Microprocessor display counter with 4 relays output

Description

The F2X_ instrument is a multifunction mono or bidirectional programmable instrument, which is employed to visualize signals that come from incremental tranducers (encoders optical lines etc.) or like a simple pulses counter for signals coming from sensors, mechanical contacts, photoelectric switch on a 6 digits display with sign (reading scale: -99999 +999999).

The configuration is worked out through 4 keys placed on the front, which allows the programming of all data, after inserting a Password. An auxiliary display allows a guided programming.

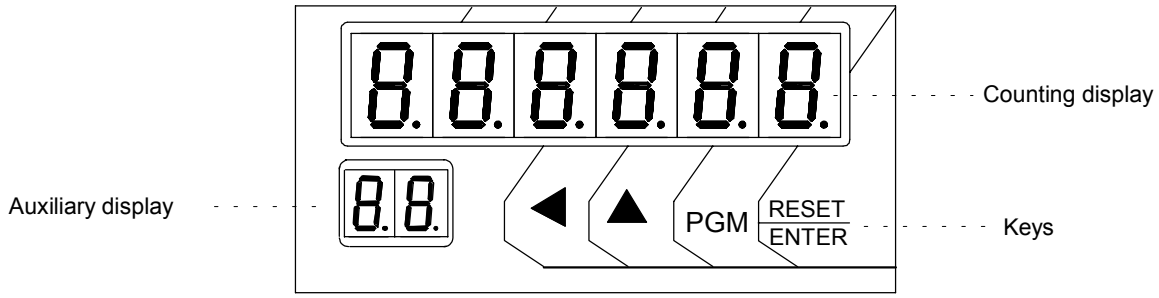
The microprocessor can make a correction of the inputs pulses, multplying them by a coefficient, which is programmable between 0,00001 and 9,99999 by the operator.

The count of the input impulses takes place in the “TOTAL/PARTIAL”, or “ABSOLUTE/RELATIVE” working sections. The function of double count can put into action two separate counters, which have two separate and indipendent inputs, and two different correction factors.

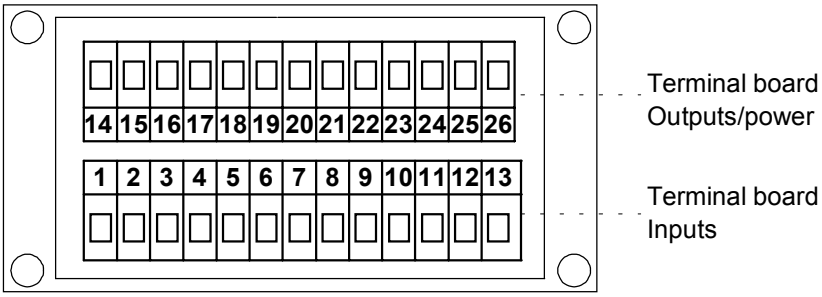
The Reset/Enter key can be employed to introduce a preset quote.

The instrument memorizes datas even when the machinery is off by means of a not volatile memory (EEPROM).

Frontal view



Back view



Inputs description

The display F2X has 6 optoisolated inputs (see connection scheme):

A	input count for channel A for Counter1
B	input count for channel B for Counter1
RESET1	input Reset/Preset for Counter1
CONT	input count for Counter2 (monodirectional counter)
RESET2	input reset for Counter 2
BLOCK	block count input for Counter1 and Counter2

Programming

The keys which are employed for the programming are:

▲	to increase the digit you are modifying, to select the constant to modify
◀	to skip from a digit to the following one, to leave the condition of Hold and visualize the current number
RESET/ENTER	to confirm the introduced values,
PGM	to start an to leave the programming mode

Press **PGM** in order to start with the programming phase: for some seconds the word *"Set1"* will be shown, followed by *"000",* whose first number blinks on the right side.This particular signal means that you have to introduce the password, therefore select the number **273** in the following way:

press ▲ to increase the value of the blinking number

press ◀ to select the blinking number

after programming the number 273 ,press **RESET/ENTER** in order to confirm it, and the constant value, you have just selected, will be shown.

N.B.: in case you insert a wrong password, the instrument leaves the programming phase.

