ESM 4900 OWNER's MANUAL

Please read the following information before using and thank you very much for buying Emko products.

The safety requirements are classified as "warning" or "caution" according to the following explanations:
WARNING: Suggests that the user' s mishandling can result in personal death or serious injury.
CAUTION: Suggests that the user' s mishandling can result in personal injury or damage to the property.

Packing List: One unit.
                  Two fixing clamps.
                  One owner's manual.

1. INTRODUCTION:
ESM series process indicators can be adapted easily to all applications and automation systems to monitor heating, cooling or any process parameters. They are mainly used in the glass, plastics, petrochemical, textile, automotive and machine production industries. ESM series products are highly developed and full featured.

2. INSTALLATION:
 WARNING: A visual inspection of this product for possible damage during shipment is recommended before installation. It is your responsibility to ensure that qualified mechanical and electrical technicians install this product.
If there is danger of serious accident resulting from a failure or defect in this unit, the user shall provide the unit with an appropriate external protective circuit.
The unit is normally supplied without a power switch or a fuse. Use power switch and fuse as required (fuse rating is 1A@250VAC)
Be sure to use the rated power supply voltage to protect the unit against damage and to prevent failure.
Keep the power off until all of the wiring is completed so that electric shock and trouble with the unit can be prevented.
Never attempt to disassemble, modify, or repair this unit. Tampering with the unit may result in malfunction, electric shock, or fire.
Do not use the unit in combustible or explosive gaseous atmospheres.
During installation into a metal panel, care should be taken to avoid injury from metal burrs which might be present. The equipment can loosen from vibration and become dislodged if installation parts aren't properly tightened.
WARNING: Before beginning installation of this product:
                  Disconnect all electrical power to the machine.
                  Make sure the machine cannot operate during installation.
                  Follow all safety warnings of the machine manufacturer.
CAUTION: Forbidden Conditions: Corrosive and explosive atmospheres, Home application. This unit is for industrial applications, only.

**Carefully read and follow all installation instructions.**

Installing / Replacing Output Modules

❶ Remove power from unit. Firmly grip the facia, push the locking tabs top and bottom and pull the unit from its case.

❷ Insert the module(s) into the cavity(ies as shown).

❸ Carefully reinsert the unit into its housing. Make certain that the communications port lines up with the hole at the back of the housing and snap into place.
Use product codes: EMx-4xx for 48mm H models, EMx-7xx for 72mm H models and EMx-9xx for 96mm H models
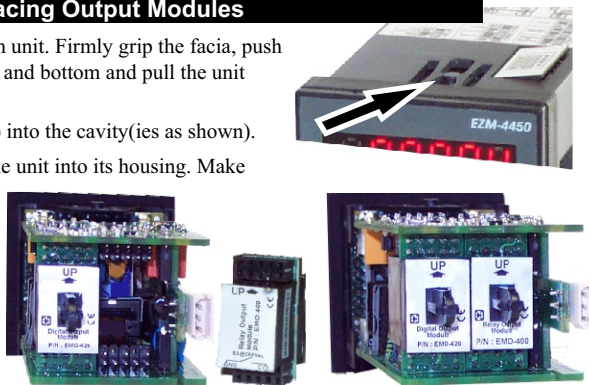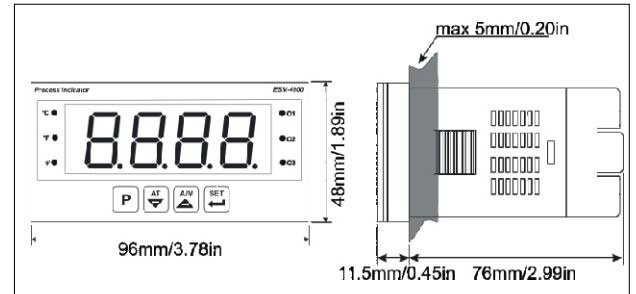

Plug-in Modules	Product Code		
Relay Output *	EMO-400	EMO-700	EMO-900
SSR Output 20mA@18Vdc	EMO-410	EMO-710	EMO-910
Transistor Output 40mA@18Vdc	EMO-420	EMO-720	EMO-920
Volt/Current Out (0 to 20mA, 0 to 10V)	EMO-430	EMO-730	EMO-930

