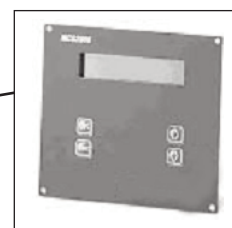


MC514r-gb-0309

HMCS2000-ECA	Digital control
HMCS2000-PRG	Programmer
HMCS2000-DP	Display
HMCS2000-CRD-2	Memory card



DP



CRD-2



PRG

ECA

HMCS2000-ECA

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This manual is valid for software version 3.07 or later, issued after June 1, 2006

Important : this manual is available in German and French on request

1 SAFETY INSTRUCTIONS

The unit must be supplied with low voltage 24VDC and then do not require special precaution regarding high voltage installation

The unit contents sensitive electronic and MOS circuits. Installation and programming do not require to open the unit. However any operation on the board requires care regarding static electricity. The operator should be grounded for such an operation. Only qualified people are authorised to attend. The EEPROM used guarantees proper values storage over 20 years.

Do not install the unit close to frequency converter and power cable path

The unit must be mounted vertically to have a correct natural cooling

All "0V" accessible on the terminal block are internally connected to the housing

2. PRODUCT DESCRIPTION

The **HMCS2000-ECA** unit is a closed loop controller with one **SENSOR** input and two outputs. It is mainly dedicated to the tension control where the sensor works on the **DANCER ARM** principle.

Input / Outputs are normalised to +/- 10V and 0 (4) to 20 mA.

Additional functions are installed to make easy any **TENSION CONTROL**. The control is applicable regardless the power part used (brake or motor).

See § BLOCK DIAGRAM for more information about the complete possibility of the control

USING DANCER FEEDBACK - PRECAUTIONS :

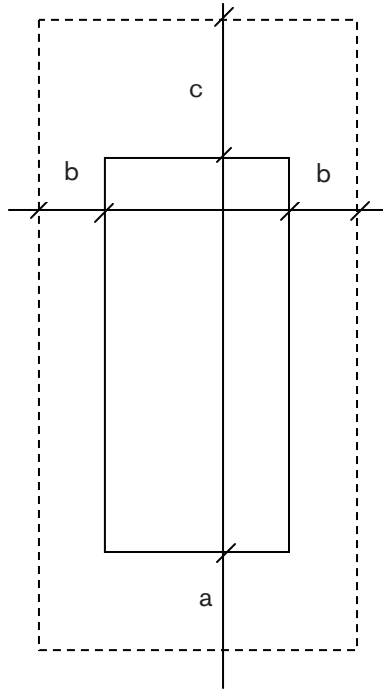
- Dancer feedback is in fact a **POSITION** control
- The web tension is determined by the **WEIGHT** of dancer arm + the pneumatic cylinder **FORCE** if applied
- Dancer arm has to be built as light as possible to **MINIMISE ITS OWN INERTIA AND INITIAL FRICTION** (\Rightarrow **WEIGHT** $\downarrow\downarrow$) and additional force to increase the web tension has to be created with a pneumatic cylinder by adjusting the air pressure (\Rightarrow **FORCE** $\uparrow\uparrow$).

THE PRESENT MANUAL IS DESCRIBING THE USUAL FUNCTIONS USED IN TENSION CONTROL. FOR SPECIAL APPLICATION PLEASE ASK ADDITIONAL INFORMATION TO WEARNER ELECTRIC.

HMCS2000-ECA

3. MOUNTING AND DIMENSIONS

The housing has been designed for wall mounting in fan cooled cabinet. All connections are placed on front face unit except the 9 poles D-Sub connector for the optional HMCS2000-DP with access from the top.



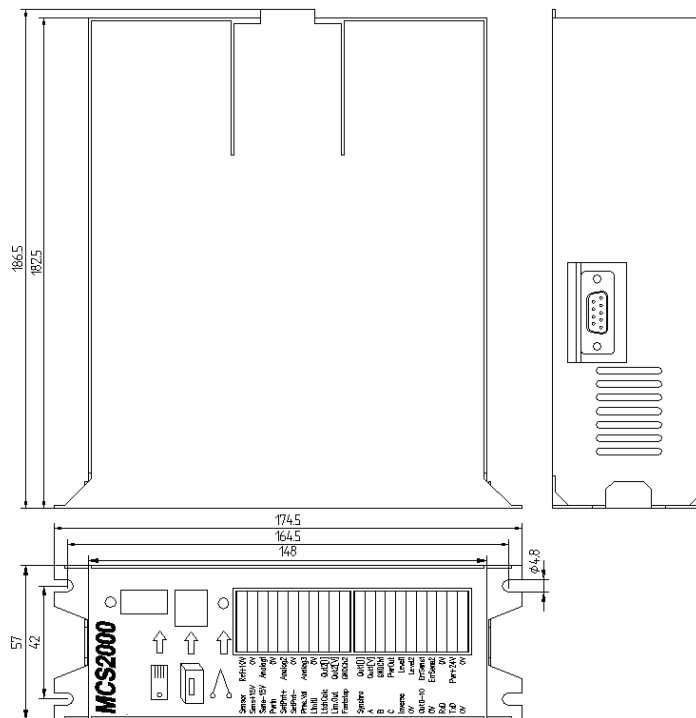
Respect minimum free space :

- 50 mm for a
- 30 mm for b
- 80 mm for c

The plug in front face connector requires a free space of 50 mm to wire properly

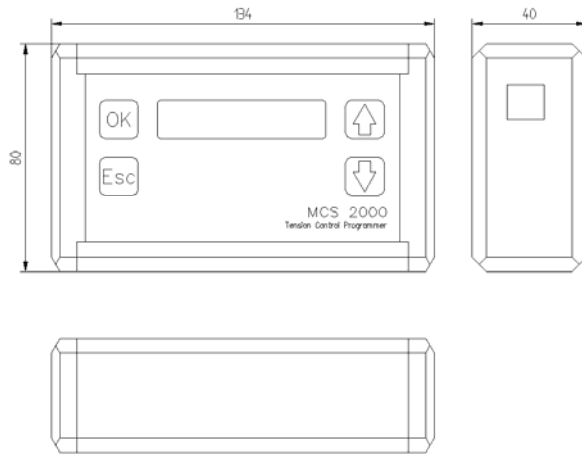
To plug easily the DP connector on the top of controller distance c must be respected. In case where you do not use DP distance c can be reduced to a.

