

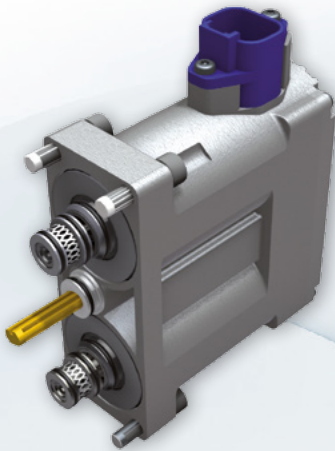
# TECNORD

SERVOCOMANDI E REGOLAZIONE

## Multidrom MLT FD-5

### PRINCIPLE OF OPERATION

The **MLT-FD5/D** electro-hydraulic proportional actuator has been designed to shift a directional control valve spool either directly (**FL version**) or by means of a servo-piston mechanically connected to it (**SP version**). The internal closed loop position control configuration of the **MLT-FD5/D** makes the valve spool achieve the desired position with accuracy levels approaching the performance of a servo-valve, by continuously comparing the set-point of a remote control device (**Potentiometer, Joystick, Machine Management System**) with the feed-back signal generated by a high-precision hall effect position transducer.



### FEATURES

#### Two Independent Proportional Valves

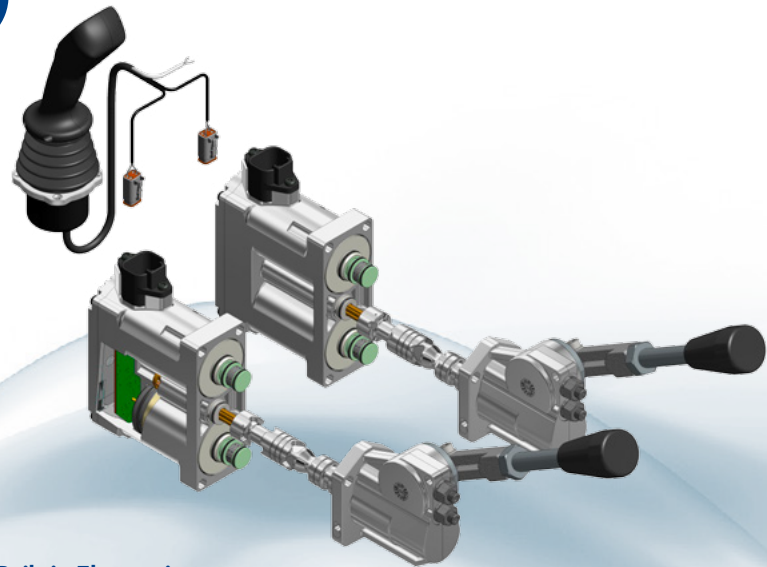
**Control Configuration:** bidirectional with MOTOR SPOOL center position for fail-safe return to neutral in case of power loss.

**Flow Rate:** 0.2 to 0.5 lt/min. max. flow requirement under normal conditions.

**Work Pressure:** 12 to 35 bar.

#### Hall Effect/Contactless Spool Position Sensor

- Excellent linear control on 100% of spool travel.
- 8 mm standard control stroke from each side of NEUTRAL/13 mm for FLOAT position in one direction only.
- No "Cross Talking" between adjacent work sections.



### Built-in Electronics

**MLT-FD5-D (digital):** microprocessor-based actuator.

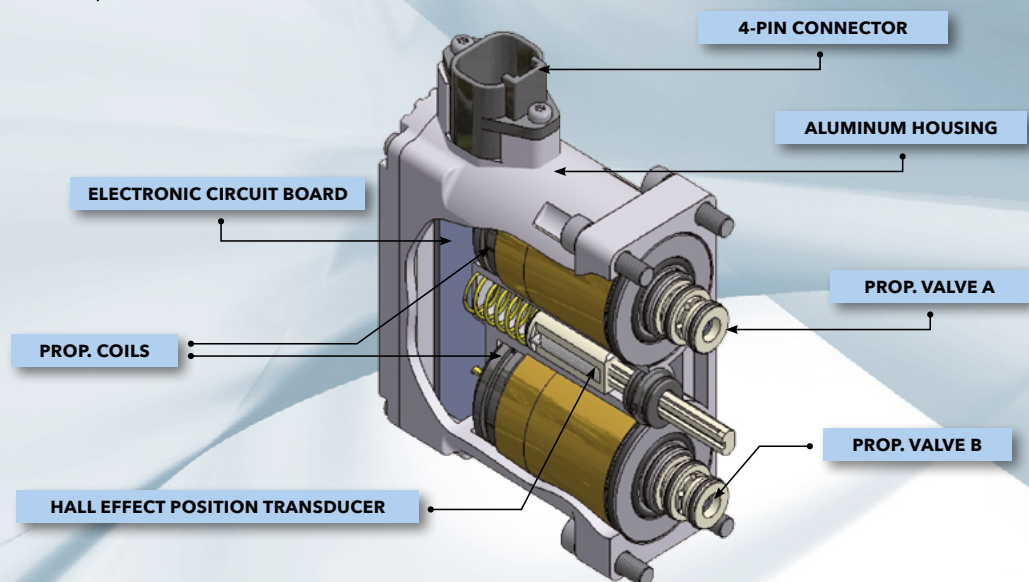
Choice between different types of control:

- Analog control (0 – 5V), with following auxiliary signals available:
  - ✓ spool position feedback.
  - ✓ 5V for external potentiometer or joystick.
- CANbus control (J1939 or CANopen protocols).

**MLT-FD5-0 (on-off):** 12 or 24V version.

### APPLICATIONS

- High performance proportional control of stackable or monoblock directional control valves.
- Proportional control of variable displacement pumps and motors.
- Engine governor RPM controls.



## CONTROL CHARACTERISTIC OF MLT-FD5 PROPORTIONAL ACTUATOR (ANALOG OPERATING MODE)

### SPOOL STROKE A

When the input voltage signal fed to the MLT-FD5 actuator is maintained within 2.25 and 2.75V, the directional valve spool is at rest (Neutral Dead Band). When  $V_{in} = 2.75V$ , the spool steps up from NEUTRAL to MINIMUM FLOW control position. A linear ramp from MIN. to MAX. spool stroke will follow by increasing  $V_{in}$  from 2.75 to 4.1V. At  $V_{in} = 4.50V$ , the spool is brought into its FLOAT POSITION, if present. By decreasing the input voltage from 4.1 to 2.75V, the spool stroke is linearly reduced and after the oil flow is fully shut-off, a step-down from MINIMUM FLOW to NEUTRAL position takes place.