Press **RESET/ENTER** and modify the constante value by means of these two keys ▲ ◀

press **RESET/ENTER** to confirm the value, you have just inserted

press ▲ to reach other constants, or

double press ◀ to leave the programming phase

In the programming phase you can see all the constants which have been programmed by means of the key▲ :

SEt 1	threshold value for relay 1
SEt 2	threshold value for relay 2
SEt 3	threshold value for relay 3
SEt 4	threshold value for relay 4
InPut	selection of the input type (bi-directional encoder, sensor, …)
U ISuAL	correcting factor of the input impulses
n.dEC.	decimal numbers
COunt	counting way of the input impulses (total/partial, absolute/relative, double count)
PrESEt	preset quote
Nod.A22.	zero setting mode
Nod.SEt	activation of threshold relays
Nod.PASS.	password to enter threshold quotes
F ILtrO	input filter selection
U IS.d IS.	type of visualization (metric units, inches, degree)
bAudE	serial port baud rate setting

Threshold formulation SEt 1, SEt 2, SEt 3, SEt 4

The measured value can be associated to four thresholds Set1, Set2, Set3, Set4 which cause the relays to activate. The courrent state of the relays is displayed by the auxiliary display on the front panel. When the display counter reaches the trigger threshold value, the relay is activated by the mode set you can see also in "ModSEt " table (see page 6).

Input selection InPut

By means of the programming of this parameter you can select the right kind of count for inputs A and B.

INPUT	INPUT TYPE
0	Bi-directional encoder with 2 channels output
1	One way count with: A count impulses at **NO-NC** edge B count direction: B open = decreasing count B closed* = increasing count
2	One way (one directional) count with: A count impulses at **NC-NO** edge B count direction: B open = decreasing count B closed* = increasing count
3	Summing up count - subtracting count with: A count impulses, whose counter decreases at **NO-NC** edge B count impulses, whose counter decreases at **NO-NC** edge

* B must be closed at GND if the sensor type is NPN; or at +12V if the sensor type is PNP

Value which corresponds to 1 encoder revolution UISuAL

This instrument can correct the impulses, and multiply them by a coefficient, which corresponds to the ratio between constant uISUAL and InPULS. If you programme these two constants correctly the display will visualize the value you need with a certain number of impulses (they are reckoned in the inputs). The programmed value of this parameter represents the value visualized on the display.
The interval value of this count is programmable between 0 ÷ 999999.

Number of impulses for every encoder revolution IMPuLS

The value, which should programmed in this section, represents the number of impulses for every encoder revolution, this is to say the division factor of input impulses.
The interval of the allowed values is 1 ÷ 999999.

Example 1:
If you have a 100 impulse/rev. Encoder, and for every revolution you need to visualize 123,4567 pls. follow the next description: VISUAL=1234 and IMPULS=100 . If you need to input a decimal number in the second position too, pls. insert N.DEC=1.
N.B: In order to reduce the approximation error we suggest you to multiply VISUAL and IMPULS by 10 or 100 or 1000 . With reference to the above mentioned values you will get :123.4567 x 100 =123456 and IMPULS=10000.
The value will be composed by 6 numerals (instead of 4) for every visualization.

Example 2:
If you have a proximity sensor, and after 10 impulses you need to see the value 7, pls. programme in the following way: VISUAL=7 and IMPULS=10.

Decimal digit numbers n.dEC.

Programme the position of the decimal point according to the following explanation: 0: no decimal number, 1: one decimal number, etc. till 4 decimal numbers.
During the programming of the decimal number, the auxiliary display will show “n.d.”.