HMCS2000-ECA

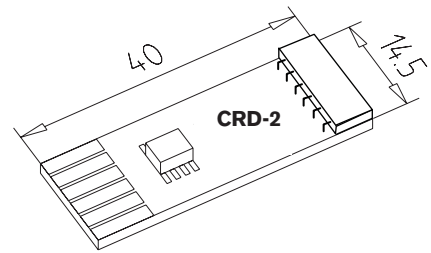


HMCS2000-ECA

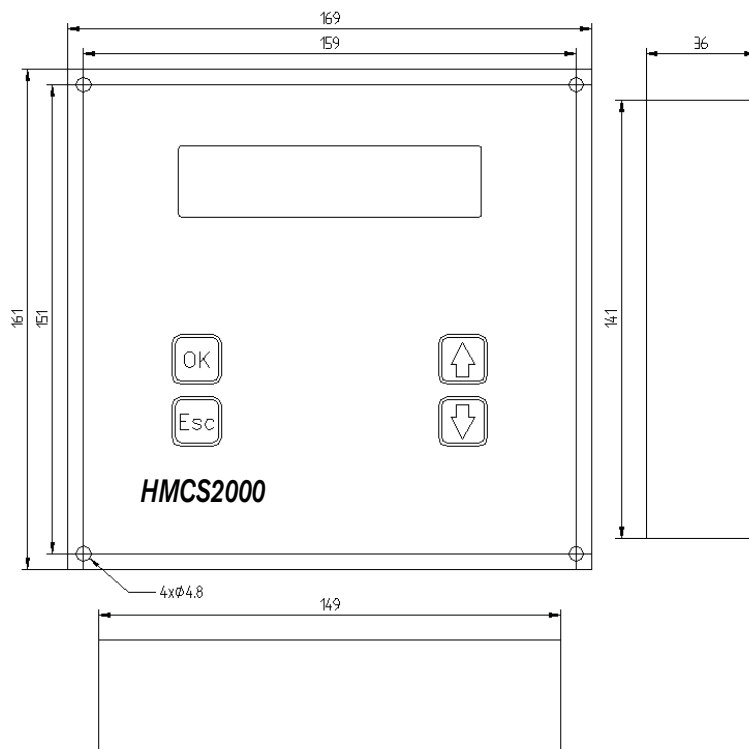
HMCS2000-PRG



HMCS2000-CRD-2



MCS2000-DP



HMCS2000-ECA

4. WHAT YOU NEED TO COMMISSION PROPERLY YOUR INSTALLATION

- A. As the HMCS2000-ECA unit is a digital control which requires a “on site” programming you need the necessary tool to have access to the internal software programme.

Access is possible in four ways :

- With the pluggable programming tool **HMCS2000-PRG**
- With the connectable display **HMCS2000-DP**
- With PC equipped with dedicated software **HMCS2000-WIN**
- With PC or PLC in terminal mode with **HMCS2000-PLC**

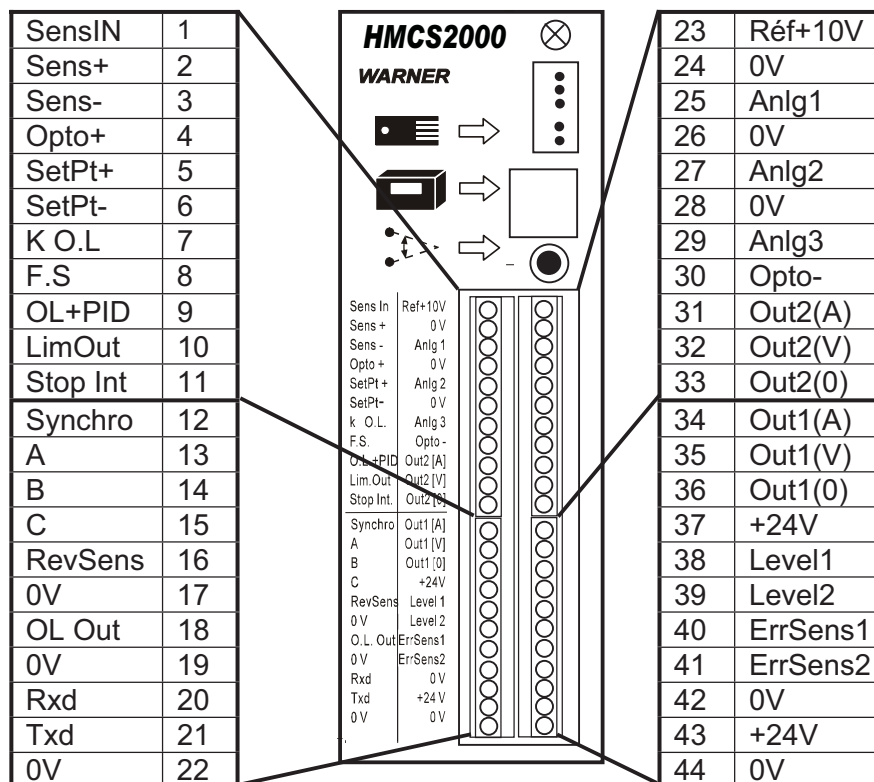
The detachable programming tool **HMCS2000-PRG** is recommended for first installation in the case where you do not need to display values permanently.

The connectable **HMCS2000-DP** has same programming /display possibilities as HMCS2000-PRG but designed to be mounted in front face cabinet as permanent indicator.

For programming through HMCS2000-WIN or HMCS2000-PLC ask Warner Electric for more information


- B. One important feature of HMCS2000-ECA is the possibility the save the completed programme on pluggable memory card **HMCS2000-CRD-2** which is delivered as option. It's recommended to use it as programme back-up soon as definitive setting completed.
- C. Optional dancer arm position sensor **HMCS605-E**. It's the recommended position sensor delivered for dancer arm application. However any other position sensor can be used provided it delivers a HMCS2000-ECA compatible signal.
- D. A 24 VDC / min 200mA power supply, for example our **HMCS2000-PS** (Power Supply). 200 mA is the HMCS2000-ECA consumption. If some other “consumers” are connected to the power supply via the HMCS2000-ECA unit their own current consumption has to be added to previous 200 mA.

