

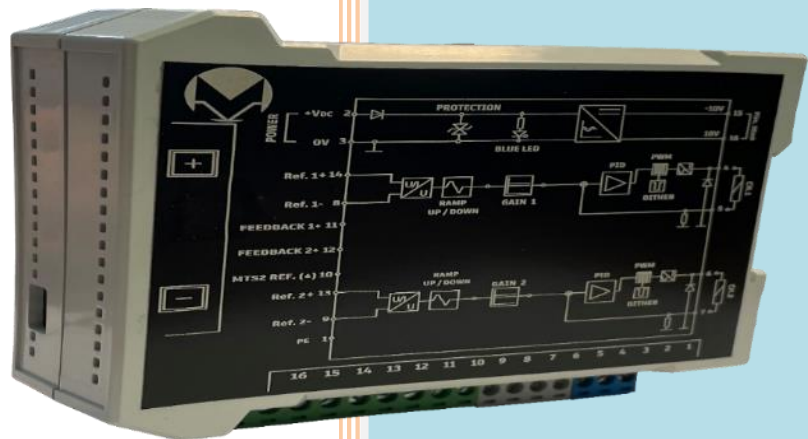
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**MTS-M\* / 3.0 Digital  
Proportional Card**

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**Start – Up  
Manuel**

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## GENERAL INFO

These manual displays information about the **digital card MTS-\* series 3.0**, universal amplifier for proportional valves.

Identification codes:

**MTS-1\*/3.0V\*-A**  
**MTS-1\*/3.0V\*-B**

**MTS-2\*\*/3.0V\*-A**  
**MTS-2\*\*/3.0V\*-B**

**MTS-3\*\*\*/3.0V\*-A**  
**MTS-3\*\*\*/3.0V\*-B**

**By METOSAN H&P**

Should you have any questions concerning just the card, please contact with your dealer.

Other useful literature about **MTS-\*/3.0V** and its start-up can be found in:

Technical catalogue           **10576/42 MRT**

Software pack                   **MTS\_Oransal Software V3.0 and later**

Please for installation, start-up, commissioning and maintenance use only skilled workers and materials fit for purpose, as recommended.

Please before installation read this file and follow strictly what is indicated.

METOSAN H&P SAN.TIC.LTD.STI disclaims any liability for damage to person or property resulting from noncompliance of rules and instructions here declared, from misuse or incorrect use or from tampering of provided cards.

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## Features

The MTS-\* is a digital card suitable for the control of one proportional valve with two solenoids (MTS2 version) or one/two independent proportional valves, also pressure or throttle, with one solenoid each (MTS1 and MTS3 versions).

It is designed for rail mounting type DIN EN 50022.

The card supplies the current to the solenoid according to the reference signal and independently of temperature variations or load impedance.

The card uses mini-USB interface, and via software MTS\_Oransal configurator it is possible to set parameters.

**- Mini USB connector:**

no serial converter required.

**- Separate current settings (PWM-Dither) in the 2-channels version EDM-M3**

**- Parameters programmable via software:**

Ramps, Min.current, Max.current, frequency, PID parameter adjustments (Kp, Ki, Kd), manual control, scaling of analogue inputs

- Fault recognition (cable breaks, short-circuits, etc.)

## Available versions

### MTS - Z XX Y /3.0V Q

The functionalities of the module can be chosen by the proper ordering code, where:

**Z is the type of valve / valves to be driven.**

- 1 - single valve with one solenoid
- 2 - single valve with two solenoids
- 3 - two valves with one solenoid each, (separate channels, MTS-3 can manage even two different type of valves)

**X indicates the nominal current required.**

Two digits - XX - appear in MTS3 version only, because of the separate channels which require entries for each coil.

- 1 – 860 mA
- 2 – 1200 mA
- 3 – 1600 mA
- 4 – 1880 mA
- 5 – 2700 mA

**Y indicates the choices for PWM frequency**

- 1 – 125 Hz
- 2 – 200 Hz
- 3 – 300 Hz
- 4 – 400 Hz
- 5 – 500Hz

**Q indicates the type of reference signal**

- 0 = reference signal in voltage 0...10V or  $\pm 10$  V depending on Z choice,
- 1 = reference signal in current 4...20 mA

## Diagnostic

Source	Characteristic
Command Signal PIN 14 / 8 Command Signal PIN 13 / 9 4 ÷ 20 mA, 0-10V, ±10V	The power stage is deactivated
Solenoid A PIN 4 / 5 Solenoid B PIN 6 / 7	The power stage is deactivated
Supply Voltage	The power stage is deactivated
EEPROM (at switching on)	The output is deactivated

## Power output

Proper parameters of maximum current, PWM and set the output supplied to solenoids.