Counting mode of the input impulses COunt

COUNT	COUNTING MODE
0	Count from inputs A and B, according to what is shown by constant INPUT.
1	**TOTAL/PARTIAL** count is not allowed when your constant is INPUT=0 (input from encoder) If you press ▲ for about 2 seconds, you go from a total count to a partial one, and vice versa. If you press the key ▲ for less than 2 seconds you can see the whole real visualization. When the current count is TOTAL, you can get a zero-setting or a preset of the total count, if you press the key RESET/ENTER according to what you have programmed in the constant MOD.AZZ and in the zero-setting of the partial zero-setting. When the current count is PARTIAL, you can get the zero-setting of this kind of count by means of the key “RESET/ENTER”. Do not forget that you cannot get any total zero-setting of the partial mode by this key. If you start up the “RESET1” INPUT, you can get the zero-setting, or the preset, or the hold of the total count, according to what you programmed in the constant MOD.AZZ, and to the zero-setting of the partial count. If you start the RESET2 input you can get the zero-setting of the Partial count. The Set1 and Set3 are assigned to the TOTAL count, Set2 and Set4 are assigned to the PARTIAL one.
2	**ABSOLUTE/RELATIVE** count: it takes place only by means of the constant INPUT=0 (input coming from an encoder) If you press this key ▲ for about two seconds this visualization will be switched over from an absolute count to the relative one and vice versa If you press this key ▲ for less than 2 seconds the real visualization is displayed. When the current count is Absolute you can get the zero-setting or the preset of the absolute count by means of the key “RESET/ENTER”. This programming takes place according to what you have programmed in the constant MOD.AZZ, and the zero-setting of the relative count. When the courrent count is Relative, and when you press Reset/Enter you can get the zero-setting only of the relative count (no absolute count!). If you start the input Reset 1, you will have the zero-setting, or the preset or the hold of the Absolute Count according to what you have programmed in the constant MOD.AZZ, and to the zero-setting of the relative count. If you put into action the input Reset 2, you will get the zero-setting of the Relative count. In this mode Ssets are assigned to the Absolute count.
3	**Double count**: **Count 1** from A and B inputs according to the instructions about *Input* constant. **Count 2** monodirectional increasing count (from input CONT= piece counter input) With this way of countig the input CONT is associated to the correcting factor of the input impulses *“F.COR.2”* (programmable from 0,00001 to 9,99999) and to a number of decimal digits *“Num.Dec.2.”* (from 0 to 4), which are different from those associated to A and B inputs. Their programming is shown immediately after this constant. The zero-setting of the Count 2 takes place by means of the input Reset 2. If you press this key ▲ for about 2 seconds the visualization will be switched over from Count1 to Count2 to and vice versa.

	If you press the key ▲ for less than 2 seconds you can see the current situation of the visualization. When your current count is Count 1 you can get the zero-setting or the preset of Count1 by means of the key RESET/ENTER. When your courrent count is Count2, and when you press RESET/ENTER you will always get the zero-setting of Count2 but not of Count1. When you start the RESET1 input, you will get the zero-setting, or preset or hold of Count1, according to what you have programmed in the Constant MOD.AZZ. If you start the input of RESET2 you will have the zero setting of Count 2 . The Set1 and Set3 are assigned to the Count1, Set2 and Set4 are assigned to the Count2.
4	not used

Preset quote PrESEt

This instrument allows the formulation of the value that will be visualized after pressing the key RESET/ENTER or after the activation of the **RESET** inputs according Mod.Azz constant.
During the zero-setting programming, the auxiliary display will show “Pr”.

Zero setting mode Mod.A22.

The programming of the zero setting mode allows you to select the different programming choises of this instrument after pressing the key **RESET/ENTER** or closing the **RESET** contact in the terminal board. If the control resets or presets from keyboard have been closed, you can easily get the reset or preset of the quote by means of the key **RESET/ENTER** , if you press it twice you will reach the previous quote within 2 seconds.
Choose your zero-setting way from the following scheme:

Zero-Setting	RESET1 working way	RESET/ENTER function
0	Reset	disabled key
1	Preset	disabled key
2	Reset	Reset
3	Reset	Preset
4	Preset	Reset
5	Preset	Preset
6	disabled input	Reset
7	disabled input	Preset
8	disabled input	disabled key
9	disabled input	delayed reset (about 3 s)
10	Hold	Disabled
11	Hold	Reset
12	Hold	Preset
13	Hold	delayed reset (about 3 s)

Hold conditions stop the visualized quote on the display, but do not lose the other count impulses; if you want to leave Hold press this key ◀
During the programming of the zero setting the symbol “M.A” is shown on the auxiliary display .

Relays activation mode Mod.SEt

By means of this constant you can set the operation mode of the relays output.

Mod.Set	Relay1 ON if:	Relay2 ON if:	Relay3 ON if:	Relay4 ON if:
0	count < SET1	count < SET2	count < SET3	count < SET4
1	count > SET1	count > SET2	count > SET3	count > SET4
2	count < SET1	count > SET2	count > SET3	count < SET4
3	count > SET1	count < SET2	count < SET3	count > SET4
4	count < SET1	count < SET2 Timing + PRESET	count > SET3	count > SET4
5	count > SET1	count > SET2 Timing + PRESET		
6	count > SET1	count > SET2	count > SET3	count > SET4 Timing + PRESET
7	count > SET1	count > SET2 Timing	count > SET3 Timing	count > SET4 Timing
8	count < SET1 Timing	count < SET2 Timing	count < SET3 Timing	count < SET4 Timing

Password to enter Thresholds ModPASS.

