Workshop literature

Reach trucks

With explosion protection

FM-X-10
FM-X-12
FM-X-14
FM-X-17
FM-X-20
FM-X-20 HD
FM-X-25

CE

1900 1901 1902 1903 1904 1905
1906 1907 1908 1909 1910 1914
1915 1916 1917 1918 1919 1920
1921 1922

first in intralogistics

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The qualified person must have experience of carrying out the test in question or of carrying out similar tests Moreover, this person must be aware of the latest technological developments regarding the industrial truck to be tested and the risk being assessed

- Sufficient depth of knowledge regarding explosion-protected industrial trucks
- A qualification certificate to the standard "DIN EN 60079-17:2014-10" and training on new features no later than after two years
- Have at least one year's experience in manufacturing, assembling or repairing the systems or system components set out in §1 para.2 no.3 of the German Ordinance on Industrial Safety and Health (BetrSichV)
- The person must have at least one year's experience in manufacturing or repairing the devices, protection systems or safety, monitoring or control equipment set out in Article 1 of Directive 2014/34/EU
- Have the necessary specific knowledge, regularly updated, of explosion-protection and be familiar with the relevant technical regulations

The qualified person may work on industrial trucks from by STILL, which have been converted by Miretti.

– Observe the national regulations for the country of use.

Towing the truck safely out of potentially explosive areas

⚠ DANGER

Risk of explosion!

Working on a truck within potentially explosive areas can lead to explosions in the surrounding atmosphere. Repair work is forbidden in potentially explosive areas.

If it is necessary to tow the truck out of a potentially explosive area, the safety officer must be informed.

Only a towing vehicle that complies with explosion-protection regulations may be used.

– Do not perform any work on trucks in potentially explosive areas.
– Inform the safety officer.
– Ensure that the towing vehicle is approved for the relevant explosion-protected area.

Intrinsic safety (EEx i)

- Zener barriers
- Intrinsic safety PCB
- Insulation monitoring PCB
- Key switch
- Emergency off switch
- Reset button
- Sensor for brake temperature
- Sensor for hydraulic oil temperature
- Sensor for brake fluid temperature
- Sensor for brake wear
- Sensor for brake fluid level
- Actual value transmitter and setpoint device for steering
- Distance sensor for reach carriage
- Strain gauge for active load stabilisation
- Switch for parking brake
- Switch for forward/reverse drive direction
- Switch for buckle
- Seat switch
- Stop switch
- Dead man switch (variant)
- Windscreen wiper (variant)

Additional explosion-protection measures

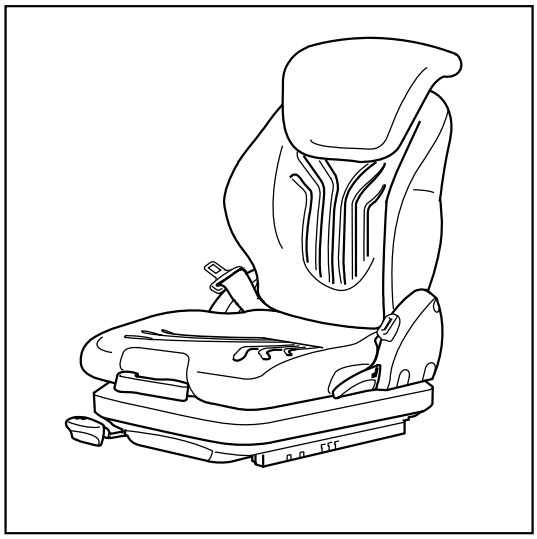
Additional explosion-protection measures consist of fitting components that cannot produce sparks or electrostatic charges due to their design or the materials used.

The following components are equipped with additional explosion-protection measures:

- Fork arms (coated)
- Driver's seat (antistatic cover)
- Tyres (antistatic)
- Antistatic belt with leak resistance (for non-marking, light-coloured tyres)
- Corona electrode with leak resistance
- Plastic parts (antistatic paint)
- Cable inlets (pressure-tight)
- Floor covering (e.g. textured aluminium sheet)
- Floor mat (antistatic)

Driver's seat

Checking the driver's seat



⚠ DANGER

Risk of explosion!