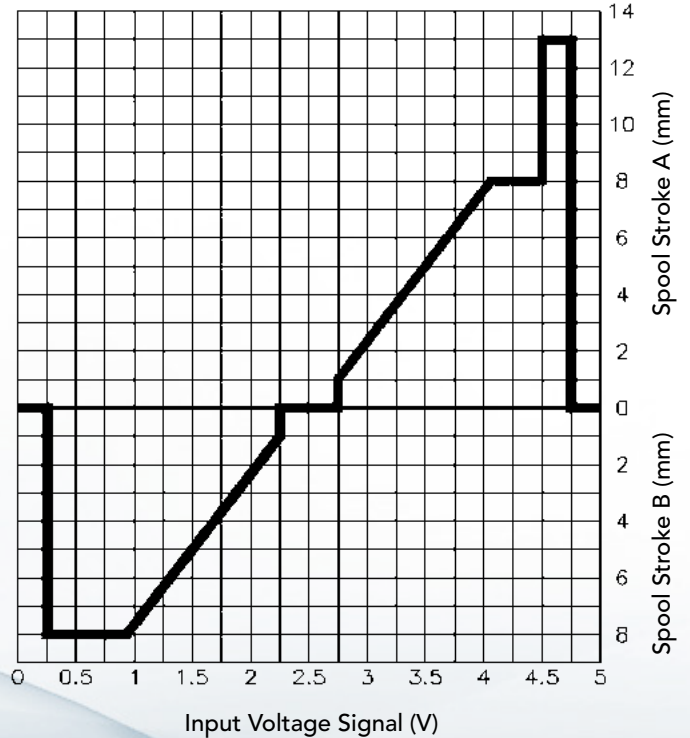
### SPOOL STROKE B

Same as for STROKE A, by varying  $V_{in}$  from 2.25 to 0.9V, the spool will go from NEUTRAL to MAX. STROKE in the opposite direction.

### ALARM / FAIL - SAFE MODE

An input voltage variation beyond the calibration range ( $<0.25V$  or  $>4.75V$ ) will bring the system into an ALARM mode, urging the spool to return to its NEUTRAL position until  $V_{in}$  is brought back to its nominal control range.

Spool Stroke (mm) vs. Input Voltage Signal (Volt DC)



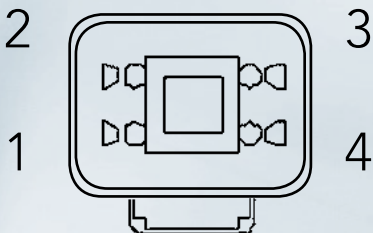
### HYDRAULIC SPECIFICATIONS

Max. supply pressure.....	35 bar
Min. supply pressure .....	12 bar
Max. back pressure.....	1.5 bar
Pilot flow requirement.....	0.2 lt/section
Oil temperature range .....	-20/+95°C
Oil viscosity range .....	3-650 cSt
Filtration .....	18/15 (ISO 4406)

### ELECTRICAL SPECIFICATIONS

Operating voltage .....	8-30 VDC
Max. current consumption .....	750mA/section
Operating temperature.....	-20/+105°C
Analog input impedance .....	>40 kOhm
Typical ctrl pot. resistance.....	1-10 kOhm
Analog input signal .....	0-5V
Degree of protection.....	IP 68

### CONNECTOR PINOUT (FRONT VIEW)



#### D/A0

1. + Power Supply
2. Do not Connect
3. Control Signal
4. - Power Supply (GND)

#### D/A5

1. + Power Supply
2. + 5V Aux. Supply voltage
3. Control Signal
4. - Power Supply (GND)

#### D/AF

1. + Power Supply
2. Sensor Feedback Output
3. Control Signal
4. - Power Supply (GND)

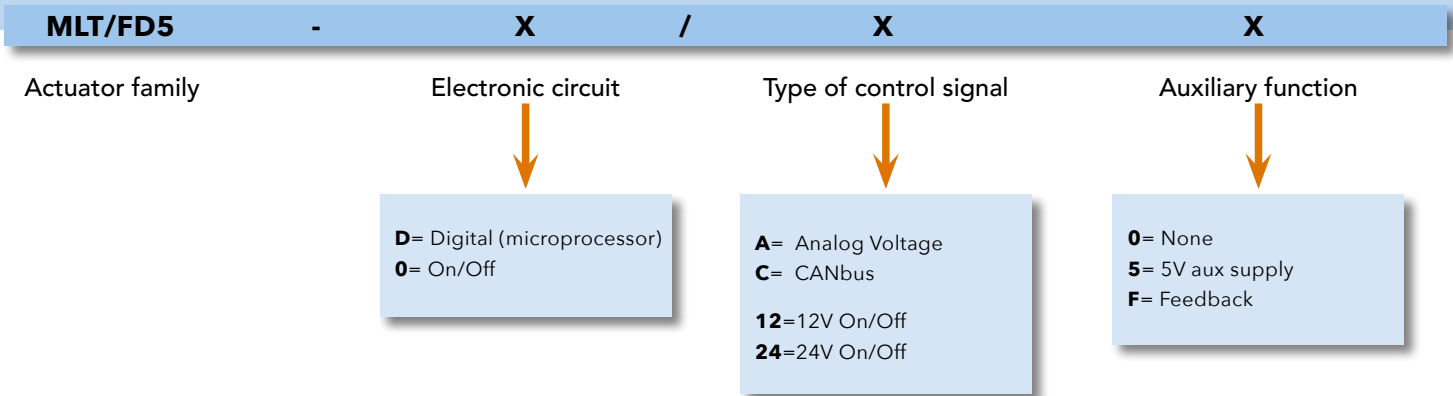
#### D/C0

1. + Power Supply
2. CANL
3. CANH
4. - Power Supply (GND)

#### O/12 - O/24

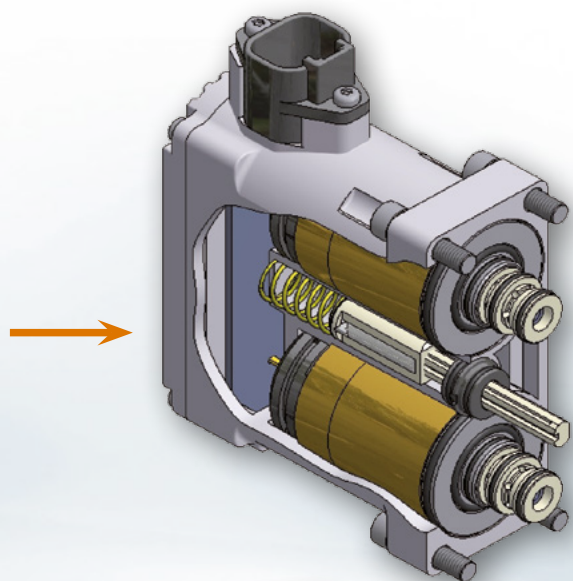
1. + Power Supply coil A
2. - Power Supply (GND) coil A
3. + Power Supply coil B
4. - Power Supply (GND) coil B