Separate parameters are available for each output channel in MTS-3 card version (two valves with single solenoid).

The output value can be compensated using the dead band compensation parameter set.

The maximum current that can be provided to a coil is 110% of the CURRENT parameter.

## Analog input

Analog inputs type can be selected by 4-20 mA, 0-10V And ±10V parameter and signal can be scaled by GAIN parameter.

MTS-1 version (for one valve with one coil) require unipolar voltage (0...10 V) or current signal (4...20 mA).

MTS-2 version (for one valve with two coils) generates a proportional current on solenoid A with a positive value of voltage or a current between 12...20 mA and a proportional current on solenoid B with a negative value of voltage or a current between 4...12 mA.

MTS-3 version (for two valves with one coil each), requires that both the analogue inputs must be used.

## Led description

The card is equipped with LEDs in the front panel, for a fast check of the card operation.

### **L5 (Blue Led):** Power On

**OFF:** No power supply

**ON:** Module supplied

### **L4 (Red Led):** Error

**OFF:** No error

**ON:** Error detected

### **L1 (Blue Led):** USB perception

**OFF:** USB not connected

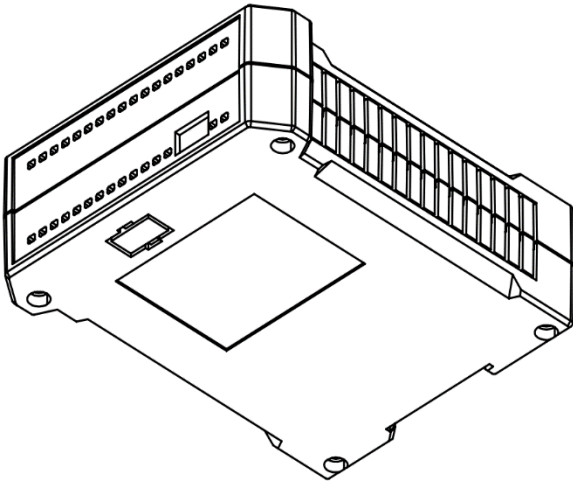
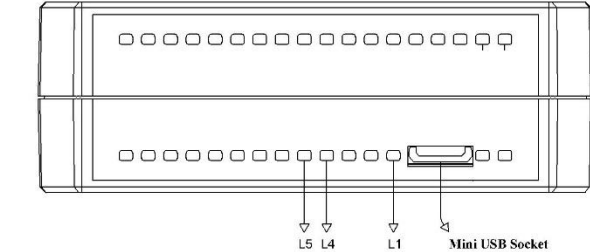
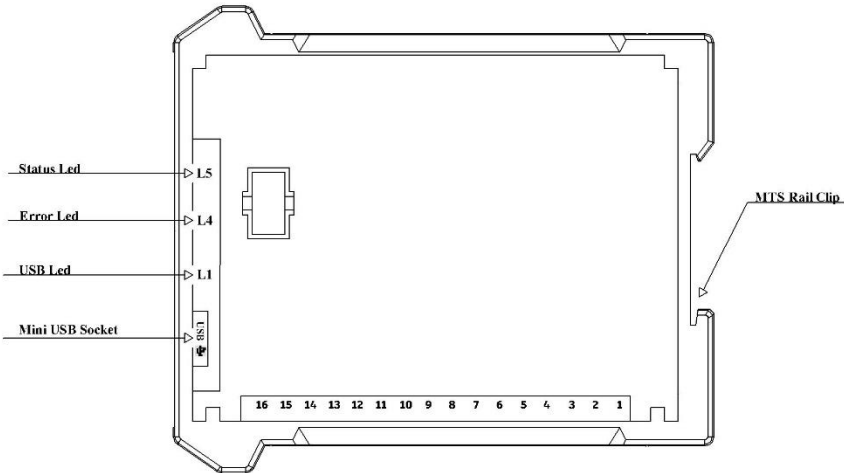
**ON:** USB connected