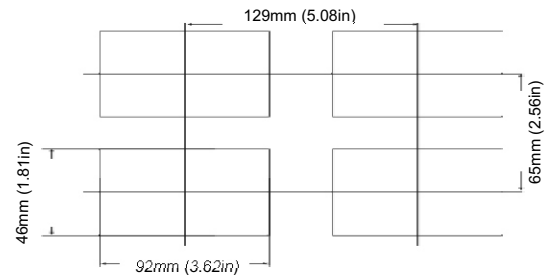* 3A@250Vac for EMO-400 / 5A@250Vac for EMO-700 & 900
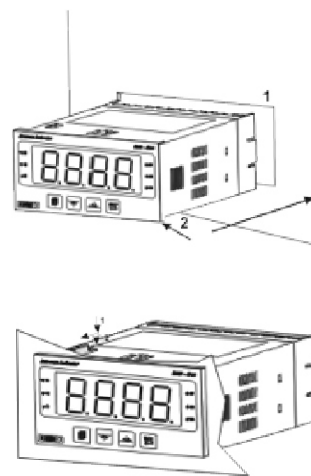
2.1 GENERAL DESCRIPTION:
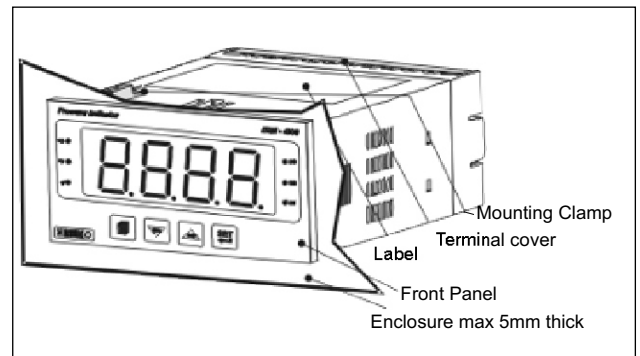
2.2 DIMENSIONS:

2.3 PANEL CUT-OUT:

2.4 PANEL MOUNTING:

Inserting into Panel:
 WARNING: During installation into a metal panel, care should be taken to avoid injury from metal burrs which might be present. The equipment can loosen from vibration and become dislodged if installation parts aren't properly tightened.
● Prepare panel cut-out.
● Check front panel gasket position.
● Insert the device through the cut-out.

Installing the Fixing Clamps:
The unit is designed for panel mounting. Fixing is by mounting clamps top and bottom.
Insert the unit in the panel cut-out from the front.
Insert the mounting clamps from the rear side of the device and tighten the fixing screws to secure the unit against the panel.

Removing from panel:
1) Loosen screws.
2) Pull the fixing clamps, both top and bottom, from the device while holding the unit in place.
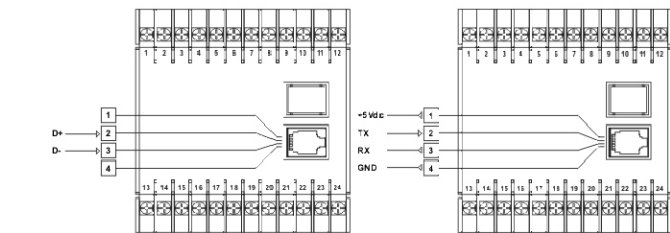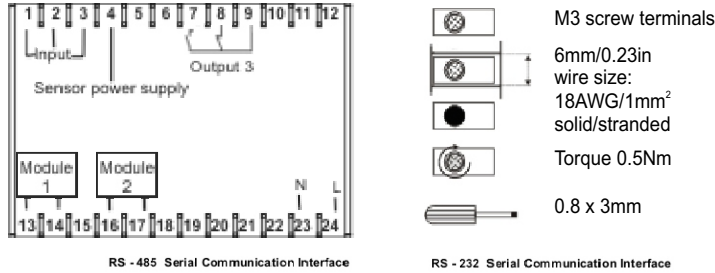3) Pull the unit through the front of the panel.

3 ELECTRICAL CONNECTIONS:

WARNING: You must ensure that the controller is correctly configured for your application. Incorrect configuration could result in damage to the process being controlled, and/or personal injury. It is your responsibility, as the installer, to ensure that the configuration is correct. The controller may either have been configured when ordered, or may need configuring now.

