O.TYPE│  │t.PULSE│
│Txt 14│   │Txt 20│  │Txt 21│  │ Txt 22│  │Txt 23│  │Txt 19│  │Txt 24│
└──────┘   └──────┘  └──────┘  └───────┘  └──────┘  └──────┘  └──────┘
                                            f>500 Hz    50%DC
```

Second flow row

```
┌──────┐  ┌───────┐  ┌───────┐  ┌──────┐  ┌──────┐  ┌──────┐
│  0   │  │ 0.06  │  │  0   │  │50%DC │  │  1   │
│30000 │  │30000  │  │30000 │  │Prg P │  │1000  │
└──────┘  └───────┘  └──────┘  └──────┘  └──────┘
   △▽        △▽         △▽        △▽        △▽
┌──────┐  ┌──────┐  ┌───────┐  ┌──────┐  ┌──────┐  ┌──────┐
│ P/-  │OK│  0   │OK│ 1000  │OK│  0   │OK│ 50%  │OK│  20  │OK
│OU.UN │  │P.min │  │ P.max │  │CUT.OFF│  │O.TYPE│  │t.PULSE│
│Txt 20│  │Txt 21│  │ Txt 22│  │Txt 23│  │Txt 19│  │Txt 24│
└──────┘  └──────┘  └───────┘  └──────┘  └──────┘  └──────┘
                                            50%DC
```

UNIT selection

```
┌──────┐
│  °C  │
│  °F  │
└──────┘
   △▽
┌──────┐
│  °C  │OK
│ UNIT │
│Txt 9 │
└──────┘
```
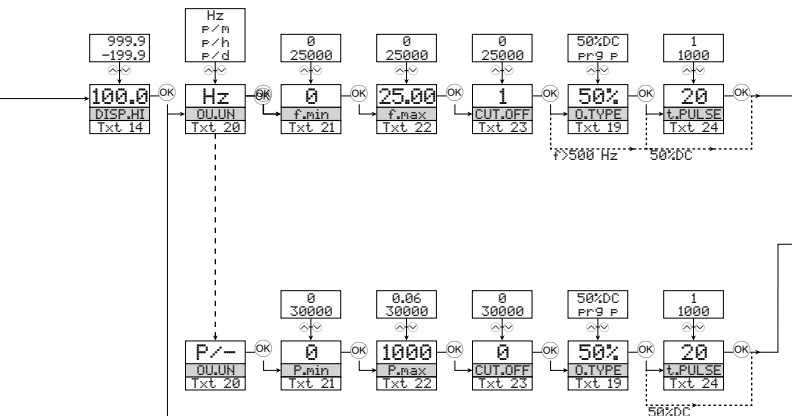
Selectable UNITS:

%	hPa	kWh	mils	Pa
°C	Hz	L	min	PH
°F	in	L/h	mm	rpm
A	in/h	L/min	mm/s	s
bar	in/min	L/s	mm/s^2	S
cm	in/s	m	mol	t
ft	Ips	m/h	MPa	t/h
ft/h	K	m/min	mV	uA
ft/min	kA	m/s	MW	um
ft/s	kg	m/s^2	MWh	uS
g	kHz	m3	N	V
gal/h	kJ	m3/h	Ohm	W
gal/min	kPa	m3/min	P/day	Wh
GW	kV	mA	P/h	yd
hP	kW	mbar	P/min	[blank]
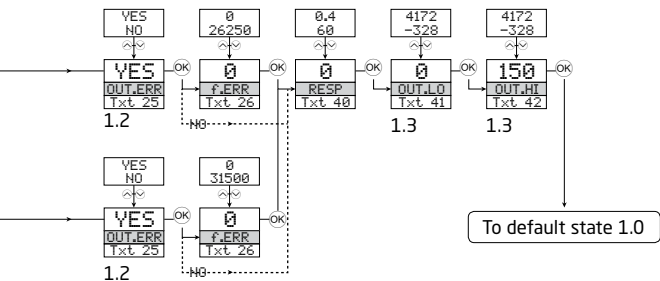
```
         YES          0            0.4          4172         4172
         NO           26250        60           -328         -328
        ┌────┐       ┌────┐       ┌────┐       ┌────┐       ┌────┐
        │YES │─OK→   │ 0  │─OK→   │ 0  │─OK→   │ 0  │─OK→   │150 │─OK→
        │OUT.ERR│    │f.ERR│      │RESP │      │OUT.LO│     │OUT.HI│
        │Txt 25│     │Txt 26│     │Txt 40│     │Txt 41│     │Txt 42│
         1.2          NO            1.3          1.3
```

```
         YES          0
         NO           31500
        ┌────┐       ┌────┐
        │YES │─OK→   │ 0  │
        │OUT.ERR│    │f.ERR│
        │Txt 25│     │Txt 26│
         1.2          NO
```

To default state 1.0

1.2 = Not valid for these
      input signals:
      0…20 mA and
      voltage.
1.3 = Only if input signal
      is temperature.

ROUTING DIAGRAM
ADVANCED SETTINGS (ADV.SET)

2.0 In the submenu simulation (SIM) you must press ⊛ to return to the default state 1.0.

