

# Interface Modules

Model 703

## Description

The interface modules provide power for various meter transmitters and interfaces with other instruments. All models are packaged in a 5.9" x 5.9" x 4" NEMA4X enclosure or a 6.35"L x 5.3"W x 3.0"H NEMA1 enclosure. The Model 1104A front panel is blank.



Models 703NR



Models 703N

## Features

### MODELS

#### Models 703(N)

The Models 703(N) can be configured with up to three (3) isolated mercury wetted contact outputs that are synchronous with the meter input signal at a maximum frequency of 100 hertz. The long life mercury relays are SPST.

#### Model 703(N)R

The Model 703(N)R have a readout that displays the total consumed, an incremental total and the instantaneous flow rate through the connected meter. They also have optional outputs to provide a flow alarm relay or a totalizer factored contact closure. Both of these outputs are field programmable. These models also provide an optional communication port output for interfacing to other computers or communication systems.

#### Model 703(N)P

The Models 703(N)P has one (1) contact closure that is synchronous with the signal output from the meter. This instrument is designed to interface with meters that have a solid state output to other devices that require a dry contact closure, such as the OMNI Meters and transmitters with switch type outputs. The relays are SPDT type with a maximum operating frequency of 500 pulses per minute.

### INPUT SIGNALS

#### General Requirements

Input Frequency (full scale) – 1 to 1000 Hz  
Maximum loop resistance – 40 ohms

#### Contact Closure Inputs

Type – SPST Interrupting Current 60 mA.

#### Solid State Inputs

An open collector Interrupting Current 60 mA

#### Electrical

Input – 117 VAC  $\pm$  10%, 60 Hz, 1 phase Power

Consumption less, than 20 volt amps,  
Maximum Output: 12 VDC , 125 mA, maximum  
24 VDC, 125 mA, maximum

#### Temperature Operating Conditions

Ambient temperature – 0° F to 120° F

	NEMA1	NEMA4X
Length	6.35"	5.9"
Height	3.0"	5.0"
Width	5.3"	3.8"
Weight	2.5 Lbs	2.5 Lbs

### OPTIONAL OUTPUTS

Mercury Relay Output – A SPST mercury-wetted bounce free contact closure synchronous with the input. Rated 1 amp 24 VDC, or 0.1 amp VAC. All resistive.

Pulsed Relay Output - A SPDT dry contact closure rated 5 amps resistive 24 VDC resistive, 117 VAC.

Solid State Pulse Output – A solid state common emitter output rated 50 mA at 24 VDC maximum.

Totalizer – Mechanical totalizer, 6 digits.

Electronic Readout—An eight (8) digit

transmissive Red LCD, 0.45" high, dual totalizers with a six (6) digit flow rate indicator, non-volatile E2PROM memory.

Flow Alarm Relay Output – (Option L) A SPDT relay activated at flow rate set point. Rated 5 amps resistive 24 VDC resistive, 117 VAC.

Pulsed Relay Output – (Option Bb) A SPDT relay activated at a specified quantity. Rated 5 amps resistive 24 VDC resistive, 117 VAC.

Communications Port – RS485 or RS 232 serial communications card.

#### RS485

Type: RS485 multi-point balanced interface (non-isolated)

Baud rate: 300 to 19.2K

Data Format: 7/8 bits; odd, even, or no parity

Bus Address: 0 – 99, maximum of 32 meters per line

#### RS232

Type: RS232 half duplex (non-isolated)

Baud Rate: 300 to 19.2K

Data Format: 7/8 bits, odd, even, or no parity

## ELECTRICAL CONNECTIONS

Complete all connections to the metering device and instrument before applying power. If it becomes necessary to disconnect any of these connections first remove AC power to the instrument.

TERMINAL NUMBER	FUNCTION	SWITCH INPUTS	SOLID STATE INPUTS
1	Meter Input	Switch IN	Signal In (White)
2	Shield	Shield	Shield
3	Ground	Switch IN	Common (Black)
4	+12VDC	No Connection	Meter Power (Red)

### AC POWER INPUTS

TERMINAL NUMBERS	FUNCTION
8	Earth Ground
9	117 VAC
10	117 VAC

### PULSED OUTPUT

TERMINAL NUMBERS	FUNCTION
11(14)(17)	Normally Open (NO)
12(15)(18)	Common (C)
13(16)(19)	Normally Closed (NC)