WARNING: This equipment does not contain any parts and material related to users. Only qualified personnel and technicians trained specially should work on this equipment. This equipment contains internal circuits with voltage dangerous to human life. There is severe danger for human life in the case of unauthorized intervention.
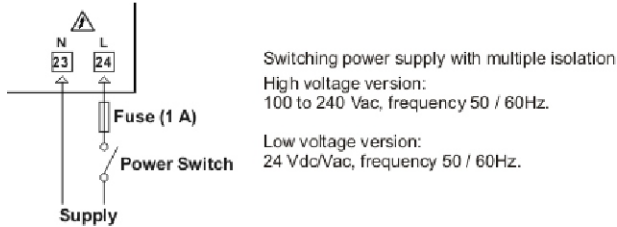
WARNING: Be sure to use the rated power supply voltage to protect the unit against damage and to prevent failure.

WARNING: Keep the power off until all of the wiring is completed so that electric shock and trouble with the unit can be prevented.
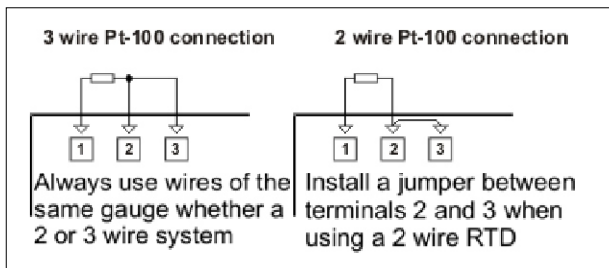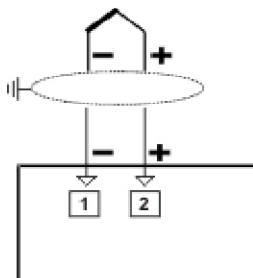
3.1 TERMINAL LAYOUT AND CONNECTION INSTRUCTIONS:

M3 screw terminals

6mm/0.23in
wire size:
18AWG/1mm^2
solid/stranded

Torque 0.5Nm

0.8 x 3mm

RS - 485 Serial Communication Interface

RS - 232 Serial Communication Interface

3.2 POWER SUPPLY:

Switching power supply with multiple isolation
High voltage version:
100 to 240 Vac, frequency 50 / 60Hz.

Low voltage version:
24 Vdc/Vac, frequency 50 / 60Hz.

3.3 PT100 INPUT:

3 wire Pt-100 connection

2 wire Pt-100 connection

Always use wires of the same gauge whether a 2 or 3 wire system

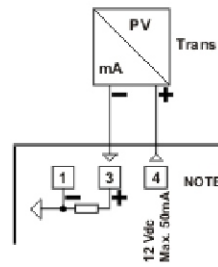Install a jumper between terminals 2 and 3 when using a 2 wire RTD
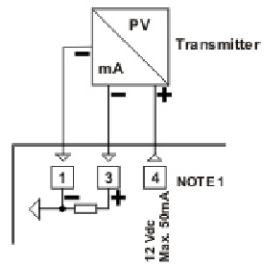
3.4 THERMOCOUPLE SENSOR:

Connect the wires with the polarity as shown. Always use compensation wire corresponding to the thermocouple used. If present, the shield must be connected to a proper ground.
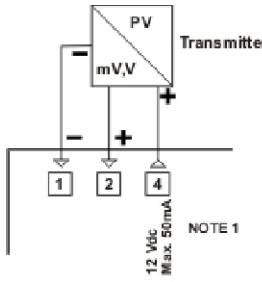
3.5 CURRENT OUTPUT TRANSDUCER:

With 2 wire transducer

With 3 wire transducer

NOTE 1: Auxiliary power supply for external transmitter 12Vdc ±10% / 50mAmax with short circuit protection

3.6 VOLTAGE OUTPUT TRANSDUCER:

NOTE 1: Auxiliary power supply for external transmitter 12Vdc ±10% / 50mAmax with short circuit protection

