

Features

- 13-bit Singleturn
- High code change frequency
- Inputs for:
 - Selection of counting direction
 - Buffer memory (LATCH)
 - Multiplex operation (TRISTATE)
- Short-circuit proof push/pull output stage
- Gray, Gray-Excess, Binary or BCD-Code



Description of device:

This series is focused on the rapid transfer of data. The position data are read out directly from the Gray-coded physical measurement. The high code change frequency of 400 kHz is achieved through the intentional avoidance of the use of a microcontroller.

As far as the mechanics are concerned, there is a choice of a solid, hollow, or blind-hole shaft in the 58 mm diameter housing. The hollow shaft versions represent a simple and favourably-priced mounting solution. The shaft / hub connection is already integrated into the encoder. The encoder is fixed by means of a torque bracket - Acceptance of the locating pin is provided in the encoder flange.



Technical Data

Electrical data	Units	FVS 58, FHS 58
Steps per revolution		8192 (13 bit)
Linearity		± 1 LSB
Operating voltage (PELV)	[VDC]	10 ... 30
Current consumption at 24 VDC	[mA]	85
Output code		Gray, Gray-Excess, binary, BCD
Inputs		- Selection of counting direction - Buffer memory (LATCH) - Multiplex operation (TRISTATE)
Input level - Low (0)	[V]	0...2
Input level-High (1)	[V]	10...30
Input current	[mA]	< 6
Outputs		
Data outputs		Push-pull output stage
Load capacity I_{OL} per channel	[mA]	≤ 40 short-circuit proof
Load capacity I_{OH} per channel	[mA]	≤ 40 short-circuit proof
Signal level U_H at $I_H = 30$ mA	[V]	> $U_B - 3$
Signal level U_L at $I_L = 30$ mA	[V]	< 2.8
Load capacitance C_L	[nF]	≤ 1
Maximum code change frequency	[kHz]	400 with 1 m cable length
Maximum rise time	[ns]	300
Maximum fall time	[ns]	300
Alarm output		Open collector, NPN "0" Fault state "1" Device serviceable
Load capacity I_L	[mA]	≤ 5
Saturation voltage U_{OL} at 5 mA	[V]	max. 0.7

Solid shaft Mechanical characteristics	[Units]	FVS 58
Housing		Aluminium
Flange		Aluminium
Solid shaft		High-grade steel, non-rusting Material 1.4305
Weight	[g]	approx. 350
Max. rotational speed	[min ⁻¹]	12,000
Moment of inertia	[gcm ²]	≤ 30
Starting torque at 20°C	[Ncm]	≤ 1.5
Max. shaft loading F (axial)		
≤ 6000 min ⁻¹ :	[N]	40
Max. shaft loading F(radial)		
≤ 6000 min ⁻¹ :	[N]	60
Minimum life		
F axial ≤ 40 N, F radial ≤ 60 N:	[Revolutions]	4.01 x 10 ¹⁰
F axial ≤ 10 N, F radial ≤ 20 N:	[Revolutions]	1.08 x 10 ¹²

Blind hole shaft Mechanical characteristics	[Units]	FSS 58
Housing		Aluminium
Flange		Aluminium
Hollow shaft		High-grade steel, non-rusting Material 1.4305
Weight	[g]	approx. 350
Max. rotational speed	[min ⁻¹]	10,000 at 100 % insertion depth
Moment of inertia	[gcm ²]	≤ 30
Starting torque at 20°C	[Ncm]	≤ 1.5
Tightening torque, clamping ring screws, max.	[Nm]	1.8
Permissible axial offset with stator coupling	[mm]	±1 with axial pin engagement of 1.5 mm
Angular offset	[°]	±1 with axial pin engagement of 1.5 mm