### FLOW ALARM AND FACTORED RELAY

TERMINAL NUMBERS	FUNCTION
5	Normally Open (NO)
6	Common (C)
7	Normally Closed (NC)

### MERCURY RELAY

TERMINAL NUMBERS	FUNCTION
11(14)(17)	Normally Open (NO)
12(15)(18)	Common (C)

### SOLID STATE

TERMINAL NUMBERS	FUNCTION
11(14)(17)	Common
12(15)(18)	Collector

## FLOW RATE INDICATOR / TOTALIZER

### Field Adjustments

CAUTION: All instruments are preprogrammed to operate with the meter specified when ordered and no additional

programming is required. Entering the program mode may cause erroneous operation. This should only be done when the operating specifications have changed.

To enter the programming mode, depress and hold the SEL button on the readout for 2 seconds. In the program mode the display will show Pro and flash to 000 with the least significant digit flashing. Press the RST button 4 times to read 004 (if you exceed the desired number keep pressing the RST button until the number comes back to 4). Press the SEL button and the second digit will start flashing. Press the RST button two (2) times to read a 2 the readout should read 024. If it does not, repeat the above process until the proper code is displayed. When the 024 is displayed press the SEL button and the third digit will start to flash. Press the RST button one (1) time to display the code 124. Once the correct code is displayed press and hold the SEL button until the display flashes Pro NO. The default entry code is 124 (in some instances another number may be used), check the wiring diagram label to find the correct number.

There are five (5) programming modules available. Press the RST button to step through the modules. When the correct module is displayed press the SEL button to enter that module.

In the module the function being programmed is shown then flashes to the value presently entered for the function. Pressing the RST button stops the display from flashing and places the unit into the data selection mode. In the selection mode the operator presses the RST button to scroll through the parameters available for that function. When the desired selection is displayed press the SEL button to store the data and advance to the next function.

When setting numerical values use the RST button to increment the flashing digit, and momentarily press the SEL button to advance to the next digit. To start the least significant digit flashing momentarily depress the RST button.

To exit the programming mode and save all parameters step through the module until one of the five main modules is displayed, then press the RST button until Pro nO is displayed. Pressing the SEL button at this point enters the data and closes the program mode.

### Instrument Program

#### PROGRAM MENUS

Module #1 (1 – input)

InP A-b – dual Cnt

CntA dP – (Numeric selection depends on the factors determined below.)

CntA ScF – (This factor equals the desired totalizer registration divided by the number of pulses for that registration. The number varies with each meter and registration. Example for a W2000 DRE meter reading in gallons. 500.9663 pulses equals 1000 gallons. Therefore, the factor is 1/500.9883 or

0.0019961. Only four(4) digits can be entered for the factor. Therefore, the number entered would be 0.0020, the factor round off.

To improve the accuracy the decimal should be moved two (2) places and the factor becomes 0.19961. Since the decimal was moved two (2) places, the selection for CntA dP above is 0.00 and the factor entered into Cnt ScF is 0.1996.

CntA rST – to ZErO

CntA dir - Nor

CntA Ld – 0000

Cntb bAT - nO

Cntb dP – (Usually the same as CntA dP) If the units of measure are not the same use the procedure listed above to determine the decimal point location and factor. Possible examples are one totalizer reading in gallons and the second in cubic feet or cubic meters and imperial gallons.

Cntb ScF – Usually the same as CntA ScF (if not use the procedure listed above.)

RSt P – UP – nO

USEr InP – reset

USEr ASn – both A–b

Module #2 (2 – rAtE)

RAtE Enb – yES

RAtE dP – The decimal location depends on the flow rate value. It typically is set to display the multiplier to use all six digits on the display. This setting is determined below.)

RAtE dSP – This number represents the maximum flow rate to be displayed. In establishing this number, all 6 of the available digits should be used if possible. This setting is determined below.

RAtE InP – Programs the hertz value at the programmed flow rate. This number should be enhanced as follows: For a w2000 DRE the maximum flow rate is 2500 GPM at 20.87 hertz. The 2500 could be used for RAtE dSP above, but to improve the accuracy it should be set to 25000. The decimal was moved one place to the right, the hertz value must also be moved one place to keep proportions the same. Therefore, RAtE dP should be 0.0, RAtE dSP should be 25000.0 and the hertz set to 208.7.

LO – Udt – Set to 5.0. this sets the number of seconds between flow rate display updates. If the flow rate indicator due to varying meter signals, increasing this number reduces display fluctuations. May be set between 0.1 and 99.99 seconds.

