

Rope Length Transmitter

Tilt Angle Sensor

Joystick

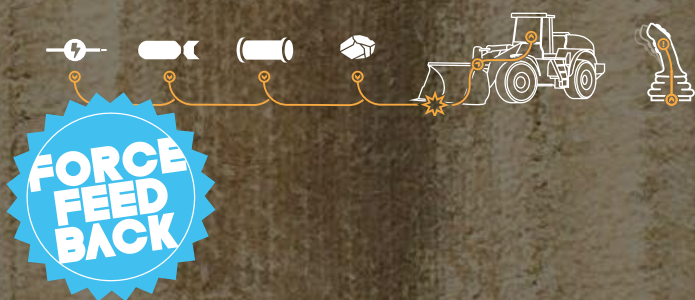
Angular Position Transducer

Pedal Actuated Transmitter

Wind sensor



THE JOYSTICK





Hydraulically operated control equipment, e. g. on

- Construction and drilling vehicles
- Cranes and excavators
- Lifting devices and conveying equipment
- Ships and offshore facilities etc.

Are increasingly electronically controlled nowadays.

Especially for this application – under extreme operating conditions – electronic joysticks of series ST have been designed for. Corresponding to lever displacement they provide a control and switch signal output for both axes x and y, depending on direction. Further control commands can be initiated by actuating the control elements integrated in the grip handle.

As measuring system wear-free, non-contact inductive or magnetic systems are used for control signal output.

They are available as uniaxial or dual axis transmitter. For control purposes the integrated electronics provide on its output per axis either an analogue current or voltage output signal or digitally coded a CANopen interface.




For direct drive of hydraulic servo valves there is the possibility to equip the inductive control system with an integrated power electronics having a pulse-width modulated output current up to 1000 mA.



SAFETY

Almost every FSG joystick is equipped with redundant sensors. Depending on their electrical circuit these sensors fulfil hence the requirements of functional safety according to guidelines EN ISO 13849 and EN 61508.



Joystick	magnetic	magnetic	magnetic
			

Mechanical Data

Series	ST-MH-II-y	ST-MH-(MU)-II-x/y/z/GS40	ST-MH-MU-x/y/GS60
Casing	38 x 54 mm	40 x 40 mm	Ø 60 mm
Casing material	Plastic	Plastic	Aluminium
Casing length	–	approx. 40 mm (approx. 53 mm)	approx. 50 mm
IP code of casing	IP65	IP67	IP65
Lever displacement	x-Axis	x-/y-/z-Axis	x-/y-Axis
Actuation	Spring return to center position	Spring return to center position	Spring return to center position
Deflection angle (x/y)	±33°	±17.5°	±20°
Deflection angle (z)	–	±45°	–
Temperature range	-40°C bis +60°C	-40°C bis +60°C	-30°C bis +70°C
Shock	50g, 30ms	50g, 30ms	50g, 6ms
Vibration	5 - 150Hz, 20g	5 - 150Hz, 20g	5 - 200Hz, 10g
Connection	soldering pins	flat cable + ZHR-plug ³⁾	Plug / cable
Weight	50g	195g	200g

Electrical Data

Electronics	redundant	redundant	single
Voltage output	2 x 0,5 - 4,5V DC, ratiometric	2 x 0,5 - 4,5V DC, ratiometric	2 x 0,5 - 4,5 VDC, ratiometric
Current output	–	4 - 20mA	4 - 20mA / 20-4-20mA
Min. burden voltage output	10kΩ	10kΩ	–
Max. burden current output	–	600Ω (18 - 36V DC), 250Ω (8 - 18 V DC)	600Ω
Bus output	–	–	–
Signal calibration	Firm calibration	Firm calibration	Firm calibration
Supply ¹⁾	5V DC	5V DC / 8 - 36V DC	18 - 33V DC
Current consumption	9mA	9mA / < 25mA	ca. 50mA
Temperature coefficient	0.15% / 10K	0.15% / 10K	0.15% / 10K
Test voltage	500V, 50Hz, 1min	500V, 50Hz, 1min	500 V, 50 Hz, 1 min
Interference immunity	EN 61 000-6-2	EN 61 000-6-2	EN 61 000-6-2
Emitted interference	EN 61 000-6-4	EN 61 000-6-4	EN 61 000-6-4