ACTUATORS SELECTION GUIDE



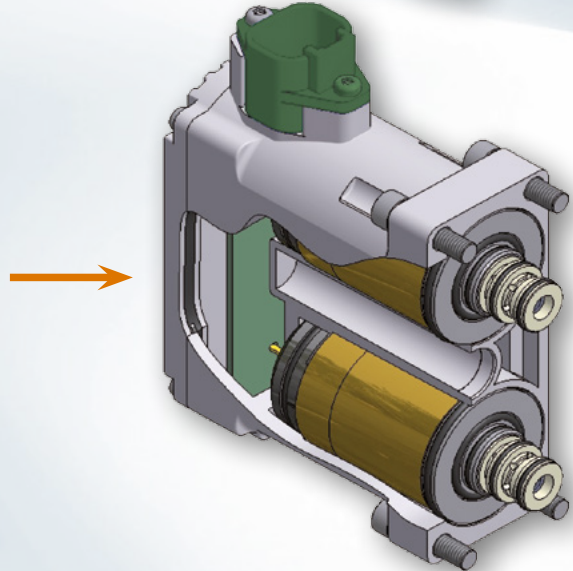
AVAILABLE CONFIGURATIONS AND MODEL DESIGNATION

- MLT/FD5-D/A0**  
Proportional actuator  
Digital electronics  
Analog control signal (e.g. Potentiometer)
- MLT/FD5-D/A5**  
Proportional actuator  
Digital electronics  
Analog control signal (e.g. Potentiometer)  
+5V auxiliary power supply for the control potentiometer
- MLT/FD5-D/AF**  
Proportional actuator  
Digital electronics  
Analog control signal (e.g. Potentiometer)  
Feedback output (spool position): 0-5V
- MLT/FD5-D/C0**  
Proportional actuator  
Digital electronics  
CANbus control (J1939)



**Digital Actuator**  
Black connector

- MLT/FD5-0-12**  
On/Off actuator, 12V coils
- MLT/FD5-0-24**  
On/Off actuator, 24V coils

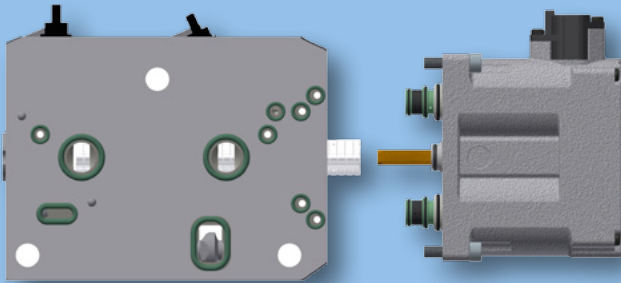


**On/Off Actuator**  
(without hall effect sensor)  
Blue connector: 12V  
Green connector: 24V



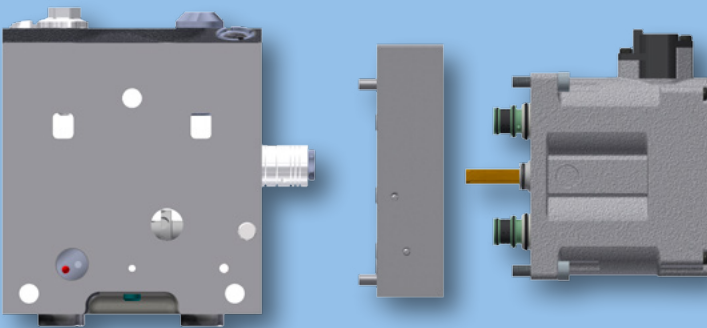
## INSTALLATION OPTIONS

### DIRECT FLANGED MOUNTING STYLE



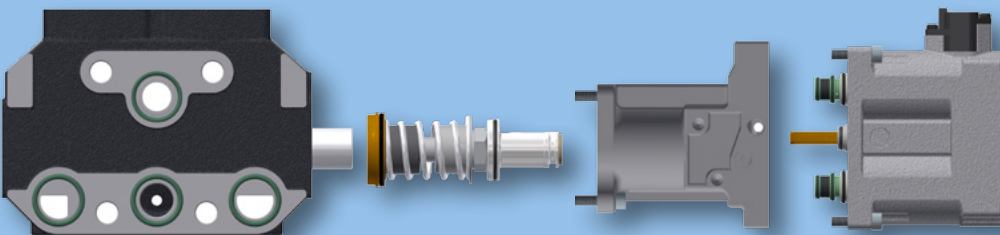
TDV 100

### ADAPTER PLATE MOUNTING STYLE



BUCHER HDS34

### ADAPTER PLATE WITH BUILT-IN D/A SERVO PISTON

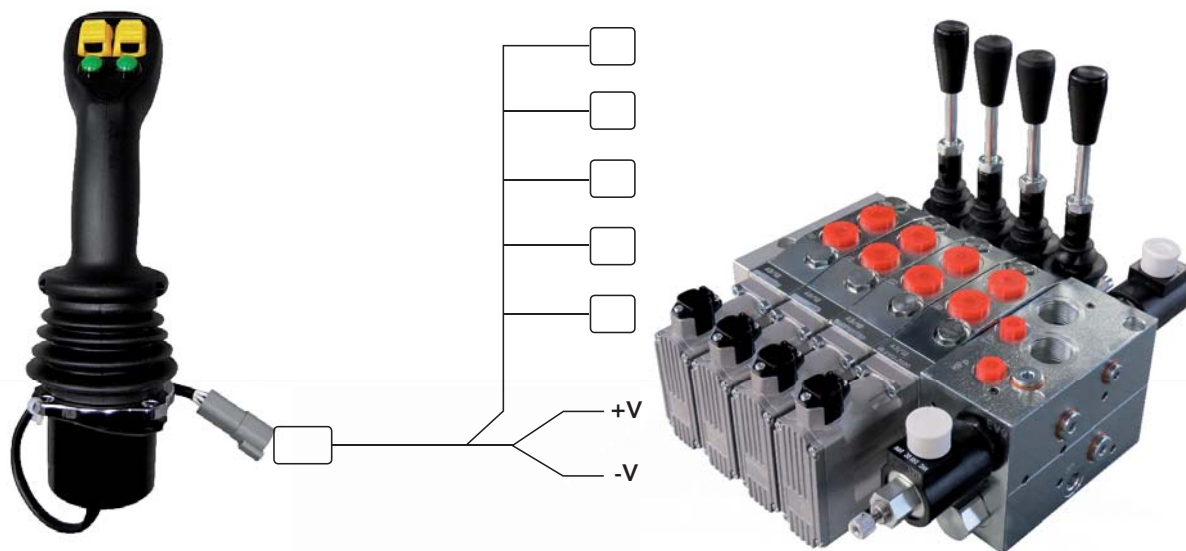


BOSCH-REXROTH  
MOD. SX14



**TECNORD**

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tecnord@tecnord.com - www.tecnord.com