## Technical Characteristics

PARAMETER	UNIT	
Power Supply Voltage	V DC	12-30 (Ripple Included)
Power Consumption	W	Max 70
Max. Output Current	A	6 (For MTS3)
Output Current	A	Max 2.5A (For Single Channel) Max. 5A (For Double Channel)
Electrical Protection		Overvoltage Protection Short Circuit Protection Reverse Polarity Protection
Reference Signal Input	V mA	0-10V
Resolution	mA	1
Frequency	Hz	125-500
Interface Connection		USB HID (Mini USB)
Operating Temperature Range	°C	-20 / +70
Connector		Plug-In Terminal Block with Tightening Screws: 16 Poles
Housing Dimensions	mm	31x90x118
Housing Material		ABS
Mass	Kg	0,175



# Overall And Mounting Dimensions



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## Installation Instructions

This module is designed for installation in a shielded EMC housing control cabinet.

All cables which lead outside must be screened; complete screening is required. It is also necessary to avoid strong electro-magnetic interference sources being installed nearby when using our open and closed loop control modules.

### Typical Installation Location:

24 V control signal area close to PLC

The devices must be arranged in the control cabinet so that the power section and the signal section are separate from each other.

Experience shows that the installation place close to the PLC (24 V area) is most suitable. All digital and analogue inputs and outputs are fitted with filters and surge absorbers in the device.

The card must be installed and wired according to the EMC 2014/30/EU directive rules. If other consumers are operated with the same power supply, a star-shaped ground wiring scheme is recommended.

The following points must be observed when wiring:

0V DC of the power supply must be connected to the GND on electrical cabinet. • The signal cables must be laid separately from power cables.

- Analogue signal cables must be screened.
- All other cables must be screened if there are powerful interference sources (frequency converters, power contactors) and cable lengths > 3 m. Inexpensive SMD ferrites can be used with high-frequency radiation.
- The screening should be connected to PE (PE terminal) as close to the module as possible. Local requirements for screening must always be considered. The screening should be connected to at both ends. Equipotential bonding must be provided where there are differences between the connected electrical components.
- If having longer lengths of cable (> 30 m), the diameters and screening measures should be checked by specialists and if necessary, please consult the manufacturer (e. g. for possible interference, noise sources and voltage drop). However, the sizing must ensure a voltage to the coil of not less than 90% of its nominal voltage.
- the value of the power supply voltage on the card must not be lower than the rated working voltage of the solenoid to be controlled.
- Provide a low-resistance connection between PE and the mounting rail. Transient interference is transmitted from the module directly to the mounting rail and from there to the local earth.

It is recommended using a regulated power supply (linear or switching mode) for card supply and for the sensors.



**WARNING!** Plugs with free-wheeling diodes and LED indicators cannot be used with current controlled power outputs. They interfere with the current control and can destroy the output stage.

Switched inductances (relays and valve coils) which are connected to the same power supply must always be provided with appropriate overvoltage protection directly at the coil.

The 16-poles terminal strip accepts connections of a 1.5 mm<sup>2</sup> conductor with ferrule. Applications that require larger cross sections require mandatorily a junction box.



**WARNING!** Engage the terminal block **ONLY** with the panel switched off.

## PIN Table

### MTS-1

Connection	POWER SUPPLY
PIN 1	PE
PIN 2	Power Supply
PIN 3	0 V (GND) Power Supply (ground). 0 V Reference for PIN 8.
Connection	PWM OUTPUT
PIN 4-5	Current Controlled PWM Output for The Solenoid Channel 1
Connection	ANALOG INPUT
PIN 14	Channel 1 Reference (input) signal, corresponds with 0...10 V
PIN 8	Channel 1 Reference for the input signal 0 V
PIN 16	Auxiliary voltage output for +10 V **Max. 30mA**
PIN 15	Auxiliary voltage output for -10 V **Max. 30mA**
PIN 12	Channel 1 Reference (input) signal, corresponds with 4...20mA