5. TERMINAL BLOCK DESCRIPTION



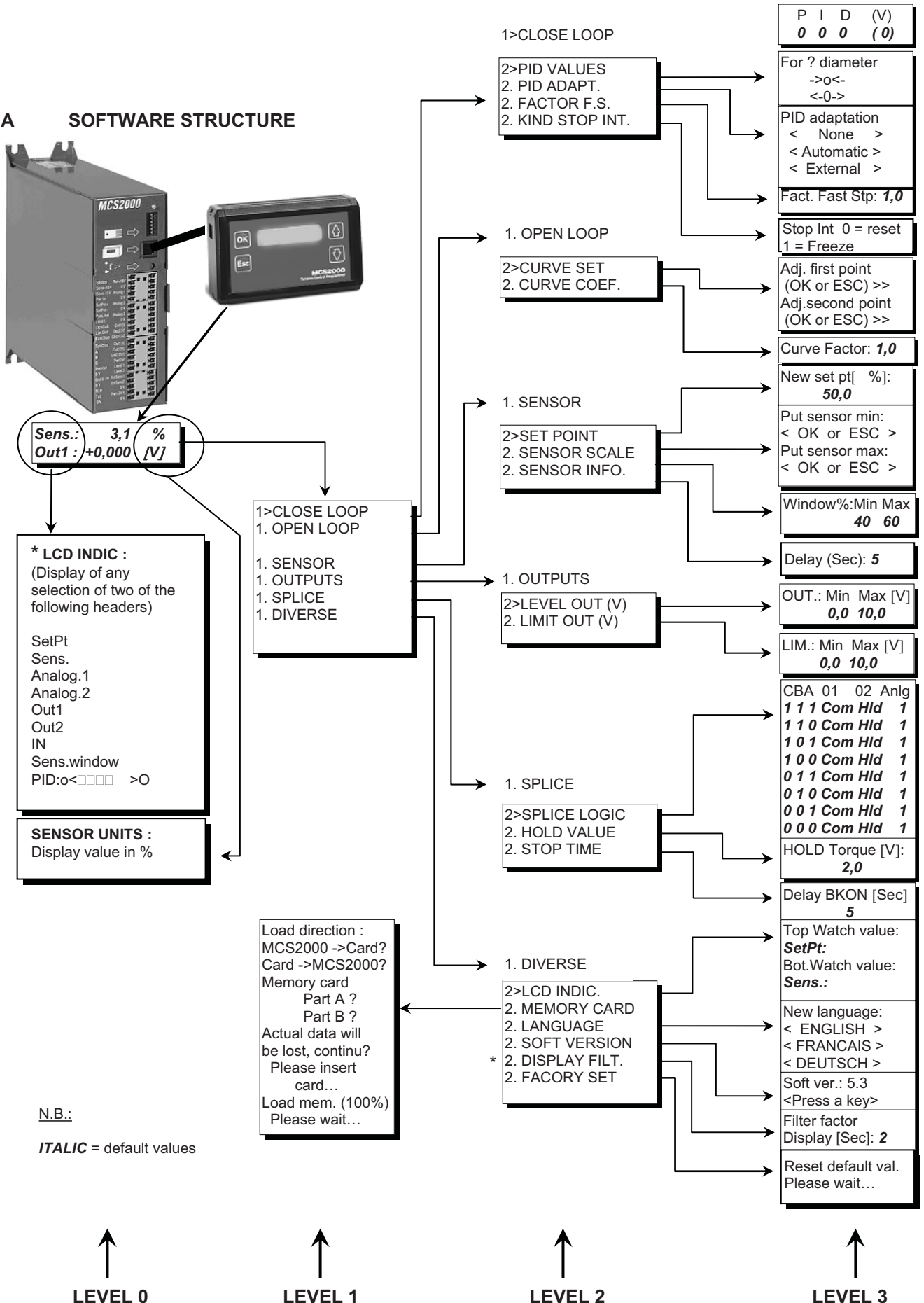
HMCS2000-ECA

IN / OUT	DESCRIPTION	RANGE	EXPLANATION
Sens In	Sensor signal input	Min delta V=4V in the +/- 10V range	In general position sensor signal in the dancer arm tension control system
Sens +	Power supply for sensor	+ 15 VDC +/- 5% 100 mA max	Compatible with dancer position sensor HMCS605-E
Sens -	Power supply for sensor	-15 VDC +/- 5% 100 mA max	Compatible with dancer position sensor HMCS605-E
Opto +	Input to supply opto-coupler	12 to 24 VDC	Usually connected to + 24 VDC general power supply see § OPTO-COUPLER
SetPt +	Digital input to move set point	Active low	To increase set point value via terminal block
SetPt -	Digital input to move set point	Active low	To decrease set point value via terminal block
k.OL	Digital input to change open loop curve scaling	Active low	Purely dedicated to open loop part, see block diagram
FS^	Digital input to multiply the closed loop general gain	Active low	Change instantaneously the closed loop gain with a programmable value. Used in general for fast stop (FS)
O.L.+ PID	Digital input to add both open + closed loop value	Active low	To add open and closed loop part See block diagram
Lim. Out	Digital input to limit the output value	Active low	Limit the output value at programmable output range
Stop Int	Digital input to cancel the term I of the PID	Active low	To avoid output saturation while machine stand-still see § STOPINT INPUT
Synchro	Digital input for A,B,C inputs synchronisation	Active low	In general permanently connected to 0V See § Synchro
A, B, C	3 digital inputs to configure the outputs	Active low	8 possible combinations to affect each output with some values see § SPLICE LOGIC
RevSens	Digital input to reverse the effect of sensor	Active low	Easy way to change the polarity of correction
O.L. Out	Open loop analog output	0-10V /10 mA	Purely concerned by open loop part See block diagram
Rxd	RS 232 connection		See separated –WIN or PLC manual
Txd	RS 232 connection		See separated –WIN or PLC manual
Ref +10V	10 V reference source	10 V +/-1%,10mA	For any test or simulation on the control
Anlg1	Analog input 1	0-10 V	Used for open loop or PID compensation
Anlg2	Analog input 2	0-10 V	Used for PID compensation
Anlg 3	Not active		
Opto -	Input supply for opto coupler	0V	Usually connected to 0V general power supply. See § OPTO-COUPLER
Out2(A)	Current output channel 2	0(4) to 20 mA	Following the voltage output Uout 2 (V)
Out2(V)	Voltage output channel 2	- 10V to + 10V	Reference for the driver unit
Out2(0)	0V used for output	0V	Internally tied to all 0V points
Out1(A)	Current output channel 1	0(4) to 20 mA	Following the voltage output Uout 1 (V)
Out1(V)	Voltage output channel 1	- 10V to + 10V	Reference for the driver unit
Out1(0)	0V used for output	0V	Internally tied to all 0V points
+24V	+24 V point available	+24V	Same as general power supply
Level1,2	Not active		
ErrSens1	Digital output for error sensor information	Active low	Linked to the menu “SENSOR INFO”
ErrSens2	Digital output for error sensor information	Active low +24 VDC +/- 5% 200 mA	Linked to the menu “SENSOR INFO”
+24V	General power supply input		
0V (all)	General power supply 0 V	0V	Internally linked to all 0V