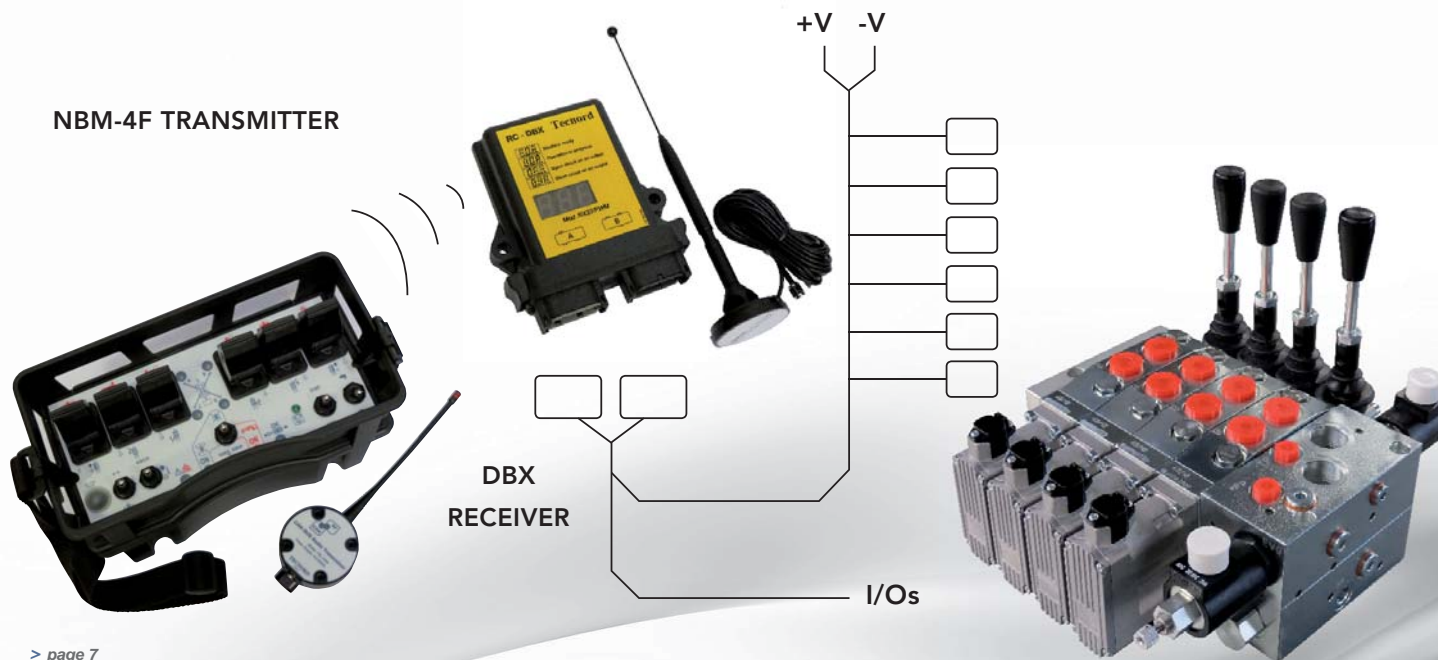
**APPLICATION EXAMPLE 1**

Tecnord Multi-axes Joystick Mod. JHM driving a 4-sections valves bank equipped with MLT-FD5 proportional actuators.

- 2 x proportional control signals from X-X and Y-Y main axes of the joystick base.

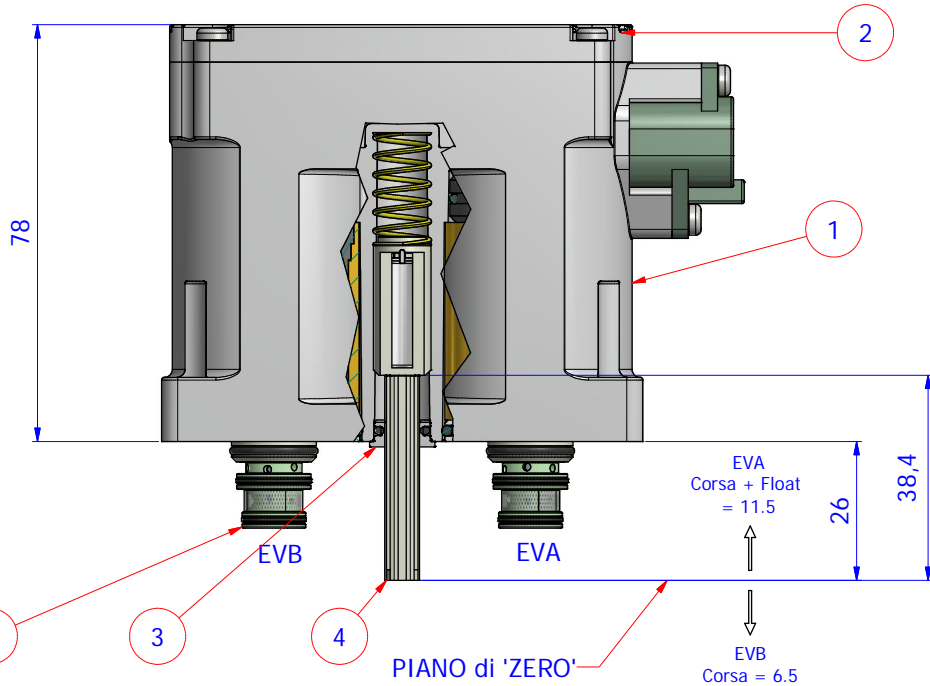
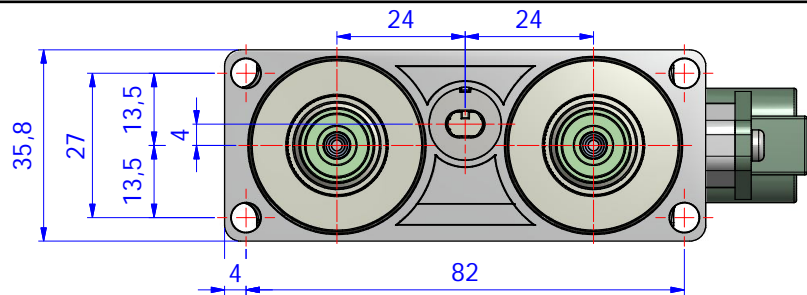
- 2 x proportional control signals from a pair of FPR proportional rollers lodged on grip.

**NBM-4F TRANSMITTER**



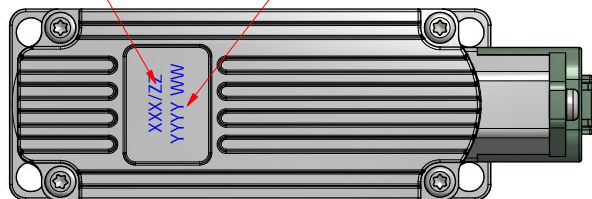
**APPLICATION EXAMPLE 2**

Tecnord NBM /DBX Radio System driving MLT-FD5 proportional actuators via CAN- BUS interface.



CODICE E NUMERO DI SERIE.

ANNO E SETTIMANA DI PRODUZIONE.



Elenco parti

ELEMENTO	QTÀ	NUMERO PARTE	DESCRIZIONE
1	1	13.0306.127	ASSIEME CARTER MLT-FD5
2	1	13.0306.024	ASSIEME COPERCHIO MLT-FD5
3	1	13.0312.005	KIT DI TENUTA TASTATORE
4	1	21.1002.023	KIT PORTACALAMITA L=38,4
5	2	14.0104.012	T061 MONOLITICA MLT-FD5

**Description**

Electro-hydraulic proportional actuator with closed-loop position control of the valve spool stroke and integrated electronics.

