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Product ID: 3 PHASE EMU_MASTER CONTROLLER
Model/Type No 3543 Rev 0

Doc Name: 3Ø EMU MC -Technical Details
Author: NAT

Doc No: 3543_TD_Rev.0/March 2022



SAITRONIX

3 PHASE EMU MASTER CONTROLLER

R^3

Reliable, Rugged& Redundant

MODEL No: 3543



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INTRODUCTION

Master Controller is a crucial man & machine interface module to control the powering up, control and running of the rolling stock. Hence it is a combined master cum brake controller, integrated into a single unit with step less movement. The controller is designed with reliable and rugged mechanical modules to ensure trouble-free performance. Further, the Master Controller compact & modular designs occupies less space on driver console, with less maintenance and minimize equipment downtime for attending repairs or periodic overhauling.

Saitronix electro drives pvt. Ltd . has designed & developed the 3 phase Master Controller imbibing the above parameters into the system and also emphasizing the need to minimize the mechanical moving & rubbing parts and electrically more reliable switching contacts, to improve the reliability and to minimize the periodic maintenance.

FUNCTIONAL DESCRIPTION:

The Saitronix 3 phase EMU Master Controller consists of four modules. They are:

1. Key Switch
2. Reverser
3. T Grip handle /drive or brake control unit
4. Angle position sensor with 2-20 mA current output.

Key switch:

It's designed with specially designed & programmed safety lock & key with cams and auxiliary cam switches to provide redundant operation with safety mechanical inter locking with reverser and drive & break handle. Key switch has 3 notched positions: "RDM", "0" and "ON". The key can only be removed in the "0"-position. It is not possible to move switch or handle if the key is out of the key lock. Please refer to drg no SC3543_001.

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Reverser Switch:

The mode Selector (Reverser) switch is provided for direction selection to move either in forward or reverse movement of power car. It will have three notches :- (FWD (forward), REV(reverse)& "0" (neutral) for choosing the driving direction. Direction shall be acknowledged only at zero speed. If the mode selector is in 'Neutral' position any movement of the T-grip will be blocked entirely. Only with the mode selector in either 'Forward' or 'Reverse' then the movement of the T-grip be possible. Only with the T-grip in 'Coast'-position can the mode selector be moved from 'Forward' to 'Reverse.

The mode selector switch is designed for Suitable forward/reverse interlocks and interlocks with drive/braking system is incorporated in the master controller. The traction shall be be possible only from one cab at a time. Please refer to drg no SC3543_001 for the switching programme of Reverser switch

T Grip handle /drive or brake control unit:

The Master Controller is designed with T grip handle to have smooth operation of power / break control unit. The Horizontal axis with T-grip will have Motoring action when moving forward from neutral (towards wind shield) and will have Braking action when moving backward from neutral (towards pilot side). The T-grip handle shall have four Notches- Neutral notch (Costing) P min, B min and Emergency braking notch (EB). The length of T grip handle of master controller will be approximately 100 mm. The T-grip movement is limited to +45 degrees (For Motoring action) to - 45 degrees (for braking action).

The T grip handle is equipped with Dead Man Operation by rotation of the T-grip up to 15 degrees. During normal operation the handle is to be rotated by 10 -15 degrees clockwise. The Dead Man Operation will be functional during motoring and braking. Releasing the T-grip will result in de-energizing the dead man contacts, regardless of the position of the driving handle and applies brake to train by safety interlocks of train circuit. The dead man handle operation is smooth and with anti

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lock /struck mechanism. Please refer to drg no SC3543_001 for the switching programme of T Grip handle /drive or brake control unit:

Angle position sensor with 4-20 mA current output / 9 Bit Excess gray code:

The Drive/ Brake control unit is equipped with state of art in house designed & developed angle position sensor to read T grip handle position in drive sector or in brake sector. It will have 4- 20 mA current output or a 9 bit excess gray code output based on the customer requirement . The master controller has provision to provide single / double/ triple current transducers for fail safe signal redundancy as required by the customers. Further the current/ grey code output Vs angle can be configured as per the requirements of customers. Please refer to drg no SC3543_001 for the current out put Vs TGrip handle /drive or brake control unit.