Through this constant the password avoid reaching the thresholds.
If you select *"In"* , the input to the threshold quotes is protected by the password 273, if you select "Out" the programming of the threshold quotes will take place without using any password.
While programming MOD.PAS, the constant "M.P:" is shown on the display.

Input Filter FILtr0

To count the impulses deriving from mechanical contacts (switches, relays...) you have to filter the input, so that you can avoid counting false impulses.
Select your filter option according to the following scheme:

Filter	Type of filter
0	none
1	filter on count 1 (input A and B)
2	filter on count 2 (on input CONT)
3	filter on count 1 (input A and B) and filter on count 2 (on input CONT)

You can see the symbol "FL" while programming the filter of the count on the auxiliary display

Type of visualization UISd IS

If you start the visualization function you can switch over the visualized quote on the display from metrical units (hundreths of millimetres, tenths of millimetres etc...) to inch units according to the following scheme:

UIS	changing over		decimal numb.
dISAb	disabled		-
dEC. MP.	from decimals of mm	to millesimal of inches	3
dEC. CP.	from decimals of mm	to hundreths of inches	2
MM. CP.	from mm	to hundreths of inches	2
MM. dP.	from mm	to tenths of inches	1
CM. CP.	from cm	to hundreths of inches	1
dM. P.	from dm	to inches	0
GrAd I	sexagesimal degree reading		2
Gr. Pr I.	reading in sexagesimal degrees and primes		2

If you choose a value between 1 and 6 for costant 6, and if you press the key **PGM** for about 3 seconds, you can reach the inch units and leave the metrical ones and vice versa.
If you choose the values 7,8 you can select the visualization in sexagesimal degrees.
While programming this type of visualization, the auxiliary display will show “V.S.” .

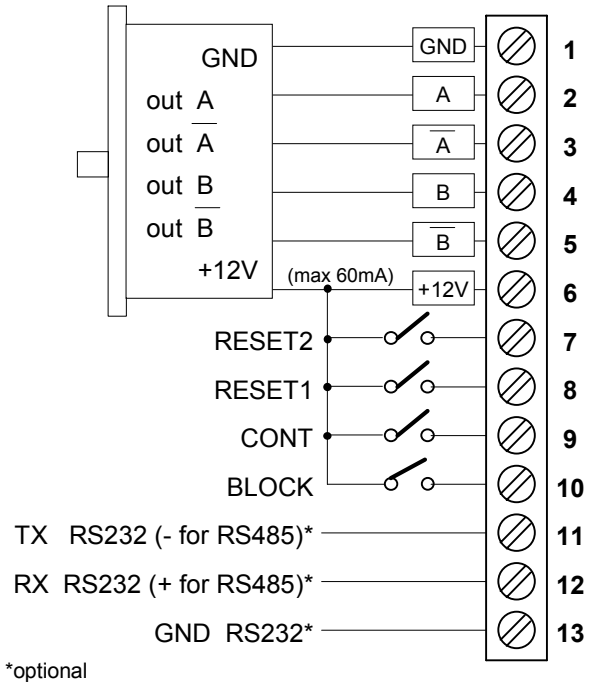
Baud rate out serial port setting bAudE

Not used, set to d 15A6.