On explosion-protected trucks (category 2G/3G), the driver's seat is coated with a special antistatic, conductive seat covering, which prevents the build-up of electrostatic charges.

– Do not use any additional seat padding such as blankets, cushions or furs.

The driver's seat of the truck has antistatic characteristics.

- Inside the cover is a network of fine copper wires that is conductively connected to the seat frame and the earth of the truck.
- Driver's seats with antistatic characteristics are identified on the seat backrest with decal information "ANTISTATIC CHECKED".
- The surface resistance must be less than or equal to 1 GΩ (10^9 Ω) at a test voltage of 500 V.

– Check the seat adjustment mechanism for correct operation.

– Check the condition of the seat (e.g. wear on the upholstery) and the secure fastening to the hood.

– Check the connecting lines on and to the seat.

If the entire driver's seat is to be replaced, the use of an explosion-protected driver's seat from the same manufacturer is strongly recommended.

- Damage to the cover must not extend over an area greater than that specified.

  Otherwise the respective section of the driver's seat must be replaced.

  Refer to the table below.

Maximum permissible damage to the driver's seat

Category of the truck	Maximum permissible damaged area
IIA	100 cm^2
IIB	
IIB + H_2	20 cm^2
IIB + C_2H_2	
IIB + H_2 + C_2H_2	

The truck is only approved to be used again in potentially explosive areas when it complies with the specified surface resistance.

Instruments

Explosion-protection warning lights

⚠ DANGER

Risk of explosion!

During operation, the temperatures, wear values and insulation values of various components are monitored by sensors.

– Do not operate the truck if a warning light is lit.

NOTE

The mounting position and number of warning lights may vary depending on the truck equipment. The warning lights must be labelled in the language of the country in which they are being used.

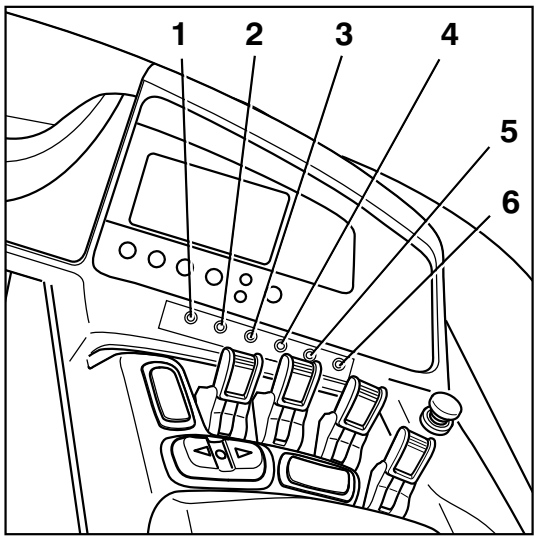
– See the original operating instructions in the section entitled "Actions when the explosion protection indicator lights are illuminated".

– Observe the electric circuit diagrams.

Warning lights in the category 2 version

The warning light (1) indicates an insulation fault. The warning lights (2-6) indicate when limit values are reached.

▷



1 Warning light for "insulation monitoring"
2 Warning light for "traction motor temperature"
3 Warning light for "pump motor temperature"
4 Warning light for "steering motor temperature"
5 Warning light for "brake temperature"
6 Warning light for "brake wear"

Electrical system

Connecting and disconnecting the battery male connector

⚠ DANGER

Risk of explosion!

Working on a truck within potentially explosive areas can lead to explosions in the surrounding atmosphere.

No work must be performed on the truck in potentially explosive areas.

⚠ CAUTION

Risk of component damage!

If you connect the battery male connectors when the key switch is switched on (under load), an arc will be generated. This can lead to erosion at the contacts, which considerably shortens their service life.

– Do not connect the battery male connectors with the key switch switched on.
– Make sure that the key switch is switched off before connecting the battery male connectors.

⚠ CAUTION

There is a risk of short circuit if the cables are damaged.

– Ensure that the battery cable is not crushed when inserting the battery tray into the truck.