**Hydraulic Specification**

- Max supply pressure: 35 bar
- Operating pressure: 12-35 bar
- Max back pressure: 1,5 bar
- Pilot flow requirement: 0,4 lt/section
- Oil temperature range: -20/+115 °C
- Oil viscosity range: 3-650 cSt
- Oil type: MS1209/F200-AMBRA MULTI G  
AMBRA MULTI G BIO-S
- Filtration: 18/15/10 ISO 4406

**Electrical Specification**

- Operating voltage: 8,5-30 Vdc
- Max current consumption: 750 mA/section
- Operating temperature: -20/+105° C
- Degree of protection: IP68

**Type**

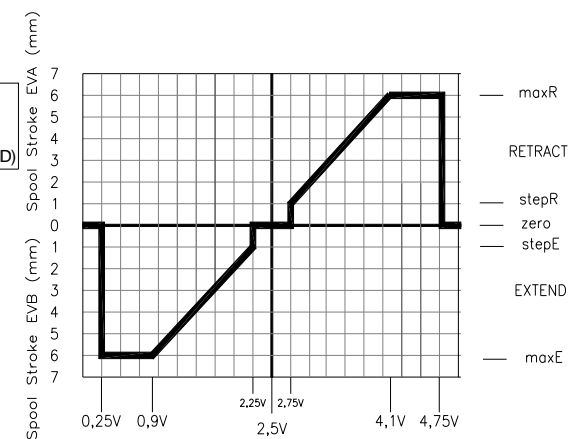
- MLT-FD5 / AF ANALOG VOLTAGE CONTROL

**Wiring diagram** (Deutsch Mod. DT04 compatible connector)

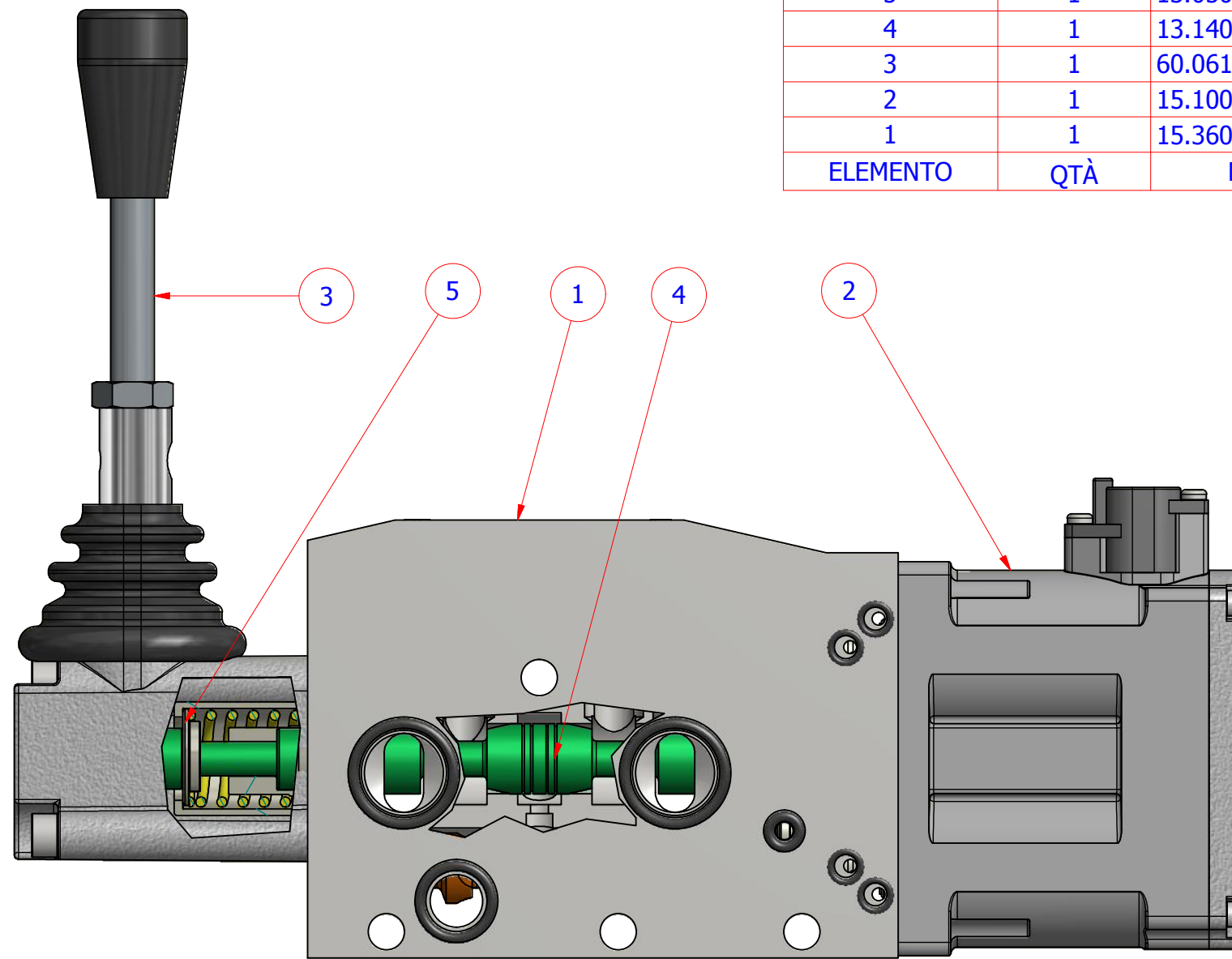
Front view



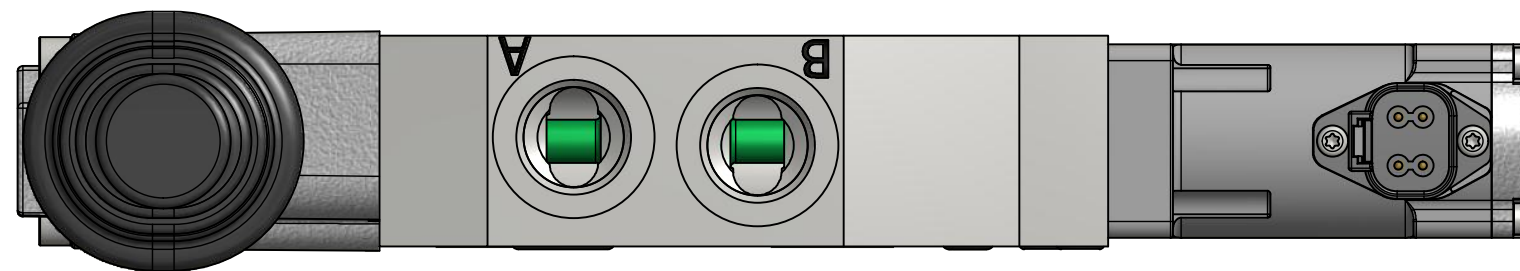
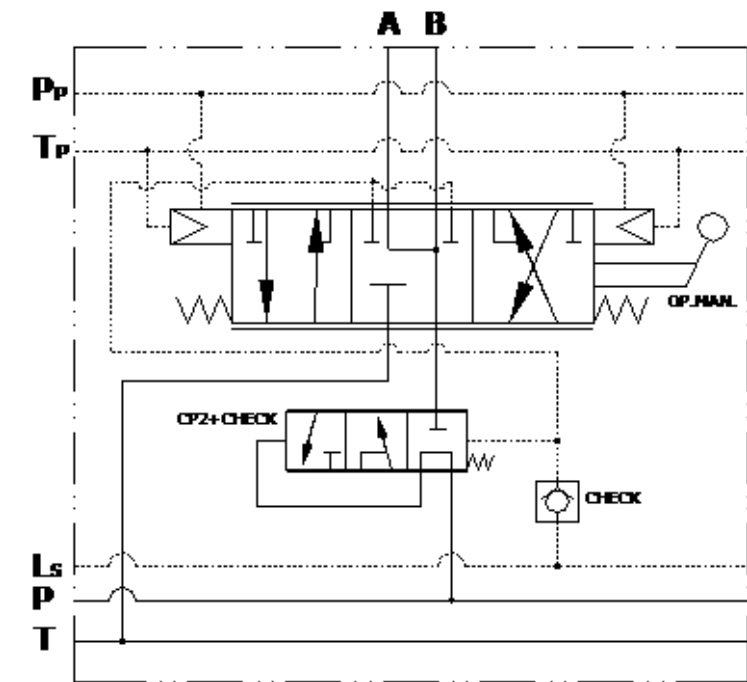
- 1 +V (POWER SOURCE)
- 2 Feed back
- 3 V SIGNAL
- 4 -V (POWER SOURCE GND)