 Minimum wiring for basic and standard application

6. PROGRAMMATION

A SOFTWARE STRUCTURE



HMCS2000-ECA

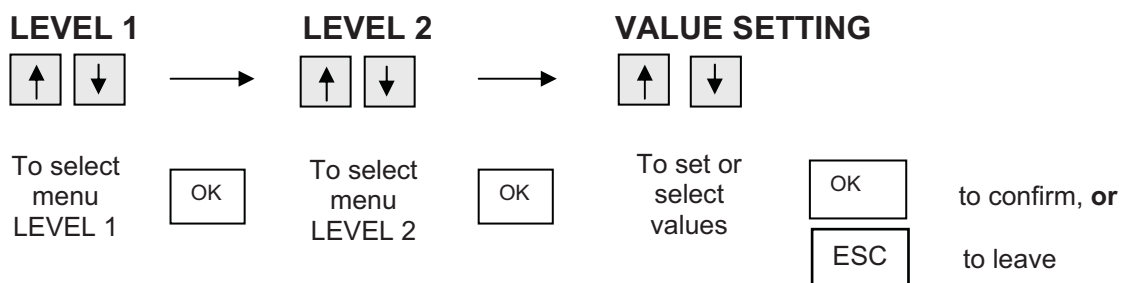
B. SHORT EXPLANATION

With the selected programming tool (PRG or DP or WIN or PLC) you have access to the internal software in order to programme correctly the HMCS2000-ECA control according the installation. Programme structure is shown below:

Menu level 1	Menu level 2	Selecting / Setting / Defining	Activated or influenced by terminal block input:
1. CLOSED LOOP	2. PID VALUES 2. PID ADAPT 2. FACTOR FS 2. KIND STOP INT	To set the 3 terms of P,I, and D To choose if you need the PID compensation To set the closed loop gain multiplier To define the behaviour of STOPINT	Analog 1,2 FS STOPINT
1. OPEN LOOP	2. CURVE SET 2. CURVE COEFF	To set the open loop curve you need To set the open loop curve multiplier	Analog 1 k. OL
1. SENSOR	2. SET POINT 2. SENSOR SCALE 2. SENSOR INFO	To set closed loop working point To scale the sensor automatically To define some sensor zone	SetPt+ et SetPt-
1. OUTPUTS	2. LEVEL OUT 2. LIMIT OUT	To define the output excursion To define another limited output excursion	Limit out, Stop Int Limit Out
1. SPLICE	2. SPLICE LOGIC	To determine the binary input combination with A,B,C and the needed corresponding output value	A, B, C, Synchro
1. DIVERSE	2. HOLD VALUE 2. STOP TIME 2. LCD INDIC. 2. MEMORY CARD 2. LANGUAGE 2. SOFT VERSION 2. DISPLAY FILTER 2. FACTORY SET	To set an output fix value To set max time at max output value To select the default display values To load or download memory card from or to the ECA unit To choose the displayed language To read the software version To set the refreshing cycle of the display To reload the factory values	A, B, C, Synchro A, B, C, Synchro
"Bold / Italic"	Minimum steps to be programmed for basic and standard application		

C. HOW TO RUN INTO THE PROGRAM

With the control HMCS2000-ECA powered ON and HMCS2000-PRG or HMCS2000-DP connected, the display is showing the default values. These two default values could be changed later into the programme. Press OK for 1 second. You automatically enter in the programme at LEVEL 1.



IMPORTANT : Any new selection or value setting is valid only after confirmation with **OK**
In case of doubt during set up press **ESC** and not **OK**.

WARNING : As soon as you press **OK** in **FACTORY SET** menu you lose all previous settings and immediately turn back to factory setting.

HMCS2000-ECA

7. BLOCK DIAGRAM

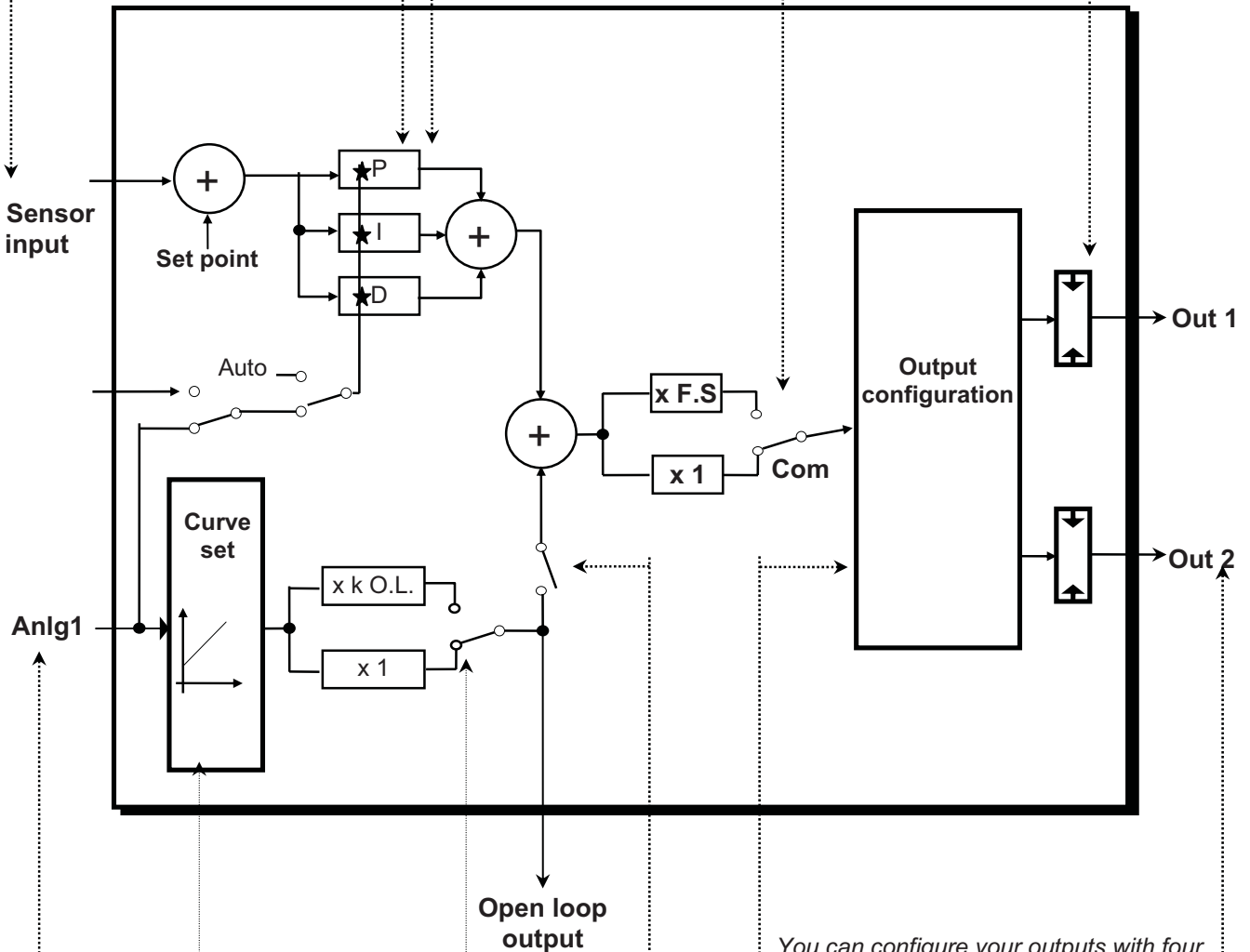
PID factors can be adapted in 2 ways:
 - Internal automatic.
 - External with Anlg 1 or 2.