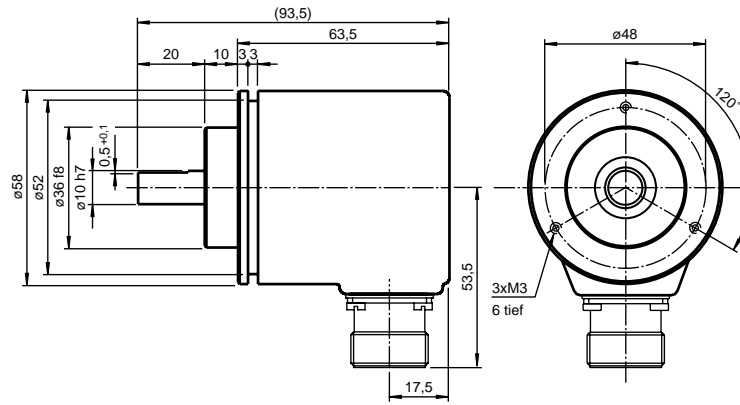
Hollow shaft Mechanical characteristics	[Units]	FHS 58
Housing		Aluminium
Flange		Aluminium
Hollow shaft		High-grade steel, non-rusting Material 1.4305
Weight	[g]	approx. 350
Max. rotational speed	[min ⁻¹]	6,000
Moment of inertia	[gcm ²]	≤ 50
Starting torque at 20°C	[Ncm]	≤ 3
Tightening torque, clamping ring screws, max.	[Nm]	1.8
Permissible axial offset with stator coupling	[mm]	±1 with axial pin engagement of 1.5 mm
Angular offset	[°]	±1 with axial pin engagement of 1.5 mm

Connection	[Units]	FVS 58, FSS 58, FHS 58
Cable		12 x 2 x 0.14mm ² , PVC, radial
Flanged connector		9420, 9424, radial

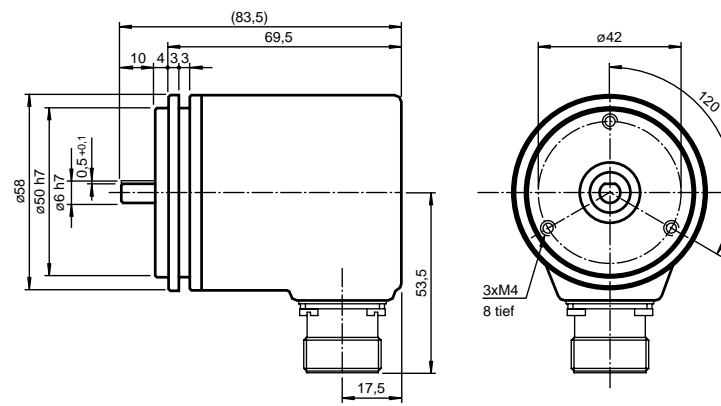
Ambient conditions	[Units]	FVS 58, FSS 58, FHS 58
Storage temperature		
Standard:	[°C]	-40 ... +90
Extended:	[°C]	-40 ... +110
Operating temperature		
Standard: Moving cable	[°C]	-10 ... +80
Fixed cable	[°C]	-20 ... +80
Flanged socket	[°C]	-20 ... +80
Extended: only with flanged socket	[°C]	-20 ... +100
Climatic test in accordance with IEC 68-2-30		98 % relative air humidity (no moisture condensation)
Emitted interference in accordance with		DIN EN 50081-1, 1993
Interference immunity in accordance with		DIN EN 50082-2, 1995
Shock resistance in accordance with DIN EN 60068-2-27		
Vibration resistance in accordance with DIN EN 6006-2-6		
Protection class		
Shaft entry:		IP 65
On housing:		IP 67

Dimensions

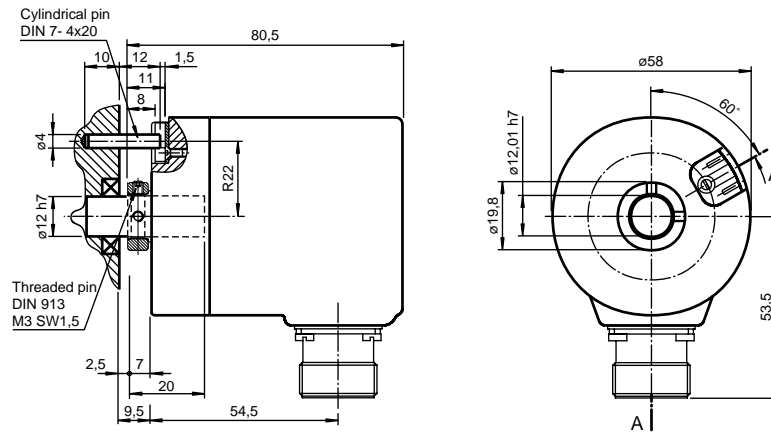
FVS 58-011 ...