4. TECHNICAL SPECIFICATIONS AND RATINGS

Equipment use:	Process controller equipment
Housing & Mounting:	96mm x 48mm x 76mm 1/8 DIN 43700 Plastic housing for panel mounting.
Panel cut out:	92x46mm.
Protection:	NEMA 4X (IP65 front, IP20 rear).
Weight:	Approximately 0.21 Kg.
Environmental rating:	Standard, indoor at an altitude of less than 2000 meters with non condensing humidity
Polution degree:	II, Normal office or workplace, non conductive pollution
Mode of operation:	Continuous
Supply voltage:	100 to 240 VAC 50/60 Hz. 24Vac/dc 50/60 Hz
Process Inputs:	User selectable (TC, RTD, DC Voltage/Current)
Accuracy:	± 0,25% of FS for thermocouple, thermoresistance, voltage and + 0,70% of FS for current measurement.
Sampling Cycle:	3 samples per second.
Input Filter:	Adjustable from 0.0 to 900.0 Seconds.
Control Form:	Programmable ON/OFF, P, PI, PD or PID.
Standard Relay Output:	1 rated 5A@250Vac (Programmable control or alarm output)
Plug-in modules:	optional, 2 max.
Process Display:	20.3 mm Red 4 digit LED display
LED indicators:	°C(Centigrade LED), °F(Fahrenheit LED), V(Other), O1(Alarm output 1), O2(Alarm output 2), OP3(Alarm output 3).
Operating / Storage temperature:	-5 °C to +55 °C / -40 °C to +85 °C
Operating / Storage humidity:	90 % max. (non condensing)
Installation overvoltage category:	II, Distribution level, fixed installation category
Thermocouple input types:	User selectable (L,J,K,R,S,T,B,E,N,C)
Thermoresistance input type:	PT 100 (2 and 3 wires)
DC Voltage input types:	User selectable (0 to 50mV, 0 to 5V, 0 to 10V)
DC Current input types:	User selectable (0 to 20mA, 4 to 20mA)
Cold Junction Compensation:	Automatically ±0.1°C/1°C
Line Compensation:	Maximum 10 Ohm
Sensor Break Protection:	Within the operating scale.

WARRANTY:
We warrant that the products will be free from defects in material and workmanship for 2 years from the date of purchase.
The warranty above shall not apply for any damage caused by the use of the product and is limited only to the repair or replacement of the product.

ESM 4900 Programming Guide

Front Panel Description

Display & Indicators	
°C	°C unit LED
°F	°F unit LED
♨	LED indicator for units other than °C and °F
O1	Output1 Alarm LED
O2	Output2 Alarm LED
O3	Output3 Alarm LED

Keyboard

P	Access all menus and to move up to another menu.
SET	Access alarm set values and OK button when in the program mode.
▲	Increase the parameter values and access the program menus.
▼	Decrease the parameter values and access the program menus.

Table-1 (Process Input Type and Scale selection)

Process Input Type(TC)		Scale(°C)		Scale(°F)	
0	L(FeConst DIN43710)	-100°C	850°C	-148°F	1562°F
1	L(FeConst DIN43710)	-100.0°C	850.0°C	-148.0°F	999.9°F
2	J(FeConst IEC-584)	-200°C	900°C	-328°F	1652°F
3	J(FeConst IEC-584)	-199.9°C	900.0°C	-199.9°F	999.9°F
4	K(NiCrNi DIN/IEC)	-200°C	1300°C	-328°F	2372°F
5	K(NiCrNi DIN/IEC)	-199.9°C	999.9°C	-199.9°F	999.9°F
6	R(Pt13%RhPt DIN/IEC)	0°C	1700°C	32°F	3092°F
7	R(Pt13%RhPt DIN/IEC)	0.0°C	999.9°C	32.0°F	999.9°F
8	S(Pt10%RhPt DIN/IEC)	0°C	1700°C	32°F	3092°F
9	S(Pt10%RhPt DIN/IEC)	0.0°C	999.9°C	32.0°F	999.9°F
10	T(CuConst DIN/IEC)	-200°C	400°C	-328°F	752°F
11	T(CuConst DIN/IEC)	-199.9°C	400.0°C	-199.9°F	752.0°F
12	B(Pt18%RhPt DIN/IEC)	-200°C	400°C	-328°F	752°F
13	B(Pt18%RhPt DIN/IEC)	-199.9°C	400.0°C	-199.9°F	752.0°F
14	E(CrConst DIN/IEC)	-150°C	700°C	-238°F	1292°F
15	E(CrConst DIN/IEC)	-150.0°C	700.0°C	-199.9°F	999.9°F
16	N(NicrosilNisil DIN/IEC)	-200°C	1300°C	-328°F	2372°F
17	N(NicrosilNisil DIN/IEC)	-199.9°C	999.9°C	-199.9°F	999.9°F
18	C(... DIN/IEC)	0°C	2300°C	32°F	4172°F
19	C(... DIN/IEC)	0.0°C	999.9°C	32.0°F	999.9°F

Process Input Type(RTD)		Scale(°C)		Scale(°F)	
0	PT 100	-200°C	650°C	-328°F	1202°F
1	PT 100	-199.9°C	650.0°C	-199.9°F	999.9°F