The output value of regulator can be multiply at any time with external digital signal. (F.S.)

Sensor input range: +/- 10V
 (with min. delta voltage: 4V).

The three terms of PID can be set separately.

Output limitation can be activated at any time with external digital input.



Anlg1

Open loop output

Analogue 1 & 2 input are factory limited to 10V. Other range possible.

You can register any linear curve you need according to your input voltage

You can multiply the registered open loop curve at any time with an external digital signal

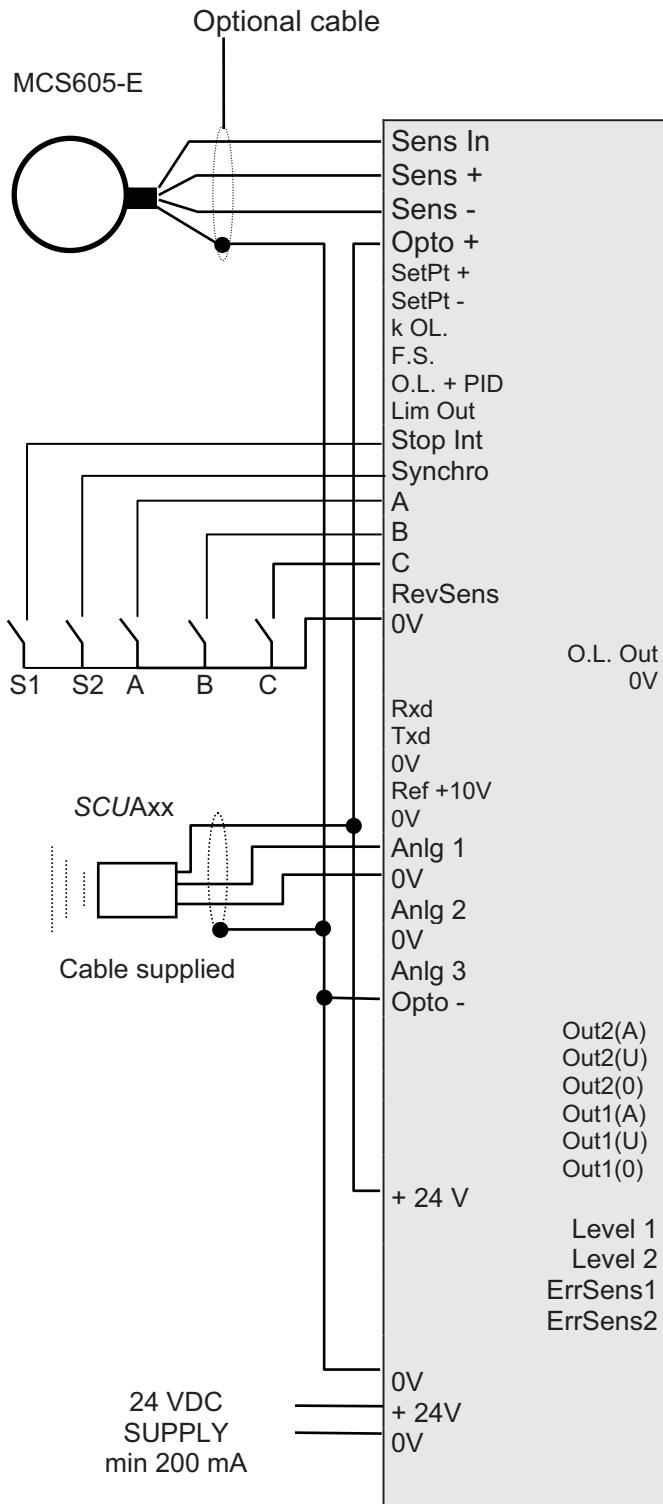
You can add the open loop value to the close loop signal at any time with **the switch on board**.

You can configure your outputs with four digital binary inputs: A, B, C, Synchro.

Both channels have voltage and current output: +/- 10V and 0 to 20 mA.

HMCS2000-ECA

8. TYPICAL WIRING DIAGRAM



S1 function :
 Customer supplied, usually coming from main machine drive.
 Must be:
 - closed while machine standstill
 - open when machine running

A,B,C function :
 Customer supplied, used in binary combination to affect the outputs with desired values. In simple application where only one combination is used we do not need them. In this case the default combination 1 1 1 is used. See § *SPLICE LOGIC* for detailed information

Ultrasonic sensor SCUAx :
 Sonic is use as diameter reading for internal PID compensation.
 Needed :
 - for elec brake installation and diam ratio more than 10
 - for air brake installation and diameter ratio more than 5

Dual channel output available in voltage and current . Can be connected to any driver, typically to HMCS2000-DRV (elec. Brake driver) or EPC-V / EPC-I (pneumatic transducer for air brake)

All additional inputs / outputs can be exploited for specific application. Ask Warner Electric for more information