DENOMINAZIONE: <b>COMPLESSIVO MLT-FD5/D-AF</b>		SOSTITUISCE IL: -		MODIFICHE APPROVATE		
TRATT. SUPERFICIALE: -		SOSTITUITO DA: -		 SERVOCOMANDI E REGOLAZIONE		
TRATT. TERMICO: -		NOME FILE: 15.1001.230_00 MODULO MLT - FD5 - D-AF - L=38,4 .idw				SCALA
MATERIALE: -		-		21/02/2012		1/1
CLIENTE AMI	COMPLESSIVO -	DISIGNATO G.S.	CONTR. A.V.	APPROV. -	SF -	
QUOTE SENZA TOLLERANZA: da 0 a 1: ±0.05		da 1 a 80: ±0.1	da 80 a 200: ±0.15	da 200 a 300: ±0.2	da 300 a 600: ±0.3	CODICE <b>15.1001.230 / 00</b>



5	1	13.0501.166	GUIDAMOLLA SINISTRO
4	1	13.1407.094	Spola Ø16 MOTOR SPOOL 25L TDV100 NEW anello chiuso
3	1	60.0610.032	LEVA 100mm
2	1	15.1001.132	MLT-FD5-D/A0 TDV100
1	1	15.3604.000/A	SEZIONE PREALLESTITA
ELEMENTO	QTÀ	NUMERO PARTE	DESCRIZIONE

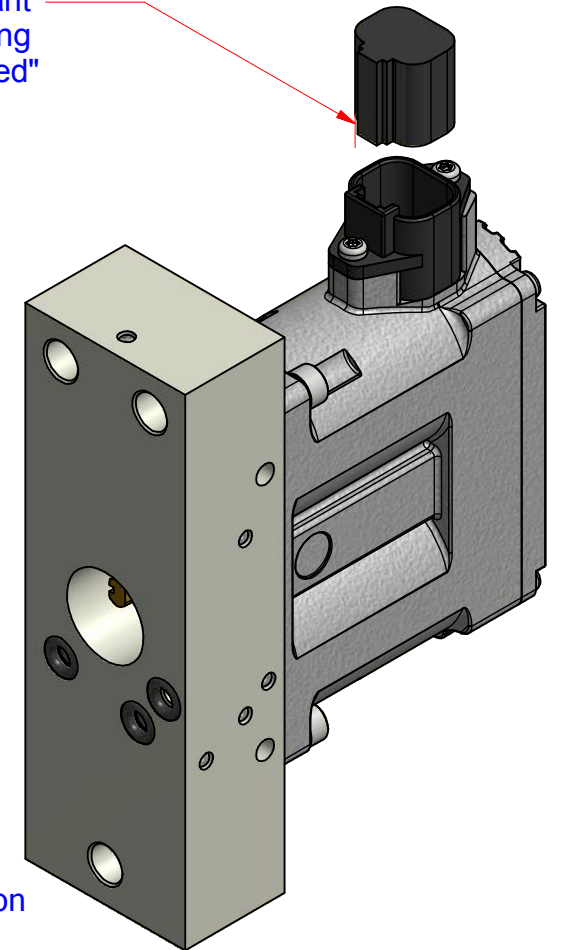
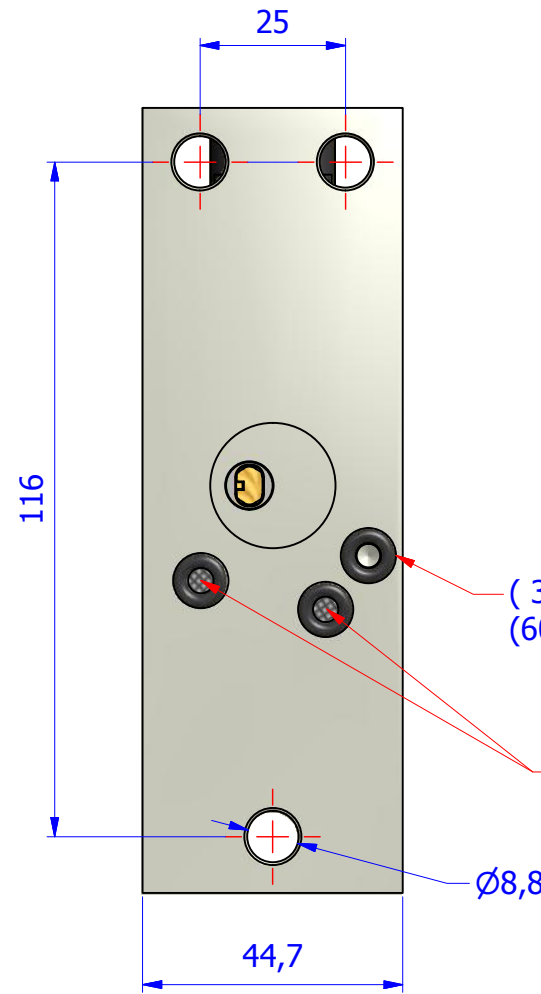
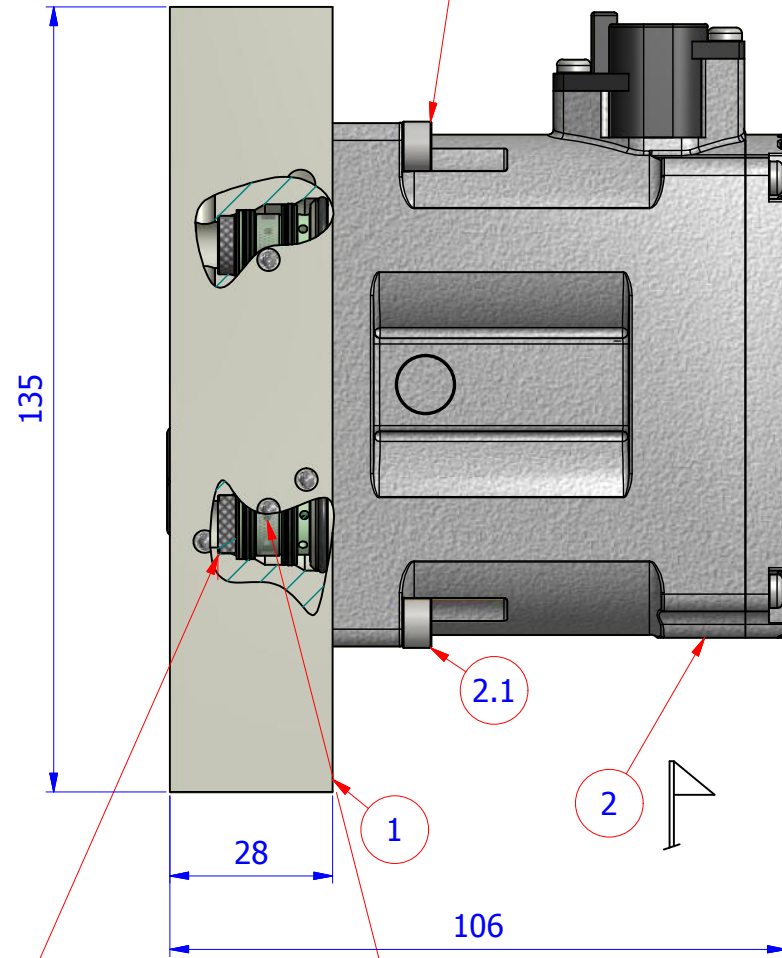
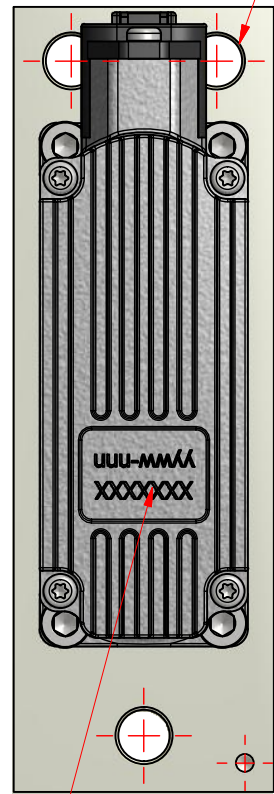