CONNECTION SCHEME OF THE TERMINAL BOARD

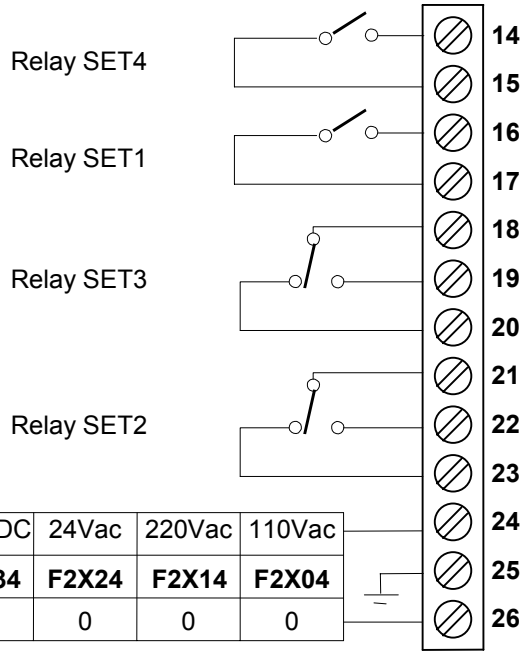
TERMINAL BOARD INPUTS

bidirectional encoder line driver output



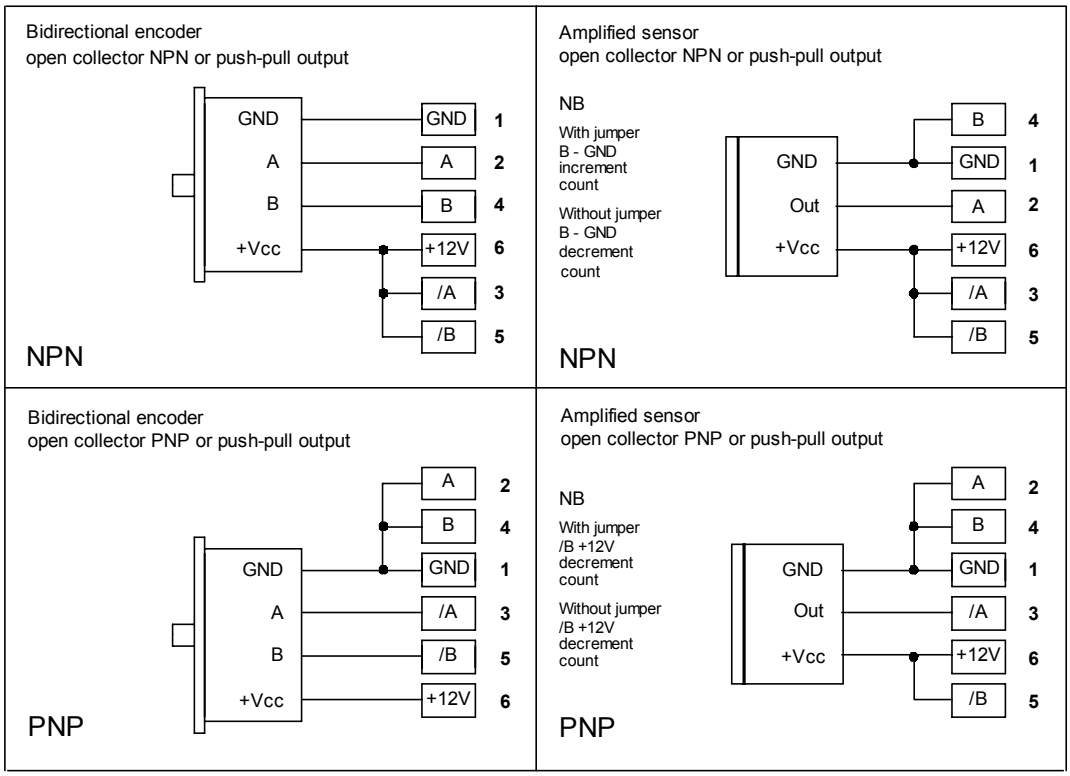
*optional

TERMINAL BOARD OUTPUTS/POWER SUPPLY



+24VDC	24Vac	220Vac	110Vac
F2X34	**F2X24**	**F2X14**	**F2X04**
0	0	0	0

CONNECTION SCHEME FOR TRASDUCERS



General features

- Power supply — 110Vac, 220Vac, 24Vac, 24Vdc ± 10%
- Line frequency — 50/60 Hz
- Power draw — 3VA
- Visualization — 6 digits -99999 ÷ 999999
- Input type — Optoinsulated
- Encoder power supply — 12Vdc (max 60mA)
- Encoders and sensors input — Open collector NPN/PNP
Push-pull
Differential line driver 12V
- Max input frequency on A B inputs — 100 KHz
- Max input frequency CONT input — 2 KHz
- Working possibilities — Bidirectional
Monodirectional (counting up)
Monodirectional (counting down)
- Inputs ON/OFF — Reset1,
Reset2,
Block count,
Count
- 4 relays outputs — 120Vac, 0,5A; 24Vdc, 1A
- Serial enter (optional) — RS232, RS485
- Working room temperature — 0-50°C
- Relative humidity — 35-85%
- Self-extinguish and anticollision case — DIN 43700
- Front case protection degree — IP54
- Measures (terminal board included) — 48x96x120 mm
- Perforation profile — 45x92 mm
- Directive: Electromagnetic compatibility 2014/30/EU, Low voltage 2014/35/EU, RoHS 2011/65/EU