

## Technical request form

For

EPST implementation

SOFT TORQUE

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## List of abbreviations:

Abbreviation	Description
BHA	Bottom Hole Assembly
EP	ElectroProject
EPST	ElectroProject Soft Torque
Ex	Hazardous area classification zone
HMI	Human Machine Interface
PLC	Programmable Logic Controller
PO	Purchase Order
SCR	Silicon Controlled Rectifier
STRS	Soft Torque Rotary System
TD	Top Drive
TDS	Top Drive System
VFD	Variable Frequency Drive

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## Introduction

This document will help ElectroProject to gather as much as possible information of an existing Top Drive System at a drilling rig to be able to find out if it is possible to implement an ElectroProject Soft Torque (EPST) system.

## Process

The process to implement ElectroProject Soft Torque, into an existing Top Drive system, needs to be well prepared. Below high level process overview (figure 1) shows how we at ElectroProject handle each EPST project. The information collected by filling out this document is mostly suitable enough to determine if EPST implementation is possible and to be able to provide our customers a final quotation.

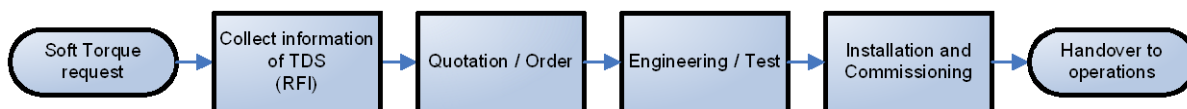


Figure 1 - High Level EPST process overview

## Management of Change

How EPST can be implemented into an existing TD system (Figure 2) is shown in below figure 3. Only the common Management Of Change is shown in this document. Practically there are more different kind of interfaces possible. Normally, other interfaces than showed need a site survey first, to be able to develop an appropriate interface.

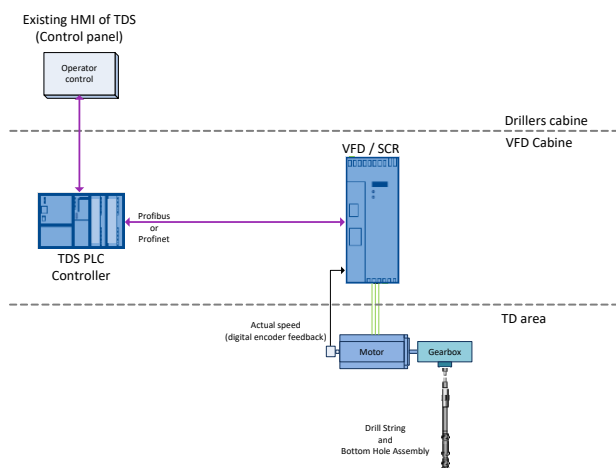


Figure 2 - High Level overview of an existing TD system implemented

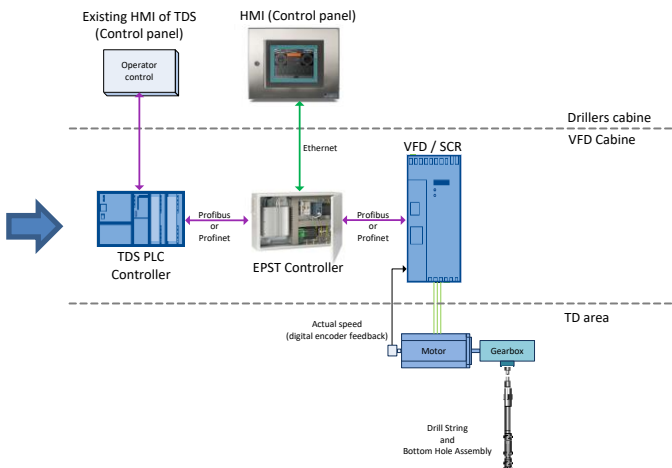


Figure 3 – TDS with EPST

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Please answer as much as possible the questions in below tables. But minimum questions that need to be answered are marked with a "R" (required) in the question number.