```
MEM
DISP
CAL
SIM
PASS
LANG
∧∨
```

MEM ─(OK)─	SAVE ─(OK)─
SETUP	MEMORY
Txt 43	Txt 44

SAVE / LOAD

DISP ─(OK)─	3 ─(OK)─	9 ─(OK)─	TAGNO. ─(OK)─	f.OUT ─(OK)─
SETUP	CONTRA	LIGHT	TAGNO.	LINE 3
Txt 43	Txt 45	Txt 46	Txt 47	Txt 48

9/0 — 9/9 — 9/A — TAG f.OUT

CAL ─(OK)─	YES ─(OK)─	2.0 ─(OK)─	YES ─(OK)─	90.0 ─(OK)─	YES ─(OK)─
SETUP	CAL.LO	°C	CAL.HI	°C	USE.CAL
Txt 43	Txt 49	Txt 61	Txt 50	Txt 62	Txt 60

YES/NO — 4172/-328 — YES/NO — 4172/-328 — YES/NO

To default state 1.0

SIM ─(OK)─	YES ─(OK)─	25.0 ─(OK)─
SETUP	EN.SIM	°C
Txt 43	Txt 51	Txt 52

YES/NO — 4172/-328

2.0

PASS ─(OK)─	YES ─(OK)─	0000 ─(OK)─
SETUP	EN.PASS	NEW.PAS
Txt 43	Txt 54	Txt 55

YES/NO — 9999/0000

LANG ─(OK)─	UK ─(OK)─
SETUP	LANGUA
Txt 43	Txt 59

DE, DK, ES, FR, IT, SE, UK

SCROLLING HELP TEXT IN DISPLAY LINE 3

[01] Set correct password
[02] Enter advanced setup menu?
[03] Select temperature input
    Select potentiometer input
    Select linear resistance input
    Select current input
    Select voltage input
[04] Select 0.0-1 V input range
    Select 0.2-1 V input range
    Select 0-2.5 V input range
    Select 0.5-2.5 V input range
    Select 0-5 V input range
    Select 1-5 V input range
    Select 0-10 V input range
    Select 2-10 V input range
[05] Select 0-20 mA input range
    Select 4-20 mA input range
[06] Select 2-wire sensor connection
    Select 3-wire sensor connection
    Select 4-wire sensor connection
[07] Set 0% resistance value
[08] Set 100% resistance value
[09] Select Celsius as temperature unit
    Select Fahrenheit as temperature unit
[10] Select TC sensor type
    Select Ni sensor type
    Select Pt sensor type
[11] Select display unit
[12] Select decimal point position
[13] Set display readout low
[14] Set display readout high
[16] Select Pt10 as sensor type
    Select Pt20 as sensor type
    Select Pt50 as sensor type
    Select Pt100 as sensor type
    Select Pt200 as sensor type
    Select Pt250 as sensor type
    Select Pt300 as sensor type
    Select Pt400 as sensor type
    Select Pt500 as sensor type
    Select Pt1000 as sensor type
[17] Select Ni50 as sensor type
    Select Ni100 as sensor type
    Select Ni120 as sensor type
    Select Ni1000 as sensor type
[18] Select TC-B as sensor type
    Select TC-E as sensor type
    Select TC-J as sensor type
    Select TC-K as sensor type
    Select TC-L as sensor type
    Select TC-N as sensor type
    Select TC-R as sensor type
    Select TC-S as sensor type
    Select TC-T as sensor type
    Select TC-U as sensor type
    Select TC-W3 as sensor type
    Select TC-W5 as sensor type
    Select TC-Lr as sensor type

[19] Select 50% duty cycle output
    Select programmable pulse time
[20] Select Hz as output unit
    Select pulses/minute as output unit
    Select pulses/hour as output unit
    Select pulses/day as output unit
[21] Set output frequency for 0% input
[22] Set output frequency for 100% input
[23] Set low cut-off frequency
[24] Set pulse time in milliseconds
[25] Select no error action - output undefined at error
    Set output at specific frequency on input error
[26] Set output frequency on input error
[40] Set response time in seconds
[41] Set temperature for frequency output low
[42] Set temperature for frequency output high
[43] Enter language setup
    Enter password setup
    Enter simulation mode
    Perform process calibration
    Enter display setup
    Perform memory operations
[44] Load saved configuration into module
    Save configuration in display front
[45] Adjust LCD contrast
[46] Adjust LCD backlight
[47] Write a 6-character device TAG
[48] Output frequency is shown in display line 3
    Device TAG is shown in display line 3
[49] Calibrate input low to process value?
[50] Calibrate input high to process value?
[51] Enter simulation mode?
[52] Simulate input value
[54] Enable password protection?
[55] Set new password
[59] Select language
[60] Use process calibration values?
[61] Set value for low calibration point
[62] Set value for high calibration point

Ordering information

DESCRIPTION	PART NUMBER
Analog to Freq. Converter	**AFCM0000**
Programming Module	**PGMMOD00**
Program/Comms Module	**PGMMODC1**