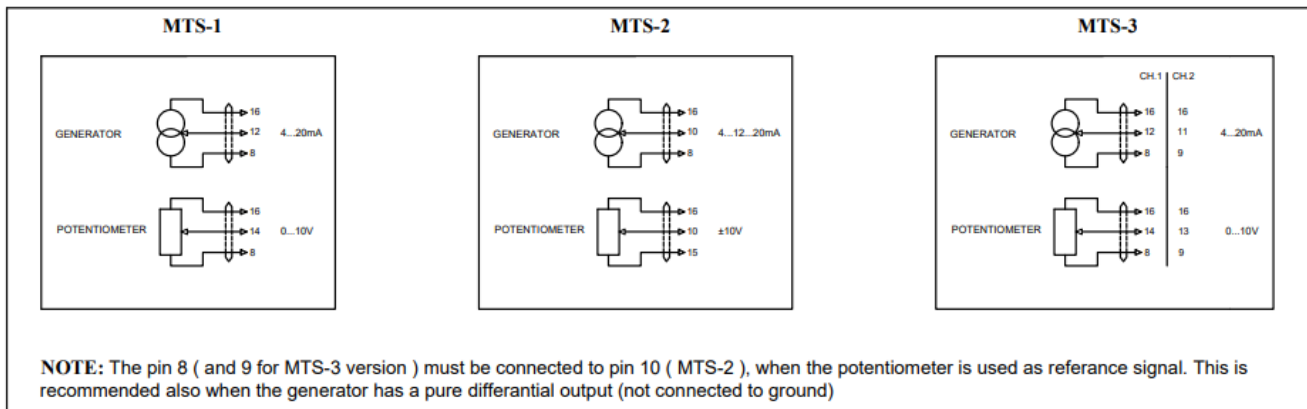
## MTS-2

<b>Connection</b>	<b>POWER SUPPLY</b>
PIN 1	PE
PIN 2	Power Supply
PIN 3	0 V (GND) Power Supply (ground). 0 V Reference for PIN 8.
<b>Connection</b>	<b>PWM OUTPUT</b>
PIN 4-5	Current Controlled PWM Output for The Solenoid Channel 1
PIN 6-7	Current Controlled PWM Output for The Solenoid Channel 2
<b>Connection</b>	<b>ANALOG INPUT</b>
PIN 16	Auxiliary voltage output for +10 V **Max. 30mA**
PIN 15	Auxiliary voltage output for -10 V **Max. 30mA**
PIN 10	±10V Reference Input (Model: MTS-2)
PIN 12	Channel 1 Reference (input) signal, corresponds with 4...20mA
PIN11	Channel 2 Reference (input) signal, corresponds with 4...20mA

## MTS-3

Connection	POWER SUPPLY
PIN 1	PE
PIN 2	Power Supply
PIN 3	0 V (GND) Power Supply (ground). 0 V Reference for PIN 8.
Connection	PWM OUTPUT
PIN 4-5	Current Controlled PWM Output for The Solenoid Channel 1
PIN 6-7	Current Controlled PWM Output for The Solenoid Channel 2
Connection	ANALOG INPUT
PIN 14	Channel 1 Reference (input) signal, corresponds with 0...10 V
PIN 8	Channel 1 Reference for the input signal 0 V
PIN 13	Channel 2 Reference (input) signal, corresponds with 0...10 V
PIN 9	Channel 2 Reference for the input signal 0 V
PIN 16	Auxiliary voltage output for +10 V **Max. 30mA**
PIN 15	Auxiliary voltage output for -10 V **Max. 30mA**
PIN 10	±10V Reference Input (Model: MTS-2)
PIN 12	Channel 1 Reference (input) signal, corresponds with 4...20mA
PIN11	Channel 2 Reference (input) signal, corresponds with 4...20mA