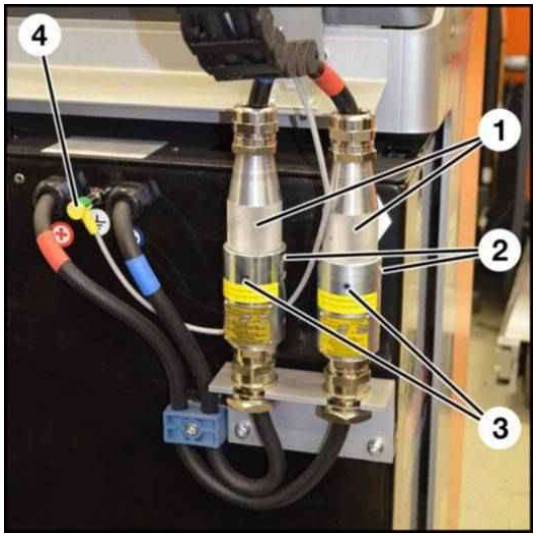
The battery male connectors are located at the front of the truck.

Category 2 version

NOTE

The battery male connectors on the category 2 version are non-interchangeable.

- *The "positive" battery male connector is routed through two grooves*
- *The "negative" battery male connector is routed through one groove*



Disconnecting

– Loosen the screws (3).
– Disconnect the battery male connectors by unscrewing them out of the grooves (2).
– Before removing the battery also disconnect the potential equalisation (4).

At terminal strip J2 (4), the closing of the relay contacts can be checked with an ohmmeter.

Short-circuiting input	Relay contacts to check
J1-10 to J1-1	J2-1 and J2-3
J1-10 to J1-2	J2-4 and J2-6
J1-10 to J1-3	J2-7 and J2-9
J1-10 to J1-4	J2-10 and J2-12
J1-10 to J1-5	J2-13 and J2-15
J1-10 to J1-6	J2-16 and J2-18
J1-10 to J1-7	J2-19 and J2-21
J1-10 to J1-8	J2-22 and J2-24

The associated red LEDs (2) on the relays (3) must illuminate.

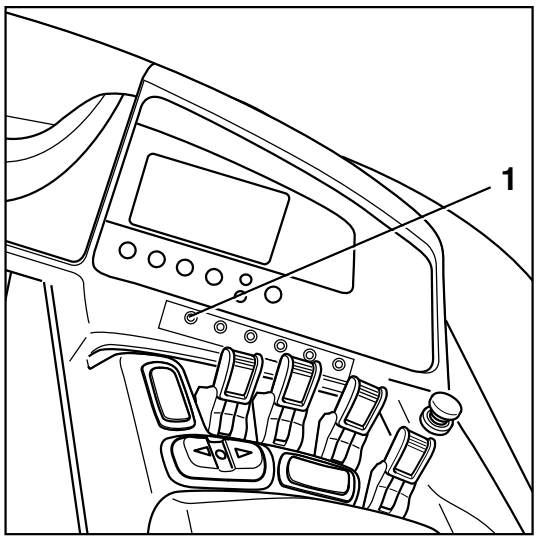
– If one of the functions cannot be successfully tested, replace the entire PCB.

Insulation protection and emergency shutdown

Functional description

The truck is equipped with a monitoring device that switches off the power supply to the truck when an insulation fault (short circuit to earth) is detected.

At the same time, the "insulation warning" light (1) lights up (only in category 2 versions).



The power supply is switched off in the following cases:

- Cables not correctly insulated
- Electromechanical components are poorly insulated
- Condensation in the electronic control unit
- Electronics poorly insulated

Emergency shutdown

⚠ DANGER

Risk of explosion!

If the truck controller automatically shuts down, this indicates that a serious malfunction has occurred.

The safety officer must be informed immediately. Only the safety officer may decide whether the truck must be removed from the potentially explosive area.

– After this, immediately determine and remedy the cause of the automatic emergency shutdown.

Pump units

Replacing the pump motor

⚠ DANGER

Risk of explosion!

Working on a truck within potentially explosive areas can lead to explosions in the surrounding atmosphere. Repair work is not permitted in potentially explosive areas.

Repairs on electric motors may be carried out only by personnel who have undergone special training for this purpose and who have been awarded the corresponding qualification.

- Do not perform any work on trucks in potentially explosive areas.
- The following work may only be carried out by a person qualified to work with explosion protection-related components.
- Restrict motor-related repair work on the truck to removing and installing the motors.
- Send the motors to the manufacturer to be repaired.