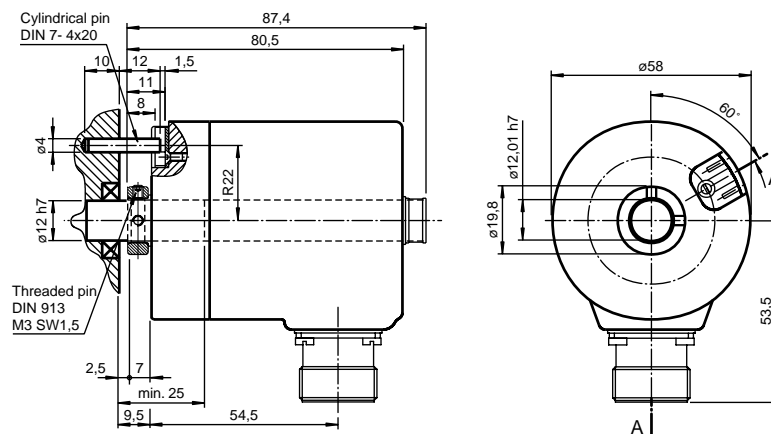
FVS 58-032 ...



FSS 58-02A ...



FHS 58-0BA ...



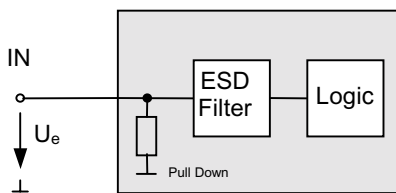
Connection table

No.	Signal	Colour code DIN 47100 paired cable	16 pin 9420	19 pin 9424	Explanation
1	GND (Encoder)	white	1	6	Encoder earth connection: "The voltage relative to "GND (Encoder)" is "UB (Encoder)"
2	UB (Encoder)	brown	2	12	Encoder supply voltage
3	Data bit 1	green	3	1	Data output
4	Data bit 2	yellow	4	2	Data output
5	Data bit 3	grey	5	3	Data output
6	Data bit 4	pink	6	4	Data output
7	Data bit 5	blue	7	5	Data output
8	Data bit 6	red	8	7	Data output
9	Data bit 7	black	9	8	Data output
10	Data bit 8	violet	10	9	Data output
11	Data bit 9	grey-pink	11	10	Data output
12	Data bit 10	red-blue	12	11	Data output
13	Data bit 11	white-green	13	13	Data output
14	Data bit 12	brown-green	14	14	Data output
15	Data bit 13	white-yellow	15	15	Data output
16	Data bit 14	yellow-brown	--	--	Data output for BCD
17		white-grey	--	--	Reserved
			--	19	Fault output "0" = Fault state "1" = Device serviceable
18	ALARM	grey-brown			
19	V/R	white-pink	16	16	Input: Direction of counting selection
20	LATCH	pink-brown	--	17	Input: Buffer
21	TRISTATE	white-blue	--	18	Input: Multiplex operation
22		brown-blue	--	--	Reserved
23		white-red	--	--	Reserved
24	18	brown-red	--	--	Reserved

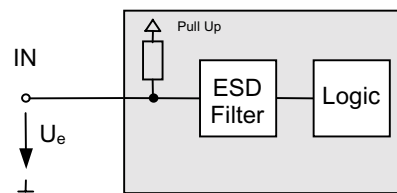
Operating principle

Inputs:

LATCH
TRISTATE



V/R



Input level: "0" 0...2 VDC, "1" 10...30 VDC , I < 6 mA

V/R - Input

On the absolute value rotary encoder the direction of counting is defined as right rotation (clockwise), rising / falling, when the shaft is viewed from the front. The direction of counting can be reversed by means of the V/R input. If the input is open circuit, then the direction of counting is defined as rising (Standard), the level is at "1". Pulse duration T > 1 ms.