9. INSTALLATION AND PROGRAMMING

1. Make sure the HMCS2000-ECA is correctly mounted according to the present manual recommendations and the wiring is realised correctly (refer to TYPICAL WIRING)
2. Make sure the HMCS605-E sensor or other is correctly fit to the machine and is giving a progressive signal when you move the dancer arm in the mechanical limit up and down
3. Switch ON the 24 VDC power supply. Green front face LED should be ON
4. Connect the HMCS2000-PRG or the HMCS2000-DP to the controller
5. After internal self test display should show default values on screen

Now programming can be done - machine NOT RUNNING

- | | |
|--|--|
| 1. Press OK. You enter in first level menu | 1. CLOSED LOOP
1. OPEN LOOP on screen |
| 2. Press OK. You enter in the menu CLOSED LOOP | 2. PID VALUES
2. PID ADAPT on screen |
| 3. Press OK. You enter in the PID VALUES setting.
All parameters are factory set to 0 (zero)
With arrow up and down put 500 for proportional (P) , press OK
Leave the I and D to 0 (zero), Press OK to run through the line
Display will finally show

Note : These 3 parameters will be definitively set later. | 2. PID VALUES
2. PID ADAPT on screen |
| 4. Press ESC. You turn back to level 1 | 1. CLOSED LOOP
1. OPEN LOOP on screen |
| 5. With arrow up and down select the menu SENSOR | 1. SENSOR
1. OUTPUTS on screen |
| 6. Press OK. You enter in SENSOR menu | 2. SET POINT
2. SENSOR SCALE on screen |
| 7. Press OK. You enter in SET POINT menu
With arrow you programme the set point value in percentage of full dancer stroke
0% means dancer with max loop, 100% means dancer with min loop
We usually programme 50% which is the middle stroke
Press OK to confirm set point value, display turn back to | 2. SET POINT
2. SENSOR SCALE on screen |
| Note : this value could be changed at any time even while machine is running | |
| 8. With arrow up and down select the menu SENSOR SCALE | 2. SENSOR SCALE
2. SENSOR INFO on screen |
| 9. Press OK. You enter in SENSOR SCALE menu
Follow display indication : Sensor low means max loop
Sensor high means min loop

Display must ask you 2 times the extreme positions low and high,
if not restart the scaling process.
Soon as scaling completed display turn back to : | 2. SENSOR SCALE
2. SENSOR INFO on screen |
| 10. Press ESC. You turn back in first level | 1. SENSOR
1. OUTPUTS on screen |
| 11. With arrow up and down select the menu OUTPUTS | 1. OUTPUTS
1. SPLICE on screen |
| 12. Press OK. You enter in OUTPUTS menu | 2. LEVEL OUT
2. LIMIT OUT on screen |

13. Press OK. You enter in LEVEL OUT menu
 - With arrow set the min. Usually 0V Press OK
 - With arrow set the max. Usually 10V Press OK

Display turn back to :

Note : the output in current is following the voltage

2. LEVEL OUT
2. LIMIT. OUT[V] on screen

14. Press ESC. Display turn back to :

1. OUTPUT
1. SPLICE on screen

15. With arrow up and down select the menu SPLICE

1. SPLICE
1. DIVERSE on screen

16. Press OK. You enter in SPLICE menu

2. SPLICE LOGIC
2. HOLD VALUE on screen

More explanation about SPLICE LOGIC menu programming :

The controller HMCS2000-ECA owns 2 outputs. Each output can be assigned with some values which are :

- **COM** This is the main signal in closed loop coming from the PID
- **OFF** This is the 0V
- **ON** This is the max value set in LEVEL OUT menu
- **HOLD** This is a fix value which can be programmed in the HOLD VALUE menu

The assignment is done with the 3 binary input A,B,C . In the menu SPLICE LOGIC you can make your own binary combination for the outputs assignment you need.

Usually for simple case where we use only the COM value, we use the 111 default combination. In this case we do not need to wire the 3 switches A,B,C (see the TYPICAL WIRING)

Before programming – to analyse what you need – make the following table :

Binary input						
A	B	C	Out 1	Out 2	Analog	Example of use
1	1	1	COM	OFF	* (1 or 2)	Simple use
1	1	0	ON	ON	* (1 or 2)	For emergency
1	0	1	OFF	COM	* (1 or 2)	For brake change (splice)
1	0	0	ON	ON	* (1 or 2)	For emergency

* In case of splice use you can select the correct diameter sensor which are in this case connected to analog input 1 and 2. When nothing wired on these 2 analog input this programmation is not important.

To summarise : 8 combinations are possible to affect both outputs with the value you need

17. Press OK. You enter in the SPLICE LOGIC menu.
With arrow up and down you can programme the table you have previously prepared
Do not forget the default combination (factory setting) 1 1 1 COM HOLD 1is convenient for most of the case where we use only one output with COM signal. No need in this case to wire the A,B, C switches.
Note : To get out of this menu you have to press ESC

Then after programming completed press ESC
You turn back at level 2

2. SPLICE LOGIC
2. HOLD VALUE on screen

18. Press ESC. You turn back in first level

1. SPLICE
1. DIVERSE on screen

19. With arrow up and down select the DIVERSE menu

1. DIVERSE
1.CLOSED LOOP on screen

20. Press OK. You enter in the DIVERSE menu

2. LCD INDIC

2. MEMORY CARD on screen

21. Press OK. You enter in LCD INDIC setting part

Display ask you the default value you need on top line

With arrow up and down you select the value you want to display as default

In general we display the SET POINT value

Press OK, Display asks you the default value you need on bottom line

With arrow up and down you select the second value you want to display as default

In general we display the SENSOR value

Press OK, Press ESC many times, The display will turn back to the default value you just programmed

These default values display will appear on screen every time you switch ON the controller

First and important physical test :

Keep the HMCS2000-ECA ON and the HMCS2000-PRG or HMCS2000-DP connected

Move dancer up and down to extreme stroke limit (same excursion you have used for SENSOR SCALING

Observe :

- 1) The SENSOR VALUE displayed as default should vary between 0 % (max web loop) and 100% (min web loop)
- 2) When min loop the output of controller (the output, which has been programmed in SPLICE LOGIC menu) must be 0V. Moving the dancer to max loop direction the output should start to go up when you pass the set point (the value you have programmed in SET POINT menu)
Use a voltmeter placed on the output terminal to make this verification

If you get opposite reaction change the sensor polarity (if you use the MCS605-E a switch with A-B position is provided on sensor)

Another way to change polarity is to make a permanent bridge between the RevSens input and 0V on the terminal block of the controller.