Process Input Type(DC Voltage and Current)		Scale
0	0...50 mV	Configurable
1	0...5 V	Configurable
2	0...10 V	Configurable
3	0...20 mA	Configurable
4	4...20 mA	Configurable

Entering Alarm Set Values and Parameters

Setting the alarm values:
Alarm set values are shown as ALr1, ALr2 and ALr3 in the SET LIST menu. To access the Set List menu press the 🔲 button. If no additional output modules have been installed, the display will read ALr3. Press the 🔼 to access the parameter. The display will begin to flash. Set the desired value using the 🔼 and 🔽 buttons. Press the 🔲 button to commit this new value to memory and return to the actual value. If output modules were added and configured as alarm outputs (Lou1=0 and Lou2=0), then, the display would have read ALr1 instead of ALr3 the first time the 🔲 Button was pressed and after commiting the new value to memory the display would read ALr2 allowing you to set its new value per the aforementioned instructions. If an analogue module was installed, it won't be accessible at this time.

Observing and changing parameter values:
The parameters have been divided into two groups: Technician and Calibration. The calibration parameters can be accessed by the manufacturer only. The default value of the user-changeable passwords is "0". To enter a new password, you must first access the technician's parameters and scroll to "PASS ConF". To do this, first press the 🅿 key followed by 🔲 , 🔽 , 🔲 and 🔼 in sequence. Select any value to 9999 using the 🔼 and enter it into memory with the 🔲 button.

You can access the main titles of the menu by using the 🔼 and 🔽 buttons. Press the 🔲 button to move to the next level of any menu. Change the value of your chosen parameter by using 🔼 and 🔽 buttons. The new value is saved to memory by using the 🔲 button.
When finished, press the 🅿 key to exit the programming mode.

Abbreviations

Parameters are listed in the left hand column in **bold lettering** followed by its description and available choices. Some abbreviations are defined as follow:

FS	Full Scale (or Max. Scale)		Su-L	Minimum Operating Value
HYS	Hysteresis		Su-u	Maximum Operating Value
PV	Process Value			

Programming Mode - Main Menus

🅿 → **tECH**   ▲   **CAL**

SET

see technician's   factory settings
parameters
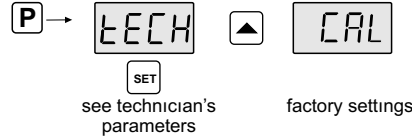
TECHNICIAN'S PARAMETERS

PinP parameters

iSSL — Configuration for process input type.
0=TC,   1=RTD,   2=DC Voltage/Current

TC Input (issl=0)

tCSL — TC input type selection for thermocouple and scale (ref. Table-1)
unit — Configuration for unit of measure (°C, °F)
LOL — Minimum value of operation scale
UPL — Maximum value of operation scale
PUOF — Process offset ±10% of FS. Added to process value.
iFLt — Input signal filtering time. (0.0 to 900.0 seconds)
CjnC — NO=cold junction compensation is inactive. YES=cold junction compensation is active.

RTD Input (issl=1)

rtdS — RTD input type selection for thermoresistance and scale (Ref. Table-1)
Unit — Configuration for unit of measure (°C, °F)
LOL — Minimum value of operation scale
UPL — Maximum value of operation scale
PUoF — Process offset ±10% of FS. Added to process value.
iFLt — Input signal filtering time. (0.0 to 900.0 second)

DC Voltage/Current (issl=2)

UASL — Input type selection for voltage and current (Table-1)
dPnt — Decimal point position on the displays
0=0000   1=000.0   2=00.00   3=0.000
UCAL — Dual or multi-point calibration
0=None   1=Dual point   2=Multi-point
P000 to P016 — Calibratiton points for multi-point configuration -1999 to 9999
CoEF — Input coefficient. Used to scale input. eg. If sensor input = 40mV, a coefficient of 1.25 is used to get a FS deflection (to 9999).
unit — Configuration for unit of measure
°C=Centigrade   °F=Fahrenheit   U=other   - =none
Lol — Minimum value of operating scale
Upl — Maximum value of operating scale
Puof — PV offset (±10% FS) This parameter value is added to process value.
iFLt — Input signal filtering time (0.0 to 900.0 seconds) .