Input level: "1" or open circuit = Rising code value for clockwise direction of rotation.

Input level: "0" = Falling code value for clockwise direction of rotation.

LATCH - Input

With the LATCH input "active" the position data on the parallel interface are "frozen". This enables the error-free transfer of the position data (in particular of binary position data), since a data change is prevented during the read in. In open circuit this input is at "0". Pulse duration T > 1 ms.

Input level: "1" = Position data stored and stable at the output.
 Input level: "0" or open circuit = Position data free-running at the output.

TRISTATE - Input

If a number of absolute value encoders are operated on the data bus, then by connecting the TRISTATE input, the corresponding data output information can be transferred to the parallel bus lines.
 Open circuit, this input is at "0". Pulse duration T > 1 ms.

Input level: "1" = data outputs are active.
 Input level: "0" or open circuit = data outputs have high ohmic values (Tristate mode)

Outputs



ALARM-Output:

The alarm output is set to "0" on overloading the outputs, undervoltage and defective LED. A pull-up resistance is required to evaluate the fault output.

Block circuit diagram: Driver open-collector (NPN)



Encoder resolution

Data line	Binary code			Gray code	Gray Excess code		BCD code
	8192	7200	5760		7200	5760	
Encoder resolution	8192	7200	5760	8192	7200	5760	3600
1...13	8192	7200	5760	8192	7200	5760	
2...13	4096	3600	2880	4096	3600	2880	
3...13	2048	1800	1440	2048	1800	1440	
4...13	1024	900	720	1024	900	720	
5...13	512	450	360	512	450	360	
6...13	256	225	180	256		180	
7...13	128		90	128		90	
8...13	64		45	64			
9...13	32			32			
10...13	16			16			
11...13	8			8			
12...13	4			4			
13...13	2			2			
1...14							3600
5...14							360
9...14							36
13...14							3

Type code



Shaft	Shaft dimensions	Connection	Code	Temperature	Steps
V = Solid shaft	011 = Solid shaft, 10 x 20 mm with clamping flange 032 = Solid shaft, 6 x 10 mm with synchro flange	K2 = Cable, 2 m	B = Binary G = Gray		13 = 8192 SM = 5760
H = Hollow shaft	02A = Blind-hole shaft, 12 x 21 mm	AC = 9420	E = Gray-Excess		SN = 7200
S = Blind-hole shaft	0BA = Hollow shaft, d = 12 mm	AB = 9424	C = BCD	T = 100 °C	SL = 3600

The following resolutions are available:

Steps	Binary	Gray	Gray-Excess	BCD
13 = 8192	X	X		
SM = 5760	X		X	
SN = 7200	X		X	
SL = 3600				X

Accessories









We recommend the following accessories:

Series FVS58-011: Coupling 9404, 9401, 9409, KW 10/d₂
 Mounting bracket 9203, 9213
 Clamping element: 9310-3

Serie FVS58-032: Coupling 9404, 9402, 9409, KW 6/d₂
 Mounting bell 9300 + Mounting set 9311
 Clamping element: 9310-3

With mating connector 9420: With mating connector 9424: Cable socket 9424

General safety instructions

-  During all work on the absolute value encoder, observe the national safety and accident prevention regulations and the following safety instructions in this operating instruction.
-  If faults cannot be rectified, the device is to be rendered inoperative and protected from further inadvertent operation.
-  Repairs must only be carried out by the manufacturer.
-  Interference with and modification of the device are not permitted. Only tighten the clamping ring when a shaft is fitted.
-  Tighten all screws and connectors before operating the encoder.
-  Do not stand or lean on the encoder
-  Do not modify the shaft in any way.
-  Avoid shock loading



Do not modify the housing in any way.