HI-Udt – Set to 30.0. Sets the number of seconds the instrument will wait for a meter pulse before going to zero (0). May be set between 0.1 and 99.9.

Module #3 (3-dSPLAy)

SEL Enb – Set to yES.

RSt Enb - This step programs the counter(s) to be reset with the RST button. Typically set to Count b to reset the b totalizer with the RST button. To reset the a totalizer set to Count A, to make both re-settable set to both A-b.

d-ScroLL – Typically set to nO, set to yES to have the display automatically scroll between A total, b total and the flow rate.

d-Color - Specifies the color of the display (Typically set to rEd, if green is desired set to Grn)

d-LEVEL – Sets display intensity ( Typically set to 5, to reduce the intensity reduce the number)

Pro Code – Factory set to 124. Although a lock code is not necessary it is an electronic lock to prevent tampering. It may be changed to any three (3) digit number.

CodE VEr - nO

FACt Set - Set to no. Setting to yES causes the program stored in memory to be erased.

Module #4 (4-SetPt)

This module is only active when options Bb or L are present.

SPT SEL – SP1

SP2 Enb -nO

SPT ASn – Set to rAtE for Flow Alarm Output Contact out is then based on the flow rate. Set to Count b for Factored Relay OutputContact output is based on quantity.

SPT ACt – If rAtE was selected above set to BOUnD if contacts are to be activated when the flow rate equals or exceeds the set point and close below the set point. Set to LATCh to hold the contacts closed once the flow equals the set point. A manual reset is required to release the latched contacts.

– If Count b was selected set to t-OUT for a time controlled output contact closure. Set to LatCh to close the contacts when a preset quantity has been reached. The contacts will remain closed until they are released with a manual reset.

SPT tOUt - Only active if t-OUT was selected above. SET the number of seconds that the relay remains closed, each time it is activated.

SPT VAL – If rAtE was selected above, set the actual flow rate where the contact closure is desired. If Count b was selected above set the value to represent the total quantity the contact closures represents when the relay actuates.

SPn Out – Typically set to nOr to turn the relay on when activated and off when deactivated. Set to nOR to reverse this action.

SPN Lit – Set to nOr.

SPT P-UP – Set to SAVE.

SPn type – Set to HI-ACt

SPN Stby – Set to nO.

SPn AUtO – Set to nO.

SP1 OFF2 – Set to nO

SP2 OFF1 – Set to nO.

SPt rSt – Set to nO.

SPn ChC – Typically set to yES. Set to nO inhibit the backlight color to change.

Module #5 (5 - Ser iAL) – This module is only active when one of the Communication options are installed.

bAUd – Set the baud rate to match of other communications equipment. Choices are 300, 600, 1200, 2400, 4800, 9600, 19200, 38400.

dAtA – Set to either 7-bit or 8-bit to match communications equipment.

PAritY – Select nO, Odd, or EVEn.

Addr – Set to zero(0) if communicating with a single piece of equipment in the RS232 mode. The mode address applies specifically to RS485 applications.

Abbr – Typically set to no for a full print transmission, consisting of meter address, mnemonics, and parameter data. Select yES for abbreviated print transmission consisting of parameter data only.

Prnt Opt – This parameter selects the instrument data transmitted in response to a Print Request. Select Prnt ALL to transmit all of the data or select yES for each item in the list that is to be transmitted.

## READ BEFORE CHANGING THE PROGRAM

### UNLOCK PROCEDURE

The following procedures involve programming changes when making these changes use the Programming Menus After making a change press and hold the SEL button for approximately 2 seconds to enter the change into memory. After making all changes always return to normal operation before removing power to permanently enter all changes into memory.

To enter the program mode, press and hold the SEL button on the readout until it flashes Pro CodE (If it does not display PrO nO press the SEL button until it does) and flashes over to 000 with the least significant digit flashing. Press the RST button 4 times to read 004 (if you exceed the desired number keep pressing the RST button until the number comes back to 4. When the 4 is displayed, press and hold the SEL button until the second digit starts flashing, reading 004. Press the RST button 2 times to read a 2 the readout should read 124. If it does not, repeat the above process until the proper code is displayed. When the correct code is displayed, press and hold the SEL button until the display flashes PrO nO.