## Wiring

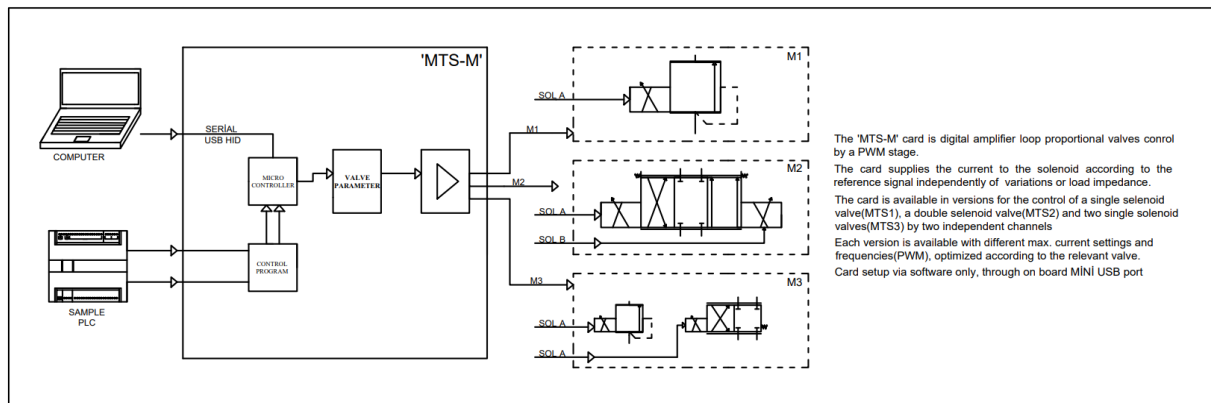


## Card Setup

Card configuration occurs only by MTS\_Oransal software from a PC or by MTS\_Oransal app. Anyway, cable connection with the card is always necessary.

All the ancillary equipment is available as separate kit.

It includes a USB communication cable (mini-USB B male - USB A male) of 2 meters length, 2 adapter cables, a USB key with MTS\_Oransal software pack for notebook, to be installed.



## MTS\_Oransal App

This app has been developed to offer immediate diagnostic and configuration activities of USER level parameters of electronic cards even in the field, with a traceability function that makes service operations more efficient.

Use the communication cable and the suitable adapter in the MTSPC kit to connect the MTS\_Oransal app allows diagnostic and configuration activities of USER level parameters. Password is required to apply parameters changes. See Parameters section.

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## MTS\_Oransal configurator software

This is the software for MTS-\* parameters configuration.

MTS\_Oransal software is a graphical interface for digital communication, diagnostic tasks and parameterization.

In addition to the features available on the app, it offers advanced diagnostic programs and an oscilloscope with measure functions, and allows to save and import parameters sets, as needed for fast card replacement and for the reduction of start-up time of the system.

The software is distributed inside the MTSPC kit and is also available for download at:

<http://www.hidrolikuretim.com>

### System Requirements & Settings

The MTS\_Oransal software can be installed on every machine equipped with Microsoft OS: Windows 7, 8 and 10, a free USB port to connect the communication cable (standard cable type USB A – mini USB B).

Launch the setup file and follow the guided procedure to install the program and USB drivers. Complete driver setup and restart the machine if requested before connecting the module to the PC.

At the end of installation, a security alert could appear, asking to define permissions for firewall, depending on your OS and notebook configuration.

**See software literature (inside software pack) for MTS\_Oransal configuration software.**

If you need to energize the valve simultaneously, you need the power supply to pins 1/2.