**1. General**

1.1R	Client name	
1.2	Rig contractor name	
1.3R	Operator name	
1.4R	Rig name	
1.5R	Type of Rig (Land or Off-shore)	
1.6R	Location of the rig (Country and city nearby) (where Installation and commissioning will take place)	
1.7	Coordinates (X,Y) of the location	

**2. Safety**

2.1R	Are there known risks in the country or area where the Installation and Commissioning will take place?	
2.2	Which Safety trainings/certificates/ company safety policy are required to be able to work at the rig?	
2.3	Is visa applicable (business or work)?	

**3. Top Drive system**

<b>Top Drive info</b>		
3.1R	Top Drive brand	
3.2R	Top Drive type	
<b>Drilling Motor specification</b>		
3.3R	AC or DC motors	
3.4	Amount of motors	
3.5	Deliverer	
3.6	Type	
3.7R	Speed feedback (i.e. encoder, resolver .....)	
3.8	Encoder Speed feedback. How many pulses	
<b>Transmission</b>		
3.9	High/Low gear applicable (Yes / No)	
3.10	Gear ratio High gearing	
3.11	Gear ratio Low gearing	
<b>VFD (AC) / SCR (DC)</b>		
3.12R	VFD or SCR brand	
3.13R	VFD or SCR type	
3.14	Execution: 1 Q or 4 Q	
<b>Communications between PLC (Controls) and VFD/SCR</b>		
3.15R	ProfiBus communications (Yes / No) If Yes, provide ProfiBus layout	
3.16	Other type of communication	Submit drawings

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## 4. EPST System

The EPST system consist of the following main components.

- **Control panel (HMI)**

The Control panel (HMI) needs to be operated by the driller. Therefore it needs to be mounted as close as possible to the driller's (chair). Depending of the Rig type, ElectroProject has several HMI options:

- Indoor 10" HMI without enclosure, to be mounted in Drillers cabinet.
- Indoor 10" HMI in non-Ex enclosure
- Indoor 10" HMI in Ex-zone 2 enclosure (standard delivery)
- Outdoor 15" HMI in Ex-zone1 enclosure. (Ambient temperature 55 C max.)

All enclosures are suitable for wall mounting only and cables are fed into the enclosure by use of glands.

Control panel (HMI)		
4.1R	Does the HMI to be installed either indoor or outdoor?	
4.2	If indoor, has the HMI to be mounted into an enclosure?	
4.3	Does the enclosure need to be Ex-zone2 approved?	
4.4	Is a 2 <sup>nd</sup> HMI, for monitoring purposes, essential?	
4.5	What would be the location of the 2 <sup>nd</sup> HMI?	
4.6	Is a power source, at the rig, for the HMI available? 100 – 240Vac / >1A or 24Vdc / >4A	

- **EPST controller**

The EPST controller need to be operated by the Control panel. Because the EPST controller is communicating with the VFD/SCR, it need to be installed as close as possible to the VFD/SCR.

Standard delivery is an EPST controller in a cabinet but if the EPST controller has to be installed in an existing cabinet, ElectroProject can deliver separated parts instead.

EPST Controller		
4.7	Does the EPST controller need to be delivered into a standard cabinet or as separated components?	
4.8	Is a power source 100 – 240Vac / >2A, at the rig, for the EPST controller available?	
4.9	If ProfiBus communications between the PLC and EPST controller is applicable, what would be the necessary cable length between these two?	

- **Ethernet communication**

The Control panel (HMI) and EPST controller need to communicate with each other to either follow-up actions made by the Driller or display information to the Driller instead.

The maximum cable length that can be used for Ethernet communication is 100 meter. If the distance between the HMI and EPST controller exceeds 100 meter, special switches need to be installed. The cable is specially designed for EPST and suitable for on- and offshore use. ElectroProject also delivers Plugs, connectors and panel feedthroughs which are suitable for Ex-zone2 environmental use.

Ethernet communication		
4.13R	What is the distance between the proposed location of the EPST controller and the of the HMI	

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## 5. Additional information (if available)

To better understand the existing Top Drive System and the locations where EPST can be installed, it would be of great advantage to provide us the following information:

- Photos of TD
- VFD room
- Driller room
- Place of proposed location of the EPST controller
- Place of proposed location of the Control Panel (HMI)

Contact persons if additional information of the Rig or TDS is needed:

	Name	Phone	Email
Rig Manager			
Drilling Supervisor			
For technical information			