DENOMINAZIONE: <b>TDV-102-PMPC-LA-A00B00-PY-25/25- MLT-FD5-D/A0</b>		SOSTITUISCE IL: -	MODIFICHE APPROVATE	
TRATT. SUPERFICIALE: - TRATT. TERMICO: -		SOSTITUITO DA: -	<b>TECNORD</b> SERVOCOMANDI E REGOLAZIONE	
MATERIALE: -		NOME FILE: 15.3604.002_A.idw	SCALA 1:1,4	DATA 09/12/2009
CLIENTE -	COMPLESSIVO -	DISEGNATO F.S.	CONTR. B.B.	APPROV. -
QUOTE SENZA TOLLERANZA: da 0 a 1: ±0.05		da 1 a 80: ±0.1	da 80 a 200: ±0.15	da 200 a 300: ±0.2
		da 300 a 600: ±0.3	SF -	
			CODICE <b>15.3604.002 / A</b>	




Connector Deutsch DT04/4P  
 "Insert profiled rubber plug after  
 completing valve test at Racine Plant  
 and do not remove until painting  
 process is completed"

3 Holes for M8 screws  
 Torque 27-29 Nm



(X2) FILTER 60 MICRON  
 (60.0305.023)

(2x) FILTER 90 MICRON

APPLICATION SW  
 RELEASE: 2.0.0.0.

XXXXXXXX : code  
 yyww-nnn: data-n°

do not remove protective  
 sticker before final painting  
 of the pilot head



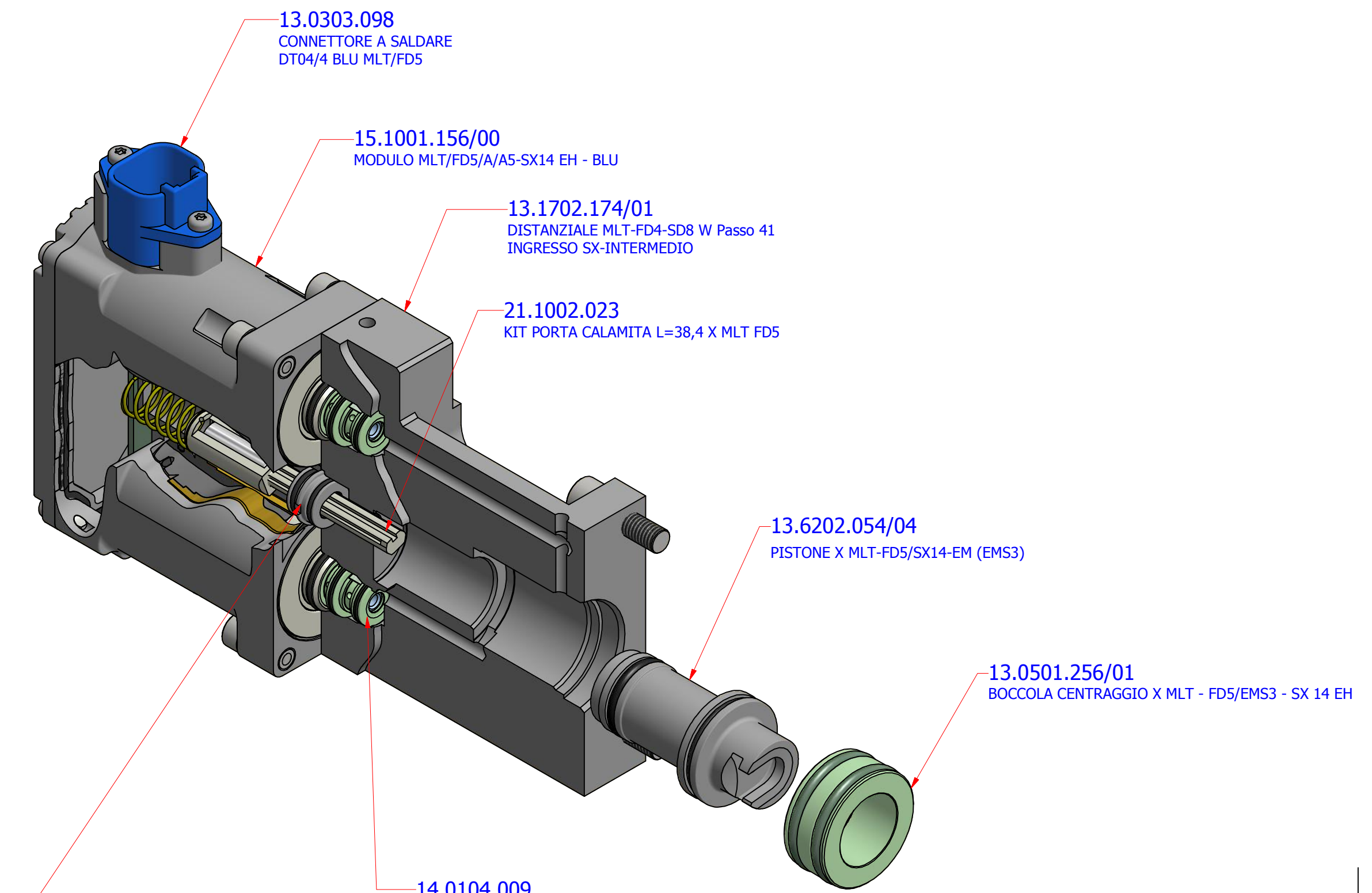
Indicates an important characteristic

2.1	SCREW M5x20 TCEI UNI5931 ZN	4	60.1002.051
2	PILOT HEAD MOD. MLT/FD5-D/C0 SW 2.0.0.0	1	15.1001.245
1	ASSEMBLY ADAPTER PLATE	1	21.1401.009
POS.	DESCRIPTION	QTY	CODE