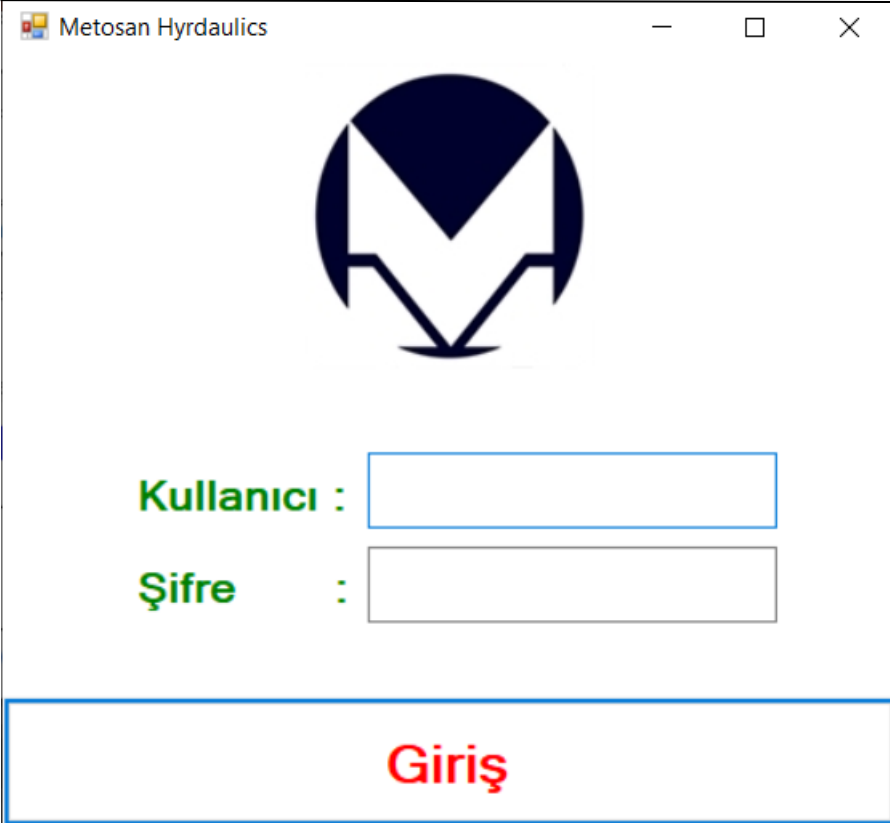
## Parameters

When the software is started, the parameters are displayed in read- default mode.


Parameter configuration is structured with different access levels.

To access “User” parameter config in the MTS\_Oransal software you need to log in with the following case-sensitive credentials:

**Login:** User      **Password:** 1



Metosan Hydraulics



**Kullanıcı :**

**Şifre :**

**Giriş**

## SUMMARY

Parameter	Defaulted Value	Range	Group
Card Mode	MTS-1	MTS-1, MTS-2, MTS-3	-
Frequency	250 Hz	125 - 500 Hz	MTS-1, MTS-2, MTS-3
Transmitter	Passive (working on)	-	-
Gain	1	1-5	MTS-1, MTS-2, MTS-3
Max. Current (mA) *CH1*	860	0-2500	MTS-1, MTS-2, MTS-3
Min. Current (mA) *CH1*	25	0-1250	MTS-1, MTS-2, MTS-3
RAMP_UP *CH1*	0	0-250	MTS-1, MTS-2, MTS-3
RAMP_DOWN *CH1*	0	0-250	MTS-1, MTS-2, MTS-3
Max. Current (mA) *CH2*	860	0-2500	MTS-2, MTS-3
Min. Current (mA) *CH2*	25	0-1250	MTS-2, MTS-3
RAMP_UP *CH2*	0	0-250	MTS-2, MTS-3
RAMP_DOWN *CH2*	0	0-250	MTS-2, MTS-3
4-20mA Active-Passive Box	Passive	-	MTS-1, MTS-2, MTS-3
Manual Control Box	Passive	-	MTS-1, MTS-2, MTS-3
Advanced Interface ON- OFF Box	Passive	-	MTS-1, MTS-2, MTS-3
Graphic ON-OFF Box	Passive	-	MTS-1, MTS-2, MTS-3

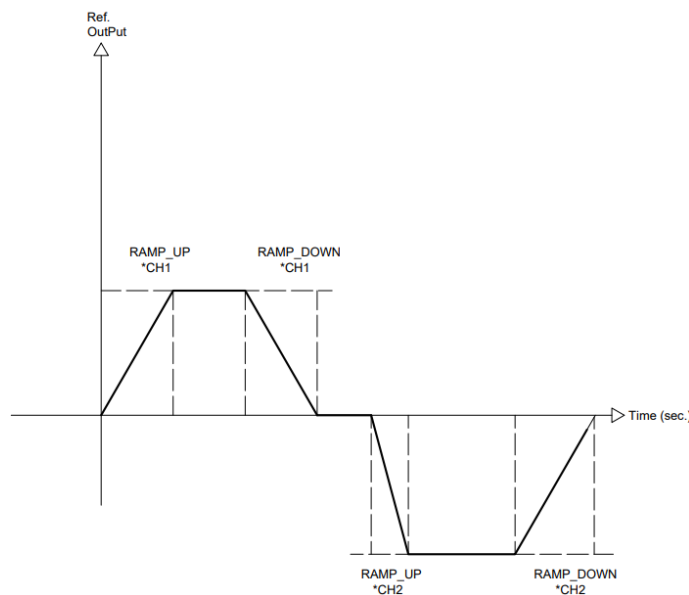
- \* When the 4-20mA box is activated, the send button must be pressed.
- \*\*When manual control is activated, control can be made with the help of the sliding button on the interface.
- \*\*\* Signal scaling example:  
 With an **MTS-1/3.0V** the available signal type is 0...+10V.  
 If application signal is 0.....5V this means:
  - 0% signal for the valve must be moved from 5V (application 0%) to 0V
  - Signal input must be scaled from 5V to Standard Full Scale of 10V
  - $GAIN = \text{Standard F.S.} / \text{Application F.S.} = 10 / 5 = 2$
- \*\*\*\*