After changing polarity make a new sensor scaling according point 8,9 of present description and repeat this test.

The main programming now is done. Last step is to programme the PID. We have previously introduced P=500 just for test. PID setting is the most important step. It will guarantee the stability of the system. Before programming, please read attentively following explanation:

More explanation about PID setting :

As the loop we have to manage with HMCS2000-ECA is composed with some electrical, pneumatic, mechanical components it is very difficult to provide some typical values for the PID terms. Also the type of sensor is determining for PID setting. It exists a big difference between the dancer principle and the load cell.

The present manual is describing the use of HMCS2000-ECA with dancer. But this unit can also be used with load cells. Ask Warner Electric for more information

However, according the Warner Electric and Wichita experience we are able to give you some indication for first step in setting PID. Table will give you when the PID correction is necessary (Y), not necessary (N), recommended (R)

PID correction – when necessary – is explained § PID COMPENSATION.

HMCS2000-ECA

Indication for first step in setting PID

Weight of roll	Diameter max.	Diameter ratio	Dancer/load cell	Elec./Pneumatic brake	P / I / D See p.19	PID Correction Yes/No/Recom.
800-1500 Kg	1000-1300	< 9	Dancer	Electric	300 / 100 / 150	No
				Pneumatic	80 / 40 / 20	Yes
			Load cell	Electric	50 / 50 / 5	No
		Pneumatic		50 / 50 / 0	No	
		> 9	Dancer	Electric	300 / 100 / 150	Recom.
				Pneumatic*		
Load cell	Electric		50 / 50 / 5	Recom.		
	Pneumatic	50 / 50 / 0	Yes			
300-800 Kg	1000-1300	< 9	Dancer	Electric	150 / 50 / 50	No
				Pneumatic	40 / 30 / 8	Yes
			Load cell	Electric	30 / 50 / 3	No
		Pneumatic		30 / 50 / 0	No	
		> 9	Dancer	Electric	150 / 50 / 50	Recom.
				Pneumatic*		
Load cell	Electric		30 / 50 / 3	Recom.		
	Pneumatic	30 / 50 / 0	Yes			

This table has to be interpreted as guideline. As the loop, which is handled by the controller, is mainly composed with some mechanical or pneumatic parts it is not possible to establish some fix PID values. Setting PID requires many physical tests on machine in high-low speed, with large-small diameter, in acceleration and deceleration. A good PID transfer curve is established when – after disturbing the installation at any condition – the system is recovering stability after one or 2 smooth oscillations.

* Dancer solution combined with pneumatic brakes **TO AVOID** if big diameter ratio (>9).

22. Press OK. You enter in the first level menu

1. CLOSED LOOP

1. OPEN LOOP on display

23. Press OK. You enter in CLOSED LOOP menu

2. PID VALUES

2. PID ADAPT on display

24. Press OK. You enter in the PID VALUES setting

Introduce the P factor as per the table above, press OK

Introduce I..... D.....press OK

Display is showing

2. PID VALUES

2. PID ADAPT

Now programming is completed and you can start machine in low speed. Verify the StopInt wiring, refer to § STOPINT INPUT in case of doubt. It is indispensable to wire this StopInt function to have proper machine starting

Observe the dancer behaviour. It's the only physical and reliable indication you have. It should remains stable with some smooth oscillations admitted in the machine speed transitory phase.

You can at any time re-enter in the PID VALUES setting and modify any parameter while machine is running. At this time you can modify your P, I and D values on line. Pressing OK will record the new value.

Do not make a too big jump in PID values change during re-setting. 10% regarding previous value is a good ratio

10. MORE DETAILS ABOUT CONTROLLER AND INSTALLATION

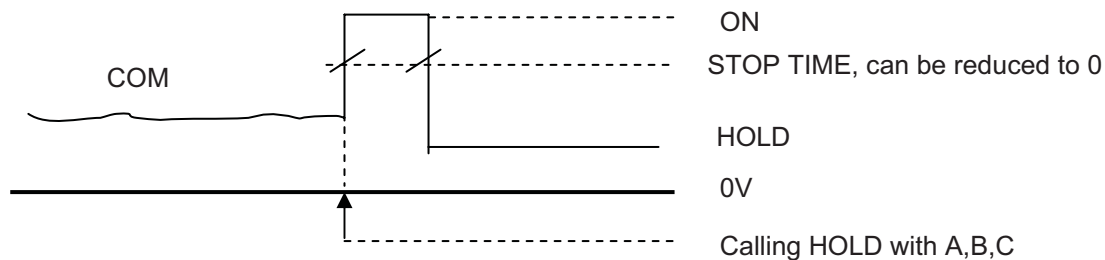
A. PID FACTORY SETTING

The **PID factory setting** is to 0 for the three terms. With 0 on the PID it's not possible to get an output value. Then for any check you are forced to introduce, at least, a value for P (eg. P=500 as suggest in the programming step 3 see § PID VALUES).

B. HOLD

When you use the HOLD value assigned to one output, every time you call this value trough the A,B,C contact one pulse of value ON will first appear on the output. This pulse is called STOP. It's possible to suppress it in the menu STOP TIME where you have to set the time to 0.

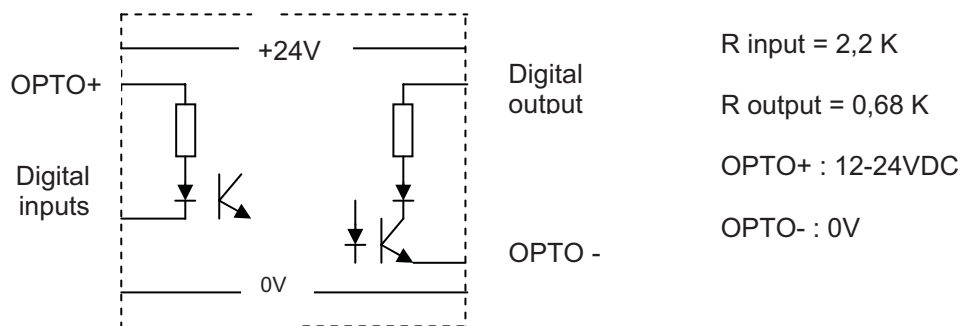
Example : Machine running with closed loop control (COM value on the output) and calling HOLD value.



C. OPTO-COUPLER

As all digital inputs / outputs are opto-coupled it is indispensable to make the connection represented in the TYPICAL WIRING : OPTO + to + 24 VDC and OPTO - to 0V.