### Setting the A Totalizer to a Preset Number.

1. Determine the number to be preset into totalizer A.

2. Go to Pro—nO If instrument is locked follow the Unlock Procedure above to unlock.
3. Press the RST button once. Go to Module #1. Display should read 1– INPUT.
4. Press the SEL button 4 times. Readout reads CntA rSt - to ZERo press RST to change to CtLd.
5. Press the SEL button 2 times the readout reads CntA Ld—enter the desired number to be preset.
6. Press and hold the SEL button for 2 seconds to enter number.
7. Press the SEL button to go to Pro—nO.
8. Press the RST button 3 times. Display should read 3 - dSPLAy.
9. Press the SEL button 2 times. The readout reads RSt Enb - Count b
10. Press the RST button to change to Count A.
11. Press the SEL button to until the readout returns to normal operation.
12. Press the SEL button to go to Counter A.
13. Press the RST button. Observe that the desired number was entered into counter A.
14. Go to Pro—nO If instrument is locked follow the Unlock Procedure above to unlock.
15. Press the RST button once.
16. Go to Module #1. Display should read 1– INPUT.
17. Press the SEL button 4 times. Readout reads CntA rSt - to CtLd press RST to change to ZERo.
18. Press the SEL button to go to Pro—nO.
19. Press the RST button 3 times. Display should read 3 - dSPLAy.
20. Press the SEL button 2 times. The readout reads RSt Enb - Count A .
21. Press the RST button to change to Count b.
22. Press the SEL button to return to normal operation.

### PROGRAMMING OPTION L

1. Go to PrO nO. If instrument is locked follow the Unlock procedure above to unlock.
2. Press the RST button four (4) times the readout should read 4 SEtPt
3. Press the SEL button once. Readout should read SPt SEL – SP2. If not press the RST button until it does.
4. Press the SEL button 2 times. Readout should read SP2 - ASn - rAtE. If not press the RST button until it does.
5. Press the SEL button the readout should read SP2 Act - bOUNd\* or LATCH\*\*. If not press the RST button until it does. (See \* and \*\* below)

6. Press the SEL button one (1) time the readout should read SP1 - VAL and change over to a number. This is the flow rate where the set point will activate if acceptable press the SEL button if not change to the desired number and press SEL button.
7. If SP2- Act is set to LAtCH and you want to unlatch with the RST button on the front of the readout.
8. Press the SEL button 5 times. Readout should read SP2-rSt yES, if not set to yES with the RST button. In all other cases SP2-rSt should be set to nO.
9. Press the SEL button until the readout returns to normal operation

\* bOUNd causes the relay to close when the flow rate equals or exceeds set point. If the flow rate falls below the set point the relay will open.

\*\* LAtCH causes the relay to close when the flow equals or exceeds the set point. Once closed it will remain closed regardless of flow rate until the RST button is pushed.

#### Change Counter A and/or Counter b Scale Factor

If the counter scale factor must be changed, this is accomplished in Module #1.

2. Go to PRO nO If instrument is locked follow the Unlock procedure above to unlock.
3. Press the RST button once the readout should read 1 - INPUT
4. See procedure for Module #1 in the Program Modules under CntA Scf. In the example the CntA ScF was 0.1996 with two (2) decimals entered under CntA dP. Following the same logic 50.09663 pulses equals 100 gallons, the reciprocal is 0.019961. To change to 100 gallon counts change CntA dP to 0.0 (one (1) decimal ) and leave CntA ScF at 0.1996. To change to 10 gallon pulses, change Cnt dP to 0 (no decimals). After completing, press SEL until the display shows Pro nO. Pressing it again will return the display to normal operation. The above procedure may be used for counter b by changing Cntb Scf and Cntb dP.