## ANALOG INPUT

### RAMPS

Command	Parameters	Unit	Default
RAMP_UP RAMP_DOWN *CH1	Entered value / 10	Sec.	0
RAMP_UP RAMP_DOWN *CH2	Entered value / 10	Sec.	0

Entered ramp time is related to 100% of signal variation. Different ramps times are available for each quadrant in MTS-2 card:



## OUTPUT SIGNALS

### CURRENT

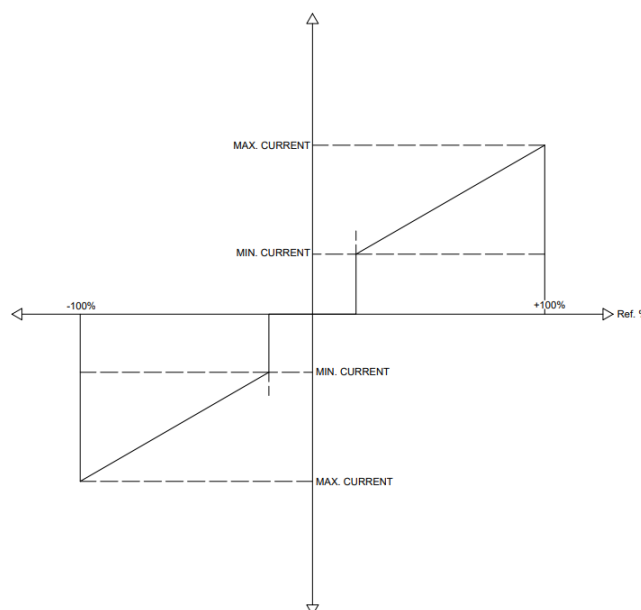
Command	Parameters	Unit	Default	Group
CURRENT *CH1	CURRENT MAX. CURRENT MIN.	mA	860	MTS-1 MTS-2 MTS-3
CURRENT *CH2	CURRENT MAX. CURRENT MIN.	mA	860	MTS-2 MTS-3

It set the nominal current of the coil connected. The current can be then adjusted by parameters for “Curve adjustment”.

CURRENT values are internally used by the card for an optimum current control loop.

For a correct behavior, MTS-\* model must be ordered with the nominal current as close as possible to the nominal current of the coil.

MAX. CURRENT and MIN. CURRENT value is a parameter set by the manufacturer according with the model of ordered card.



## PWM

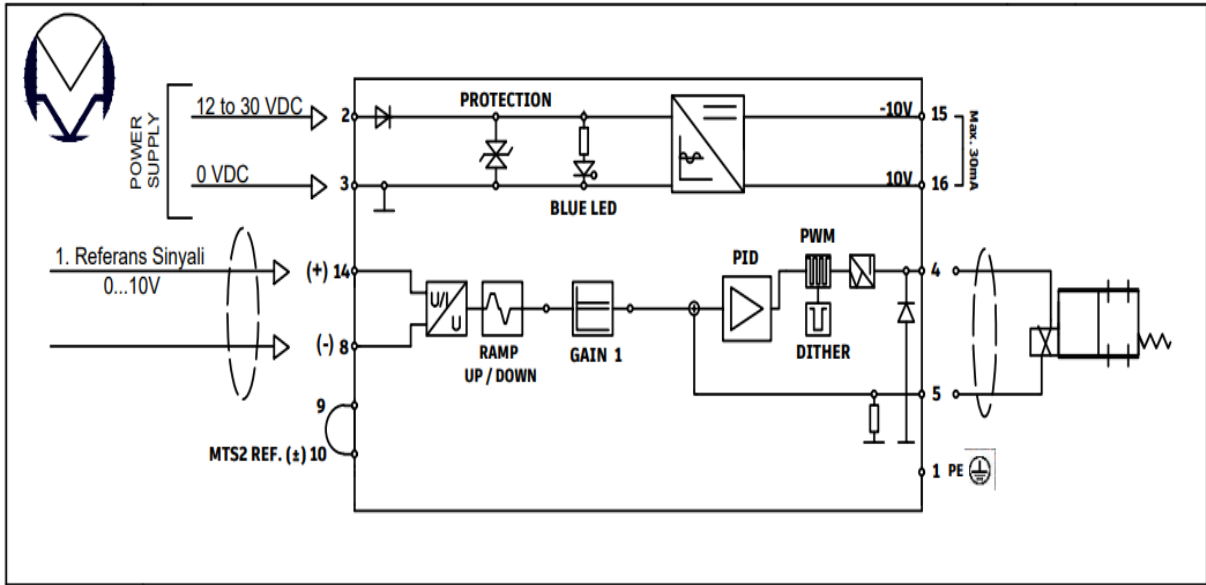
Command	Parameters	Unit	Default	Group
PWM	125-500	Hz	250	MTS-1 MTS-2 MTS-3