NOTE

This text refers to the specific features of the category 2 versions. For the following tasks, also observe the instructions in the "workshop manual" for the series-production truck.

Removing the pump motor

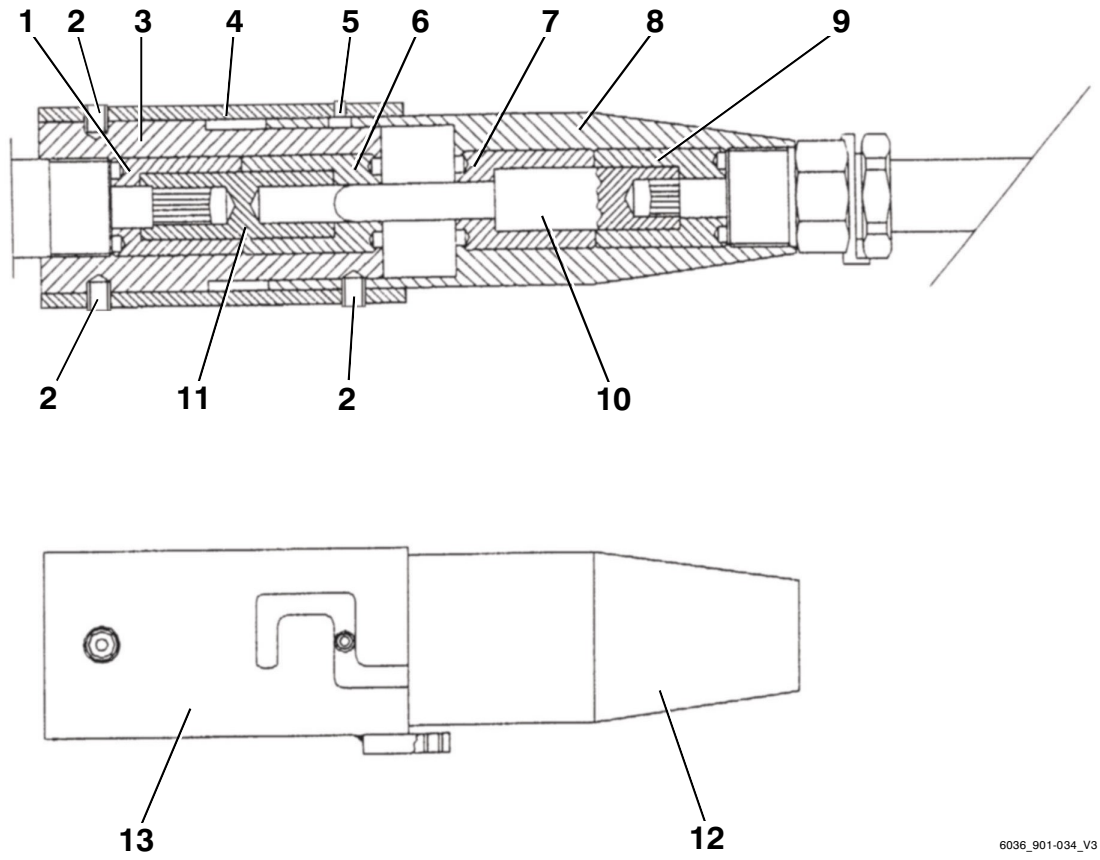
- Loosen the wiring from the surface temperature sensor (3).
- Loosen the wiring from the rev sensor.
- Open the pressure-tight housing (1).
- Loosen the screw joints (2), disconnect the cables.
- Then remove the entire pump motor from the truck.

The motor can be ordered by specifying the "Miretti" job number.

Installing the pump motor

- Install the pump motor.
- Connect all the cable connections.
- Connect transmitters and sensors.