Other

Customized features	Low priced uniaxial joystick	Push button for x/y-operation ²⁾ with error detection and message, low priced three axial joystick	optional with SPI-output, push button inside off grip head
Article number	3587Z02	3585Z01	3550Z01

¹⁾ others on request

²⁾ on request

³⁾ Version MU: 5-poles PNJ-plug

⁴⁾ optional

Joystick	inductive	inductive	magnetic
			

Mechanical Data

Series	ST2000-W-i-x/y/GS78	ST2000-W-CAN-x/y/GS82	ST-MH-II/x/y/GS85
Casing	Ø 78 mm	Ø 82 mm	Ø 85 mm
Casing material	Aluminium	Aluminium	Aluminium
Casing length	approx. 90 mm	123 mm	72 mm
IP code of casing	IP65	IP65	IP65
Lever displacement	x-/y-Axis	x-/y-Axis	x-/y-Axis
Actuation	Spring return to center position	Spring return to center position	Spring return to center position
Deflection angle (x/y)	±20°	±20°	±20°
Deflection angle (z)	–	–	–
Temperature range	-30°C bis +70°C	-30°C bis +70°C	-30°C bis +70°C
Shock	50g, 6ms	50g, 6ms	50g, 6ms
Vibration	5 - 200Hz, 10g	5 - 200Hz, 10g	5 - 200Hz, 10
Connection	Plug / cable	Plug / cable	Plug / cable
Weight	2000g	2000g	1800g

Electrical Data

Electronics	redundant	redundant	redundant
Voltage output	0 - 10V / 10-0-10V	–	–
Current output	4 - 20mA / 20 - 4 - 20mA	–	–
Min. burden voltage output	10kΩ	–	–
Max. burden current output	600Ω	–	–
Bus output	–	CANopen / CANopen-safety	CANopen / CANopen-safety
Signal calibration	Firm calibration	CAN-Bus	CAN-Bus
Supply ¹⁾	18 - 33V DC	18 - 33V DC	7 - 48V DC
Current consumption	approx. 60mA	–	–
Temperature coefficient	0.15% / 10K	0.1% / 10K	0.1% / 10K
Test voltage	500V, 50Hz, 1min	500V, 50Hz, 1min	500V, 50Hz, 1min
Interference immunity	EN 61 000-6-2	EN 61 000-6-2	EN 61 000-6-2
Emitted interference	EN 61 000-6-4	EN 61 000-6-4	EN 61 000-6-4

Other

Customized features	Suitable for multi functional grip ST2000, ST2010, ST2020 or ball grip	Suitable for multi functional grip ST2000, ST2010, ST2020 or ball grip, Profinet / Profinet-safety ²⁾	Suitable for multi functional grip ST2000, ST2010, ST2020 or ball grip
Article number	3495Z05	3498Z01	3590Z01



ST2000



Toggle switch, button, adjusting wheel



Vibration



Dead man's switch mechanic



Capacitive effect



ST2010



Toggle switch, button, adjusting wheel



Vibration



Dead man's switch mechanic



Capacitive effect



ST2020



Assembly-examples top



Assembly-examples bottom



SERIES ST2020

Push buttons

Switch voltage	max. 32V DC
Switch current	max. 100mA
Life time	max. 3 Mio. operating cycles

Dead man´s button

Switch voltage	max. 24V DC
Switch current	max. 50mA
Life time	max. 10 Mio. operating cycles

Rocker switch

Switch voltage	max. 30V DC
Switch current	max. 250mA
Life time	max. 1 Mio. operating cycles

Adjusting wheel

Measuring system	magnetic, redundant
Supply	5V DC, 12V / 24V DC on request
Output	2 x 0,5V - 4,5V DC, opposite
Current consumption	max. 22mA
Angle of adjusting wheel	±30° with spring return, ±35° with breaks
Versions	Spring return in center position or with 10 breaks

Vibrator

Supply	24V DC
Coil resistance	160 Ohm
Frequency	max. 25Hz

Minijoystick

Measuring system	magnetic, redundant
Supply	5V DC ±10%
Output	2 x 0,5V - 4,5V DC opposite
Current consumption	< 25mA
Direction of actuation	x-/y-axis
Actuation	Spring return in center position
Lifetime	max. 5 Mio. operating cycles

Capacitive sensor & grip heating

Data on request





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