The frequency can be changed between 125 and 500 Hz step less. The optimum frequency depends on the valve types

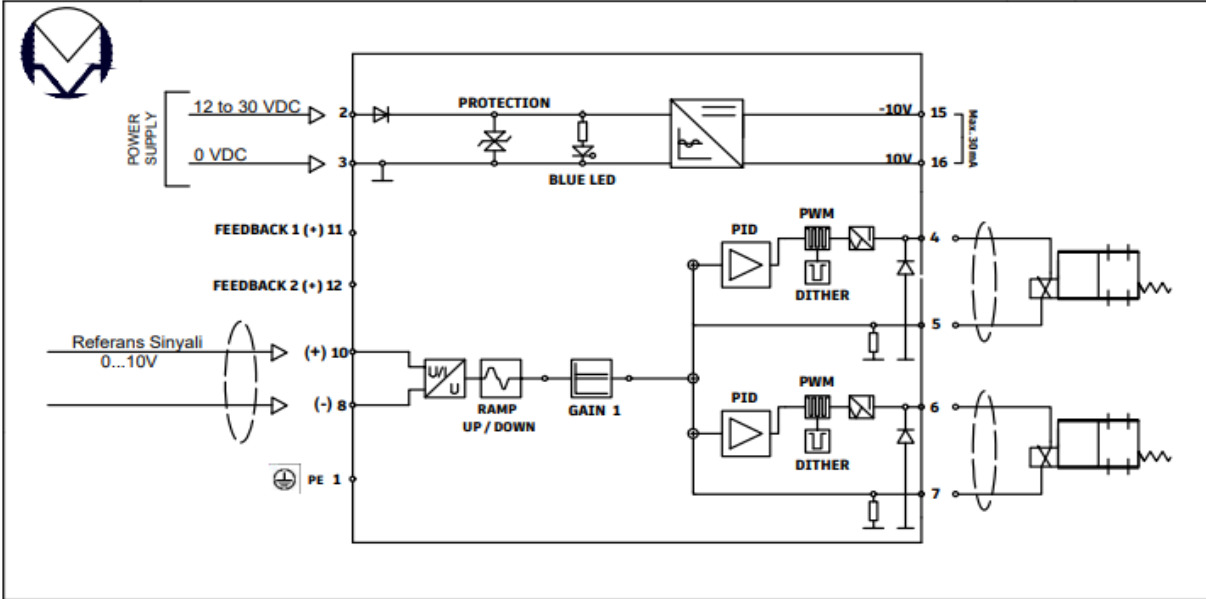
Command	Description	Unit
CURRENT (CH1)	Output current of solenoid CH1 (MTS-1) Output current of solenoid A (MTS-2) Output current of solenoid CH1 (MTS-3)	mA
CURRENT (CH2)	Output current of solenoid B (MTS-2) Output current of solenoid CH2 (MTS-3)	mA
REFERENCE-1	0-10v analog signal indicator for channel 1	string of numbers
REFERENCE-2	0-10v analog signal indicator for channel 2	string of numbers
DUTY CYCLE (CH1)	Percentage of PWM on solenoid CH1 (MTS-1) Percentage of PWM on solenoid CH1 (MTS-2) Percentage of PWM on solenoid CH1 (MTS-3)	%
DUTY CYCLE (CH2)	Percentage of PWM on solenoid CH2 (MTS-2) Percentage of PWM on solenoid CH2 (MTS-3)	%

# BLOCK DIAGRAMS

**MTS-1**



**MTS-2**



**MTS-3**