DENOMINAZIONE: MODULO MLT/FD5-D/C0/ SW.2.0.0.0 + INTERF. FLT SU "P/T" - PILOT HEAD MLT/FD5-D/C0/ SW.2.0.0.0 + INTERF. FLT SU "P/T"		SOSTITUISCE IL: 15.1001.255/00		MODIFICHE APPROVATE	
TRATT. SUPERFICIALE: -		SOSTITUITO DA: -		TECNORD SERVOCOMANDI E REGOLAZIONE	
TRATT. TERMICO: -		NOME FILE: 15.1001.255_A MODULO MLT_FD5-D_CO_SW.2.0.0.0 + INTERF. FLT SU P-T CNH 47643919.rdw		SCALA 1:1	DATA 17/02/2014
MATERIALE: -		SF -		N° FOGLIO 1	
CLIENTE -	COMPLESSIVO -	DISEGNATO G.S.	CONTR. B.B.	APPROV. -	CODICE 15.1001.224 / EXPL
QUOTE SENZA TOLLERANZA: da 0 a 1: ±0.05 da 1 a 80: ±0.1 da 80 a 200: ±0.15 da 200 a 300: ±0.2 da 300 a 600: ±0.3					

A Release for production





G L E D U B A

DENOMINAZIONE: <b>ELECTRO-HYDRAULIC PROPORTIONAL ACTUATOR MOD.: MLT -FD5/A/A5/SX14 EH + INTERFACE AND KIT</b>					SOSTITUISCE IL: -		MODIFICHE APPROVATE		
TRATT. SUPERFICIALE: -					SOSTITUITO DA: -		<b>TECNORD</b> SERVOCOMANDI E REGOLAZIONE		
TRATT. TERMICO: -					NOME FILE: 15.1001.158 VISTA CB.idw				
MATERIALE: -					SF -		CODICE <b>15.1001.158 / EXPL</b>		
CLIENTE -	COMPLESSIVO -	DISEGNATO G.S.	CONTR. -	APPROV. -					
QUOTE SENZA TOLLERANZA: da 0 a 1: ±0.05					da 1 a 80: ±0.1	da 80 a 200: ±0.15	da 200 a 300: ±0.2	da 300 a 600: ±0.3	

TECNORD SHOP ORDER

DATE

CUSTOMER

CODE

**Mod. MLT / FD5**

## Description

Electro-hydraulic proportional actuators with closed-loop position control of the valve spool stroke and integrated electronics.

## Hydraulic Specifications

- Max supply pressure: 35 bar
- Min supply pressure: 12 bar
- Max back pressure: 1.5 bar
- Pilot flow requirement: 0.2 lt/section
- Oil temperature range: -20 / +95 °C
- Oil viscosity range: 3 - 650 cSt
- Filtration: 18/15 (ISO 4406)

## Electrical Specifications

- Operating voltage: 8-30 Vdc
- Max current consumption: 750mA / section
- Operating temperature: -20 / +105 °C
- Analog input impedance: > 40 kOhm
- Typical ctrl pot resistance: 1 - 10 kOhm
- Analog input signal: 0-5 V
- Degree of protection: IP 68

## Type

### MLT/FD5 - D / C0

Digital control  
CAN BUS interface

### MLT/FD5 - D / A0

Digital control  
0-5V analog input

### MLT/FD5 - D / A5

Digital control  
0-5V analog input  
5V aux. supply

### MLT/FD5 - D / AF

Digital control  
0-5V analog input  
Sensor Feedback output

### MLT/FD5 - A / A5

Analog control  
0-5V analog input  
5V aux. supply

### MLT/FD5 - O / 12

On-Off actuation  
12V coils

### MLT/FD5 - O / 24

On-Off actuation  
24V coils

## Connections ( Deutsch Mod. DT04-4P compatible connector)

- 1** + Power Supply  
**2** CANL  
**3** CANH  
**4** - Power Supply (GND)

- 1** + Power Supply  
**2** do not connect  
**3** Control Signal  
**4** - Power Supply (GND)

- 1** + Power Supply  
**2** +5V Aux. Supply Voltage  
**3** Control Signal  
**4** - Power Supply (GND)

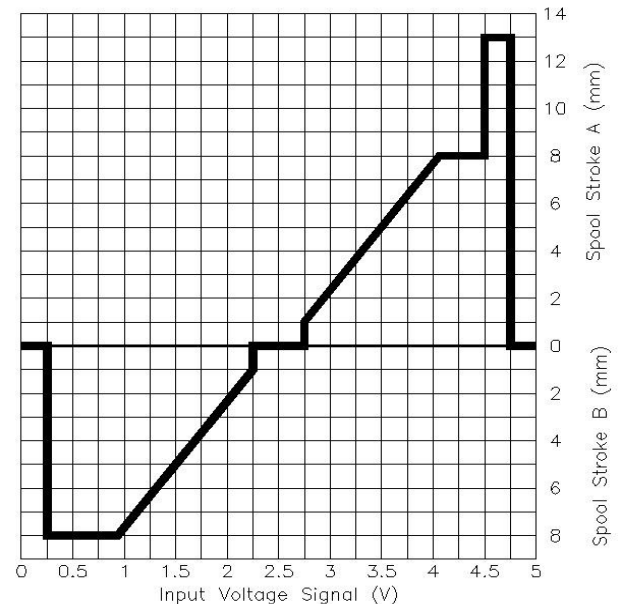
- 1** + Power Supply  
**2** Sensor Feedback Output  
**3** Control Signal  
**4** - Power Supply (GND)

- 1** + Power Supply  
**2** - Power Supply (GND)  
**3** Control Signal  
**4** +5V Aux. Supply Voltage

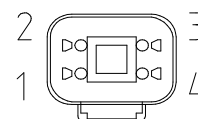
- 1** + Power Supply (12V) coil A  
**2** - Power Supply (GND) coil A  
**3** + Power Supply (12V) coil B  
**4** - Power Supply (GND) coil B

- 1** + Power Supply (24V) coil A  
**2** - Power Supply (GND) coil A  
**3** + Power Supply (24V) coil B  
**4** - Power Supply (GND) coil B

Example of Spool position vs Setpoint curve



Connector's layout (front view)



## Remarks for proportional actuators:

Input Signal : Neutral position on 2,5VDC - MAX stroke A at 4,1 VDC - MAX stroke B at 0,9 VDC

Neutral Position Dead Band from 2,25 to 2,75 VDC.

Signal cut-off is triggered at < 0,25V and > 4,75V

Float position available on versions with digital control

## Principali clienti Key Customers

Siamo membri attivi della nostra comunità, e come tali, siamo tesi alla creazione di opportunità di lavoro atte a soddisfare le aspettative di chi ne apprezza il valore.

Operando su scala globale, incoraggiamo e sosteniamo le diversità individuali per il contributo che esse offrono nella costruzione e nella condivisione di valori ed obiettivi.

*As active members of our community, we are committed to the creation of job opportunities designed to meet the expectations of people who value work and its rewards.*

*And as a global enterprise, we acknowledge and encourage diversity among individuals, mindful of the input provided by different skills and cultures in building and sharing values and goals.*