Output parameters when output is Relay, SSR, or Triac
If no extra outputs installed, then this still applies to OUTPUT 3

Lou1/ Lou2/ Lou3 — 0=Alarm output   1=Manual/Automatic   2=Sensor break alarm
(logic outputs)

ALS1/ ALS2/ ALS3 — Alarm sensor selection   0 = Process input sensor (on terminals 1,2,3)
1 = Analogue module (1 or 2) sensor

Alt1/ ALt2/ Alt3 — 0=Process high alarm
(alarm types) — 1=Process low alarm

ALH1/ ALH2/ ALH3 — Alarm hysteresis (0% to 50% of FS)
Aon1/ Aon2/ — Alarm delay from fault 0.0 to 9999 seconds
AoF1/ AoF2/ AoF3 — Alarm reset from fault 0.0 to 9998 seconds. For high limit with manual reset only, select 9999. Display will read LtCH to indicate latch feature

If Module 1 or 2 is EMO-430 (corresponding LED flashes) retransmits PV

OAt1/ oAt2 — Output scale   0= 0...20mA (connect parallel 500 ohm for 0-10VDC)
1= 4...20mA (connect parallel 500 ohm for 2-10VDC)

Parameters

General Configuration (Genn ConF)

SU-L SV min. limit. Adjustable from min. scale to SU-u value . It's the minimum value of the operation scale.

SU-u SV max. limit. Adjustable from SU-L value to max. scale. It's the maximum value of the operation scale.

Communication Configuration (Comm Conf)

SAdr Slave Address from 1 to 247

BAud Baud Rate: 0- 1200   1- 2400   2- 4800   3- 9600   4- 19200

Prty Parity   0- none   1- ODD   2-EVEN

StPb Stop Bit   0- 1 stop bit   1- 2 stop bit

Passwords (PASS ConF)

Tcps Technician password (0 to 9999).

Manufacturer's Calibration Page (PASS CAL) - Factory Set
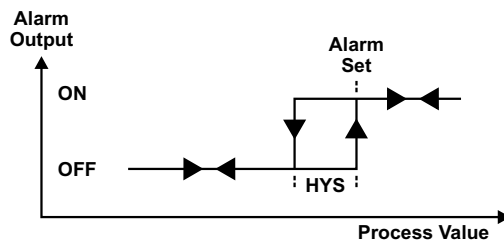
Alarm Set Value Parameters (SET LIST)

ALr Module-1's alarm set value when installed.

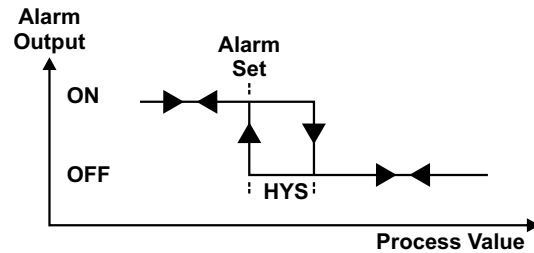**ALr2** Module-2's alarm set value when installed.

ALr3 Output-3's alarm set value.

ALARM OPTION and OUTPUT FORMS

Process high alarm

Process low alarm

Technician's Parameters
Input/Output Configuration

tECH ▲▶

SET
P inP ▲

out1 ▲   out2 ▲   out3 ▲   GEnn ▲   Corn ▲   PASS

If module 1 or 2 is
EMO x30

SET
iSSL ▲   iSSL ▲   iSSL   SET   SET   SET   SU-L   bAud   tCPS   Lou1   oAt1

SET   SET   SET   SET   SET   SET   SET   SET
tCSL   rtdS   uASL   SU-u   Prty   ALt1

SET   SET   SET   SET   SET   SET
un it   un it   dPnt   StPb   ALH1

SET   SET   SET   SET   SET
LoL   LoL   uCAL ▲   uCAL ▲   uCAL ▲   Po07   Po15   Aon1

SET   SET   SET   SET   SET   SET   SET   SET
uPL   uPL   CoEF   tPoL   Po00   Po08   Po16   AoF1

SET   SET   SET   SET   SET   SET   SET
PUoF   PUoF   un it   tPoH   Po01   Po09   CoEF

SET   SET   SET   SET   SET   SET   SET
iFLt   iFLt   LoL   CoEF   Po02   Po10   un it

SET   SET   SET   SET   SET   SET   SET
CJnC   uPL   un it   Po03   Po11   LoL

SET   SET   SET   SET   SET   SET
                      PUoF   LoL   Po04   Po12   uPL

                      SET   SET   SET   SET   SET
                      iFLt   uPL   Po05   Po13   PUoF

                      SET   SET   SET   SET   SET
                                 PUoF   Po06   Po14   iFLt

                                 SET   SET   SET   SET
                                 iFLt

                                 SET