Digital input / output configuration



D. A,B,C, INPUTS

The **A, B, C, input** can be synchronised with pulse on input Synchro. Closing momentarily Synchro input to 0V will valid the present A,B, C input situation. In general we do not need this synchronisation. The Synchro input must be – in this case and as represented in TYPICAL WIRING – permanently closed to 0V

E. STOPINT INPUT

The **input STOPINT** is very important for good system behaviour. When machine stop the sensor (HMCS605-E) will read a position error. (It's practically not possible to stop the installation with error position = 0). Reading an error, the controller - particularly the term I - will try to correct the error by increasing the output value, this to the saturation (10 V). Restarting in this condition is not possible.

By closing the **STOPINT** contact we block the term I of the PID and only a small error due to proportional term remains at the output. This contact must be re-open soon as the machine starts again.

You have two ways to set the **STOPINT**, with one you **freeze** the I value at the same level so long the contact remains closed, with the other, called **reset**, the I value will be ramped town to zero within 5 sec.

F SENSOR RESCALING

Sensor rescaling without programming tool is possible. On front face of controller you will find a front face escaped red button. Use it in the way as described here below:

Place or replace the sensor. Make sure full signal is located in the +/- voltage range
Press and keep pressed the red push button while you switch ON the MCS2000-ECA
Front face green LED is blinking slowly (1 second)
Place sensor in the highest voltage position
Release the red push button
Front face green LED is blinking quickly (0,33 second)
Place sensor in lowest voltage position
Press and keep pressed the red push button
Front face green LED is blinking very slowly (3 seconds)
Place sensor in the highest voltage position again
Release the red push button

Front face green LED must be permanently lighted, scaling or rescaling now is completed

G PID COMPENSATION

Using diameter reading as **PID compensation (correction)**

Note : It is admitted a first test has been completed without compensation and the PID values for the biggest diameter have been determined.

This feature requires to programme the CLOSED LOOP menu in this way :

Enter in CLOSED LOOP, press OK to enter in second level, with arrow up and down choose PID ADAPT.

Press OK to enter in the PID ADAPT setting. The setting is in fact a choice between 3 possibilities :

NONE No PID compensation, PID values will be constant, only the 3 factors P, I and D are displayed
EXTERNAL The PID value will be corrected with signal on Analog inputs, in general the diameter. A 4th value will be required i.e. the voltage level of the analogue input (Anlg V) for which the P, I and D are set.
AUTOMATIC The PID value will be corrected with an internal value. A 4th value will be required i.e. the voltage level of the output (Out V) for which the P, I and D are set.

The description in this manual is done with **“NONE”**. **To work with compensation choose EXTERNAL or AUTOMATIC.**

Before programming for the external diameter compensation make sure you have the diameter sensor fit on machine with the signal connected to the analog input. (refer to the typical wiring) The big roll is installed on machine. In the case where big roll is not available you have to simulate it in order to get the big roll corresponding signal at the analog input.

Press OK. You enter in the first level menu

1. CLOSED LOOP

1. OPEN LOOP on screen

Press 2 x OK. You enter in the PID VALUES menu

For ? diameter

→ O ← on screen

Note : → o ← means small diameter

← O → means big diameter

Press OK. You enter in small diameter setting

Set your previous PID values found for the big diameter.

Press OK. Display will show

2. PID VALUES

2. PID ADAPT. on screen

Press OK. You enter in PID VALUES menu

For ? diameter

→ o ← on screen

With arrow up and down select big diameter

For ? diameter

← O → on screen

Press OK. You enter in big diameter PID setting. Set your previous values found for big diameter

Press OK. Then ESC two times until to get default display

IMPORTANT : You have set the same PID values for the small and big diameter. This is the correct way to proceed.

Now you start the machine with big roll and you observe the stability. To check the stability one easy way is to disturb the roll during operation. After disturbing the dancer should recover a good stability immediately. Do this many times while the roll diameter is decreasing. Soon as you suspect instabilities :

Enter in the programme and correct the PID for small diameter. Do this while machine running.

Re-observe and make new correction. Do this to the end of the roll.

You have now established the PID range for big – small diameter. This has been done with the corresponding information on analog input.

If you have to modify this setting don't forget : Any correction on the big diameter PID has to be done with big diameter information present on analog input. And, any correction on the small diameter PID has to be done with small diameter information present on the analog input.

In general : The P term is practically in proportion with diameter, rather less.
The D term can be decreased in higher proportion than the diameter
The I term is decrease in lower proportion than the diameter, can some time stays constant

H MEMORY CARD

Using memory card HMCS2000-CRD2 as memory programme back-up or quick programme change.

The front face of the controller offers a slot in which can be plugged the memory card.

The memory card can contents 2 full HMCS2000-ECA programmes. When operating load / download the 2 programmes are identified on display by Part A and Part B.

For downloading from the HMCS2000-ECA unit to the card you need either the PRG or the DP. Loading the programme from the card to the HMCS2000-ECA unit is made with same tools.

IMPORTANT : For automatic loading without the use of PRG, proceed as follow :

- With HMCS2000-ECA switched OFF, plug in the memory card
- Switch ON the HMCS2000-ECA (apply the 24 VDC power supply)
- The part A of the memory card will automatically be loaded in the HMCS2000-ECA

Of course it's admitted that the memory card has previously been loaded with a correct programme !.

Loading and downloading from HMCS2000-ECA to the memory card HMCS2000-CRD-2 :

Enter in the programme until you get

2. MEMORY CARD

2. LANGUAGE on screen

Press OK to enter in the MEMORY CARD menu

Follow scrupulously the display indication.

Press ESC many times to turn back to default display

I FACTORY SET

WARNING in FACTORY SET step programme. Soon as you see FACTORY SET appearing on top line display all data will be lost if you press OK. There is no advising on display. Then before pressing OK be sure you want to return to factory setting.

This function is used in the case where – for some unknown reason – you prefer to restart your programmation. If by mistake you are on the FACTORY SET step programme press ESC to leave this position.

11. IN CONCLUSION

The HMCS2000-ECA is a digital PID controller, which can be placed in any closed loop control. This present manual is oriented in TENSION CONTROL for unwind stand with dancer arm principle. All other applications are possible. Do not hesitate to contact your nearest Warner Electric representative in case of need.

All the Warner Electric material used in the description is **CE approved and Y2K compatible**. Certification can be obtained on request.

Thanks for choosing Warner Electric as partner.