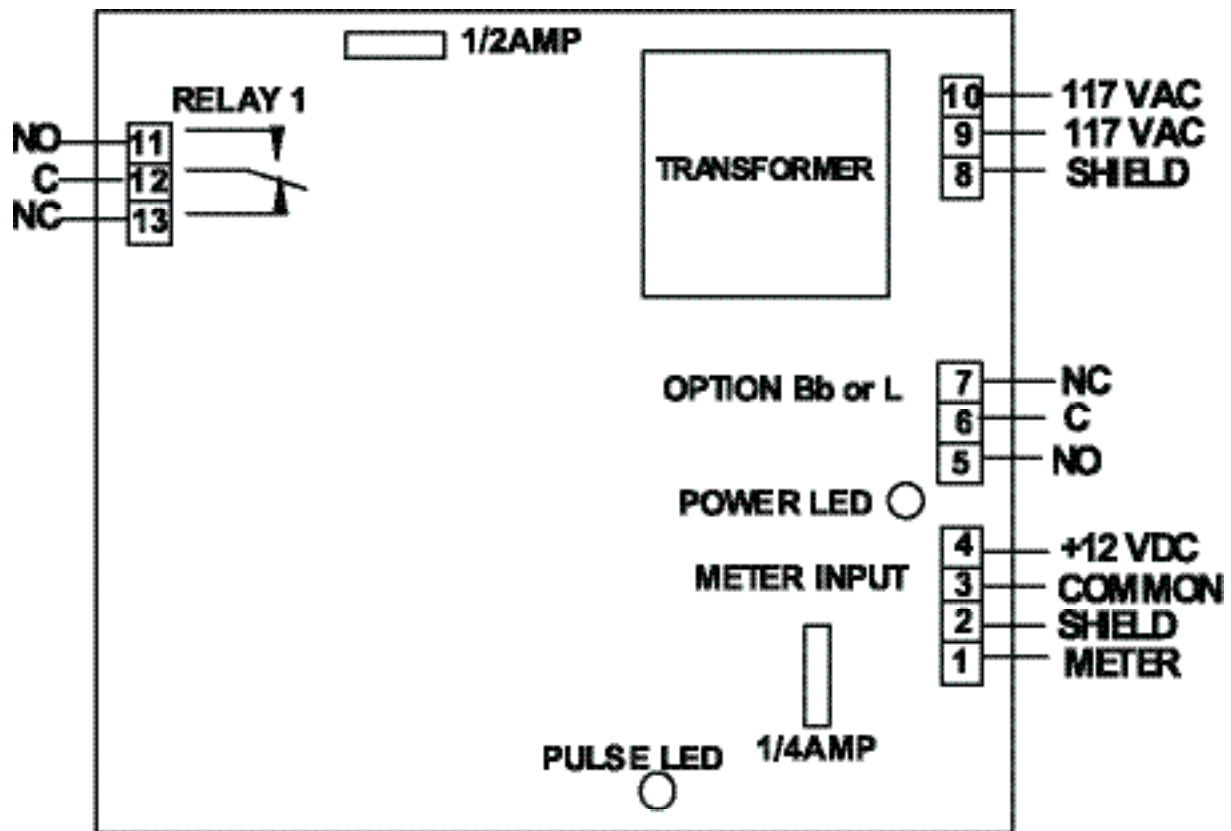
#### Programming Option Bb (Pulse Width and/or Value)

1. Determine the factor to obtain the desired contact closure output. Example: For a W2000 DRE 500.96639 pulses represent 1000 gallons. To determine the factor, take the reciprocal of the pulses per 1000 gallons. ( $1/500.96639 = .001996$ )
2. Go to Pro nO. If instrument is locked follow the Unlock Procedure above to unlock.
3. Press the RST button four (4) times the readout should read 4 - SEtPt.
4. Press the SEL button once. Readout should read SPT SEL - SP1. If not read SP1 press the RST button until it does.

5. Press the SEL button 2 times. Readout should read SP1 ASn - count b If not press the RST button until it does.
6. Press the SEL button the readout should read SP1 Act t-Out. If not press the RST button until it does.
7. Press the SEL button the readout should read SP1 - tOUt and change over to a number. This is the pulse width in seconds if acceptable press SEL if not change to desired number and press SEL button.
8. Pressing the SEL button above causes the display to read SP1 VAL and change over to a number. This is the number of counts on counter b that equal a pulse out. For example if counter b is reading 10 gallon increments and SP1 Val reads 100 this will create 1000 gallon pulses. ( $10 \times 100 = 1000$ )
9. Press the SEL button until the readout returns to normal operation.

#### Totalizer Reset

The electronic totalizer flashes "Cnt OVEr" to indicate that the totalizer has rolled over. When this occurs, a manual reset is necessary. With a NEMA4X enclosure, open the door. Locate the 3 pin connector on the printed circuit board; it is on the side of the board opposite the transformer above the mounting hole. There is a 2 place (blue or black) jumper on the 2 pins on the left side of the connector. Remove the jumper and place it temporarily on the center and right hand pins. This must be done with the power on, if preferable, turn the power to the instrument off before moving the jumper. After placing the jumper on the center and right pins, turn the power on; this resets the totalizer to zero (0). After resetting,



**CONNECTION DRAWING  
MODEL 703N w/ OPT 3**

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