Mechanical Interlocking of Key switch, reverser and drive & brake controller are as under:

Mechanical interlock of Key Switch to Direction Switch

Key Switch	Direction Mode
'RDM'	Free to move
'0'	Locked in position '0'
'ON'	Free to move

Direction mode switch to key switch

Direction Mode Switch	Key Switch
'FWD'	Locked in position 'ON/RDM'
'0'	Free to move
'REV'	Locked in position 'ON/RDM'

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Direction Mode switch to power / brake control Unit

Direction Mode Switch	Power / brake control unit
'FWD'	Free to move
'0'	Locked in coast (0)position
'REV'	Free to move

Power / brake control Unit to Direction Mode switch

Power / brake control Unit	Direction Mode switch
'Neutral Position '	Free to move
'Traction' or 'Braking'	Locked in 'Forward' or 'Reverse'

- Encl:**
1. GA Drg No.GA_3543_001 ,
 2. DRG NO: SC3543_01for switch program
 3. 3D view of master controller

//Kept free space intentionally//

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TECHNICAL DETAILS

a) Climatic and environmental condition :

1. Ambient air temperature : -30°C up to +75°C
2. Storage- and Transport temperature : -40°C up to +85°C
3. Humidity : up to 100% in the rainy season for 5 – 6 months

b) Technical data :

i) Master-cum-Brake Controller

1. Dimensions : 360mm x 240mm x 150mm (l x w x d)
2. Installation space : 336mm x 216mm x 150mm (l x w x d)
3. Weight : Apprx. 12kg to 15kg with cables

ii) Drive/Brake lever

1. Length of the lever : 100mm
2. Number of switches : 6 switches (8 switches optional)
3. Type of switches : Schaltbau/Elemex/SAS-00a/Saitronix
4. IP protection : IP 00
5. Switch Mechanical endurance: 500,000 cycles min.
6. Switching Logic: Switching logic can be configured as per the requirement of the customer

iii) Direction lever

1. Number of switches: 2nos (4 switches optional)
2. Type of switches : Schaltbau/Elemex/SAS-00a/Saitronix
3. IP protection : IP 00
4. Switch Mechanical endurance : 500,000 cycles min.
5. Switching Logic: Switching logic can be configured as per the requirement of the customer

iv) Key lever

1. Number of notches : 4 switches (6 switches optional)
2. Type of switches : Schaltbau/Elemex/SAS-00a/Saitronix
3. IP protection : IP 00
4. Switch Mechanical endurance : 500,000 cycles min.
5. Switching Logic: Switching logic can be configured as per the requirement of the customer

v) Dead Man Switch

1. Number of switches: 2 switches
2. Type of switches: Reed Switch/Mechanical Push button switch

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3. Switch Mechanical endurance: 500,000 cycle's min.
4. Switching Logic: Switching logic can be configured as per the requirement of the customer

vi). Hall Effect non-contact Angle sensor

The sensors are mounted to cam shaft end plates and hall effect sensor is actuated by magnet through non-contact mechanism to provide exact angle position of handle shaft coupled to cam shaft to a central control computer.

No of sensors: Std 2nos for each controller.

Make: Saitronix; Model : SAT189

Sensor output: 9 Bit Excess Gray Code with Push Pull Driver /2 to 20mA(3 Wire) in each direction

Operating Voltage : 12 vdc to 34vdc. Current consumption: 50mA @ 24vdc

Output current ripple : <0.3% peak to peak

Response time : < 20msec

Sensor Type : close loop

Sensor Humidity: Up to 98%

Polarity protection: Yes

Output short circuit protection : Yes

IP protection: IP 67

c. Vibration: High level vibration and shocks as per IEC

d. Control Power supply: 110vdc +25%, -30% (77vdcc to 137.5vdc)

e. Insulation resistance : >20 Mohm at 500VDC

f. Voltage withstand: 1.5Kv Ac for one minutes

g. Weight. Apprx. 12kg to 15kg with cables

h. Electrical Interface: Harting HAN 42DD /Allied / Amphenol make MG 02R B05 28-12 R30 bayonet type circular connector for 110vdc circuits and 9 pin Sub-D connector for current transducer output.