Positive battery male connector



No.	Order no.	Quantity	Description
1	B004043111	1	Bush
2	VM0605X010	3	Screw
3	S170018111	1	Bearing
4	C007056112	1	Body
5	P003027111	2	Guide pin
6	B004042111	1	Bush
7	B004044111	1	Bush
8	C007043111	1	Body
9	B004045111	1	Bush
10	S133029111	1	Plug
11	P060001111	1	Socket
12	S133018112	1	Plug unit
13	P060026112	1	Socket unit

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Annex

Legend

9K18 Relay for key switch, 3, 7
A9 Reach truck control unit (RCU), 3, 5
KS2 Auxiliary relay for key switch, 8
RS9-12 Relay, 3-6
S1 Key switch, 3
S2 Emergency off switch, 5
S3 Acknowledge button for reach/lower lock (variant), 5
SSI 1 Intrinsic safety PCB, 2-6

Legend

4H1/2 Signal horn (safety alarm), 6
4K1 Working relay, 5, 6
A9 Reach truck control unit, 4-5
HL1 Warning light for insulation monitoring, 1
HL2 Warning light for traction motor temperature, 2
HL3 Warning light for pump motor temperature, 2
HL4 Warning light for steering motor temperature, 2
HL5 Warning light for brake temperature, 3
HL6 Warning light for brake wear, 3
K4H2 Relay (safety alarm), 4, 6
S3 Acknowledge button for reach/lower lock (variant), 6
SMZ 1 Card for zener barriers, 0-4

Legend

2Y2 Proportional valve for lowering, 1-2
2Y20 Main lift for lifting, 2-3
2Y21 Main lift for lowering, 0-1
2Y52 Transition shift, DS, 7-8
2Y53 Transition shift, LS, 8-9
2Y54 Prop. valve for shifting, DS, 3-4
2Y55 Prop. valve for shifting, LS, 4-5
2Y58 Tilting, DS, 5-6
2Y59 Tilting, LS, 6-7
F2Y2/20/21 3.15-A fuse, 0
F2Y52/4/8 3.15-A fuse, 3
F2Y53/9/5 3.15-A fuse, 8
A9 Reach truck control unit (RCU), 0-9

Legend

6B24	Acceleration sensor, 5-6	9A13	Access checking device (FleetManager FMID) (variant), 4-6	*	Optional
8A12	Display, 0-3	A49	CAN power port (CPP) 2-3		

Cable BW2					
Origin	**Location of origin**	**Line**	**Colour number**	**Location of destination**	**Destination**
:LIA2		2Y64+	-7	HAZ	X2Y64:2:1
:1		918 A	-8	HAZ	X2Y64:2:2
:1			-9	HAZ	XSP2.6:2:1
:1			-10	HAZ	XSP2.6:2:2
:1		F6+	-11	HAZ	X8B21:2:1
:1		958 A	-12	HAZ	X8B21:2:2
:1		959 A	-13	HAZ	X8B21:2:4
:1		90	-14	HAZ	X8B21:2:3
:1		F6+	-15	HAZ	X2B2:2:1
:1		90	-16	HAZ	X2B2:2:2
:1		909 A	-17	HAZ	X2B2:2:3
:1		F6+	-18	HAZ	X2B67:2:1
XA:42	ENC	942 A	-19	HAZ	X2B67:2:2
:1		90	-20	HAZ	X2B67:2:3
:1		F6+	-21	HAZ	X2B46:2:1
XA:12	ENC	912 A	-22	HAZ	X2B46:2:2
:1		90	-23	HAZ	X2B46:2:3
Not connected			-24	Not connected	
			-25		
			-26		
:1		F6+	-27	HAZ	X2B65:2:1
XA:28	ENC	928 A	-28	HAZ	X2B65:2:2
:1		90	-29	HAZ	X2B65:2:3
:1		F6+	-30	HAZ	X2B44:2:1
XA:13	ENC	913 A	-31	HAZ	X2B44:2:2
:1		90	-32	HAZ	X2B44:2:3
:1			-33	HAZ	XSP2.4:2:1
:1			-34	HAZ	XSP2.4:2:2

Type CJ

Cable CJ1					
Origin	**Location of origin**	**Line**	**Colour number**	**Location of destination**	**Destination**
X1:29	ENC	629	-1	HAZ	XEN1M3:1:1
X1:28	ENC	628	-2	HAZ	XEN1M3:1:2
X1:26	ENC	626	-3	HAZ	XEN1M3:1:3
X1:27	ENC	627	-4	HAZ	XEN1M3:1:4
X1:24	ENC	624	-5	HAZ	XTH1M3:1:1
X1:25	ENC	625	-6	HAZ	XTH1M3:1:2
:2			-7	HAZ	XSP2.2:1:1
:2			-8	HAZ	XSP2.2:1:2